Stand 03/2017

Technical Manual

MDT Switch Actuator/FanCoil

AKK-03UP.02

AKK-04FC.02

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2 Overview

2.1 Overview Devices

The manual refers to the following devices (Order number printed in bold letters):

- **AKK-03UP.02** Switch actuator 3-fold flush mounted, FanCoil
  - Flush mounted, Nominal Voltage: 230VAC, Maximum Load: 10A
    Switch Actuator - Mode: Switching and Staircase functions, Logic Function, Blocking functions, central function, scene functions
    FanCoil-Mode: Controlling 3 three phase Fans, 2 Blocking objects, Additional ventilation, Automatic mode via control value or Delta T available, switching times individual adjustable
- **AKK-04FC.02** Switch actuator 4-fold, 2SU, FanCoil
  - MDRC 2SU, Nominal Voltage: 230VAC, maximum Load: 16A
    Switch Actuator - Mode: Switching and Staircase functions, Logic Function, Blocking functions, central function, scene functions
    FanCoil-Mode: Controlling four phase Fans, 2 Blocking objects, Additional ventilation, Automatic mode via control value or Delta T available, switching times individual adjustable

2.2 Exemplary circuit diagram

Connecting as switch actuator:

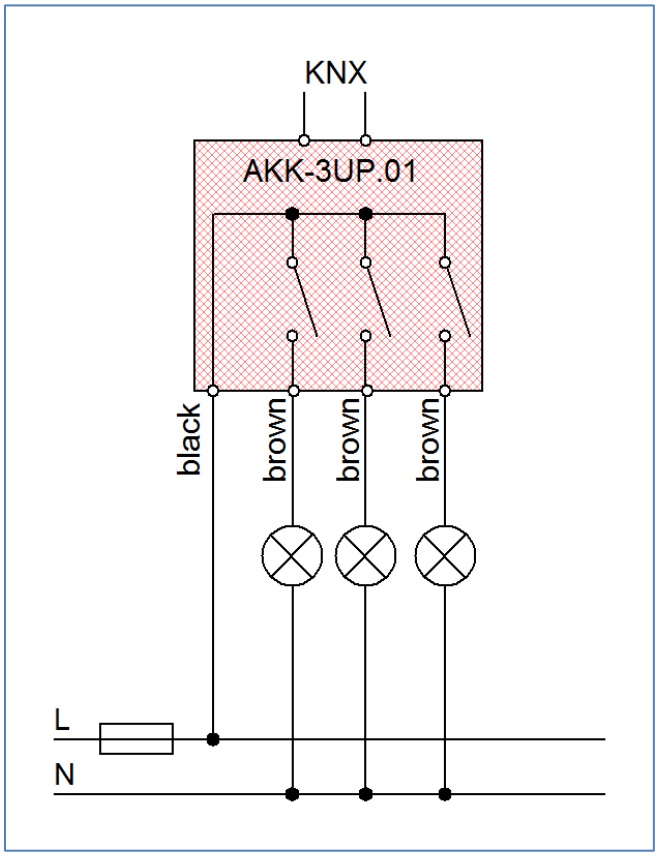

Figure 1: Exemplary circuit diagram - Actuator

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2.4 Design & Usage

The AKK-03UP.01 is designed for flush-mounting. Contacting the loads can be done by using the connecting cables. Furthermore the actuator contains of the standard elements like programming button and programming LED.

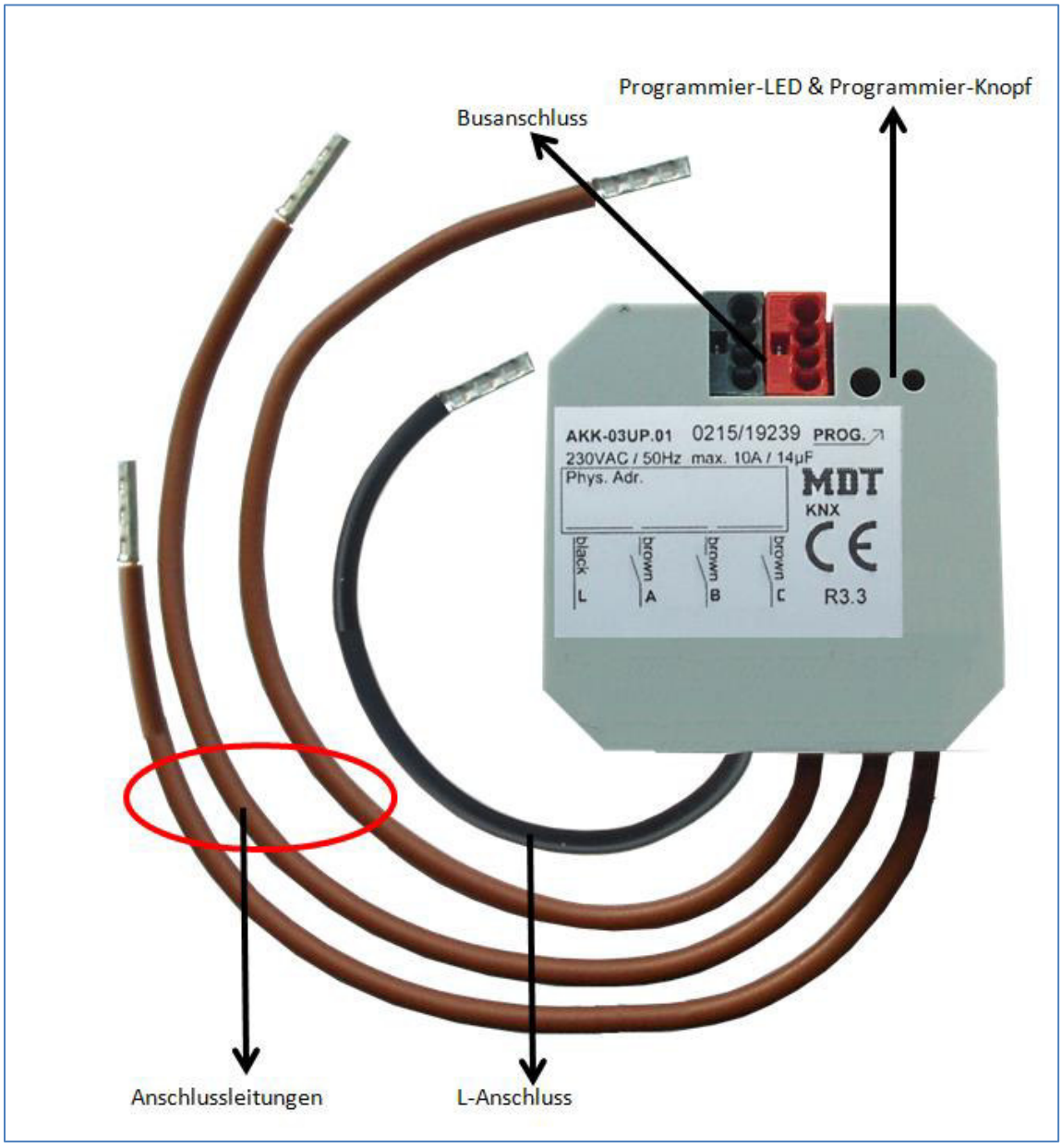

Figure 3: Overview hardware

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2.5 Setting at the ETS-Software

Selection at the product database:

Manufacturer: MDT Technologies
Product family: Actuator
Product type: Switching, Staircase
Medium Type: Twisted Pair (TP)
Product name: AKK-03UP.01
Order number: AKK-03UP.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) 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 Mode: Actuator

3.1.1 Overview and Usage

No.	Name	Object function	Data type	Direction	Info	Usage	Tip
General Functions:							
48	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 enbales the **central on/off switching of all channels**, which have an enabled central function.
50	Operating	Send Status	DPT 1.011	send	Actuator sends Operating-Telgeram cyclic	Diagnostic	Object is shown when the cyclic Operating telegram is set to active.
Functions per channel:							
0	Channel A	Switch on/off	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication object is shown at the **operating mode „switch“** and controls the **channel On/Off**, which is normally connected to all control keys. **(= Main function at switch)**
1	Channel A	Staircase	DPT 1.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication object is shown at the **operating mode „switch“** and controls the **channel On/Off**, which is normally connected to all control keys. The channel switches off again after adjusted time is expired. **(= Main function at staircase)**

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1	Channel A	Switch pulse	DPT 1.001	receive	Actuator responds to input telegram	Control buttons, Visu ... for manual operation	**Basic function of the function switch pulse,** Communication object allows the pulsed switching of the output.
3	Channel A	Block	DPT 1.003	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication object is only shown after activation of the blocking object. **Object blocks the function of this channel**. **(= Additional function)**
4	Channel A	Scene	DPT 18.001	receive	Actuator reacts to Incoming-telegramm	Push buttons, Visu... for manual control	Communication onject appears **only after activating scenes**. For calling of saved scenes, which are saved in the actuator. **(= Additional function)**
5	Channel A	Status	DPT 1.001	sending	Actuator sends current state	For diplay on Visu, Tableau, and Display Connection to Push button object „Value for toggle“	Communication object operates as status indication and can be used for visualization… **Must be connected to the object “value for toggle” of the controlling push button for sending its current state to the push button.**
6	Channel A	Logic 1	DPT 1.002	receive	Actuator reacts to Incoming-telegramm	external switching, state object of other devices	Channel switches only On, if the logic function of activated objects and switching onbject (Nr. 85) is true. Only available for switching output.

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7	Channel A	Logic 2	DPT 1.002	receive	Actuator reacts to Incoming-telegramm	external switching, state object of other devices	Channel switches only On, if the logic function of activated objects and switching onbject (Nr. 85) is true. Only available for switching output.
+11 next channel							

Table 1: Overview communication objects - Switch actuator

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3.1.2 Default-Settings of the Communication Objects

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

Default settings									
No.	**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		
1	Channel A	Switch pulse	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		
+11	**next channel**								

Table 2: Communication objects - Default settings - Switch actuator

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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3.2 Mode: FanCoil

3.2.1 Overview and Usage

No.	Name	Object function	Data type	Direction	Info	Usage	Tip
General functions:							
46	Operating	Send Status	DPT 1.011	send	Actuator sends Operating-Telgeram cyclic	Diagnostic	Object is shown when the cyclic Operating telegram is set to active.
47	Day/Night	Switching	DPT 1.001	receive	Actuator reacts to Incoming-telegram	Time Switch, Control key, Visu…	Object is shown when Day/Night is active. The usage of the day/night object allows limiting the maximum FanCoil Level at night.
General FanCoil objects:							
1	Switching Auto/Manual	1 = Automatic/ 0 = Manual	DPT 1.001	send/ receicve	Actuator reacts to Incoming telegram and sends state at automatic switchover	Central Operation Unit, Visu, Operating keys	Object is always shown and is used for switching between automatic and manual mode and status for switchover.
25	Blocking object 1	Block	DPT 1.003	receive	Actuator reacts to Incoming-telegram	Central Operation Unit, Visu, Operating keys	Communication object is shown when blocking 1 is active in the parameters and can be sued for blocking the actuator.
26	Blocking object 2	Block	DPT 1.003	receive	Actuator reacts to Incoming-telegram	Central Operation Unit, Visu, Operating keys	Communication object is shown when blocking 2 is active in the parameters and can be sued for blocking the actuator.

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Objects for additional ventilation:							
0	Additional Ventilation	Enable additional ventilation	DPT 1.001	receive	Actuator reacts to incoming telegram	Central Operation Unit, Visu, Operating keys, Time switch	Object is shown when manual additional ventilation is activated and activates the additional ventilation for the adjusted time.
Objects for Automatic mode:							
2	Automatic mode	Control value heating	DPT 5.001	receive	Actuator reacts to incoming telegram	Regulation…	Communication object is shown when a heating systems and the automatic mode “Control value” is active; Receiving the current control value.
2	Automatic mode	Control value heating/cooling	DPT 5.001	receive	Actuator reacts to incoming telegram	Regulation…	Communication object is shown at 2-Pipe systems and the automatic mode “Control value” is active; Receiving the current control value.
3	Automatic mode	Control value cooling	DPT 5.001	receive	Actuator reacts to incoming telegram	Regulation…	Communication object is shown when a cooling systems and the automatic mode “Control value” is active; Receiving the current control value.
4	Automatic mode	Control value failure	DPT 1.001	send	Actuator sends state	Visualization, Display…	Communication object is shown at automatic mode “Control value” and can sends a control value failure if this option is active.
5	Automatic mode	Heating/Cooling switchover	DPT 1.100	send/ receive	Actuator reacts to incoming telegram and sends state	Push Button, Regulation, Visualization…	Object is shown at combined heating and cooling systems and is used, according to the parameterization, for switching or visualization.

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6	Automatic mode	Switch heating valve	DPT 1.001	send	Actuator sends switching telegram	separate switching channel for switching the heating valve of the FanCoil-system	Object is always shown when heating mode is active.
7	Automatic mode	Switch cooling valve	DPT 1.001	send	Actuator sends switching telegram	separate switching channel for switching the cooling valve of the FanCoil-system	Object is always shown when cooling mode is active.
8	Automatic mode	Manual setpoint offset	DPT 1.007	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object can be activated at automatic mode “Delta T”
27	Automatic mode	Temperature value	DPT 9.001	receive	Actuator reacts to incoming telegram	Temperature-sensor	Object is always shown at automatic mode “Delta T” and is used for receiving the current temperature.
28	Automatic mode	Setoint temperature	DPT 9.001	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is always shown at automatic mode “Delta T” and is used for receiving a new setpoint.
29	Automatic mode	Setpoint offset	DPT 9.002	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object can be activated at automatic mode “Delta T” and is used for receiving a setpoint offset.
30	Automatic mode	Current setpoint temperature	DPT 9.001	send	Actuator sends state	Visualization…	Object is always shown at automatic mode “Delta T” and is used for visualization the current setpoint.

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Objects for Direct Mode:							
9	Direct Mode	Step 0	DPT 1.001	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is shown when direct mode via step switch is activated and switches the FanCoil off by receiving a “1”.
9	Direct Mode	Bit 0	DPT 1.001	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is shown when direct mode binary coded is activated and switches Bit 0 of the binary value.
9	Direct Mode	Up/Down	DPT 1.007	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is shown when direct mode via 1 Bit Up/Down is activated and switches the FanCoil one step down by receiving a “0” and one step up by receiving a “1”.
10	Direct Mode	Step 1	DPT 1.001	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is shown when direct mode via step switch is activated and switches the FanCoil into step 1 by receiving a “1”.
10	Direct Mode	Bit 1	DPT 1.001	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is shown when direct mode binary coded is activated and switches Bit 1 of the binary value.
11	Direct Mode	Step 2	DPT 1.001	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is shown when direct mode via step switch is activated and switches the FanCoil into step 2 by receiving a “1”.
12	Direct Mode	Step 3	DPT 1.001	receive	Actuator reacts to incoming telegram	Central operation unit, Visu, Push Button…	Object is shown when direct mode via step switch is activated and switches the FanCoil into step 3 by receiving a “1”.

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Objects for state:							
13	Status Input (Cascading)	External heating request	DPT 1.001	receive	Actuator receives state	State FanCoil Actuator	Object is shown when cascading is active for this state.
14	Status Output	External heating request	DPT 1.001	send	Actuator sends state	Visu, Actuator, Regulation…	Object is shown when this state is active.
15	Status Input (Cascading)	External cooling request	DPT 1.001	receive	Actuator receives state	State FanCoil Actuator	Object is shown when cascading is active for this state.
16	Status Output	External cooling request	DPT 1.001	send	Actuator sends state	Visu, Actuator, Regulation…	Object is shown when this state is active.
17	Status Input (Cascading)	Maximum control value for heating	DPT 5.001	receive	Actuator receives state	State FanCoil Actuator	Object is shown when cascading is active for this state.
18	Status Output	Maximum control value for heating	DPT 5.001	send	Actuator sends state	Visu, Actuator, Regulation…	Object is shown when this state is active.
19	Status Input (Cascading)	Maximum control value for cooling	DPT 5.001	receive	Actuator receives state	State FanCoil Actuator	Object is shown when cascading is active for this state.
20	Status Output	Maximum control value for cooling	DPT 5.001	send	Actuator sends state	Visu, Actuator, Regulation…	Object is shown when this state is active.
21	Status Input (Cascading)	Maximum fan level heating	DPT 5.005	receive	Actuator receives state	State FanCoil Actuator	Object is shown when cascading is active for this state.
22	Status Output	Maximum fan level heating	DPT 5.005	send	Actuator sends state	Visu, Actuator, Regulation…	Object is shown when this state is active.
23	Status Input (Cascading)	Maximum fan level cooling	DPT 5.005	receive	Actuator receives state	State FanCoil Actuator	Object is shown when cascading is active for this state.
24	Status Output	Maximum fan level cooling	DPT 5.005	send	Actuator sends state	Visu, Actuator, Regulation…	Object is shown when this state is active.

Table 3: Overview communication objects - FanCoil

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3.2.2 Default settings of the communication objects

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

Default settings									
No.	**Name**	**Object Function**	**Length**	**Priority**	**C**	**R**	**W**	**T**	**U**
0	Additional ventilation	Enable additional ventilation	1 Bit	Low	X		X		
1	Switching Auto/Manual	1 = Automatic/ 0 = Manual	1 Bit	Low	X	X	X	X	X
2	Automatic mode	Control value heating	1 Byte	Low	X		X		
2	Automatic mode	Control value heating/cooling	1 Byte	Low	X		X		
3	Automatic mode	Control value cooling	1 Byte	Low	X		X		
4	Automatic mode	Control value failure	1 Bit	Low	X	X		X	
5	Automatic mode	Heating/Cooling switchover	1 Bit	Low	X	X	X	X	X
6	Automatic mode	Switch heating valve	1 Bit	Low	X	X		X	
7	Automatic mode	Switch cooling valve	1 Bit	Low	X	X		X	
8	Automatic mode	Manual setpoint offset	1 Bit	Low	X		X		
9	Direktbetrieb	Step 0	1 Bit	Low	X		X		
9	Direktbetrieb	Bit 0	1 Bit	Low	X		X		
9	Direktbetrieb	Up/Down	1 Bit	Low	X		X		
10	Direktbetrieb	Step 1	1 Bit	Low	X		X		
10	Direktbetrieb	Bit 1	1 Bit	Low	X		X		
11	Direktbetrieb	Step 2	1 Bit	Low	X		X		
12	Direktbetrieb	Step 3	1 Bit	Low	X		X		
13	Status Input (Cascading)	External heating request	1 Bit	Low	X		X		
14	Status Output	External heating request	1 Bit	Low	X	X		X	
15	Status Input (Cascading)	External cooling request	1 Bit	Low	X		X		
16	Status Output	External cooling request	1 Bit	Low	X	X		X	
17	Status Input (Cascading)	Maximum control value for heating	1 Byte	Low	X		X		
18	Status Output	Maximum control value for heating	1 Byte	Low	X	X		X	
19	Status Input (Cascading)	Maximum control value for cooling	1 Byte	Low	X		X		
20	Status Output	Maximum control value for cooling	1 Byte	Low	X	X		X	
21	Status Input (Cascading)	Maximum fan level heating	1 Byte	Low	X		X		
22	Status Output	Maximum fan level heating	1 Byte	Low	X	X		X	
23	Status Input (Cascading)	Maximum fan level cooling	1 Byte	Low	X		X		

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24	Status Output	Maximum fan level cooling	1 Byte	Low	X	X		X	
25	Blocking Object 1	Block	1 Bit	Low	X		X		
26	Blocking Object 2	Block	1 Bit	Low	X		X		
27	Automatic mode	Temperature value	2 Byte	Low	X		X		
28	Automatic mode	Setoint temperature	2 Byte	Low	X		X		
29	Automatic mode	Setpoint offset	2 Byte	Low	X		X		
30	Automatic mode	Current setpoint temperature	2 Byte	Low	X	X		X	
46	Operating	Send Status	1 Bit	Low	X		X		
47	Day/Night	Switching	1 Bit	Low	X		X		

Table 4: Communication objects - Default settings – FanCoil

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 Configuration of the operating mode

The operating mode of the device can be chosen at the general settings of the device:

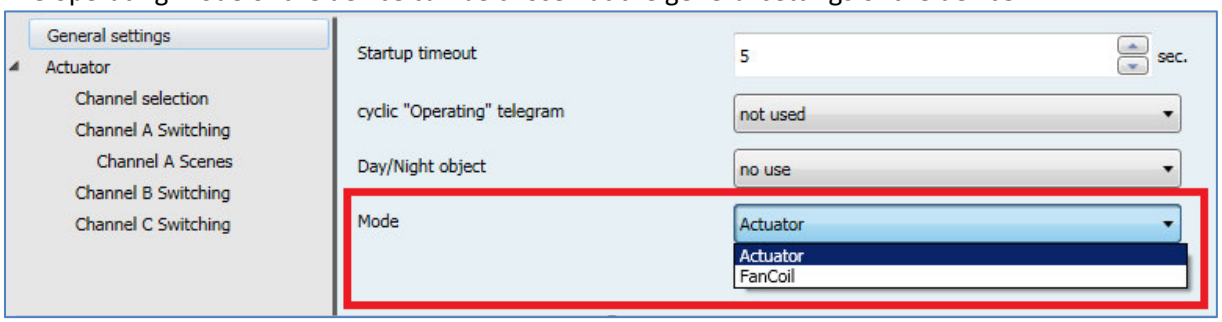

Figure 4: Selection of the operating mode

According to the adjusted operating mode, the parameter and communication objects are loaded.
If the operating mode “Actuator” is chosen, the settings and objects are available as described in 5 Reference ETS-Parameter .
If the operating mode “Actuator” is chosen, the settings and objects are available as described in6 Parameter - FanCoil.

4.1 General Settings

The following table shows the general settings for the AKK-03UP.01:

ETS-text	Dynamic range **[default value]**	comment
Startup timeout	0-120s **[5s]**	Time between a reset and the functional start of the device
Cyclic „Operating“ telegram	▪ **not used** ▪ 2 min – 24h	Adjustment if a „Operating“ telegram is send cyclic on the bus.
Day/Night object	▪ **not used** ▪ use, no read ▪ use, read after reset	Adjustment if a Day/Night object is used and whether it should be read after a reset or not. Only used in FanCoil Mode.
Polarity of day/night object	▪ **Day = 1 / Night = 0** ▪ Day= 0 / Night = 1	Adjustment of the polarity of the day/night object.

Table 5: General settings

The following table shows the communication objects:

Number	**Name**	**Length**	**Usage**
46	Operating	1 Bit	Sending a cyclic operating-telegram
47	Day/Night	1 Bit	Switching between day/night mode

Table 6: Communication objects - General

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5 Reference ETS-Parameter - Actuator

5.1 Channel selection

Every channel can be selected as Switch or as Staircase function at the sub menu Channel Selection. According to this setting, further settings are shown:

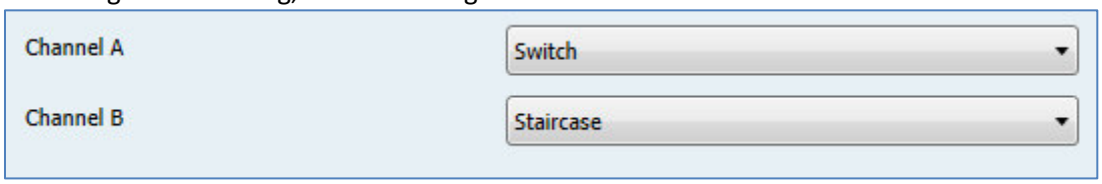

Figure 5: Channel Selection

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5.2 Switching Actuator Mode

5.2.1 Relay operating mode

The following illustration shows the setting options for this parameter:

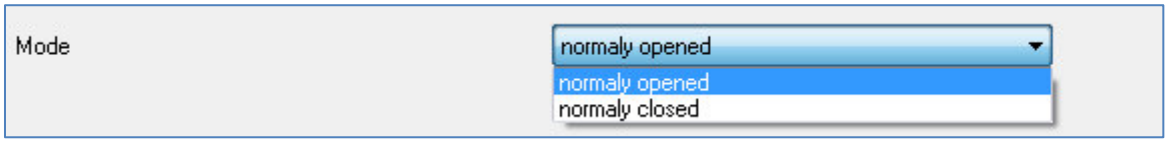


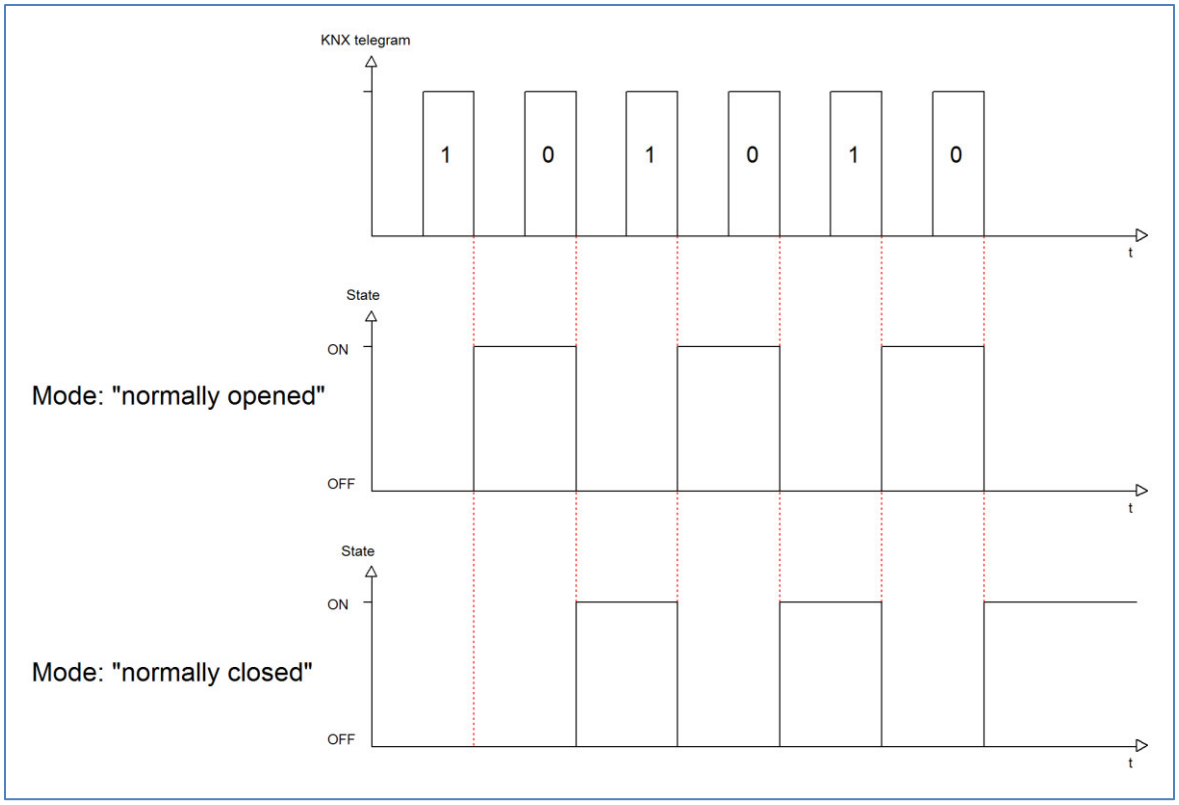
Figure 6: Operating mode

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 7: 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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5.2.2 Central function

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

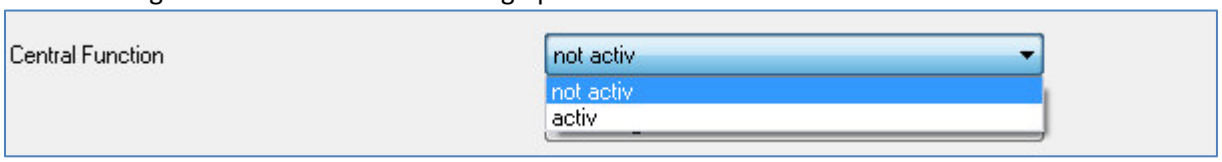

Figure 7: Central function

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 8: 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

Table 9: Communication object central function

5.2.3 Behavior at locking/unlocking

The following figure shows the available settings:

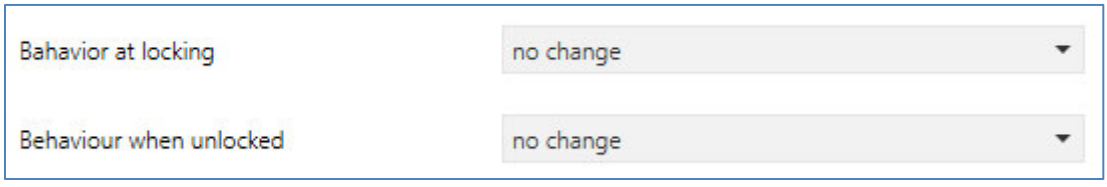

Figure 8: Behavior at locking/unlocking

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The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Behavior at locking	▪ On ▪ Off ▪ **no change**	Behavior at activating the locking function
Behavior at unlocking	▪ On ▪ Off ▪ **no change** ▪ previous state, catch up on switching ▪ previous state	Behavior at deactivating the locking function

Table 10: Behavior at locking/unlocking

A Channel is locked by sending a logical 1 to the locking object and further control is no longer available as long as the channel is locked. By sending a logical 0 the channel can be unlocked again. The following actions can be performed at locking/unlocking:

- **no change**
  The channel stays in the current state.
- **On**
  The channel is switched on.
- **Off**
  The channel is switched off.
- **previous state, catch up on switching (only at unlocking)**
  The channel restores the state before locking in compliance with the last switching command, which was sent during the channel was locked.
- **previous state (only at unlocking)**
  The channel restores the state before locking.

The following table shows the communication object:

Number	Name	Length	Usage
4	Lock	1 Bit	Object for locking/unlocking

Table 11: Communication object for locking/unlocking

5.2.4 Behavior at bus power down/bus power up

The following figure shows the available settings:

Figure 9: Behavior at bus power down/up

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The following table shows the available settings for the behavior at bus power down/up:

ETS-text	Dynamic range **[default value]**	comment
Behavior at bus power up	▪ Off ▪ On ▪ **no change**	Behavior at bus power failures
Behavior at bus power down	▪ Off ▪ On ▪ **no change**	Behavior when bus power returns

Table 12: Behavior at bus power down/up

5.2.5 On/Off delay

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

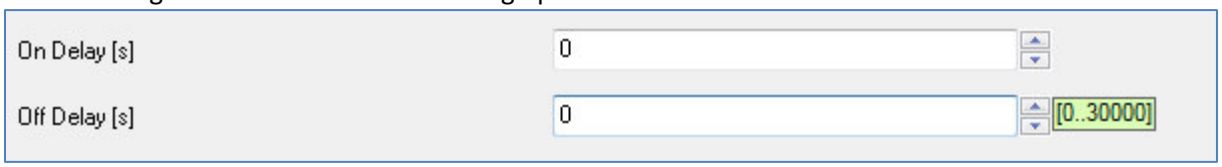
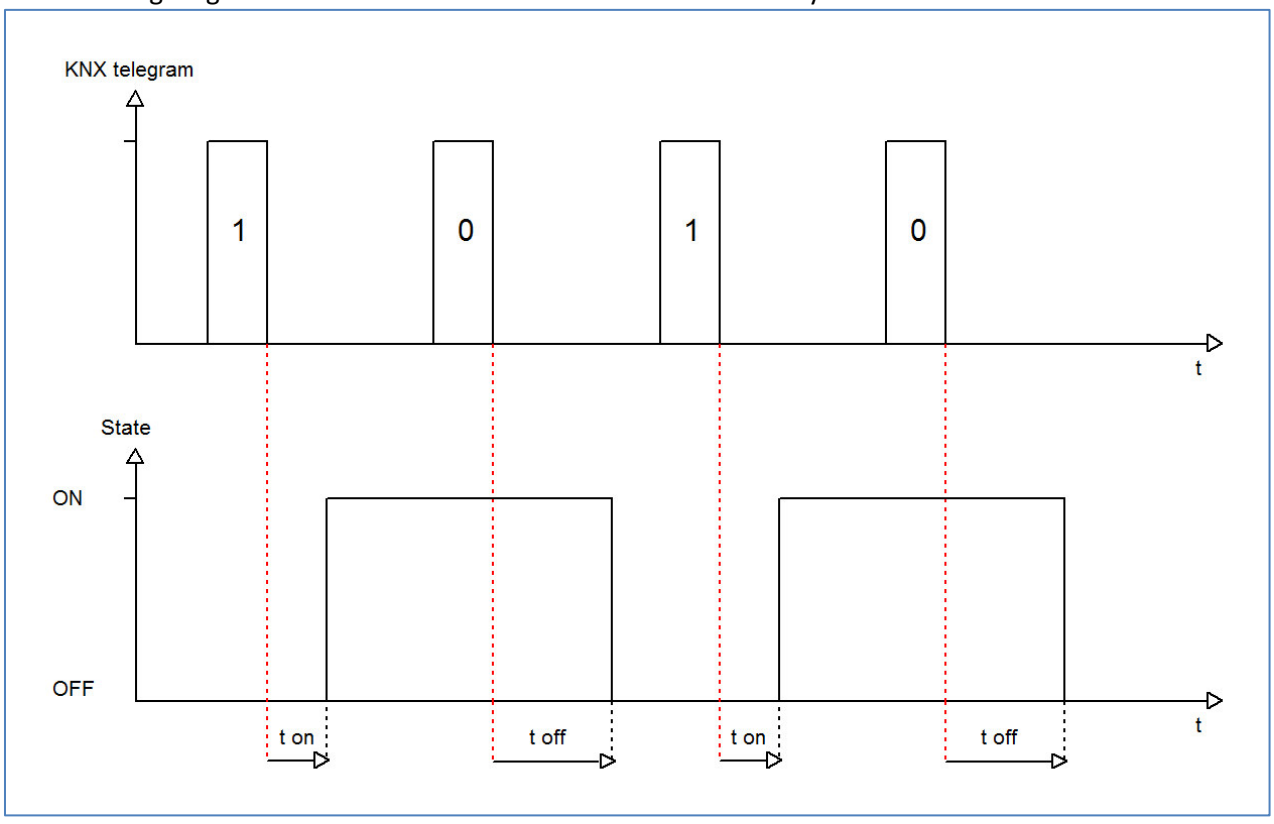


Figure 10: On/Off delay

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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5.2.6 State functions

The following figure shows the available state functions:

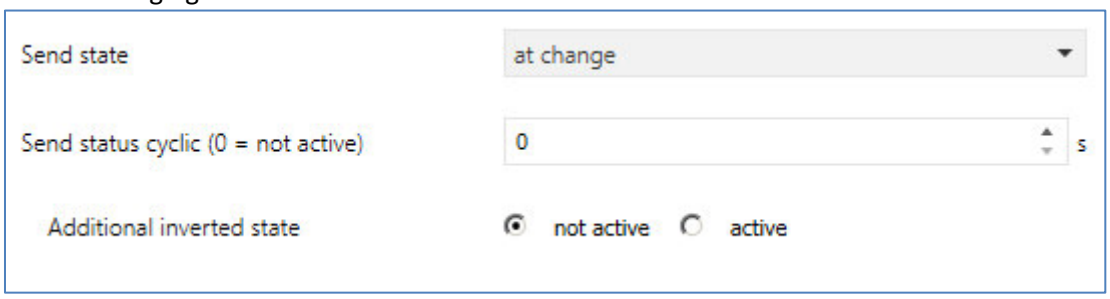

Figure 11: State functions

The following settings are available:

ETS-text	Dynamic range **[default value]**	comment
Send state	▪ no send, passive state object ▪ **at change** ▪ at change and lock ▪ always at input of telegram	Sending behavior of the state object
Send state cyclic (0 = not active)	0-30000s **[0s]**	Cyclic sending of the state
Additional inverted state	▪ **not active** ▪ active	Displaying an additional inverted state

Table 13: State functions

The following sending behavior for the state is available:

- **no send, passive state object**
  The state object does not send its current state and can only be requested.
- **at change**
  The state object sends its current state at every change of the output.
- **at change and lock**
  The state object sends its current state at every change of the output – also during the locking process. By sending the status during the locking is ensured that a switch after locking sends the correct value.
- **always at input of telegram**
  The state is sent at every input of a telegram – independent whether the output is changed or not.

The additional inverted state can be used for visualization, etc. and has always the opposite value of the “normal” state.

The following table shows the communication objects:

Number	Name	Length	Usage
7	State	1 Bit	Sends the state of the channel
8	inverted state	1 Bit	Sends the inverted state of the channel

Table 14: Communication objects state function

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5.2.7 Priority/Forced control

The following figure shows the parameter priority/forced control:

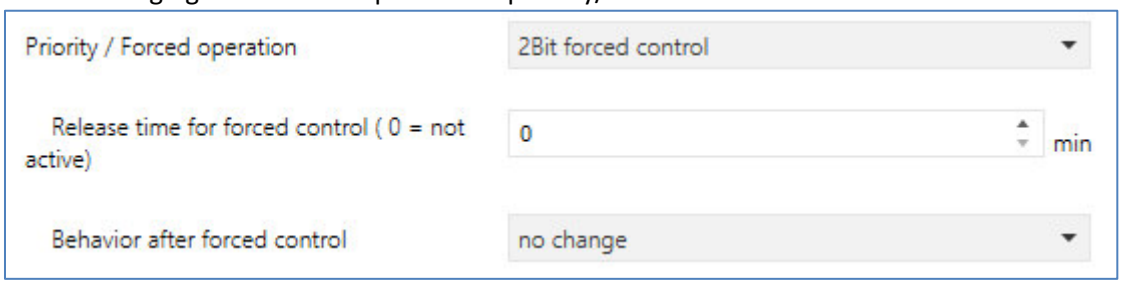

Figure 12: Priority/Forced control

The following settings are available:

ETS-text	Dynamic range **[default value]**	comment
Priority/Forced Control	▪ **not active** ▪ 2 Bit forced control ▪ 1 Bit priority ON ▪ 1 Bit priority OFF	Activation of the forced control/priority function
Release time for forced control (0 = not active)	0-600min **[0 min]**	Activation of a release time from the priority/forced control into the normal state.
Behavior after forced control/priority	▪ On ▪ Off ▪ **no change** ▪ previous state, catch up on switching ▪ previous state	Setting of the behavior after deactivating priority/forced control.

Table 15: Priority/Forced control

The priority/forced operation cause the priority switching of output. By using the release time, the priority/forced control can be deactivated automatically and the channel changes into the normal state.

The followings actions can be performed after deactivating the priority/forced control:

- **no change**
  The channel stays in the current state.
- **On**
  The channel is switched on.
- **Off**
  The channel is switched off.
- **previous state, catch up on switching**
  The channel restores the state before locking in compliance with the last switching command, which was sent during the channel was locked.
- **previous state**
  The channel restores the state before locking.

The following table shows the communication object:

Number	Name	Length	Usage
5	Forced control/Priority	1 Bit	Activation/Deactivation of the forced control/priority

Table 16: Communication object priority/forced control

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5.2.8 Logic functions

If the logical function is enabled, the following submenu for the logical function is shown:

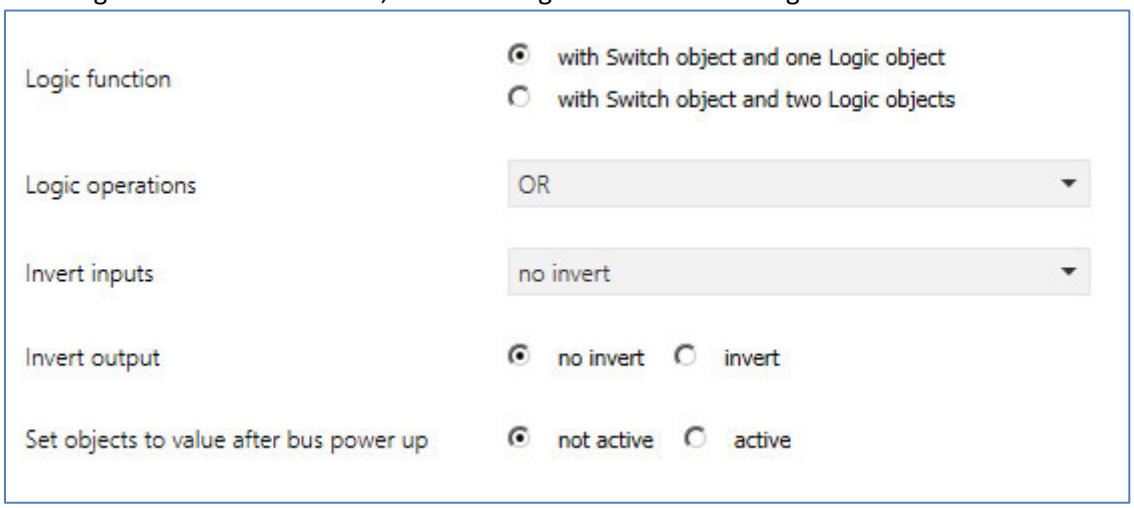

Figure 13: Logic functions

The logic function can be activated with one or two additional logic objects. The logical function AND, OR, XOR and Gate-functions are available:

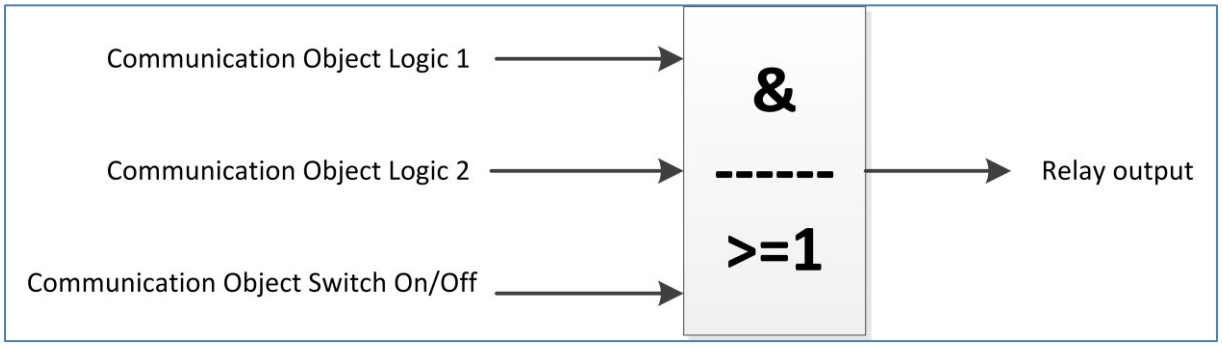

Figure 14: Logic function -> schematic diagram

The logical functions switch the output if the followings conditions are true:

- **AND**
  All inputs are active (=1).
- **OR**
  At least one input is active (=1).
- **XOR**
  Only one input is active (=1).
- **Gate opened with logical functions = 0**
  The output can be switched via the switching object if all logic objects have the value 0.
- **Gate opened with logical functions = 1**
- The output can be switched via the switching object if all logic objects have the value 1.

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Via the Parameter “Invert inputs/output”, the polarity of the input/output can be inverted.
The parameter “Set object value after bus power up” defines if the logic is set to a fixed value after a bus power return.
The following table shows the available communication objects:

Number	Name	Length	Usage
9	Logic 1	1 Bit	Logic object 1, serves for the integration of a logic function
10	Logic 2	1 Bit	Logic object 2, serves for the integration of a logic function

Table 17: Communication objects logic

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5.2.9 Scenes

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:

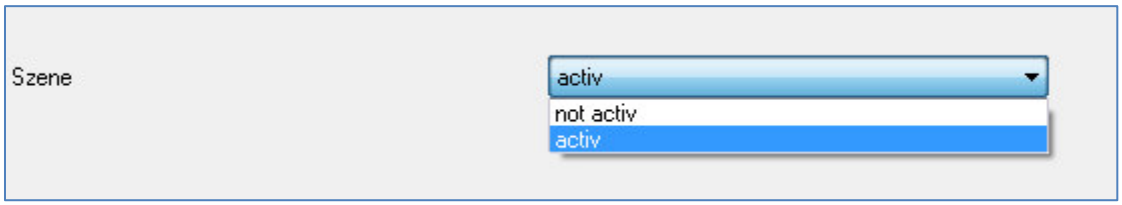

Figure 15: Scene function

The following chart shows the relevant communication object:

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

Table 18: 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.

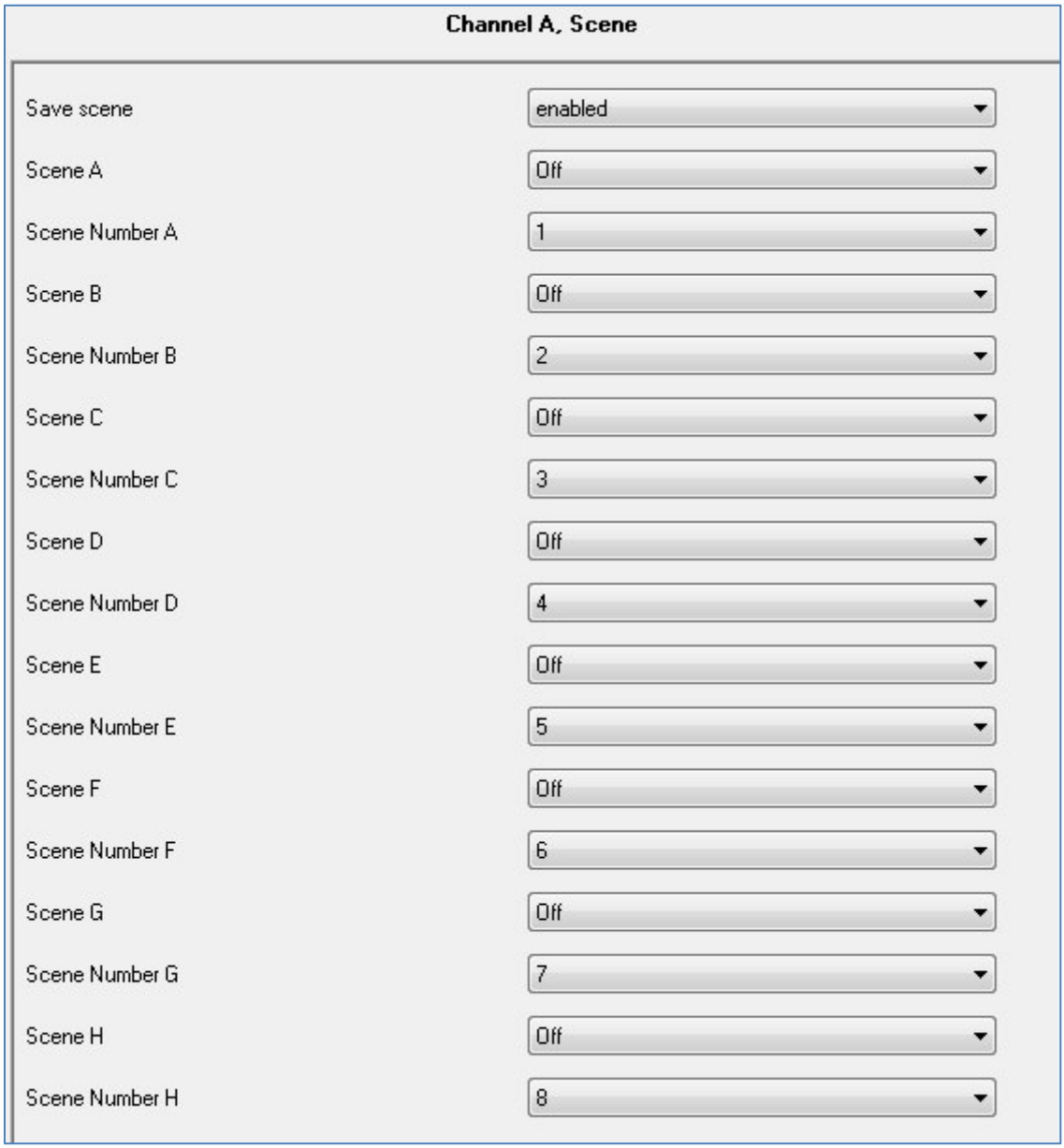

Figure 16: Sub function scene

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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 ▪ lock ▪ unlock	Activation of the scene A
Scene number A	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number

Table 19: 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

Table 20: Calling and saving scenes

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5.3 Staircase light

The staircase light function enables automatic off-switching of the channel after a parameterized time.

5.3.1 Relay operating mode

The following illustration shows the setting options for this parameter:

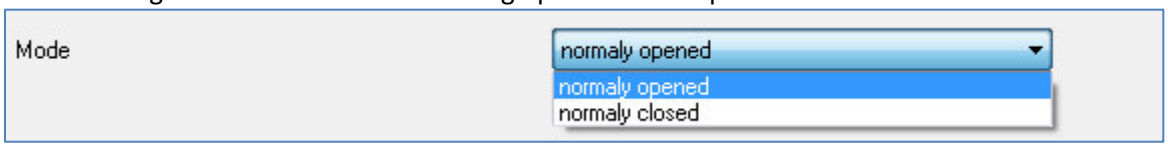


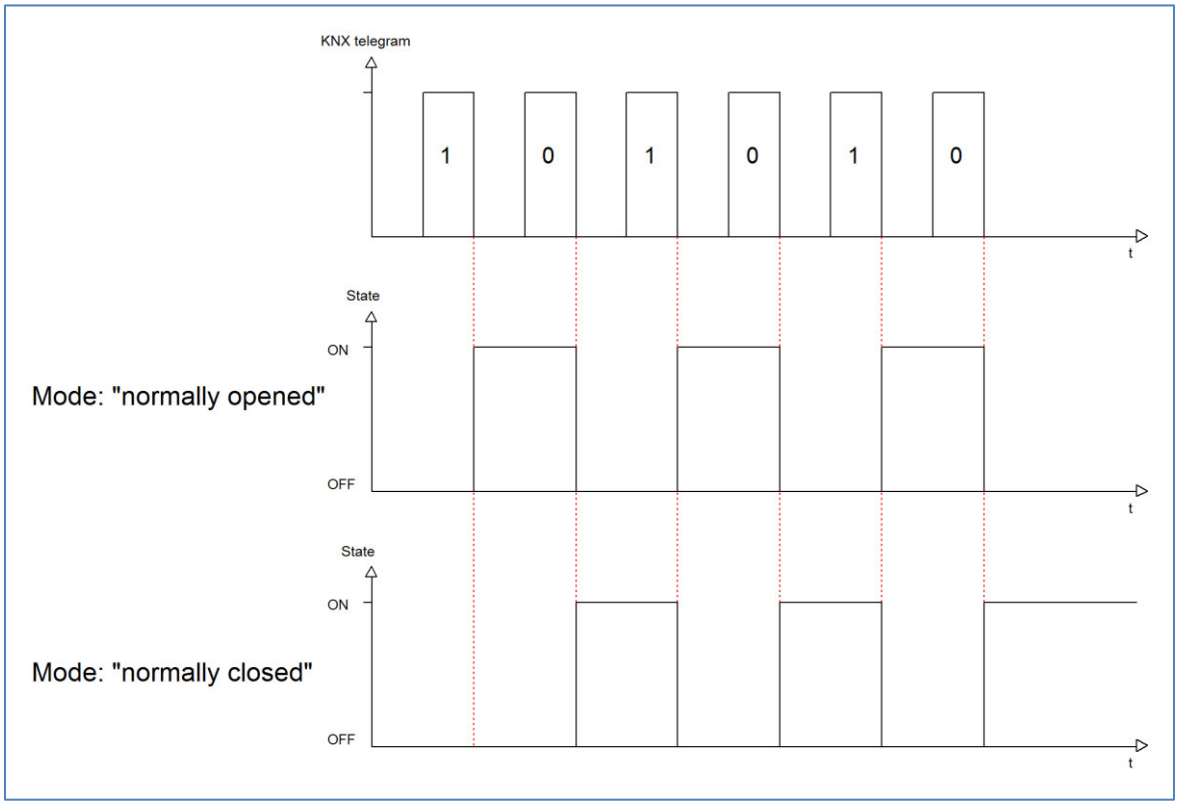
Figure 17: Operating mode

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 21: 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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5.3.2 Central function

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

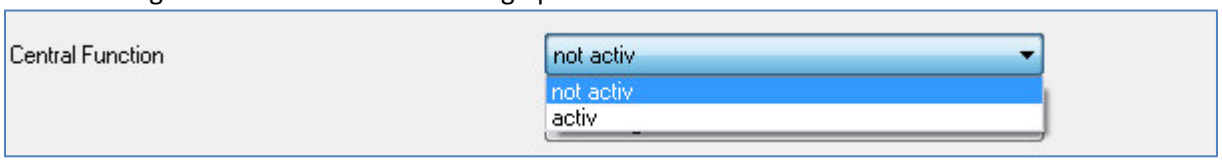

Figure 18: Central function

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 22: 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

Table 23: Communication object central function

5.3.3 Behavior at locking/unlocking

The following figure shows the available settings:

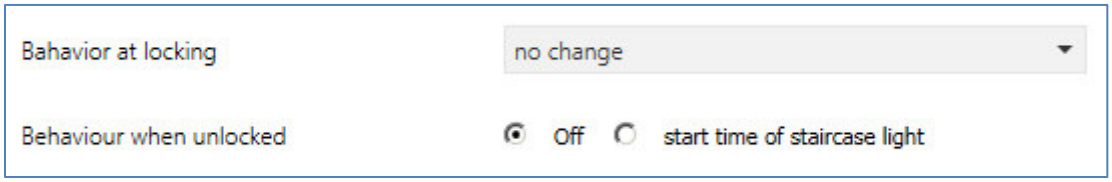

Figure 19: Locking function

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The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Behavior at locking	▪ On ▪ Off ▪ **no change**	Behavior at activating the locking function
Behavior at unlocking	▪ **Off** ▪ start time of staircase light	Behavior at deactivating the locking function

Table 24: Behavior at locking/unlocking

A Channel is locked by sending a logical 1 to the locking object and further control is no longer available as long as the channel is locked. By sending a logical 0 the channel can be unlocked again. The following actions can be performed at locking/unlocking:

- **no change**
  The channel stays in the current state.
- **On**
  The channel is switched on.
- **Off**
  The channel is switched off.
- **start time of staircase light**
  The channel is switched on for the time of the staircase light.

The following table shows the communication object:

Number	Name	Length	Usage
4	Lock	1 Bit	Object for locking the channel

Table 25: Communication object locking function

5.3.4 Behavior at bus power down/bus power up

The following figure shows the available settings:

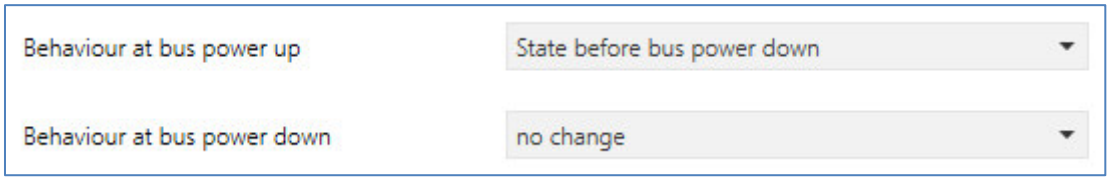

Figure 20: Behavior at bus power down/bus power up

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The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Behavior at bus power up	▪ Off ▪ start time of staircase light ▪ **State before bus power down**	Defines the behavior after bus power returns
Behavior at bus power down	▪ Off ▪ On ▪ **no change**	Defines the behavior when bus power is dwon

Table 26: Behavior at bus power down/up

The following actions can be performed at locking/unlocking:

- **no change**
  The channel stays in the current state.
- **On**
  The channel is switched on.
- **Off**
  The channel is switched off.
- **start time of staircase light**
  The channel is switched on for the time of the staircase light.
- **State before bus power down**
  The state before bus power crashes down is restored.

5.3.5 State functions

The following figure shows the available state functions:

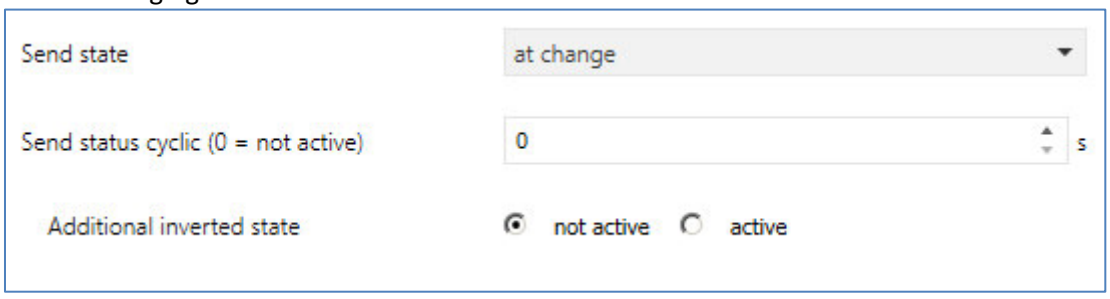

Figure 21: State functions

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The following settings are available:

ETS-text	Dynamic range **[default value]**	comment
Send state	▪ no send, passive state object ▪ **at change** ▪ at change and lock ▪ always at input of telegram	Sending behavior of the state object
Send state cyclic (0 = not active)	0-30000s **[0s]**	Cyclic sending of the state
Additional inverted state	▪ **not active** ▪ active	Displaying an additional inverted state

Table 27: State functions

The following sending behavior for the state is available:

- **no send, passive state object**
  The state object does not send its current state and can only be requested.
- **at change**
  The state object sends its current state at every change of the output.
- **at change and lock**
  The state object sends its current state at every change of the output – also during the locking process. By sending the status during the locking is ensured that a switch after locking sends the correct value.
- **always at input of telegram**
  The state is sent at every input of a telegram – independent whether the output is changed or not.

The additional inverted state can be used for visualization, etc. and has always the opposite value of the “normal” state.

The following table shows the communication objects:

Number	**Name**	**Length**	**Usage**
7	State	1 Bit	Sends the state of the channel
8	inverted state	1 Bit	Sends the inverted state of the channel

Table 28: Communication objects state function

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5.3.6 Priority/Forced control

The following figure shows the parameter priority/forced control:

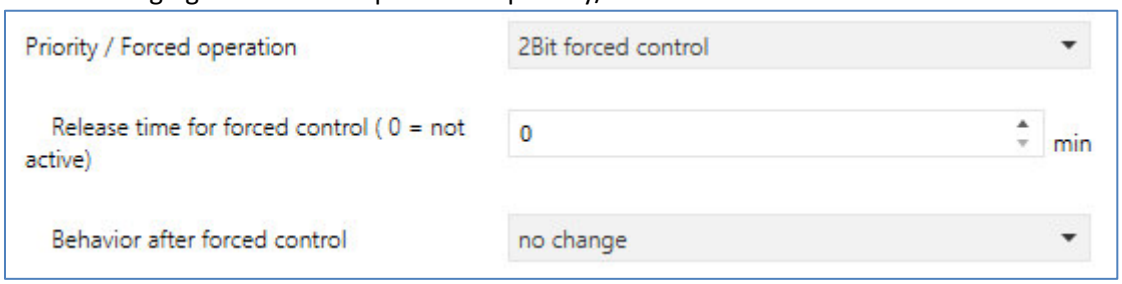

Figure 22: Priority/Forced control

The following settings are available:

ETS-text	Dynamic range **[default value]**	comment
Priority/Forced Control	▪ **not active** ▪ 2 Bit forced control ▪ 1 Bit priority ON ▪ 1 Bit priority OFF	Activation of the forced control/priority function
Release time for forced control (0 = not active)	0-600min **[0 min]**	Activation of a release time from the priority/forced control into the normal state.
Behavior after forced control/priority	▪ Off ▪ **no change** ▪ start time of staircase light	Setting of the behavior after deactivating priority/forced control.

Table 29: Priority/Forced control

The priority/forced operation cause the priority switching of output. By using the release time, the priority/forced control can be deactivated automatically and the channel changes into the normal state.
The followings actions can be performed after deactivating the priority/forced control:

- **Off**
  The channel is switched off.
- **start time of staircase light**
  The channel is switched on for the time of the staircase light.

The following table shows the communication object:

Number	Name	Length	Usage
5	Forced control/Priority	1 Bit	Activation/Deactivation of the forced control/priority

Table 30: Communication object priority/forced control

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5.3.7 Scenes

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:

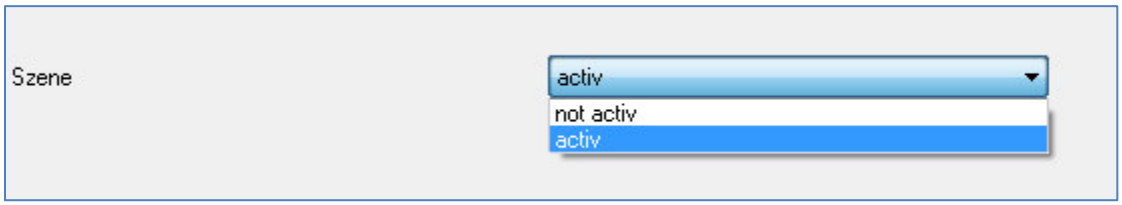

Figure 23: Scene function

The following chart shows the relevant communication object:

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

Table 31: 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.

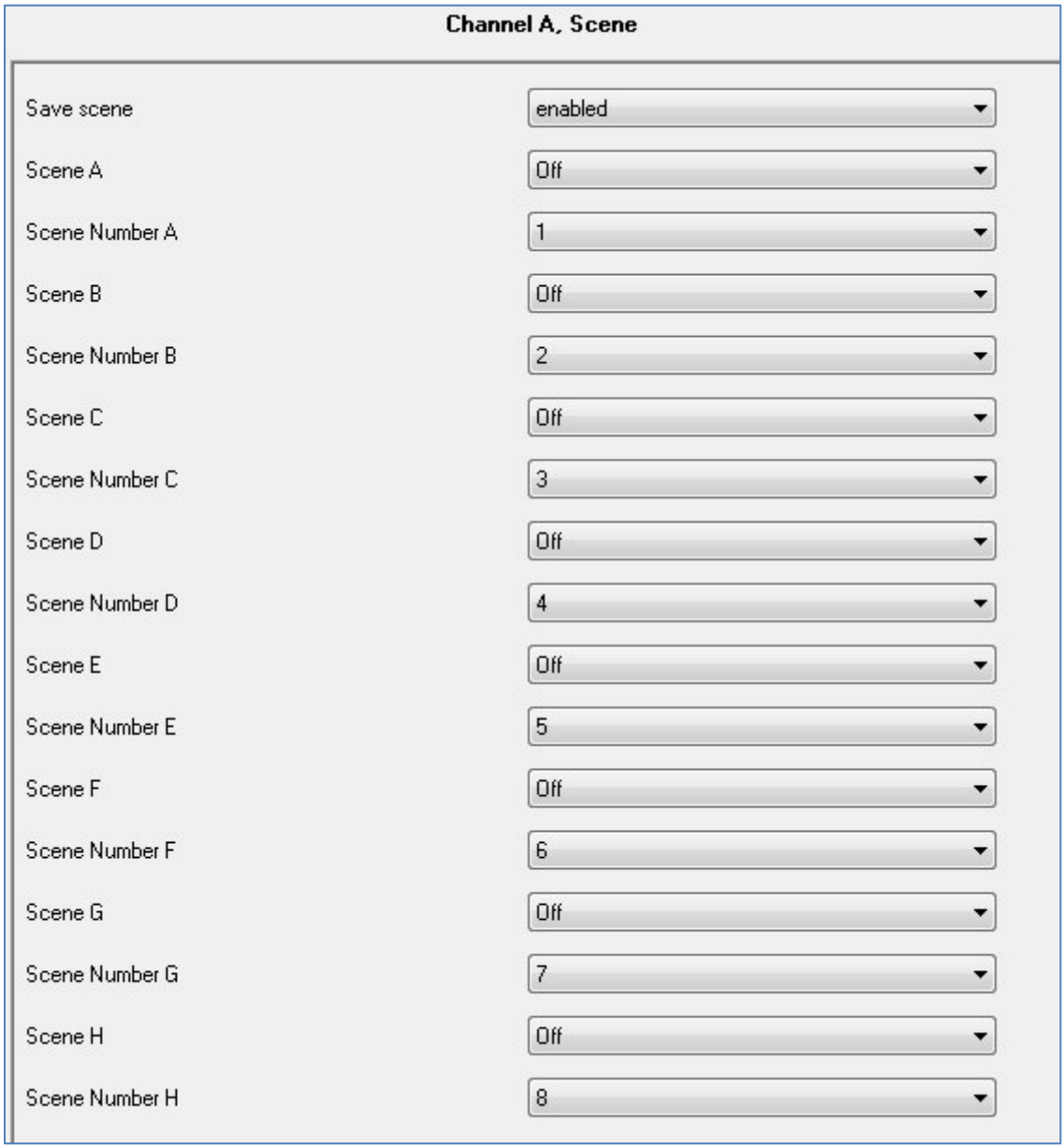

Figure 24: Sub function scene

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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 ▪ lock ▪ unlock	Activation of the scene A
Scene number A	1-64 [1]	Scene number; Calling value = 1 less than the adjusted scene number

Table 32: 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

Table 33: Calling and saving scenes

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5.3.8 Staircase with variable time

The following parameters are available for a variable staircase time:

Figure 25: Parameter variable staircase time

The variable staircase time allows staring the staircase with a variable time. For this purpose, a value of 0-255 to 1 byte input is sent. The resulting staircase lighting time is calculated as:
sent value x adjusted time factor = staircase time
If a value of 10s is set and the value 55 is sent, the staircase light is started with a time of 550seconds.
The variable staircase time can be used for starting the staircase time in a big staircase at every flor with an individual staircase time.
The following table shows the available communication object:

Number	Name	Length	Usage
2	Staircase light with time	1 Byte	Starting of the variable staircase time

Table 34: variable staircase time

5.3.9 Prewarning function

The following figure shows the available settings for the prewarning function:

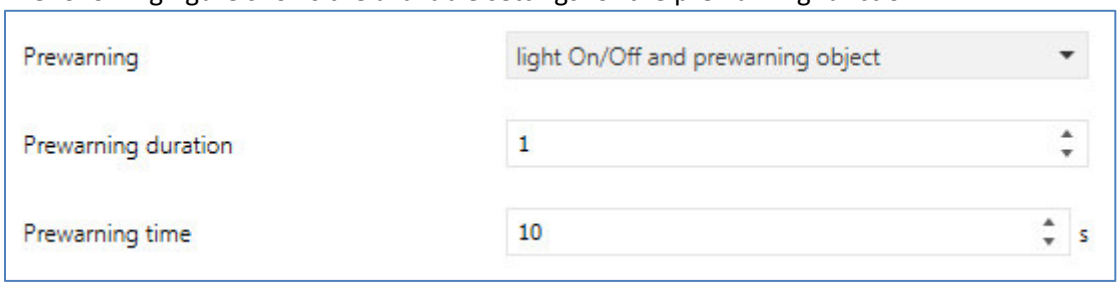

Figure 26: Prewarning function

The prewarning function warns
The warning function warns you before running out of the staircase time (and thus turning off the channel).

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The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Prewarning	▪ **not active** ▪ Light On/Off ▪ prewarning object ▪ light On/Off and prewarning object	Setting of the prewarning function
Prewarning duration	0-30.000 **[1]**	Setting the prewarning duration = the time for which the light is switched off; only available at the functions with "light On/Off"
Prewarning time	0-30.000 **[10]**	Setting the prewarning time = the time for which the prewarning object sends a „1" or the light is switched on again

Table 35: Prewarning function

The settings for the warning have the following behavior:

- **Light On/Off**
  The light is switched off, for the adjusted prewarning duration, after the staircase time runs out. Afterwards the light is switched on again for the adjusted prewarning time.
- **Prewarning object**
  An additional communication object for the prewarning function is shown. This object sends a „1" after the staircase time runs out, but the light stays on. After the prewarning time, the channel is switched off and the object sends a "0". So, by using this function, the whole staircase time is extended by the adjusted prewarning time.
- **Light On/Off and prewarning object**
  A combination of both settings.

The following table shows the available communication object:

Number	**Name**	**Length**	**Usage**
3	Prewarning	1 Bit	Sending a prewarning before the staircase time runs out.

Table 36: Prewarning object

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5.3.10 Manual switch off

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

Figure 27: 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. When this function is not activated, the channel switches only off after the staircase time runs out.

5.3.11 Extend time of staircase light

The following figure shows the available settings:

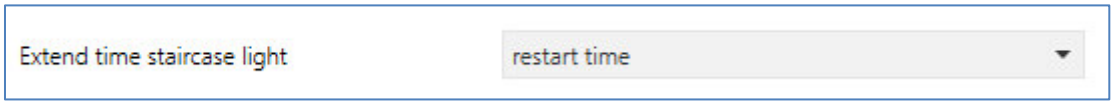

Figure 28: Extend time of staircase light

The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Extend time of staircase light	▪ no extend time ▪ **restart time** ▪ add time	Setting if the staircase light can be extended.

Table 37: Extend time of staircase light

The settings have the following functions:

- **No extend time**
  The staircase time cannot be extended. It is only possible to restart the staircase time after it runs out.
- **Restart time**
  The staircase time is restarted by sending an “on-signal” to the communication object “staircase light”.
- **Add time**
  The staircase time is added to the remaining staircase time when a new “on-signal” is sent to the communication object “staircase light”.

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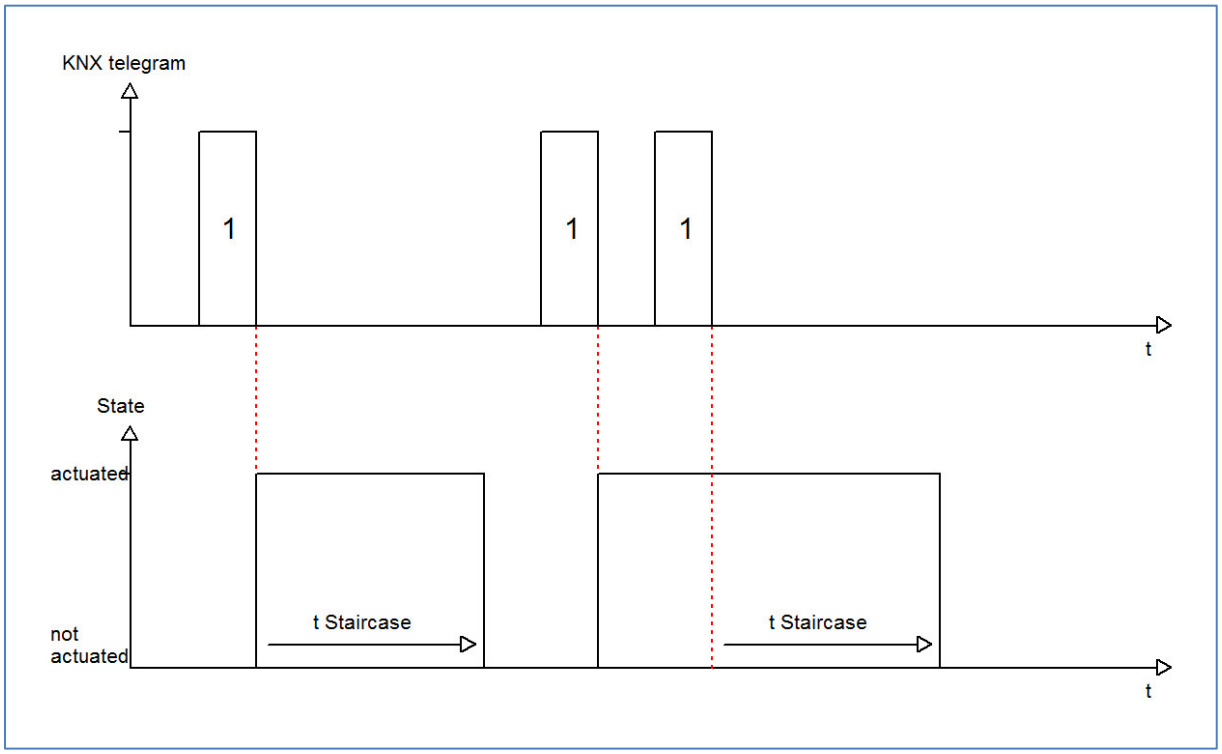
The following diagram shows the behavior of the setting “restart time”:



5.3.12 Additional switching object

The following figure shows the available settings:

Figure 29: Additional switching object

By activating the switch object, an additional switching object is shown, which works independently from the staircase light. The switching object switches the channel permanently on/off and does not operate with the staircase time.
The following table shows the available communication object:

Number	Name	Length	Usage
0	Switch On/Off	1 Bit	additional switching object

Table 38: Additional switching object

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5.4 Switch pulse

The function switch pulse can be used for generating a short switch pulse.

5.4.1 Relay operating mode

The following illustration shows the setting options for this parameter:

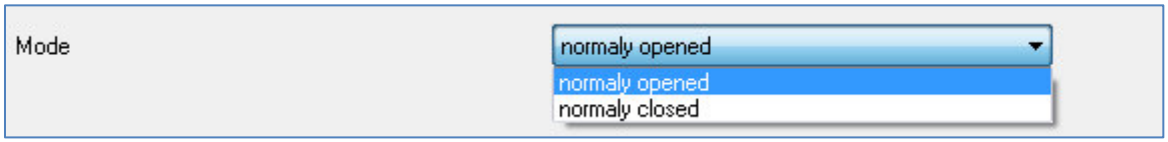


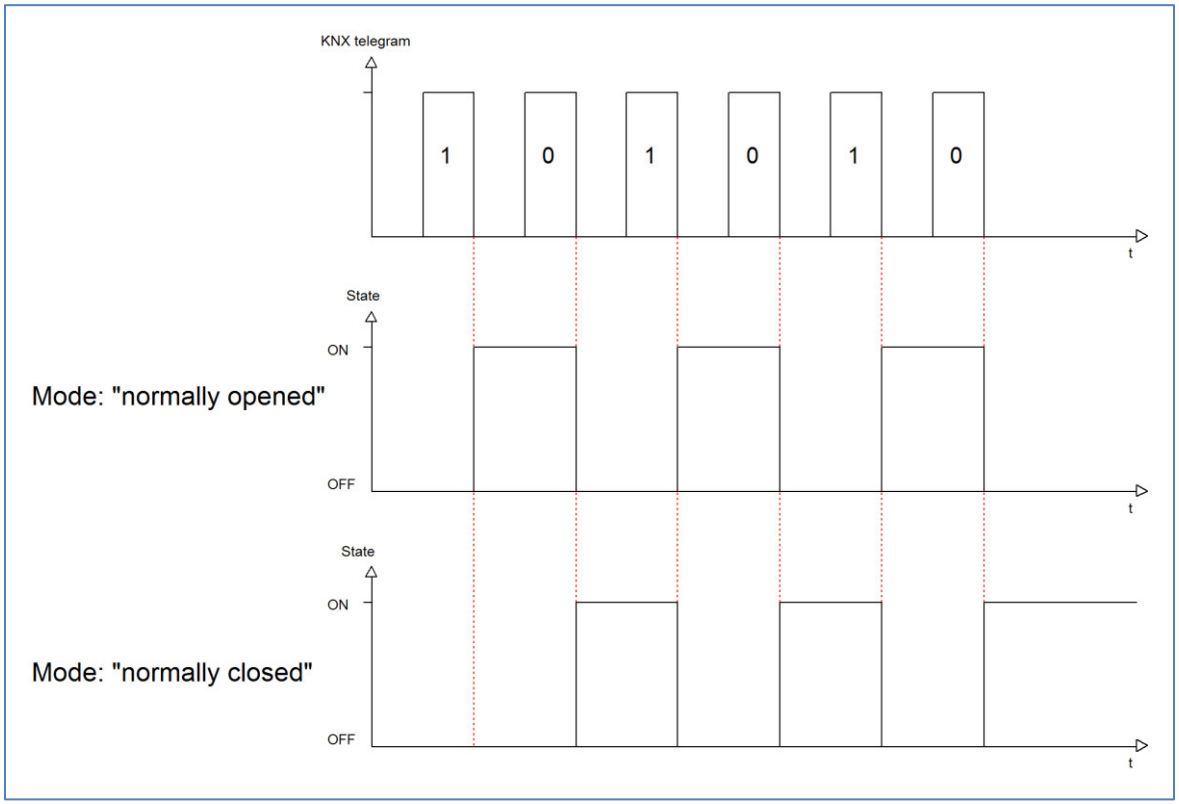
Figure 30: Operating mode

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 39: 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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5.4.2 Pulse function

The following figure shows the available settings for the pulse function:

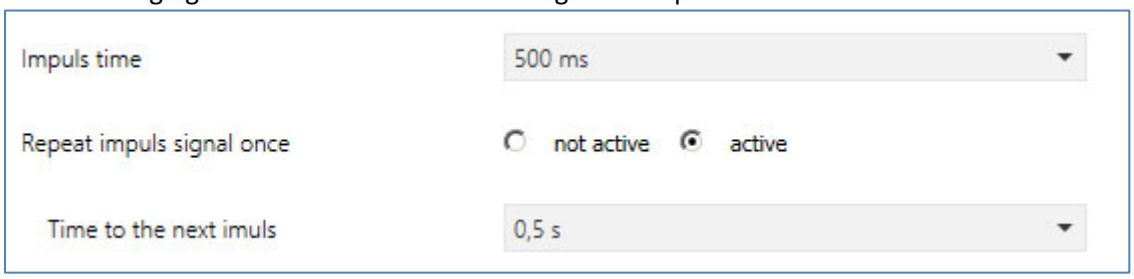

Figure 31: Pulse function

The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Pulse time	300ms – 30s **[500ms]**	Setting of the duration of the pulse
Repeat pulse signal once	• **not active** • active	Setting if the pulse is repeated once
Time to next pulse	0,5s – 30s **[0,5s]**	Setting of the duration between the first and the second pulse; is only shown when the pulse signal is repeated.

Table 40: Pulse function

The following table shows the available communication object:

Number	Name	Length	Usage
1	Switch pulse	1 Bit	Starting the pulse

Table 41: Communication object pulse function

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5.4.3 Locking function

The following figure shows the available settings for the locking function:

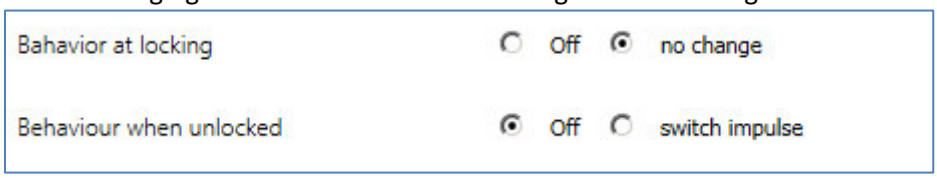

Figure 32: Locking function

The following table shows the available settings for the locking function:

ETS-text	Dynamic range **[default value]**	comment
Behavior at locking	▪ Off ▪ **no change**	Behavior at activating the locking function
Behavior at unlocking	▪ **Off** ▪ Switch pulse	Behavior at deactivating the locking function

Table 42: Locking function

A Channel is locked by sending a logical 1 to the locking object and further control is no longer available as long as the channel is locked. By sending a logical 0 the channel can be unlocked again. The following actions can be performed at locking/unlocking:

- **no change**
  The channel stays in the current state.
- **On**
  The channel is switched on.
- **Off**
  The channel is switched off.
- **switch pulse**
  The channel generates the switch pulse as parameterized.

The following table shows the available communication object:

Number	Name	Length	Usage
4	Lock	1 Bit	Object for activating/deactivating the locking function

Table 43: Communication object locking function

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6 Parameter - FanCoil

6.1 General Functions

6.1.1 FanCoil-System

The following parameter adapts the actuator to the FanCoil-System:

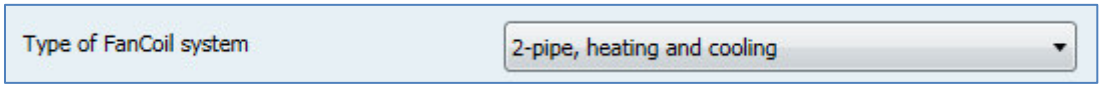

Figure 33: Selection of the FanCoil system

2-Pipe, only heating:
The following image shows a 2-Pipe system for a heating mode. The FanCoil is controlled directly from the FanCoil-Actuator, AKK-03UP.01. The heating valve is switched by a separate actuator, which is controlled by object 6:

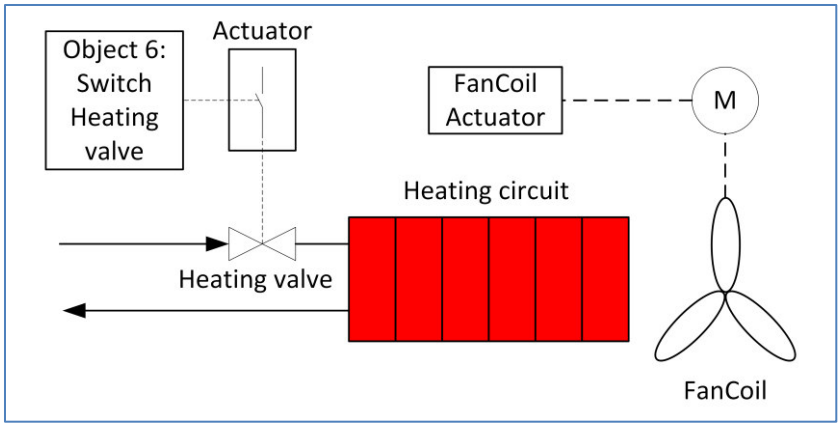

Figure 34: 2-Pipe system - Heating

2-Pipe, only Cooling:
The following image shows a 2-Pipe system for a cooling mode. The FanCoil is controlled directly from the FanCoil-Actuator, AKK-03UP.01. The cooling valve is switched by a separate actuator, which is controlled by object 7:

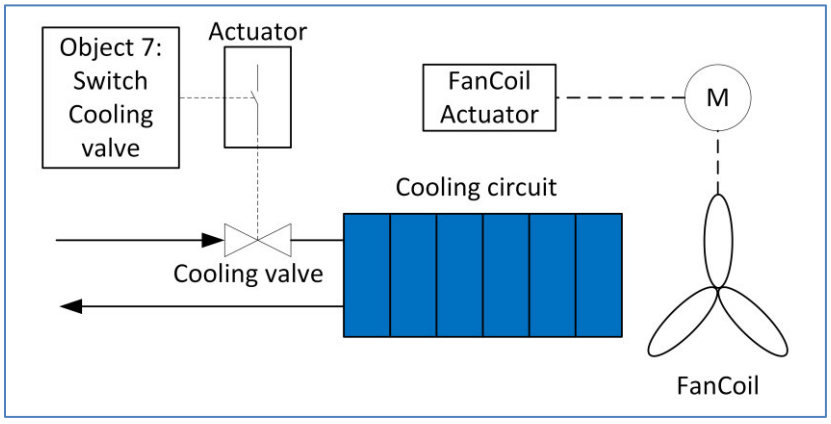

Figure 35: 2-Pipe System - Cooling

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2-Pipe System, Heating and Cooling:

The following image shows a 2-Pipe system with combined heating and cooling mode. The FanCoil is controlled directly from the FanCoil-Actuator, AKK-03UP.01. The valve, which works as heating and cooling valve, is switched by a separate actuator, which is controlled by object 6. According to the mode - heating or cooling - the heating- or cooling-supply is switched on:

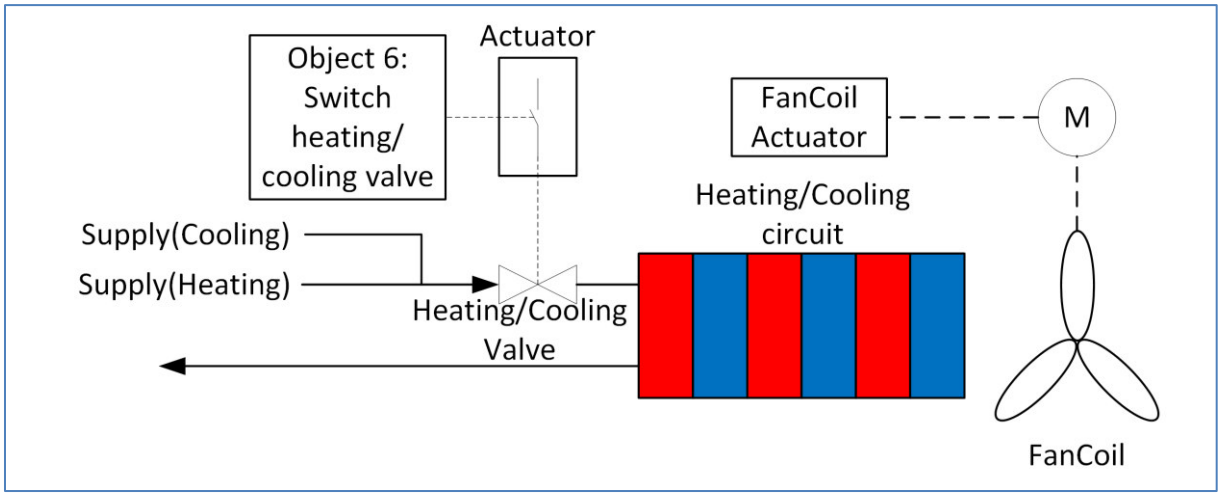

Figure 36: 2-Pipe System - Heating and Cooling

4-Pipe System, Heating and Cooling:

The following image shows a 4-Pipe system with separate heating and cooling mode. The FanCoil is controlled directly from the FanCoil-Actuator, AKK-03UP.01. The valves are switched by separate actuators, which are controlled by the objects 6 and 7. According to the mode - heating or cooling - the heating- or cooling-valve is switched on:

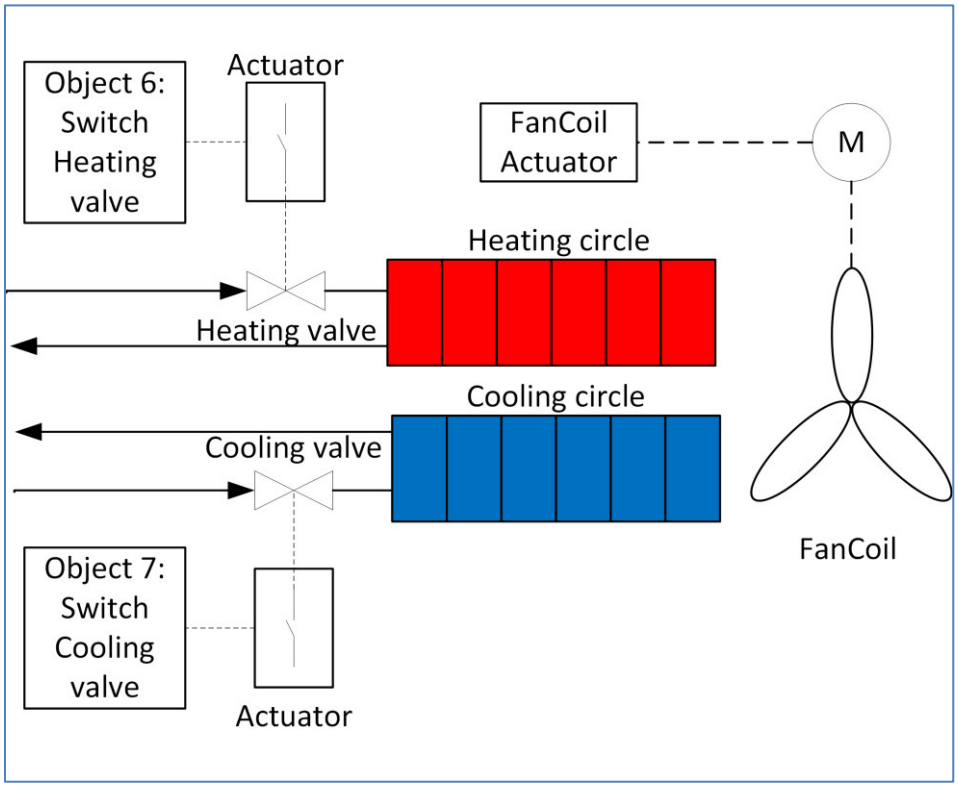

Figure 37: 4-Pipe System - Heating & Cooling

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6.1.2 General FanCoil settings

The following figure shows the general settings:

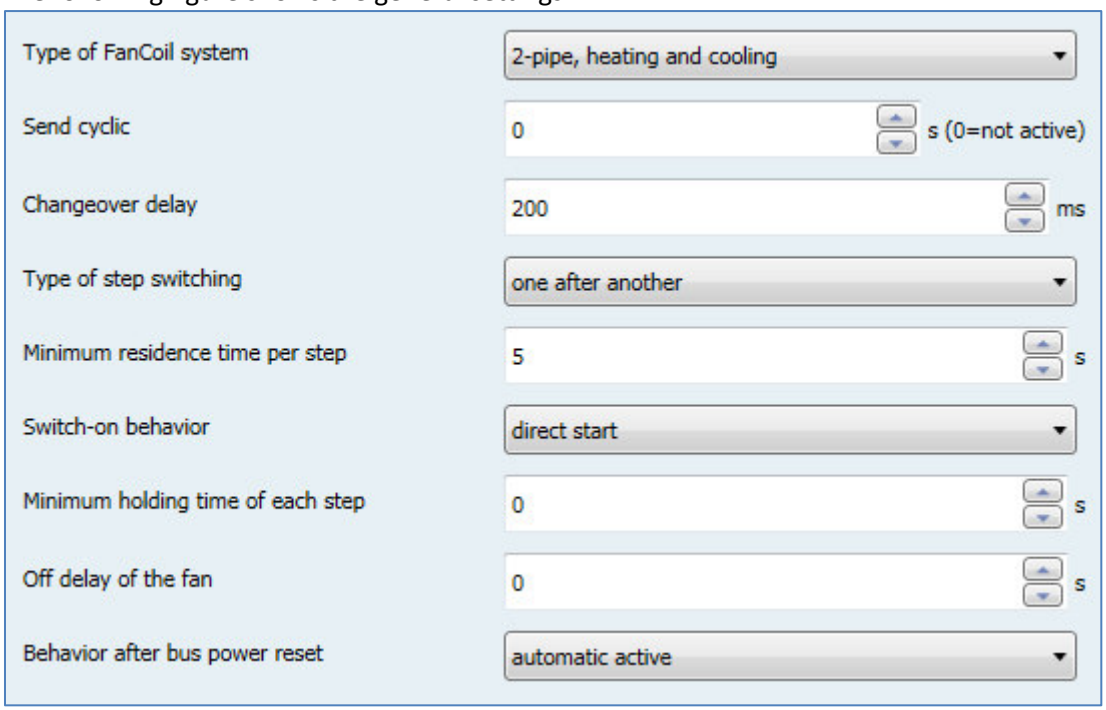

Figure 38: General settings - FanCoil

The following settings are available:

ETS-text	Dynamic range **[default value]**	comment
Send Heating/Cooling valve cyclic	0-3600s **[0s]**	Adjustment if the switching state of the heating/cooling valve is sent cyclic
Changeover delay	50-5000ms **[200ms]**	Setting for the delay between changing the steps to avoid a simultaneously control of 2 steps. **Have a look at the Datasheet of the FanCoil!**
Type of step switching	▪ **one after another** ▪ directly	Adjustment how the steps are controlled: **one after another:** Level 0 is switched on and is switched into Level3. Now the Actuator switches into Level 3 in compliance to the adjusted times as follows: Level 1-> Level 2 -> Level 3 **directly:** Level 0 is switched on and is switched into Level3. Now the actuator switches directly from level 0 to level 3.
Minimum holding time of each step	0-1000s **[5s]**	Defines how long one level is switched on until the actuator changes into the next level.

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Maximum step at night	▪ Step 1 ▪ Step 2 ▪ **Step 3**	Defines the maximum step of the FanCoil at night.
Switch-On Behavior	▪ **direct start** ▪ start with step 1 ▪ start with step 2 ▪ start with step 3	Defines the starting behavior of the FanCoil actuator.
Minimum holding time of startup level	0-1000s **[0s]**	Defines the minimum time in the starting-step if the switch-on behavior is not set to direct start.
Off-Delay of the fan	0-1000s **[0s]**	Defines the off-delay of the Fan, when it was switched off for using the residual energy of the heating/cooling circuit.
Behavior after bus power reset	▪ **automatic active** ▪ direct mode active	Adjustment if the FanCoil actuator starts in the automatic or manual mode.

Table 44: General Settings FanCoil

Changeover delay:
The changeover delay is a FanCoil specific value and must be adjusted to the data of the FanCoil. It is used to protect the FanCoil motor. The following figure shows the function of the delay:

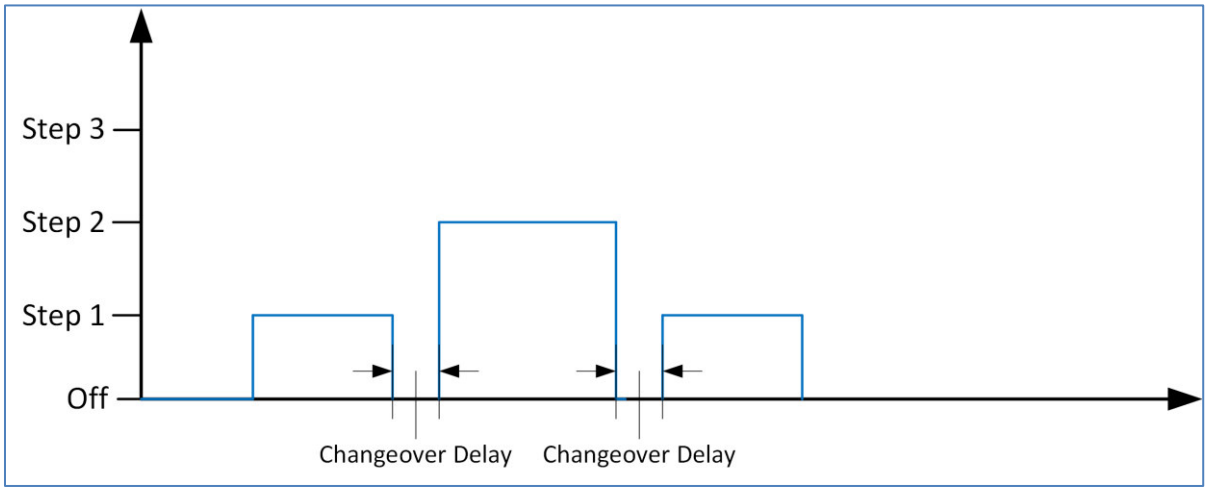

Figure 39: Changeover Delay

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Minimum holding time of each step:

The minimum holding time of each step can be used for avoiding too many changeovers between the steps. Only after the minimum holding time is elapsed, the FanCoil actuator switches into the next level. In this example, step 3 is switched on and step 0 is active. The steps are driven in succession:

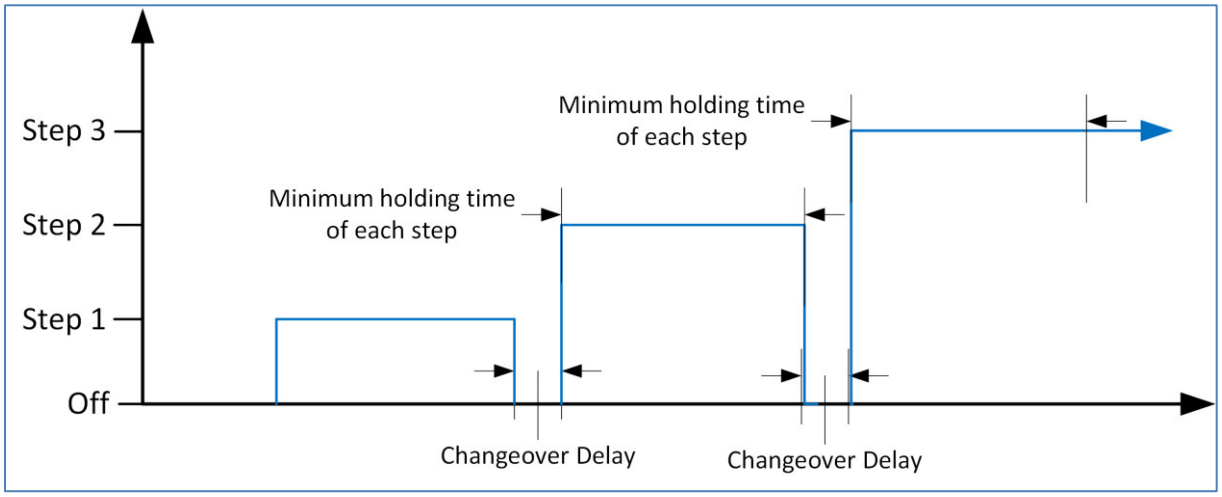

Figure 40: Minimum holding time of each step

Switch-On behavior:

If the FanCoil must be switched on with a defined level, this can be adjusted by the parameter “Switch-On Behavior” and “Minimum holding time of startup level”. In the following example, the FanCoil, is switched on with level 3 and the levels are controlled in succession:

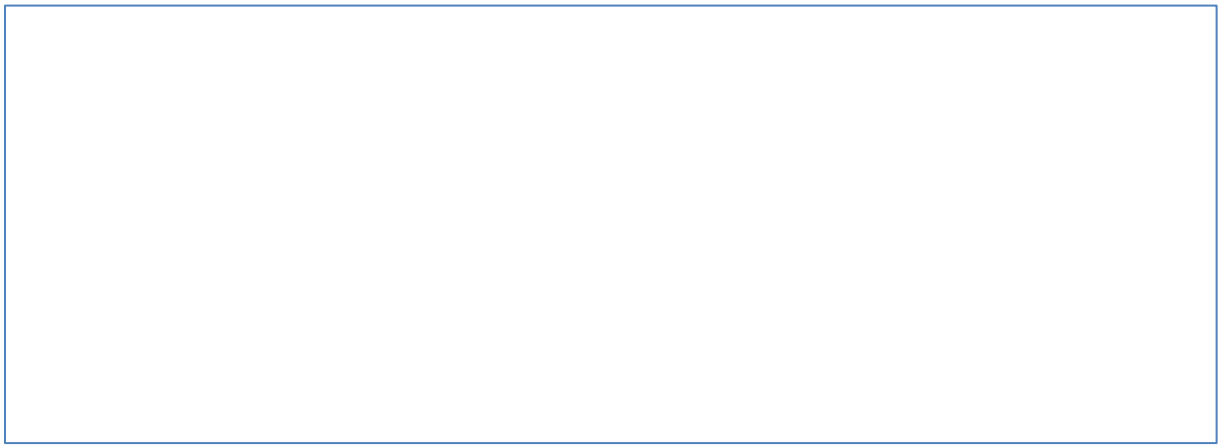

Figure 41: Switch-On Behavior

If the parameter “Switch-On behavior” is set to “direct start”, the FanCoil would be start directly with level1.

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Off-Delay of the Fan:
For using the residual energy off the heating/cooling circuit at switching the FanCoil off, the FanCoil can run after for a defined time. The valve is closed directly at the point off switching, but the FanCoil is switched after the Off-Delay is elapsed:

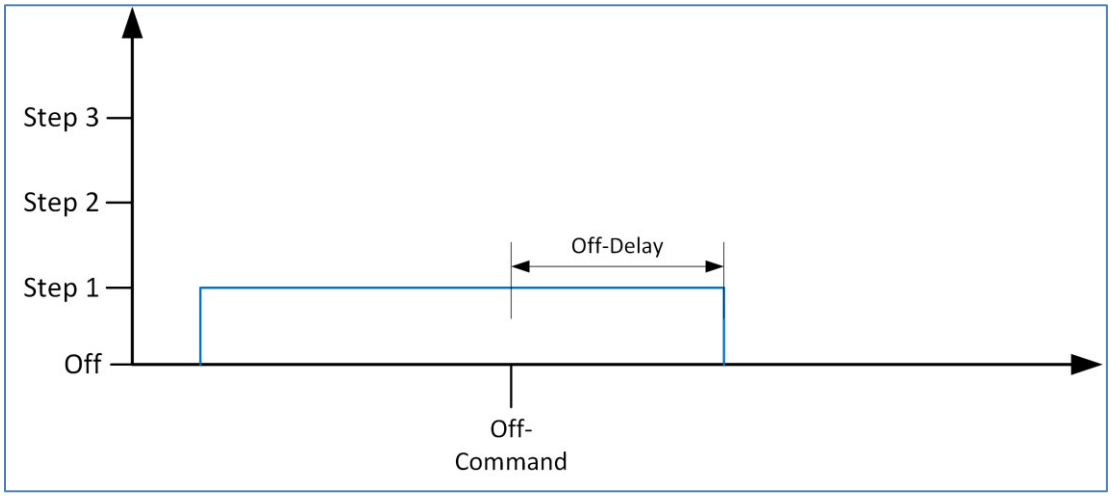

Figure 42: Off-Delay

The following table shows the available communication objects for these parameters:

Number	Name	Length	Usage
6	Switch heating valve	1 Bit	Switching the heating valve
6	Switch heating/cooling valve	1 Bit	Switching the heating/cooling valve; at 2-Pipe heating/cooling systems
7	Switch cooling valve	1 Bit	Switching the cooling valve

Table 45: Communication objects - FanCoil general

6.1.3 Blocking Functions

The following figure shows the available blocking functions:

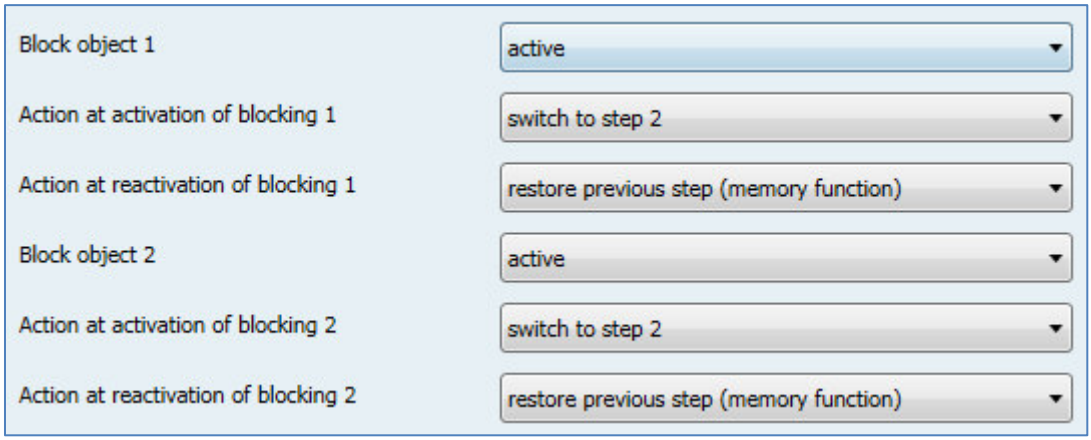

Figure 43: Blocking Functions

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The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Block Object 1/2	▪ **not active** ▪ active	Activates/Deactivates the blocking object
Action at Activation Blocking of 1/2	▪ **no reaction** ▪ switch off valves and ventilation ▪ switch to step 1 ▪ switch to step 2 ▪ switch to step 3	**no reaction**: The FanCoil is blocked for further control and stays in the current step. **Switch off valves and ventilation:** The FanCoil and the valve is switched off. **Switch to step 1-3:** The FanCoil is switched to the adjusted step.
Action at Deactivation Blocking of 1/2	▪ **no reaction** ▪ switch to step 1 ▪ switch to step 2 ▪ switch to step 3 ▪ restore previous step (Memory function)	**no reaction**: The FanCoil is blocked for further control and stays in the current step. **Switch to step 1-3:** The FanCoil is switched to the adjusted step. **Memory function:** The FanCoil restores the step which was active before blocking.

Table 46: Blocking function - FanCoil

The blocking objects 1 and 2 works independent of each other. Blocking object 1 has a higher priority than blocking object 2.
The following table shows the available communication objects:

Number	Name	Length	Usage
25	Block object 1	1 Bit	Blocking the FanCoil
26	Block object 2	1 Bit	Blocking the FanCoil

Table 47: Communication objects - Blocking Function

6.1.4 Activation of further submenus

For activating the menus of additional ventilation, automatic mode, direct mode and state functions, the following settings must be set to active:

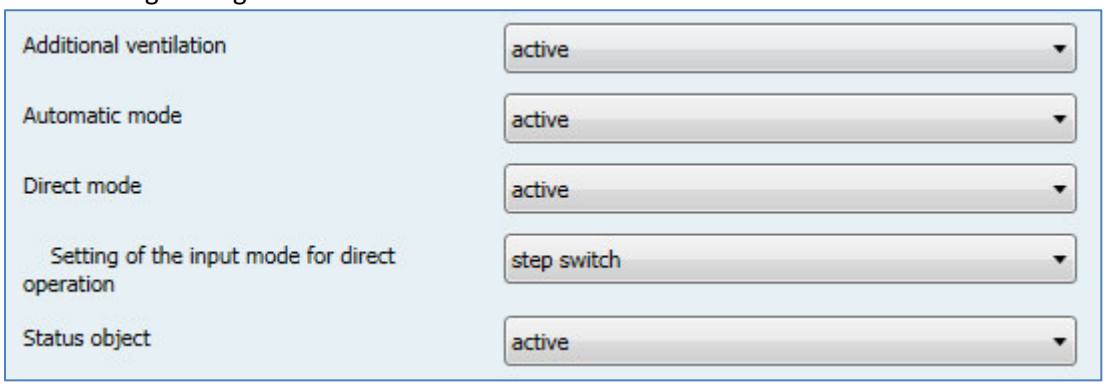

Figure 44: Activation of the submenus

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6.2 Additional Ventilation

6.2.1 Automatic additional ventilation

The following figure shows the available settings for the automatic additional ventilation:

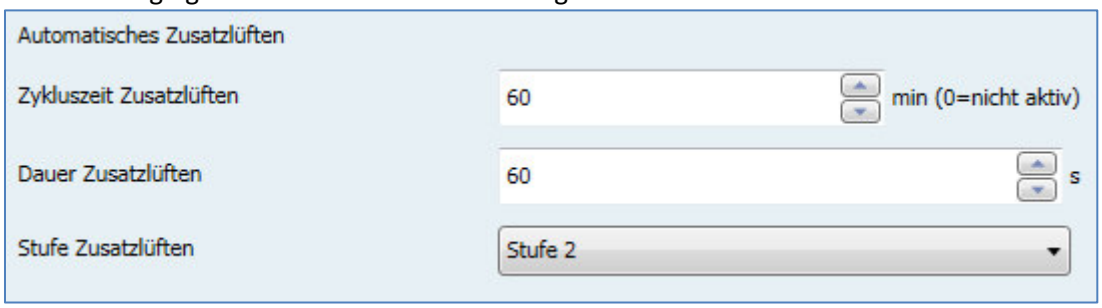

Figure 45: Automatic additional ventilation

The automatic additional ventilation switches the FanCoil for the adjusted time of the additional ventilation into the adjusted time if the FanCoil was switched off for the adjusted cycle time. So, the maximum inactive time of the FanCoil is the adjusted cycle time.

6.2.2 Manual additional ventilation

The following figure shows the available settings for the manual additional ventilation:

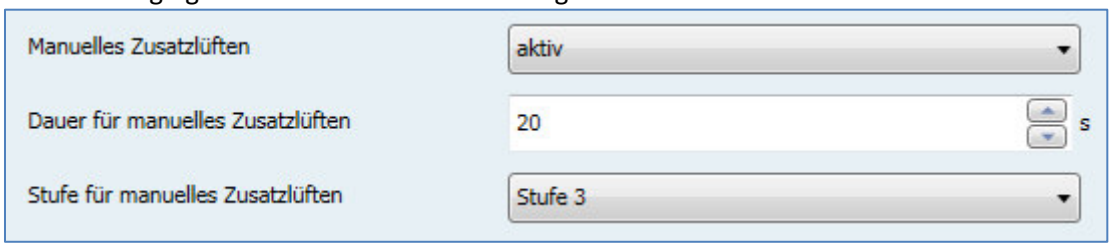

Figure 46: Manual additional ventilation

The manual additional ventilation is started by the communication object and switches the FanCoil for the adjusted time into the adjusted step. After the time for the additional ventilation is elapsed, the FanCoil switches again to the normal mode and works as before. This function can be used to ventilate rooms after special events, e.g. taking a shower or cooking.
The following table shows the communication object for activating the manual additional ventilation:

Number	Name	Length	Usage
0	Enable additional ventilation	1 Bit	Switches the manual additional ventilation on

Table 48: Communication objects additional ventilation

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6.3 Automatic Mode

The automatic mode can be realized via control value or a Delta T control. The following communication object switches between automatic and direct mode:

Number	Name	Length	Usage
1	Switching Auto/Manual	1 Bit	Switchover between automatic and manual mode

Table 49: Communication object - Switchover Auto/Manual

The FanCoil actuator reacts only to control values or temperature values if the automatic mode is switched on. The selection of the steps in the direct mode is always possible. If a new step is selected via the direct mode, the FanCoil will be switched into the manual mode and the switchover object sends the state.

6.3.1 Automatic Mode – Control Value

The following figure shows the available settings for the automatic mode via control values:

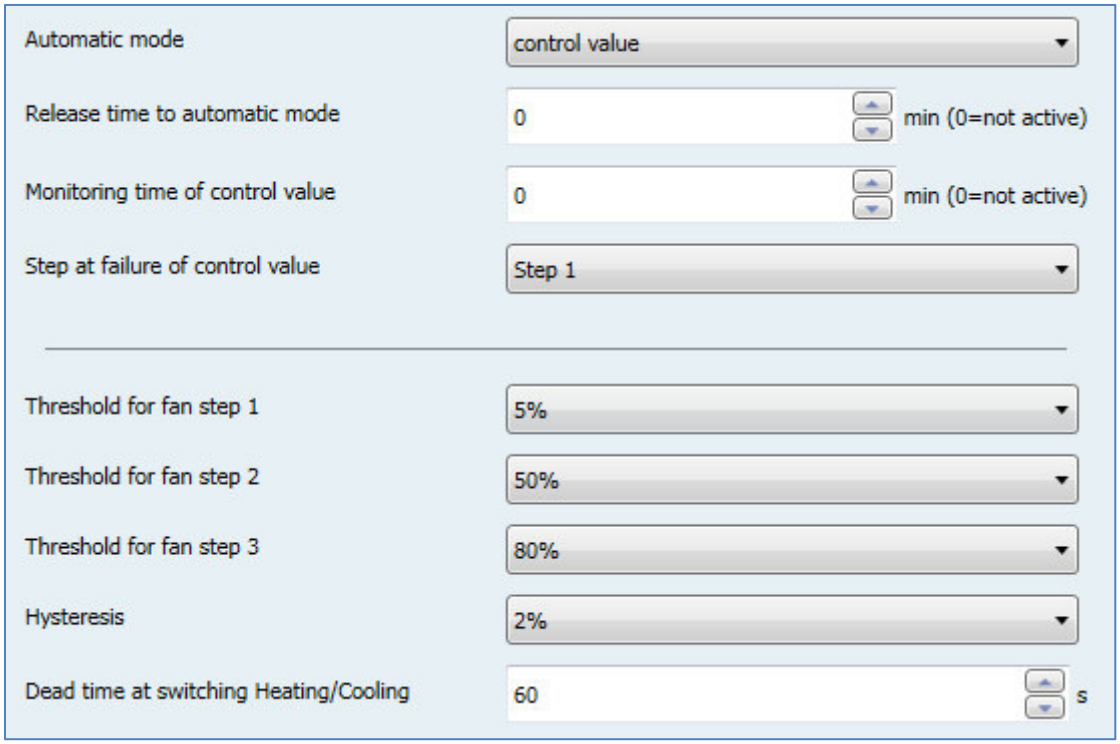

Figure 47: Automatic Mode - Control value

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The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Release time to automatic mode	0-1440 **[0]**	Defines the time which starts after switching into the direct mode. When this time is elapsed, the FanCoil switches back into the automatic mode.
Monitoring time of control value	0-360min **[0 min]**	Defines the time periods in which the actuator must receive a valid control value. If no control value is received, a control value failure is released and the FanCoil switches into the step for a FanCoil failure..
Step at failure of control value	▪ Off ▪ **Step 1** ▪ Step 2 ▪ Step 3	Step at a control value failure
Threshold for fan step 1	0-100% **[5%]**	Defines from which value the FanCoil switches into step 1.
Threshold for fan step 2	0-100% **[50%]**	Defines from which value the FanCoil switches into step 2.
Threshold for fan step 3	0-100% **[80%]**	Defines from which value the FanCoil switches into step 3.
Hysteresis	0-10% **[2%]**	Defines the hysteresis for switching off the current FanCoil step. Point of switching off = Fan Step - Hysteresis
Dead time at switching heating/cooling	0 – 1000s **[60s]**	Defines the pause between heating/cooling switchover. During this dead time, the FanCoil is witched off and both valves are closed.
Switchover between heating and cooling	▪ manually by object ▪ **automatically by control value**	**Setting is only at 4-Pipe systems available!** At the automatic switchover, the heating mode is active when the control value for heating has a value >0%. I the control value for heating has a control value =0% and the control value for cooling has a control value >0%, the cooling mode will be switched on. At the automatic switchover, the object 5 – Heating/Cooling Switchover works as state object.

Table 50: Automatic mode - Control value

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Release time to automatic mode:

The release time to automatic mode causes an automatic switching back into the automatic mode after the FanCoil was switched manual. If the FanCoil runs in the automatic mode at level 1, but the FanCoil should run for a short time in Level 3, the FanCoil can controlled via the direct mode (6.4 Direct Mode). The FanCoil actuator switches, because of the manual switching command, into the manual mode. Now, the release time switches the FanCoil actuator back into the automatic mode after the adjusted time. The following figure shows this behavior:

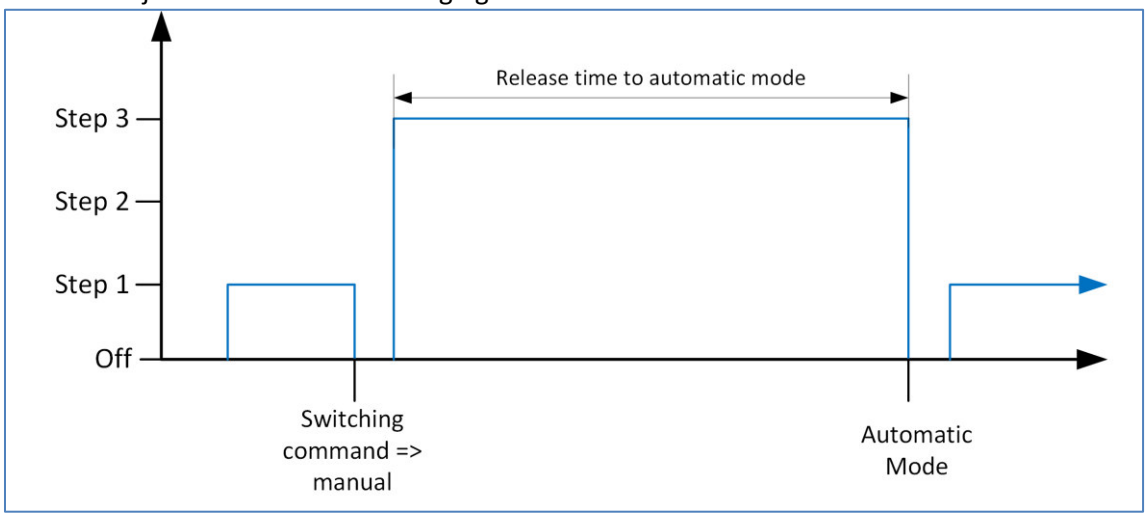

Figure 48: Release time to automatic mode

Switching thresholds:

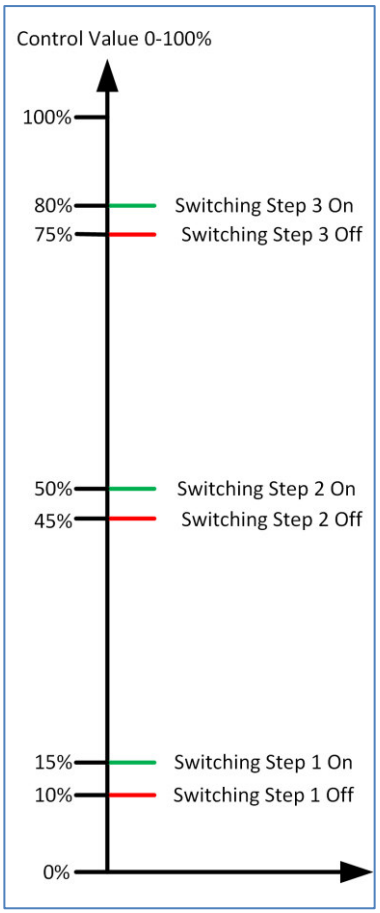

Figure 49: Thresholds - Control value shows the trehsolds for the control value. The thresholds for switching up into the next step are set directly in the parameter at the ETS-Software. At Figure 49: Thresholds - Control value, the thresholds are set to 15%, 50% and 80%. The threshold for switching into the next lower step are calculated via threshold – hysteresis. Here, the hysteresis is set to 5%.

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Figure 49: Thresholds - Control value

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Dead time at switching heating/cooling

The dead time between heating and cooling causes a pause between the switchover of heating and cooling. This function avoids ventilating with hot air after the FanCoil was switched from heating to cooling. The following figure shows the dead time at switching from heating into cooling:

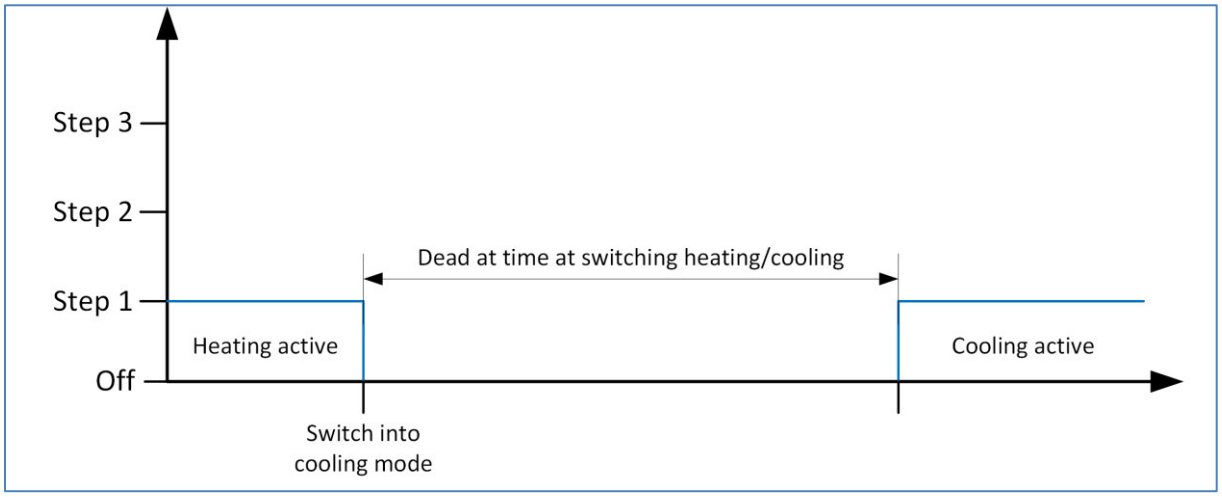

Figure 50: Dead time at heating/cooling switchover

The following table shows the communication objects for the automatic mode – control value:

Number	Name	Length	Usage
2	Control value heating	1 Byte	Receiving a control value for heating
2	Control value heating/cooling	1 Byte	Receiving a control value for heating/cooling; at 2-Pipe systems
3	Control value cooling	1 Byte	Receiving a control value for cooling
4	Control value failure	1 Bit	Showing a control value failure
5	Heating/Cooling switchover	1 Bit	Switchover between heating/cooling; Showing the current state

Table 51: Communication object - Automatic mode control value

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6.3.2 Automatic mode – Delta T

The following figure shows the available settings for the automatic mode via Delta T:

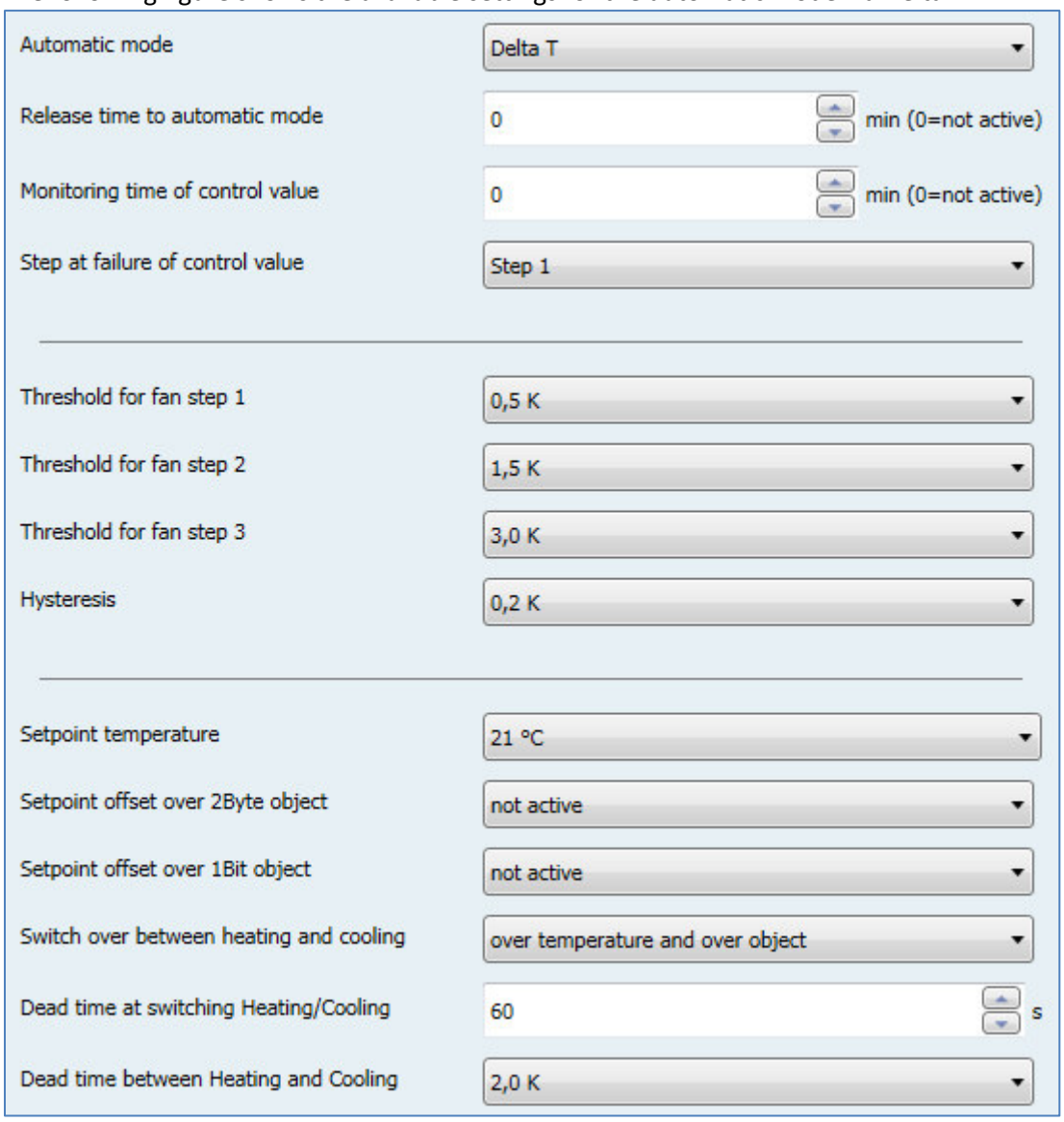

Figure 51: Automatic mode - Delta T

The following table shows the available settings:

ETS-text	Dynamic range **[default value]**	comment
Release time to automatic mode	0-1440 **[0]**	Defines the time which starts after switching into the direct mode. When this time is elapsed, the FanCoil switches back into the automatic mode.
Monitoring time of control value	0-360min **[0 min]**	Defines the time periods in which the actuator must receive a valid control value. If no control value is received, a control value failure is released and the FanCoil switches into the step for a FanCoil failure..

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Step at failure of control value	▪ Off ▪ **Step 1** ▪ Step 2 ▪ Step 3	Step at a control value failure
Threshold for fan step 1	0-100% **[5%]**	Defines from which value the FanCoil switches into step 1.
Threshold for fan step 2	0-100% **[50%]**	Defines from which value the FanCoil switches into step 2.
Threshold for fan step 3	0-100% **[80%]**	Defines from which value the FanCoil switches into step 3.
Hysteresis	0-10% **[2%]**	Defines the hysteresis for switching off the current FanCoil step. Point of switching off = Fan Step - Hysteresis
Setpoint temperature	10°C – 30°C **[21°C]**	Adjustment of the setpoint
Setpoint offset by 2 Byte object	▪ **not active** ▪ active	Activation of the setpoint offset via 2 Byte.
Maximum setpoint offset	1,0k – 10,0K **[1,0K]**	Adjustment of the maximum setpoint offset
Setpoint offset by 1 Bit object	▪ **not active** ▪ active	The setpoint offset via 1 Bit object increases the setpoint at receiving a “1” by the adjusted step range and reduces the setpoint at receiving a “0” by the adjusted step range.
Step range	0,0K – 1,0K **[0,5K]**	Defines the step range fort eh setpoint offset via 1 Bit object.
Dead time at switching heating/cooling	0 – 1000s **[60s]**	Defines the pause between heating/cooling switchover. During this dead time, the FanCoil is witched off and both valves are closed.
Switchover between heating and cooling	▪ manually by object ▪ **by temperature and object**	**Adjustment is only at heating and cooling systems available!** The automatic switchover switches automatically, in accordance to the received temperature and the current setpoint, between heating and cooling. At the automatic switchover, the object 5 – Heating/Cooling switchover, is used as state object.
Dead zone between heating and cooling	0,0K – 10,0K **[2,0K]**	The dead zone between heating and cooling is used for the automatic switchover between heating and cooling.

Table 52: Automatic mode - Delta T

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The settings „Release time to automatic mode“ and „Dead time at switching heating/cooling” are explained in chapter 6.3.1 Automatic Mode – Control Value.

Thresholds:

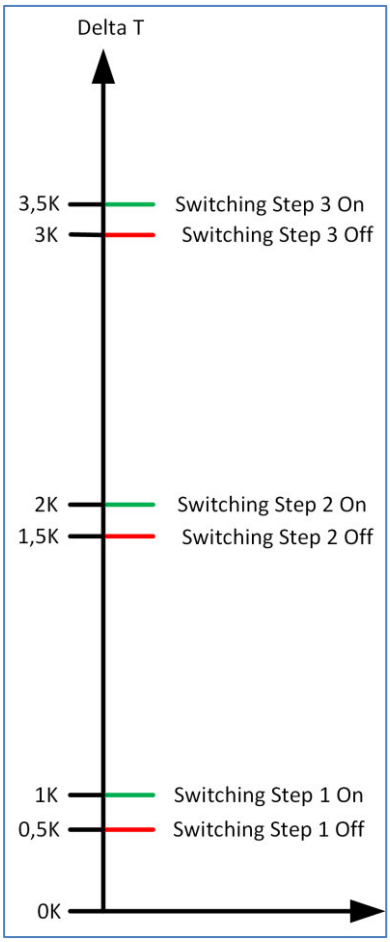

Figure 52: Thresholds - Delta T

shows the thresholds for the temperature difference. The thresholds for switching up into the next step are set directly in the parameter at the ETS-Software. At Figure 52: Thresholds - Delta T the thresholds are set to 1K, 2K and 3,5K. The threshold for switching into the next lower step are calculated via threshold – hysteresis. Here, the hysteresis is set to 0,5K. The Delta T value is calculate with setpoint – temperature at the heating mode and with temperature – setpoint at the cooling mode.

Switchover Heating/Cooling:

At the automatic switchover via the temperature, a dead zone between heating and cooling can be defined to avoid too much switching. The dead zone is calculated symmetric around the setpoint. A dead zone of 2K at a setpoint of 21°C causes switching points at 20°C and 22°C:

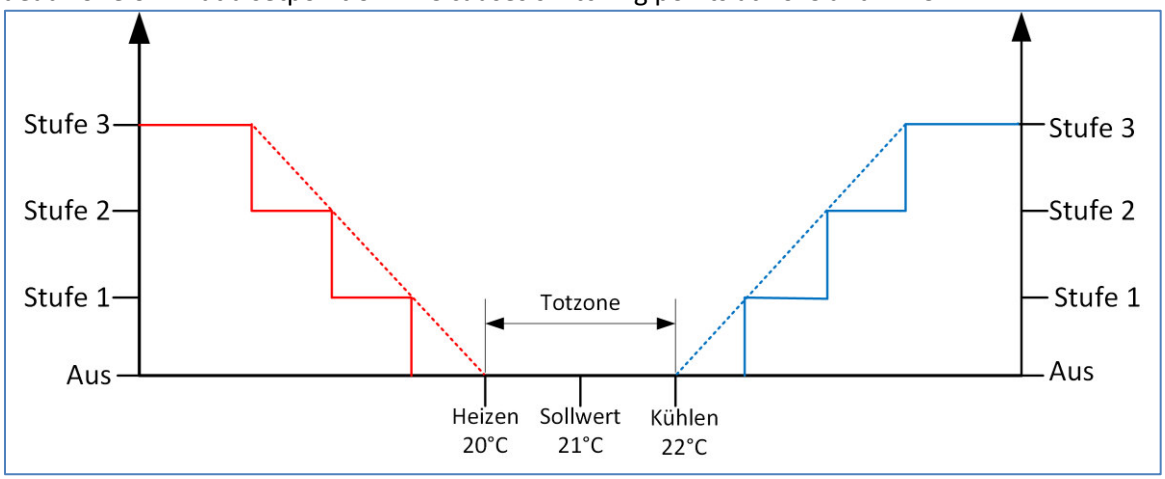

Figure 53: Dead zone heating & cooling

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Setpoint offset:

Because the Delta T- Control controls always with the current setpoint, the setpoint can be shifted or set to a new value. Three methods to change the setpoint are available:

- Setting a new absolute setpoint
  By sending a temperature to the object 28, a complete new setpoint is set.
- Shifting the current setpoint by sending a temperature difference
  By sending a temperature difference to object 29, the setpoint is shifted in relation to the current setpoint.
- Shifting the setpoint in steps by using a 1 Bit command
  By sending a „1“, the setpoint is increased by the adjusted step range and by sending a „0“, the setpoint is reduced by the adjusted step range.

The following table shows the communication objects for the automatic mode – Delta T:

Number	Name	Length	Usage
4	Control value failure	1 Bit	Showing a control value failure
5	Heating/Cooling switchover	1 Bit	Switchover between heating/cooling; Showing the current state
8	Manual setpoint offset	1 Bit	Shifts the setpoint by the adjusted step range
27	Temperature value	2 Byte	Receiving the current room temperature
28	Setpoint temperature	2 Byte	Sending a new absolute setpoint
29	Setpoint offset	2 Byte	Shifts the setpoint by a temperature difference
30	Current setpoint temperature	2 Byte	State of the current setpoint

Table 53: Communication objects - Automatic mode Delta T

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6.4 Direct Mode

The following figure shows the activation of the direct mode:

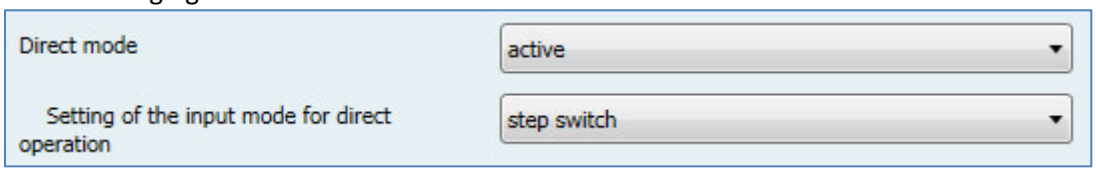

Figure 54: Direct Mode

The way of controlling the direct mode is set directly in the menu „General settings“. Three different ways of controlling the direct mode are available.

6.4.1 binary coded

At the binary coded controlling, the bits are evaluated combined:

Value - Bit 1	Value - Bit 0	Step
0	0	0
	1	1
1	0	2
1	1	3

Table 54: Direct Mode - binary coded

The following communication objects are available:

Number	Name	Length	Usage
9	Bit 0	1 Bit	Activation/Deactivation of Bit 0
10	Bit 1	1 Bit	Activation/Deactivation of Bit 1

Table 55: Communication objects - Direct mode binary coded

6.4.2 Step switch

At the step switch, every step is controlled by a separate communication object. If a communication object receives a logical 1 at one communication object, this step will be switched on and all others steps will be switched off. A logical 0 has no effect.
The following communication objects are available:

Number	Name	Length	Usage
9	Step 0	1 Bit	Switching the FanCoil off
10	Step 1	1 Bit	Switching step 1 on
11	Step 2	1 Bit	Switching step 2 on
12	Step 3	1 Bit	Switching step 3 on

Table 56: Communication object - Direct mode step switch

6.4.3 - 1 Bit Up/Down

At the direct mode via “1 Bit Up/Down”, the step is reduced/increased at receiving a 0/1. A logical 1 switches the FanCoil one step up and a logical 0 one step down.
The following communication objects are available:

Number	Name	Length	Usage
9	Up/Down	1 Bit	0 = switching one step down 1 = switching one step up

Table 57: Communication objects - Direct Mode 1 Bit Up/Down

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6.4.4 - 1 Byte Value

At the direct mode via „1 Byte Value" the next step is directly sent via the 1 Byte communication object, The value 1 sets the fan into step 1, the value 2 sets the fan into step 2 and so on. Values above the maximum fan step will be ignored.
The following table shows the communication object:

Number	Name	Length	Usage
9	1 Byte Wert	1 Byte	Sending a new Fan Level

Table 58: Communication object - 1 Byte Value

6.5 State

Three different state functions are available, which can be activated to the same time. The following settings are valid for all state functions:

Step for status
For the state-functions as well the current step as the target step can be used. If the current step is selected, the state shows always the actual step. Because of the times for changeover-delay, minimum time of each time, etc., a delay between feedback and state function can occur. If the target step is used for the state, the user becomes a direct feedback after controlling but a gap between current and controlled step can occur. The following parameter sets the step for the state:

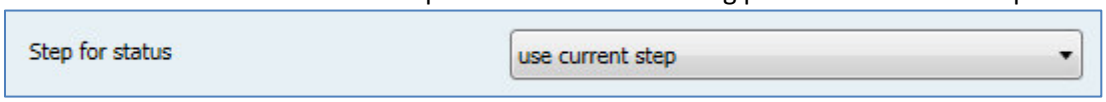

Figure 55: Step for status

Cascading
Every state function can be cascaded. If cascading is activated for a function, an additional object is shown for this state. This object must be connected with the output object of the prior FanCoil actuator. The FanCoil actuator evaluates the input and its own state and sends the larger value to its output object. For example: The input has a control value of 50% but the own control value is only 10%, so the output state of the actuator will show a control value of 50%. The following figure shows this function for the state function "maximum control value":

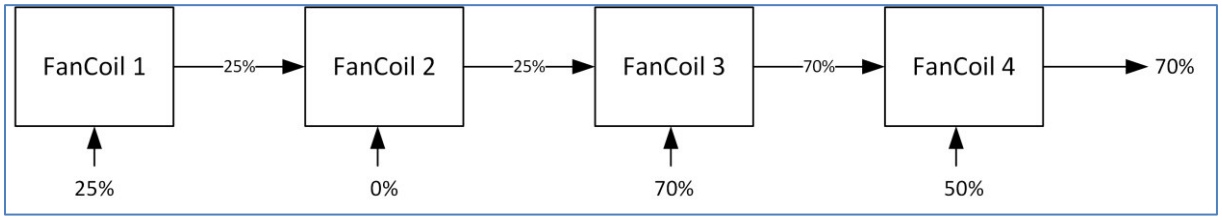

Figure 56: Cascading

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Sending behavior:
The sending behavior can be set for every state:

ETS-text	Dynamic range **[default value]**	comment
Send condition	• **at changes** • at changes and cyclic	**At changes:** The state is only sent at every change of the object value. **At changes and cyclic:** The state is sent at every change and cyclic with a defined interval.
Time for cyclic sending	0-3600s **[300s]**	Adjustment of the interval for cyclic sending

Table 59: Sending behavior

6.5.1 Status Fan at heating/cooling mode active

The state “Fan at heating/cooling mode” sends a “1” when the FanCoil is switched on – so runs at least with level 1. The cascading of the state has the effect that the output sends a “1” when the input has a “1” or the FanCoil is witched on. This state function can e.g. be used for switching a heating pump.
The following objects are available:

Number	Name	Length	Usage
13	External heating request (Input)	1 Bit	Input for cascading the heating request
14	External heating request (Output)	1 Bit	Output of the heating request
15	External cooling request (Input)	1 Bit	Input for cascading the cooling request
16	External cooling request (Output)	1 Bit	Output of the cooling request

Table 60: Communication objects - State fan active

6.5.2 Status maximum control value

The state maximum control value sends in the automatic mode-control value the received control value. The cascading of this state evaluates the input object and its own state and sends the larger value to its output object (Figure 56: Cascading).
The following communication objects are available:

Number	Name	Length	Usage
17	Maximum control value for heating (Input)	1 Byte	Input for cascading the state of the maximum control value
18	Maximum control value for heating (Output)	1 Byte	Output of the state of the maximum control value
19	Maximum control value for heating (Input)	1 Byte	Input for cascading the state of the maximum control value
20	Maximum control value for heating (Output)	1 Byte	Output of the state of the maximum control value

Table 61: Communication object - State maximum control value

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6.5.3 Status maximum Level – 1 Byte

The state maximum level shows the current Fan Level. At cascading this state, the FanCoil actuator evaluates the input object and ist own Fan-Level and sends the bigger one to ist output object.
The following communication objects are available:

Number	Name	Length	Usage
21	Maximum fan level heating (Input)	1 Bit	Input for cascading the maximum Fan Level in heating mode
22	Maximum fan level heating (Output)	1 Bit	Output of the maximum Fan Level in heating mode
23	Maximum fan level cooling (Input)	1 Bit	Input for cascading the maximum Fan Level in cooling mode
24	Maximum fan level cooling (Output)	1 Bit	Output of the maximum Fan Level in cooling mode

Table 62: Communication objects - State maximum level Byte

6.5.4 State maximum Level 3/4 x 1 Bit

The state maximum level sends a „1“ to the object for the current active level. All other objects have the value 0.
The following communication objects are available:

Number	Name	Length	Usage
22/26	Maximum Fan level Cooling/Heating – State Step 1	1 Bit	Sends an active Fan Level 1
23/27	Maximum Fan level Cooling/Heating – State Step 2	1 Bit	Sends an active Fan Level 2
24/28	Maximum Fan level Cooling/Heating – State Step 3	1 Bit	Sends an active Fan Level 3
25/29	Maximum Fan level Cooling/Heating – State Step 4	1 Bit	Sends an active Fan Level 4

Table 63: Communication objects - State maximum Fan Level 1 Bit

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8 Attachment

8.1 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.

8.2 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.

8.3 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.

8.4 Datasheet

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MDT Switch Actuator AKK Fancoil

MDT Switch Actuator 4-fold, MDRC

Version		
AKK-04FC.03	Switch Actuator 4-fold / Fancoil	2SU MDRC, 230VAC, 16A

The MDT Switch Actuator AKK receives KNX telegrams and switches up to 4 independent electrical loads in operation mode as switching actuator. Each output uses a bistable relay and is individually agjustable via ETS. In aoperation mode as fan coil actuator 3 or 4 step ventilators are controlled. In 3 speed operation the fourth channel can be used as output for valve control.

Fan coil mode:

- Control of 3/4-speed fans/ventilator convectors
- Additional switching output at 3-speed operation
- Outputs are locked against each other
- Direct operation by three 1Bit objects or a single 1Bit object (+/-)
- Automatic operation by 1Byte control value (0-100%)
- Suitable for 2-pipe/4-pipe systems
- Output objects to control valves for heating/cooling
- Day/Night function to limit fan speed at night
- Emergency operation if actuating variable fails

Switch Actuator mode:

- NO and NC contact operation
- Time functions (switch-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Logical linking of binary data, 8 scenes per channel
- Central switching functions and block functions
- Adjustable behaviour in case of bus voltage failure or return

The MDT Switch Actuator AKK Fancoil 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 Fancoil it is recommended to use the ETS. Please download the application software at www.mdt.de/downloads.html

AKK-04FC.03

- Production in Germany, certified according to ISO 9001

Fan coil mode:

- Control of 3-/4-speed fans/ventilator convectors
- Additional switching output at 3-speed operation
- Outputs are locked against each other
- Direct operation by three 1Bit objects or a single 1Bit object (+/-)
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Switch Actuator mode:

- NO and NC contact operation
- Time functions (switch-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Logical linking of binary data, 8 scenes per channel
- Central switching functions and block functions
- Adjustable behaviour in case of bus voltage failure or return
- Quick application download (long frame support for ETS5)
- 3 years warranty

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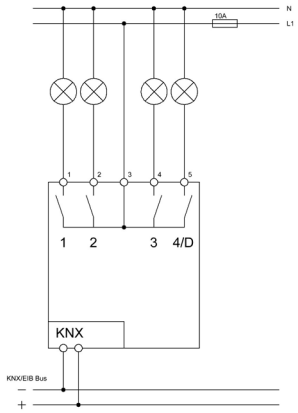
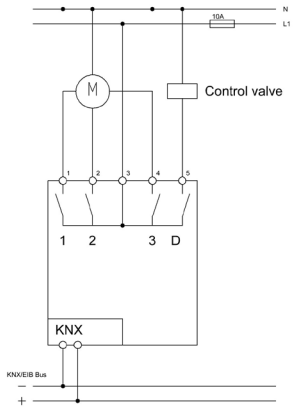
MDT Switch Actuator AKK Fancoil

Technical Data	AKK-04FC.03	
Number of outputs	4	
Output switching ratings		
Ohmic load	16A	
Capacitive load	70µF	
Voltage	230VAC	
Maximum inrush current	300A/150µs 150/600µs	
Maximum load		
Incandescent lamps	2000W	
Halogen lamp 230V	2000W	
Halogen lamp, electronic transformator	1200W	
Fluorescent lamp not compensated	1800W	
Fluorescent lamp parallel compensated	800W	
max. number of electronic transformers	10	
Output life expectancy (mechanical)	1.000.000	
Max. total current of the actuator	16A	
Specification KNX interface	TP-256 with long frame support for ETS5	
Available application software	ETS 4/5	
Permitted wire gauge		
Screw terminal	0,5 - 4,0mm² eindrähtig 0,5 - 2,5mm² feindrähtig	
KNX busconnection terminal	0,8mm Ø, solid core	
Power supply	KNX bus	
Power consumption KNX bus typ.	<0,3W	
Operation temperature range	0 to + 45°C	
Enclosure	IP 20	
Dimensions MDRC	2SU	

Examplary circuit diagram AKK-04FC.03 Switching Actuator



Examplary circuit diagram AKK-04FC.03 Fan coil



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MDT Switch Actuator AKK Fancoil

MDT Switch Actuator 3-fold, flush mounted

Version		
AKK-03UP.03	Switch Actuator 3-fold / Fancoil	Flush mounted, 230VAC, 10A

The MDT Switch Actuator AKK receives KNX telegrams and switches up to 3 independent electrical loads in operation mode as switching actuator. Each output uses a bistable relay and is individually agjustable via ETS. In aoperation mode as fan coil actuator a 3 step ventilators is controlled.

Fan coil mode:

- Control of 3-speed fans/ventilator convectors
- Outputs are locked against each other
- Direct operation by three 1Bit objects or a single 1Bit object (+/-)
- Automatic operation by 1Byte control value (0-100%)
- Suitable for 2-pipe/4-pipe systems
- Output objects to control valves for heating/cooling
- Day/Night function to limit fan speed at night
- Emergency operation if actuating variable fails

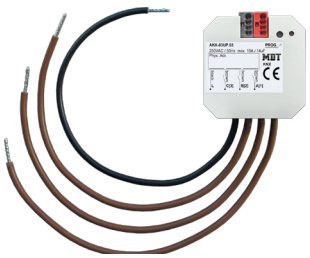
Switch Actuator mode:

- NO and NC contact operation
- Time functions (switch-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Logical linking of binary data, 8 scenes per channel
- Central switching functions and block functions
- Adjustable behaviour in case of bus voltage failure or return

The MDT Switch Actuator AKK Fancoil 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 Fancoil it is recommended to use the ETS. Please download the application software at www.mdt.de/downloads.html

AKK-03UP.03



- Production in Germany, certified according to ISO 9001

Fan coil mode:

- Control of 3-speed fans/ventilator convectors
- Outputs are locked against each other
- Direct operation by three 1Bit objects or a single 1Bit object (+/-)
- Automatic operation by 1Byte control value (0-100%)
- Suitable for 2-pipe/4-pipe systems
- Output objects to control valves for heating/cooling
- Day/Night function to limit fan speed at night
- Emergency operation if actuating variable fails

Switch Actuator mode:

- NO and NC contact operation
- Time functions (switch-on/switch-off delay)
- Staircase light function with adjustable warning time
- Status response (active/passive) for each channel
- Logical linking of binary data, 8 scenes per channel
- Central switching functions and block functions
- Adjustable behaviour in case of bus voltage failure or return
- Flush mounted in socket
- Quick application download (long frame support for ETS5)
- 3 years warranty

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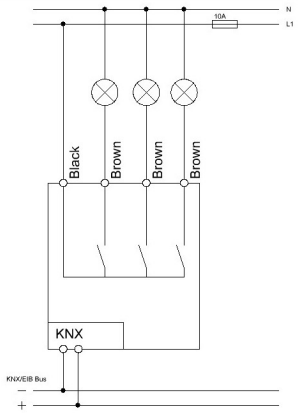
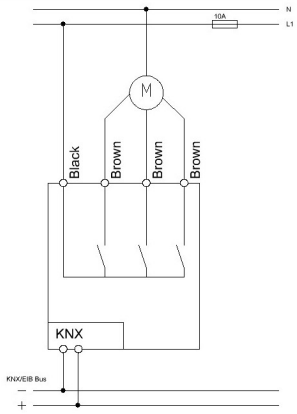
MDT Switch Actuator AKK Fancoil

Technical Data	AKK-03UP.03	
Number of outputs	3	
Output switching ratings		
Ohmic load	10A	
Capacitive load	14uF at 10A	
Voltage	230VAC	
Maximum inrush current	150A/150µs 50/600µs	
Maximum load		
Incandescent lamps	1500W	
Halogen lamps 230V	1200W	
Halogen lamps, electronic transformer	500W	
Fluorescent lamps, not compensated	500W	
Fluorescent lamps, parallel comp.	120W	
Max. number of electronic transformers	2	
Output life expectancy (mechanical)	1.000.000	
Max. total current of the actuator	16A	
Fuse protection	10A	
Specification KNX interface	TP-256 with long frame support for ETS5	
Available application software	ETS 4/5	
Permitted wire gauge		
KNX busconnection terminal	0,8mm Ø, solid core	
Power supply	KNX bus	
Power consumption KNX bus typ.	<0,3W	
Operation temperature range	0 to + 45°C	
Enclosure	IP 20	
Dimensions (W x H x D)	41mm x 41mm x 22mm	

Examplary circuit diagram AKK-03UP.03



Examplary circuit diagram AKK-03UP.03 Fancoil



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