Product documentation

Switch actuators

Art. no. 227021SR, 227061SR, 227161SR, 227241SR



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1 Information on the product

1.1 Product catalogue

Product name:	Switch actuators
Use:	Actuator
Design:	RMD
Art. no.	227021SR, 227061SR, 227161SR, 227241SR

1.2 Purpose

The switch actuator receives telegrams from sensors or other control systems via the KNX and switches electrical loads, such as lighting systems. Each relay output has bistable switching relays, which allows defined preferred positions in the event of bus voltage failure/recovery and after an ETS programming operation. The buttons on the front panel of the device permit switching the relays on and off by hand in parallel during KNX operation or activated in a non-programmed state. This feature permits fast checking of connected loads for proper functioning.

The functionalities include NC contact or NO contact, for example, extensive time functions, logic operations, scenes, monitoring functions, operating hours counters, disabling functions or alternatively restraints, which can be configured in the ETS. In addition, the switching status of a relay output can be signalled back. The central switching operation of all switching outputs of up to 6 central functions is possible, too.

In addition, the device has 8 internal logic functions. Using these functions, logic gates (e. g. AND, OR, exclusive OR, each with up to 4 inputs) can be set up and thus switching and status information can be linked and evaluated. Alternatively, a 1-bit to 1-byte converter and a disabling element with filter and time functions can be configured for each logic function. As a further option, comparators or limit value switches with hysteresis can be set as a logic function.
The logic functions have their own KNX communication objects and can process telegrams of the actuator or of other bus devices.

The actuator supports the Xpress configuration ☒, which simplifies the project design of the device in the ETS. All or individual outputs can be assigned to predefined functions - optimally adapted to specific applications. The "Customised" configuration offers all usable functions of the device without restrictions. Alternative configurations reduce the scope of parameters and objects, thereby creating specific and clear application scenarios.

The device can be updated and used for diagnostics. A firmware diagnostic (compatibility check) can be carried out easily in the parameter dialogue of the ETS application. Firmware can be easily updated with the Jung ETS Service app (additional software). The actuator is compatible with the ETS "Smart Linking" function.

The device is KNX Data Secure capable. KNX Data Secure offers protection against manipulation in building automation and can be configured in the ETS project. Detailed technical knowledge is a prerequisite. A device certificate, which is attached to the device, is required for safe commissioning. During mounting, it is recommended to remove the certificate from the device and to store it securely.

Planning, installation and commissioning of the device are carried out with the aid of the ETS, version 5.7.7 and higher or 6.3.0.

The device electronics are supplied exclusively from the bus voltage. The device is designed for mounting on DIN-rails in closed compact boxes or in power distributors in fixed mounting in dry rooms.

1.3 Device components

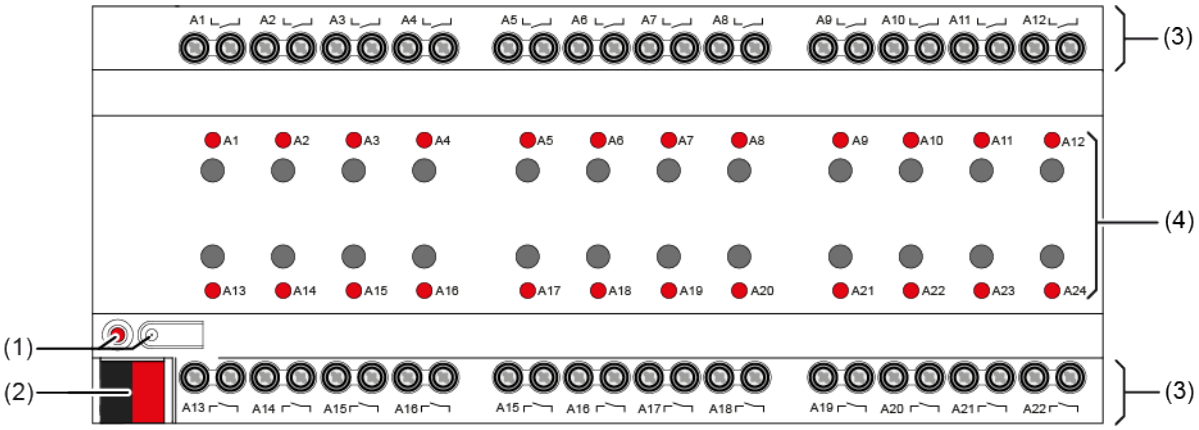


Figure 1: Device components using the example of the 24-gang device variant

(1) Programming button and LED
(2) KNX connection
(3) Load connections (relay outputs)
(4) Control panel with status displays

1.4 Technical data

KNX	
KNX medium	TP256
KNX commissioning mode	S mode
Rated voltage	DC 21 ... 32 V SELV
Current consumption	
Device variants 2-gang, 6-gang, 16-gang	5 ... 18 mA
Device variant 24-gang	5 ... 24 mA
Ambient conditions	
Ambient temperature	-5 ... +45 °C
Storage/transport temperature	-25 ... +70 °C

Clampable conductor cross-section (see figure 2)



Figure 2: Clampable conductor cross-section

Installation width	
Device variant 2-gang	36 mm / 2 HP
Device variant 6-gang	72 mm / 4 HP
Device variant 16-gang	144 mm / 8 HP
Device variant 24-gang	216 mm / 12 HP
Weight	
Device variant 2-gang	Approx. 110 g
Device variant 6-gang	Approx. 235 g
Device variant 16-gang	Approx. 508 g
Device variant 24-gang	Approx. 754 g
Terminals	
Connection mode	Screw terminals
Stripping length	8 mm
Phillips screwdriver (recommended)	PZ1 Plusminus (Pozidriv/slotted)
Phillips screwdriver	PZ1
Slotted screwdriver	4 mm
Connection torque for screw terminals	max. 0.5 Nm
Summation currents	
Neighbouring outputs	Σ 20 A

All outputs	
Device variant 2-gang	Σ 20 A
Device variant 6-gang	Σ 60 A
Device variant 16-gang	Σ 160 A
Device variant 24-gang	Σ 240 A
Circuit breaker	max. B16
Switching voltage	AC 250 V ~
Mains frequency	50 / 60 Hz
Outputs	
Switching current AC1	16 A
Fluorescent lamps	16 AX (140 µF)
Switch-on current (1,000 µs)	max. 235 A (with 400 W HV-LED load)
Loads per output	
Incandescent lamps	1500 W
HV-LED lamps	400 W
Motors	1150 VA

1.5 As-delivered state

In the as-delivered state, the actuator is passive, i.e. no telegrams are transmitted to the KNX. The outputs can, however, be activated by manual operation on the device, if the bus voltage is on. There is no status display on the KNX during manual operation.
The device can be programmed and put into operation via the ETS. The physical address is preset to 15.15.255.

Moreover the device has been configured at the factory with the following characteristics...

- Behaviour in case of bus voltage failure: open contacts
- Behaviour on bus voltage return: open contacts
- LED status indication: permanent

The as-delivered state can be restored by unloading the application program with the aid of the ETS.

1.6 Accessories

Connection cover	Art. no. 2050K

2 Safety instructions

To avoid potential damage, read and follow the following instructions:



Electric devices may only be mounted and connected by electrically skilled persons.

Danger of electric shock. Always disconnect before carrying out work on the device or load. In so doing, take all the circuit breakers into account, which support dangerous voltages to the device and or load.

Danger of electric shock on the SELV/PELV installation. Do not connect loads for mains voltage and SELV/PELV together to the device.

Instructions are part of the product. So keep them in a safe place.

3 Mounting and electrical connection

Mount device

Recommendation: Enter or scan the device certificate to add it to the ETS project. Use a high resolution camera to scan the QR code. Remove the device certificate from the device during mounting. Document all passwords and keep them safe.

- Mount device on DIN rail. The installation position is arbitrary.

Connect device

DANGER!

Electric shock when live parts are touched.

Electric shocks can be fatal.

Always disconnect before carrying out work on the device or load. To do so, switch off all associated circuit breakers. Cover up any adjacent live parts.

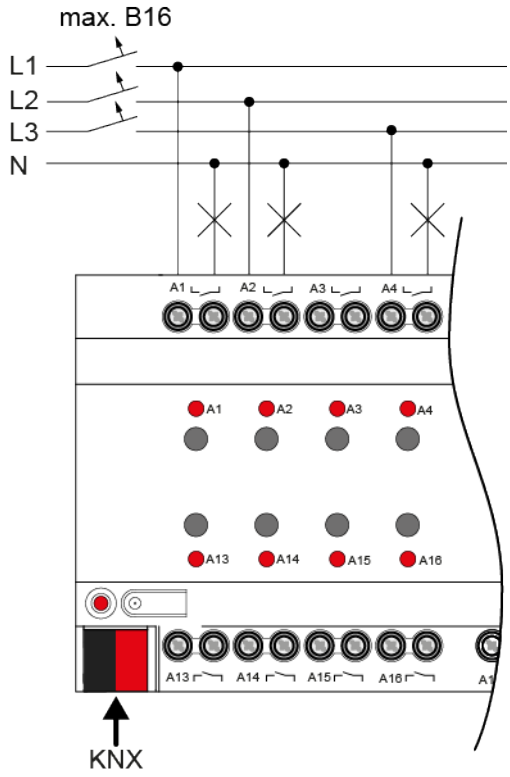


Figure 3: Device connection (connection example)

- Connect load as shown in the connection example. Observe the technical data.
- Connect bus line with KNX device connection terminal observing the correct polarity.
- Attach the cover cap (accessories) to the KNX connection as protection against hazardous voltages.

The total current capacity of neighbouring outputs is a maximum of 20 A.

4 Commissioning

Commissioning the device

- Switch on the KNX bus voltage.
- Wait approx. 10 s (see figure 4).
- Switch on load circuits.
- Perform commissioning with the ETS.

Delivery state: The outputs can be operated in manual control.

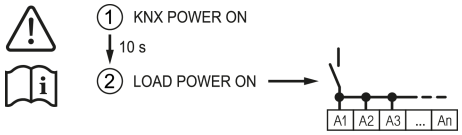


Figure 4: Sequence during commissioning - Device label

4.1 Safe-state mode and master reset

Safe-state mode

The safe-state mode stops the execution of the loaded application program.

Only the system software of the device is still functional. ETS diagnostic functions and programming of the device are possible. Manual control is not possible.

Activating safe-state mode

- Switch off the bus voltage or remove the KNX device connection terminal.
- Wait approx. 15 s.
- Press and hold down the programming button.
- Switch on the bus voltage or attach the KNX device connection terminal. Release the programming button only after the programming LED starts flashing slowly.

  Safe-state mode is activated.

  The programming mode can also be switched on and off in the safe-state mode as usual by briefly pressing the programming button again. The programming LED stops flashing if the programming mode is active.

Deactivating safe-state mode

- Switch off bus voltage (wait approx. 15 s) or carry out ETS programming.

Master reset

The master reset restores the basic device settings (physical address 15.15.255, firmware remains in place). The device must then be recommissioned with the ETS. The "Operation in delivery state" is active again.

In secure operation, a master reset will deactivate the device security. The device can then be recommissioned with the device certificate.

Performing a master reset

Prerequisite: safe-state mode is activated.

- Press and hold down the programming button for > 5 s.

  The programming LED flashes quickly.

  The device performs a master reset, restarts and is ready for operation again after approx. 5 s.

Restoring the device to factory settings

Devices can be reset to factory settings with the Jung ETS Service app. This function uses the firmware included in the device that was active at the time of delivery (delivery state). Restoring the factory settings causes the devices to lose their physical address and configuration.

5 Application programs

ETS search paths:	Output / Binary output, 2-gang / Switch actuator, 2-gang Output / Binary output, 6-gang / Switch actuator, 6-gang Output / Binary output, 16-gang / Switch actuator, 16-gang Output / Binary output, 24-gang / Switch actuator, 24-gang
Name	"Switching 20E121" for actuator variant 2-gang "Switching 20E321" for actuator variant 6-gang "Switching 20E621" for actuator variant 16-gang "Switching 20E721" for actuator variant 24-gang
Version	2.1 For ETS from version 5.7.7 or 6.3.0
Mask version	SystemB (07B0)
Summarized description	Multifunctional switching applications with logic functions and manual operation. With Xpress configuration. KNX Data Secure capable.

6 Scope of functions

General

- The actuator supports the Xpress configuration ☒, which simplifies the project design of the device in the ETS. All or individual outputs can be assigned to predefined functions - optimally adapted to specific applications. The "Customised" configuration offers all usable functions of the device without restrictions. Alternative configurations reduce the scope of parameters and objects, thereby creating specific and clear application scenarios.
- The device can be updated and used for diagnostics. A firmware diagnostic (compatibility check) can be carried out easily in the parameter dialogue of the ETS application. Firmware can be easily updated with the Jung ETS Service app (additional software).
- Compatible with the ETS "Smart Linking" function.
- Up to 8 independent logic functions for the implementation of simple or complex logic operations.
- Actively transmitting status messages can be delayed globally after the bus voltage returns or after ETS programming.
- Manual operation of outputs independent of the KNX (for instance, construction site mode) with LED status indicators. Manual control can also be disabled via the bus.

Switching outputs

- Independent switching of the switching outputs.
- Operation as NO or NC contacts.
- Central switching of up to 6 switching objects (ON, OFF, permanent ON, permanent OFF).
- Switching status: transmitting after changes or cyclically to the bus.
- Reaction in case of a bus voltage failure and when the bus voltage returns as well as after ETS programming can be set for each output.
- Logic function individual for each output.
- Disabling function can be parameterized for each channel. Forced position function separately for each output as an alternative.
- Timing functions (switch-on delay, switch-off delay, staircase lighting timer, also with pre-warning function).
- Incorporation into light moods: up to 64 internal scenes parameterizable per output.
- Operating hours counter can be activated independently for each output.
- Input monitoring for cyclical updating of the switching object with safety position.

Logic functions

- The device has 8 internal logic functions.

- Logic gates (e. g. AND, OR, exclusive AND, exclusive OR, each with up to 4 inputs).
- 1-bit to 1-byte converter with input filter, disabling object and presetting of the output values.
- Disabling element with filter and time functions and disabling object.
- Comparator for values with 9 different input data formats and many comparison operations.
- Limit switch with hysteresis with upper and lower threshold for 9 different input data formats. Incl. presetting of the 1-bit output values.
- The logic functions have their own KNX communication objects and can process telegrams of the actuator or of other bus devices.

7 Notes on the software

Unloading the application program

The application program can be unloaded with the ETS. In this case, all outputs of the product are switched off. Manual operation is possible.

ETS project design and commissioning

For project design and commissioning of the device, ETS5 version 5.7.7 or higher or ETS6 version 6.3.0 or higher is required.

Safe-state mode

If the device does not work properly - for instance as a result of errors in the project design or during commissioning - the execution of the loaded application program can be halted by activating the safe-state mode. In safe-state mode, activation of the outputs via the KNX or manual operation is not possible. The actuator remains passive in safe-state mode, since the application program is not being executed (state of execution: Terminated). Only the system software is still functional so that the ETS diagnostic functions and also programming of the device continue to be possible.

8 Operation and indication

8.1 Button operation and indication functions

Operating elements

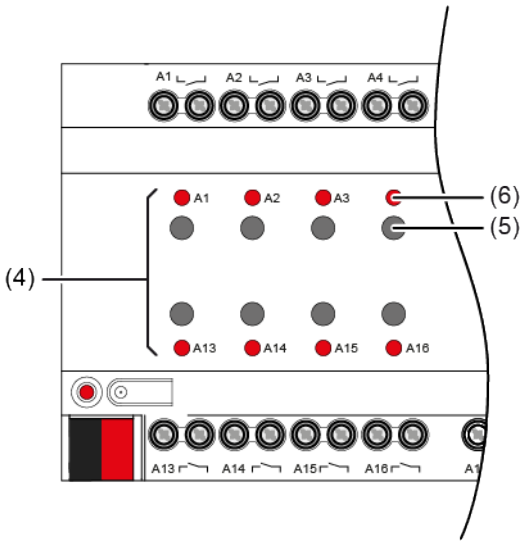


Figure 5: Operating elements – Overview

(4) Control panel with status displays

(5) Button for manual operation (per relay output)
Each press of the button changes the relay status.

(6) Status LED (per relay output)
ON: Relay output closed
OFF: Relay output opened

Bus operation / manual operation

– Bus mode: Operation via other KNX devices

– Manual operation: local manual control with keypad

After a bus voltage return, the device switches to bus mode. In the unprogrammed delivery state, all relay outputs will open.

The manual operation can be disabled for all outputs in ongoing operation via a bus telegram.

Status indication

The status LEDs (6) indicate the states of the outputs.

– OFF: Relay output opened

– ON: Relay output closed

The status LEDs can also only display the statuses temporarily according to the ETS configuration. In this case, the LEDs switch off automatically after a set display duration. When a button (5) is pressed, the status LEDs are activated and indicate the initial status if manual operation is enabled and not disabled in the ETS.

Operating the outputs

Precondition: Bus voltage is switched on.

- Press any button (5) briefly.

  The assigned output changes the relay status. The corresponding status LED (6) indicates the relay status.
- If necessary, press further buttons (5) in succession.

Simultaneous manual operation of several outputs is not possible.

Outputs that are not required can be switched off in the ETS. Manual operation of these outputs is no longer possible.

8.2 ETS configuration

8.2.1 Manual control

All outputs of the device have electronic manual operation. The relay outputs can be controlled independently of each other via a keypad on the front of the device. Manual operation is possible while the device is supplied with power from the bus supply voltage. In the as-delivered state, manual operation is fully enabled. Therefore, in the unprogrammed state, all outputs can be controlled by the manual operation so that fast function checking of the connected loads (e.g. on the construction site) is possible.

After initial commissioning of the actuator via the ETS, manual operation can be enabled or completely disabled.

Disabling manual operation permanently

Manual operation is enabled in the as-delivered state. If the parameter of the same name is deactivated on the "Manual operation" parameter page, no parameters and communication objects for manual operation are available. The outputs can then only be controlled via the bus.

Disabling manual operation temporarily

Manual control can be disabled separately via the bus. If the disabling function is enabled, then as soon as a disabling telegram is received via the disabling object, the actuator locks the function keys on the front panel of the device. The telegram polarity of the disabling object cain be configured.

Manual operation must be enabled.

- Activate the parameter "Disabling function" on the "Manual operation" parameter page.

  The disabling function of manual operation is enabled and the disabling object becomes visible.
- Select the desired telegram polarity in the parameter "Object polarity".

i If the polarity is "1 = enabled; 0 = disabled", the disabling function is immediately active on bus voltage return or after an ETS programming operation (object value "OFF"). To activate manual operation in this case, an enable telegram "ON" must first be sent to the disabling object.

i After the bus voltage returns, a disabled state that was active beforehand is always inactive when the polarity of the disabling object is non-inverted.

Behaviour after manual operation

After a manual operation, bus operation is immediately active again. The last state of all outputs remains unchanged for the time being until a new specification is made via the KNX. A disabling or forced position activated for the outputs via bus control is

overridden by manual operation. After manual operation, the actuator returns to the activated disable or forced position, but without repeating the behaviour at the beginning of these functions.

The operations triggered in manual operation update the states of the status objects. Telegrams are also sent to the KNX if the status objects concerned are enabled in the ETS.

8.2.2 Status indication

The status LEDs on the front of the device can permanently or temporarily indicate the current status of the switching outputs.

- Continuous status indication:
  The parameter "Indicate status temporarily" on the "Status indication" parameter page is deactivated. In the case of a continuous status indication, the status LEDs always indicate the current status of the outputs.
- Temporary status indication:
  The parameter "Indicate status temporarily" on the "Status indication" parameter page is activated. With a temporary indicator, the status display is activated by pressing any button on the manual control, but only if the manual control has been enabled in the ETS and not disabled by a bus telegram. The display length is set in the ETS.
  When manual operation is enabled, the operating command is also executed by pressing the push-buttons. If manual operation has been deactivated in the ETS or disabled by a bus telegram, all push-buttons are deactivated and can therefore no longer trigger the temporary status display. In this case, it is only possible to control the indicator using the "Temporary status indicator" object.

In the as-delivered state, the continuous status indication is preset.

If the parameter "Control via object" is activated, the "Temporary status indication" communication object is available in the ETS. This object is bidirectional and can firstly signal the status of the temporary status indication, and secondly, activate the status display. If a temporary status indication has been activated, the object transmits the value "ON". If the object receives a telegram with the value "OFF" or "ON", the status LEDs indicate the status of the outputs according to the display length. Manual operation is not activated in this case.

By linking the "Temporary status indication" objects of several actuators using a common group address, the indication functions of the status LED can be synchronized with one another. It is thus possible to activate the status indications of all actuators in a control cabinet at the same time if manual operation is triggered on one actuator only - e. g. for service or maintenance purposes.
In addition, the "Temporary status display" object could be controlled, for example, by a magnetic contact connected to the KNX, so that the status indications of all actuators are activated by opening the control cabinet door. If the door is closed, the status indications for energy saving remain switched off.

During a running display length, the "Temporary status indication" object does not transmit any new telegrams if the buttons for manual operation are pressed again.

8.3 Operation and indication parameters

Manual control

Manual control	Checkbox (**yes** / no)
Manual operation is possible while the device is supplied with power from the bus supply voltage. This parameter defines whether manual operation is to be possible or deactivated permanently.	

Disabling function	Checkbox (yes / **no**)
Manual operation can be disabled via the KNX. For this purpose, the disabling object can be enabled here. This parameter is only visible if manual operation is enabled.	

Disabling object polarity	**0 = enabled; 1 = disabled** 0 = disabled; 1 = enabled
This parameter sets the polarity of the disabling object. This parameter is only visible if the disabling function is enabled.	

Status indication

Indicating status temporarily	Checkbox (yes / **no**)
The status LEDs on the front of the device can permanently or temporarily indicate the current status of the switching outputs. Parameter deactivated: Continuous status indication. In this case, the status LEDs always indicate the current status of the outputs. Parameter activated: With temporary indicator, pressing any button on the manual control activates the status display, but only if the manual control has been enabled in the ETS and not disabled by a bus telegram. The display length is set in the ETS.	

Display length (6...255)	6 ... **10** ... 255
This parameter defines the display length if the temporary status indication is activated.	

Control via object	Checkbox (yes / **no**)
If the parameter "Control via object" is activated, the "Temporary status indication" communication object is available in the ETS. This object is bidirectional and can firstly signal the status of the temporary status indication, and secondly, activate the status display. If a temporary status indication has been activated, the object transmits the value "ON". If the object receives a telegram with the value "OFF" or "ON", the status LEDs indicate the status of the outputs according to the display length. Manual operation is not activated in this case.	

8.4 Object list for operation and indication

Function	Name	Type	DPT	Flag
Disabling	Manual operation - Input	1-bit	1,003	C, (R), W, -, A
1-bit object for disabling manual operation on the device. The polarity can be configured. The object is only visible if manual operation is enabled in the ETS.				

Function	Name	Type	DPT	Flag
Temporary status indication	Manual operation - Input/Output	1-bit	1,017	C, (R), W, T, A
1-bit object to signal and activate the temporary status indication. This object is bidirectional and can firstly signal the status of the temporary status indication, and secondly, activate the status display. If a temporary status indication has been activated by pressing a button for manual operation, the object transmits the value "ON". If the object receives a telegram with the value "OFF" or "ON", the status LEDs indicate the status of the outputs according to the display length. Manual operation is not activated in this case. The object is only visible if the temporary status indication is activated				

9 Channel configuration

Xpress configuration ☒

The actuator supports the Xpress configuration in the ETS. With the Xpress configuration, the project design of the device is simplified and time-optimised. All or individual outputs can be assigned to predefined functions - optimally adapted to specific applications.
Customised configuration allows you to use all of the device's functions. Alternative configurations with a reduced range of functions reduce the scope of parameters and objects, thereby creating specific and clear application scenarios. In addition to the standard use cases, it is possible to create function-specific parameter templates by using the "Custom template".

The following table shows the configurable applications for the individual outputs:

Individual



All outputs of the actuator can be individually configured and used independently. The full range of functions is available.

Own template



Customised configurations can be created by using the template. The full range of functions is available, allowing specific use cases to be realised.

All or individual outputs can be assigned to the template and thus configured identically. The parameters of the template are automatically applied to the assigned outputs. Only the communication objects remain available separately for the channels. The use of a separate template is recommended, for example, if all outputs are to have a specific range of functions and continue to be controlled by different group addresses (e.g. switching applications in office complexes or hotel rooms).

Simple switching



The outputs are configured to a specifically reduced range of functions for the simple switching of light or other loads.

Light with scene



The outputs are configured to an optimised range of functions for the control of light scenes.

Light in the stairwell



The outputs are set to a range of functions optimised for staircase lighting control.

Fan with overrun



The outputs are preconfigured in such a way that they are ideal for controlling a fan - in a toilet, for example.

It is possible to deactivate outputs by deselecting the parameter "Use" (e. g. as a reserve for future applications). Deactivated outputs have no parameters or communication objects and cannot be controlled even with manual operation.

If the use of the template is selected for at least one output, a template channel is displayed in the ETS in addition to the channels of the relay outputs. This template channel has all the functional properties of an output that is set to the individual configuration. The template does not have its own communication objects.

The parameter and object configurations of the individual outputs depend on the settings on the "Xpress" page and are expanded or reduced by the ETS depending on the application. When switching between applications, parameter settings or group address assignments to objects can be lost.

ETS Smart Linking

The device is compatible with the ETS function "Smart Linking". This can significantly simplify and speed up project design, especially the linking of communication objects with group addresses. With Smart Linking, functions of the ETS project are linked abstractly with channels of the devices.

– Functions:

  Functions are usually parts of units in building areas, for example switching lights in the kitchen, operating a Venetian blind in the bedroom or controlling a room temperature in the living room. A function contains all group addresses that are relevant for realising the intended functionality.
  The ETS assigns properties to the functions and the contained group addresses (semantics), so that later linking to devices is possible automatically.

– Channels:

  Channels map independently controllable outputs or inputs for KNX actuators or sensors, for example the relay output of a switch actuator, the dimming output of a dimming actuator or the operating rocker of a push-button sensor with display elements. Channels can also be present in room temperature controllers or physical sensors (e.g. presence detectors), which ideally combine all functionally related components into a logical unit. In the ETS, all parameters and communication objects that belong together in terms of functional logic are subordinate to the channels.
  KNX devices must be prepared accordingly in the application programme so that smart linking can be carried out with the ETS. This involves adding information (annotations) to the channels in the ETS product data so that the ETS can recognise how and in what form prepared functions can be linked to the channels of the devices. This device contains this information in the application programme.

i Smart Linking requires ETS6 version 6.4.0 or higher. Future ETS versions will further expand Smart Linking and continuously create new possibilities.

During Smart Linking, the ETS links the prepared functions with the channels of the devices. Parameters are not influenced in the process. Therefore, the devices must be configured to the intended function in the application programme before Smart Linking is executed. The Xpress configuration helps here, quickly and easily realising the right parameter configuration for many applications and ideally preparing the channels of a device for Smart Linking.

10 General settings

10.1 Heartbeat

The heartbeat function makes it easy to check whether the application is running error-free in a device. For this purpose, the Heartbeat communication object sends a telegram with the value "1" with a settable cycle time. The heartbeat function is enabled on the "General" parameter page. The time for the cyclical transmission can then be set on the parameter page "General -> Heartbeat".

10.1.1 Parameters for heartbeat

General

Heartbeat	Checkbox (yes / **no**)
If the parameter is activated, the heartbeat functions and thus the "Heartbeat" object are enabled.	

General -> Heartbeat

Cycle time for transmission of heartbeat	**0** ... 23 h 0 ... **2** ... 59 min
This parameter defines the time with which the device sends a telegram with the value "1" when the application is running. To limit the bus load, times shorter than 1 minute are excluded.	

10.1.2 Object list for heartbeat

Function	Name	Type	DPT	Flag
Devices - Status	Heartbeat - Output	1-bit	1,002	C, R, -, T, A
1-bit object for cyclical signalling of the device function. When the application of the device is running, the communication object transmits the value "1" with the set cycle time.				

10.2 Reset behaviour

Delay after bus voltage return

To reduce telegram traffic on the KNX bus line after bus voltage activation (bus reset), after connection of the device to the bus line or after an ETS programming operation, it is possible to delay all actively transmitted status or feedback telegrams of the switching function. For this purpose, a channel-independent delay can be specified (parameter "Delay after bus voltage return" on the parameter page "General -> Switching outputs (SO)"). Only after the configured time elapses are feedback telegrams for initialisation transmitted to the KNX.
Which of the telegrams is actually delayed and which is not can be set for each switching output and for status function separately.

The delay has no effect on the behaviour of the outputs. Only the bus telegrams for status or feedback are delayed. The outputs can be activated also during the delay after the bus voltage returns.

A setting of "0" for the delay after the bus voltage returns fully deactivates the time delay. In this case, any messages, if actively transmitted, will be transmitted to the KNX without any delay.

10.2.1 Reset behaviour parameters

General

Delay after bus voltage return	**0**...59 min 0...**17**…59 s
To reduce telegram traffic on the KNX bus line after bus voltage activation (bus reset), after connection of the device to the KNX line or after an ETS programming operation, it is possible to delay all actively transmitted status telegrams. For this purpose, a delay time can be defined here. Only after the configured time has elapsed are status telegrams for initialisation transmitted to the KNX.	

10.3 Central functions

Disconnect central functions

- Activate the central functions on the parameter page "General" with the parameter "Central functions".

  The 6 central objects become visible in the ETS. Names can optionally be assigned for the central functions. The names should illustrate the use of the individual central functions (e. g. "All ON", "Central OFF"). The names are only used in the ETS in the text of the central functions and central objects.

The actuator offers the possibility of linking selected individual or all switching outputs with up to 6 1-bit communication objects. The behaviour during the control of an output via the central functions can be set to "Switching" or alternatively to "Permanent" (Switching with priority).

Central function = "Switching":
This function is comparable to various central group addresses that are linked to the "Switching" object of a switching output. The last command received (ON or OFF) is executed. The polarity of the central telegram can be configured as inverted if necessary.

Central function = "Permanent":
The assigned switching outputs are controlled according to the parameterised command (ON or OFF) and locked during central control. This means that no other central function with the "Switching" function can control the locked output. Controls via normal switching objects are possible. If an output is assigned to several permanent central functions, the parameterised command decides on the priority of the central function. A "permanent OFF" has a higher priority than a "permanent ON" and thus is preferably executed. Activating a central function "permanent OFF" deactivates other assigned functions for an output with the setting "permanent ON".

Example of permanent central functions
An output is assigned to central function 1 "switching", central function 2 "permanent OFF" and central function 3 "permanent ON". Central functions 2 and 3 are initially deactivated. When a central telegram = "activate" on central function 3 is received, the assigned switching output switches on. In this state, it can no longer be controlled by central function 1, since a simple "switching" has a lower priority. When a central telegram = "activate" on central function 2 is received, the assigned switching output switches off immediately. Central function 3 is thus deactivated automatically. Only when central functions 2 and 3 are deactivated can the assigned switching output be activated again by central function 1.

i All central functions are inactive after the bus voltage returns. No central functions are saved in the event of a bus voltage failure.

Assign switching outputs to the central functions

Each switching output can be assigned to the central functions.

The central functions must have been enabled on parameter page "General".

- Set the parameter "Function and polarity of the central object" on the parameter pages "Relay outputs -> O..." to the desired function.

  The appropriate output is assigned to the central function. It can be influenced centrally.

The switching state newly set by the central functions is tracked in the status objects and transmitted to the bus.

10.3.1 Central functions parameters

General

Central functions	Checkbox (yes / **no**)
If the parameter is activated, the 6 central functions of the switching outputs and thus the objects "Switching central function ..." are enabled. An assignment of individual switching outputs to the central functions is only possible if the function is enabled.	

Name of the central functions	Free text
Names can optionally be assigned for the central functions. The names should illustrate the use of the individual central functions (e. g. "All ON", "Central OFF"). The names are only used in the ETS in the text of the central functions and central objects.	

Relay outputs -> SO... - General

Central function X assignment (X = 1 ... 6)	Checkbox (yes / **no**)
These parameters assign the supplementary functions to the selected switching output. These parameters are only visible when central functions are enabled.	

Function and central object polarity	Switching (1 = ON / 0 = OFF) Switching (0 = ON / 1 = OFF) Permanent ON (1 = active / 0 = inactive) Permanent OFF (1 = active / 0 = inactive)
The function and polarity of the central function is selected here. Switching (1 = ON / 0 = OFF): The last command received (ON or OFF) is executed. The polarity of the central telegram is preset: 1 = ON / 0 = OFF Switching (0 = ON / 1 = OFF): The last command received (ON or OFF) is executed. The polarity of the central telegram is preset: 0 = ON / 1 = OFF Permanent ON (1 = active / 0 = inactive): The assigned switching output is switched on and locked during central control. Permanent OFF (1 = active / 0 = inactive): The assigned switching output is switched off and locked during central control. If an output is assigned to several permanent central functions, the parameterised command decides on the priority of the central function. A "permanent OFF" has a higher priority than a "permanent ON" and thus is preferably executed. With permanent function, the polarity of the central telegram is always fixed: 1 = activate permanent control / 0 = deactivate permanent control. These parameters are only visible when central functions are enabled and assigned.	

10.3.2 Object list central functions

Function	Name	Type	DPT	Flag
Switching	Central function 1 - Input	1-bit	1,001	C, -, W, -, U
Switching	Central function 2 - Input	1-bit	1,001	C, -, W, -, U
Switching	Central function 3 - Input	1-bit	1,001	C, -, W, -, U
Switching	Central function 4 - Input	1-bit	1,001	C, -, W, -, U
Switching	Central function 5 - Input	1-bit	1,001	C, -, W, -, U
Switching	Central function 6 - Input	1-bit	1,001	C, -, W, -, U
1-bit object for central control of assigned switching outputs. With central function = "Switching": The polarity of the central telegram can be configured as inverted if necessary. With central function = "Permanent ON", "Permanent OFF": With permanent function, the polarity of the central telegram is always fixed: 1 = activate permanent control / 0 = deactivate permanent control.				

10.4 Collective status

After central commands or after the bus voltage returns, a KNX line is generally heavily loaded by data traffic as many bus devices are actively transmitting the state of their communication objects by means of status telegrams. This effect occurs particularly when using visualisations. Collective status telegrams for switching states can be used to keep the telegram load low during initialisation.

The collective status telegram summarises the switching states of all switching outputs - depending on the device variant - in up to two communication objects. The 32-bit communication objects "Collective status A1...x - Output switching - Status" contain bit-orientated status information for the individual outputs.

The data point type of the collective status corresponds to the KNX standard (DPT 27.001). The application would be possible in appropriate visualisation applications - for example in public buildings such as schools or hospitals - where the switching states of the actuators are displayed centrally and no status is displayed at the control sections. In such applications the collective status telegram can replace the 1-bit individual feedbacks and thereby significantly reduce the KNX bus load.

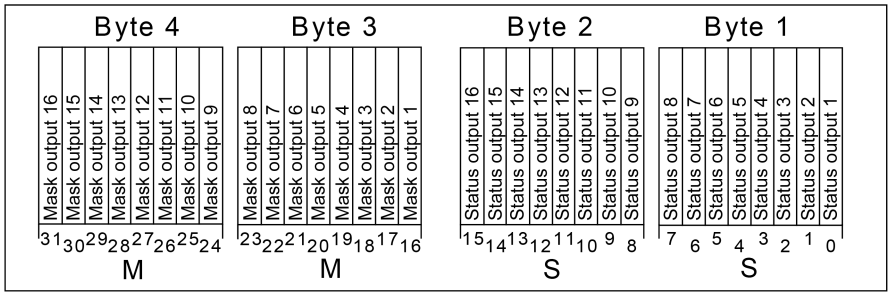


Figure 6: Structure of the collective status object for the Switching outputs 1...16

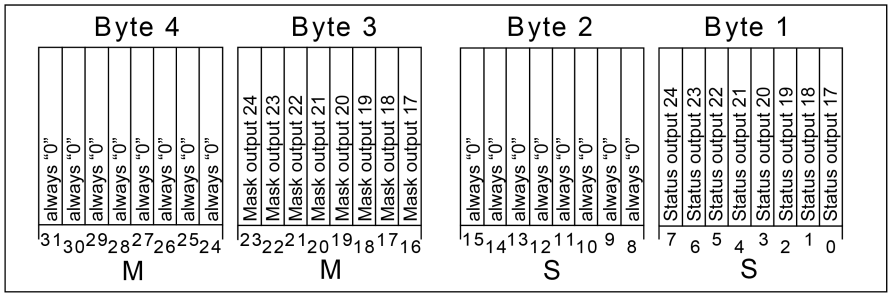


Figure 7: Structure of the collective status object for the Switching outputs 17...24

For collective status, each output possesses a bit, which signals the switching state ("S bit), and an additional bit, which defines the masking ("M" bit). The "S"-bits correspond to the logical non-inverted switching states of the outputs and are either "1" (switched on) or "0" (switched off). The switching state of the relay can be determined from the combination of switching status and configured relay operating mode (NO or NC contact):
NO contact operation: Status = "0" -> Relay open, status = "1" -> Relay closed
NC contact operation: Status = "0" -> Relay closed, status = "1" -> Relay open.

The "M"-bits are "1" when the actuator possesses this output, i.e. the channel configuration plans for this switching output. In the same way, the "M"-bits are "0" when the appropriate output is not available on the actuator. In this case, the corresponding "S"-bits are continuously "0", as there is no switching status.

i A "flashing" output (see "Disabling function") is always reported as "switched on".

Activate collective status

If the collective status is activated, it is transmitted to the KNX whenever a switching state changes or is updated (depending on the parameter "Update of the object value").

- Activate the parameter "Collective status" on the parameter page "General".

  The collection status is activated. The communication object and others parameters become visible.

  The collective status is transmitted once this it updated. An automatic telegram transmission of the status takes place after the bus voltage returns or after programming with the ETS.

Set the update of the collective status

In the ETS you can specify when the actuator should update the collective status in case of an actively transmitting communication object. The object value updated by the actuator is then signalled actively to the KNX.

Prerequisite:
The collective status must be enabled.

- Set the parameter "Update of the object value" to "On each update object 'Switching'/'Central'".

  The actuator updates the status in the object once a new telegram is received on the input objects "Switching" or "Central function..." or the switching state changes internally (e. g. through a time function). A new telegram is also then actively transmitted to the KNX each time. The telegram value of the status does not necessarily have to change. Consequently, in the case of cyclical telegrams to a switching object, for example, a corresponding collective status telegram is also generated.

- Set the parameter to "Only on change of the status value".

  The actuator only updates the collective status in the object if the telegram value (e. g. "OFF" to "ON") also changes or the switching state changes internally (e. g. through a time function). If the telegram value does not change (e. g. in the case of cyclical telegrams to the "Switching" object with the same telegram value), the actuator does not transmit any collective status telegrams.

If cyclical monitoring of a switching output is activated, the collective status is always updated if a preferred position (ON or OFF) is set when the monitoring time expires. The collective status telegram is then always sent.

Setting collective status when the bus voltage returns or after programming with the ETS

The collective status is transmitted to the KNX after the bus voltage returns or after programming with the ETS. In these cases, the feedback can be time-delayed with the time delay being set globally.

Prerequisite:
The collective status must be enabled.

- Activate the "Delay after bus voltage return" parameter.

  The collective status is transmitted with a delay after the bus voltage returns or after programming with the ETS. No status telegram is transmitted during a running delay, even if a switching state changes during the delay.

- Deactivate the "Delay after bus voltage returns" parameter.

  The collective status is transmitted immediately after the bus voltage returns or after programming with the ETS.

Set cyclical transmission of the collective status

The collective status telegram can also be transmitted cyclically, in addition to transmission on a change or update.

Prerequisite:
The collective status must be enabled.

- Activate the "Cyclical transmission" parameter and configure the "Cycle time".

  Cyclical transmission is activated. The collective status is transmitted to the KNX cyclically and if one of the switching states changes or is updated.

- Deactivate the "Cyclical transmission" parameter.

  Cyclical transmission is deactivated, which means that the collective status is only transmitted to the KNX if one of the switching states changes or is updated.

During an active delay after bus voltage return no collective status telegram will be transmitted even if a switching state changes.

10.4.1 Collective status parameter

General

Collective status	Checkbox (yes / **no**)
The collective status can be released at this point.	

Updating of the object value	after each update object "Switching"/"Central" **only when the status value changes**
Here you can define when the actuator updates the collective status. The object value updated by the actuator is then signalled actively to the KNX. after each update object "Switching"/"Central": The actuator updates the collective status in the object once a new telegram is received on the input objects "Switching" or "Central function..." or the switching state changes internally (e. g. through a time function). A new telegram is also then actively transmitted to the KNX each time. The telegram value of the collective status does not necessarily have to change. Consequently, in the case of cyclical telegrams to a switching object, for example, a corresponding collective status telegram is also generated. only when the status value changes: The actuator only updates the collective status in the object if the telegram value (e. g. "OFF" to "ON") also changes or the switching state changes internally (e. g. through a time function). If the telegram value of the collective status does not change (e. g. in the case of cyclical telegrams to the "Switching" object with the same telegram value), the actuator does not transmit any telegrams. Consequently, with an actively transmitting object, no telegram with the same content will be transmitted repeatedly either.	

Delay after bus voltage return	Checkbox (yes / **no**)
The collective status is transmitted to the KNX after the bus voltage returns or after programming with the ETS. In these cases, the collective status can be time-delayed with the time delay being set globally on the "General" parameter page.	

Cyclical transmission	Checkbox (yes / **no**)
The objects of the collective status can also transmit their value cyclically in addition to transmission when updating. If the parameter is activated, cyclical transmission is performed. If the parameter is deactivated, the cyclical transmission is inactive, which means that collective status is only transmitted to the KNX if one of the contained states changes.	

Cycle time	**0**...23 h 0...**2**...59 min **0**…59 s
The cycle time for the cyclical transmission of the collective status is parameterised here.	

10.4.2 Object list collective status

Function	Name	Type	DPT	Flag
Switching - Status	Collective status Ox... - Output	4-byte	27,001	C, R, -, T, A
4-byte objects for the indicator of a collective status of the switching output states. The collective feedback summarises the switching status in just one telegram. The object contains bit-orientated status information.				

10.5 Name of a switching output

Here, you can optionally assign a name for each switching output. The name is intended to illustrate the use of the output (e. g. "light kitchen", "wall lamp living room"). The names are only used in the ETS in the text of the parameter pages and communication objects.

10.5.1 Parameter name

Xpress

Designation	Free text
The text entered in this parameter is applied to the name of the communication objects and is used to label the switching output in the ETS parameter window (e. g. "light kitchen", "wall lamp living room"). The text is not programmed in the device.	

10.6 Diagnostics

Firmware diagnostics

The device can be used for diagnostics. Firmware diagnostics can be easily carried out in the parameter dialogue of the ETS application. This checks the compatibility of the application used in the ETS project with the firmware in the device.
A diagnostic can be carried out on the parameter page of the same name. When the "Read out device" button is clicked, the ETS establishes a diagnostic connection to the device via the configured bus interface and reads out firmware data. This process only takes a few seconds.

In order for firmware diagnostics to be carried out, the physical address must have been successfully programmed into the corresponding device at least once using the ETS. It is not necessary to programme the application for diagnostic purposes. The device must be accessible via the configured bus connection in the KNX system.

After the readout process, the parameter dialogue shows the diagnostic result. In the positive case, the application configured in the ETS project matches the firmware of the device in the KNX system. In this case, the application can be programmed without any problems.
In the negative case, the application in the ETS is incompatible with the loaded firmware of the device. The extended diagnostic information indicates which firmware is active in the device and with which firmware the configured application is actually compatible. In the event of incompatibility, either the application in the ETS or the firmware of the device must be changed so that the application can be programmed and the device then functions as intended. The Jung ETS Service app (additional software) can be used to adapt the firmware version of the device. The ETS functions can be used to customise the application in the ETS project (e.g. "Update application program version").

If the readout of the firmware data was not successful, the parameter dialogue shows a corresponding status. Such diagnostic errors can occur in the following cases, for example:

- The device read out in the system is not identical to the configured device (e.g. deviations in type, number of channels or mask version).
- The manufacturer of the device does not match.
- The physical address specified in the ETS project was mistakenly programmed into an incorrect device.

11 Switching operation

11.1 Priorities

The actuator distinguishes between different functions that can have an effect on an output. In order to prevent conflicting states, each available function has a certain priority. The function with the higher priority overrides the function with the lower priority.

For switching operation there are the following priorities...

- 1st priority: manual operation (top priority),
- 2nd priority: forced position & disabling function,
- 3th priority: Cyclical monitoring,
- 4th priority: Logical operation function & Staircase function,
- 5th priority: direct bus operation ("switching" object, scenes, central functions, reset behaviour)

The behaviour of some functions can be configured at the end (e.g. the behaviour at the end of the disabling function). These predefined reactions are only executed if the actuator can then immediately switch to direct operation (lowest priority).

11.2 Operation

The relay of a switching output can be configured as NO or NC contacts. In this way, the inversion of switching states is possible.

The parameter "Operation" exists separately for each switching output on the parameter page "Relay outputs -> O..." .

- Set the operation to "NO contact".

  The relay works as an NO contact. The logical switching state of the switching output is not forwarded to the relay in inverted form.
  Switching state = OFF ("0") -> relay contact open,
  Switching state = ON ("1") -> relay contact closed.

- Set the operation to "NC contact".

  The relay works as an NC contact. The logical switching state of the switching output is forwarded to the relay in inverted form.
  Switching state = OFF ("0") -> relay contact closed,
  Switching state = ON ("1") -> relay contact open.

The logic switching state "ON" or "OFF" is set by the communication object "Switching" and influenced by the functions that can be optionally activated (e. g. timing/staircase functions, logic operations, disabling/forced-control position functions, scenes, central objects).

The 1-bit feedbacks always feed back the logical switching state of the switching outputs. Depending on the configured relay operating mode and an inverted or non-inverted evaluation, a status has the following meanings:
NO contact not inverted: Status = "ON" -> Relay closed, status = "OFF" -> Relay

opened
NO contact inverted: Status = "ON" -> Relay opened, status = "OFF" -> Relay closed
NC contact not inverted: Status = "ON" -> Relay opened, status = "OFF" -> Relay closed
NC contact inverted: Status = "ON" -> Relay closed, status = "OFF" -> Relay opened

Generating the current switching status via the "Switching" object is not possible.

11.2.1 Operation parameters

Relay outputs -> O...

Operation	**NO contact** NC contact
The relay of a switching output can be configured as NO or NC contacts. In this way, the inversion of switching states is possible. NO contact: Switching state = OFF ("0") ->
Relay contact opened
Switching state = ON ("1") ->
Relay contact closed NC contact: Switching state = OFF ("0") ->
Relay contact closed
Switching state = ON ("1") ->
Relay contact opened	

11.2.2 Object list operation

Function	Name	Type	DPT	Flag
Switching	O... - Input	1-bit	1,001	C, -, W, -, U
1-bit input object to activate a switching output ("1" = Switch on / "0" = Switch off; "NO contact" or "NC contact" operation can be configured).				

11.3 Reset and initialisation behaviour

The switching states of the switching outputs in the event of a bus voltage failure, after the bus voltage returns or after an ETS programming operation can be set separately.

Setting the behaviour in case of bus voltage failure

The parameter "In case of bus voltage failure" is available separately for each switching output on the parameter page "Relay outputs -> O..." .

- Set the parameter to "no reaction".

  In case of bus voltage failure, the relay of the output shows no reaction and remains in the switching state last selected.
- Set the parameter to "Open contact".

  The relay contact opens in case of bus voltage failure.
- Set the parameter to "Close contact".

  The relay contact closes in case of bus voltage failure

Active disabling functions or forced position functions are cancelled by a bus voltage failure and remain inactive until they are reactivated after the bus voltage returns.

In case of a bus voltage failure, the current states of the forced-positions are also saved so that they can be tracked when the bus voltage returns if necessary (depending on the parameterization of the forced positions).

In case of a bus voltage failure, the current switching states of all switching outputs are saved internally, so that these states can be reset after the bus voltage returns if this is configured in the ETS.

Setting the behaviour after the bus voltage returns

The parameter "After bus voltage return" exists separately for each switching output on the parameter page "Relay outputs -> O..." .

- Set the parameter to "no reaction".

  After the bus voltage returns, the relay of the output shows no reaction and remains in the switching state last selected.
- Set the parameter to "Open contact".

  The relay contact is opened.
- Set the parameter to "Close contact".

  The relay contact is closed.
- Set the parameter to "state as before bus voltage failure".

  After the bus voltage returns, the switching state last set and internally stored before bus voltage failure will be tracked.

- Preset parameter to "Activate staircase function". This setting is only available when the staircase function of the appropriate switching output is enabled.

  The staircase function is – irrespective of the "Switching" object - activated after the bus voltage returns.

i Setting "State as before bus voltage failure": An ETS programming operation does not overwrite the saved switching state.

i If a switching state has been set after the bus voltage returns, it will be tracked in the status objects. The status objects do not transmit after the bus voltage returns until the initialisation of the actuator has finished, and if necessary the "Delay after bus voltage returns" has elapsed.

i In the case of forced position as supplementary function: The communication object of the forced position can be initialised separately after the bus voltage returns. This has an effect on the reaction of the switching output when the forced position is activated when the bus voltage returns. The configured "Behaviour after bus voltage returns" is executed only if no forced position after the bus voltage returns is activated!

i In the case of enabling function as supplementary function: Active disabling functions are always inactive after the bus voltage returns.

Presetting the behaviour after ETS programming

The parameter "After ETS programming operation" exists separately for each switching output on the parameter page "Relay outputs -> O..." . This parameter can be used to configure the switching state of a switching output, irrespective of the behaviour after the bus voltage returns.

- Set the parameter to "no reaction".

  After ETS programming, the relay of the output shows no response and remains in the switching state last selected. The internal logical switching state is not lost by the ETS programming operation.

- Set the parameter to "Open contact".

  The relay contact opens after an ETS programming operation.

- Set the parameter to "Close contact".

  The relay contact closes after an ETS programming operation.

i The configured behaviour will be executed after every application or parameter download by the ETS. A simple download of the physical address alone or partial programming of only the group addresses has the effect that this parameter is disregarded and that the configured "After bus voltage returns" will be executed instead.

A switching state set after an ETS programming operation is added to the status object. The status objects also only first transmit after an ETS programming cycle when the initialisation has finished and, if necessary, the "delay after bus voltage returns" has elapsed.

After an ETS programming operation, the disabling functions and the forced-positions are always deactivated. The states of the forced position objects saved in case of the bus voltage failure are deleted.

11.3.1 Reset and initialisation behaviour parameter

Relay outputs -> O...

After ETS programming operation	Close contact Open contact **No reaction**
The actuator permits setting of the reaction separately for each switching output after an ETS programming operation. Close contact: The relay contact closes after an ETS programming operation. Open contact: The relay contact opens after an ETS programming operation. no reaction: After ETS programming, the relay of the output shows no response and remains in the switching state last selected. The internal logical switching state is not lost by the ETS programming operation.	

In case of bus voltage failure	Close contact Open contact **No reaction**
The actuator permits setting of the reaction separately for each switching output if there is a bus voltage failure. Close contact: The relay contact closes in case of bus voltage failure. Open contact: The relay contact opens in case of bus voltage failure no reaction: In case of bus voltage failure, the relay of the output shows no reaction and remains in the switching state last selected.	

After the bus voltage returns	Close contact Open contact **State as before bus voltage failure** No reaction Activating staircase function
The actuator allows the reaction to be set separately for each switching output after the bus voltage returns. Close contact: The relay contact is closed. Open contact: The relay contact is opened. State as before bus voltage failure: After the bus voltage returns, the switching state last set and internally stored before the bus failure will be tracked. no reaction: After the bus voltage returns, the relay of the output shows no reaction and remains in the switching state last selected. Activate staircase function: The staircase function is – irrespective of the "Switching" object - activated after the bus voltage returns. This setting is only available when the staircase function is enabled.	

11.4 Cyclical monitoring

The actuator offers the option of monitoring individual switching outputs cyclically for the arrival of switching telegrams. In this way, the objects which must be updated cyclically by the KNX can be monitored. In so doing, the polarity of the telegram update ("OFF" or "ON") is insignificant.
If there is no update of the monitored objects within a specifically configured monitoring time, then the affected switching outputs set themselves to the preferred predefined contact position. However, this does not disable the outputs, so that, after the reception of a further switching telegram, the new switching state is set at the output.

The monitoring time can be defined separately for each switching output on the parameter page "Relay output -> O... " by the parameter "Cycle time". The time is restarted for a switching output after each reception of a switching telegram via the objects "Switching" or "Central switching" (if at least one central function is assigned to the affected switching output). The monitoring time is also restarted automatically after the bus voltage returns or after an ETS programming operation.

Activate cyclical monitoring

The cyclical monitoring function can be activated separately for each switching output by the parameter "Cyclical monitoring" on the parameter page "Relay outputs -> O..." . If the function is activated, as soon as the monitoring time elapses without having received a telegram update, the actuator sets the preference period for the appropriate switching output after the time has elapsed.

- Set the parameter to "no".

  Cyclical monitoring is deactivated.
- Set the parameter to "Yes, 'ON' when time has elapsed".

  Cyclical monitoring is activated. After the time has elapsed, the switching output is switched on. The cycle time can be configured.
- Set the parameter to "Yes, 'OFF' when time has elapsed".

  Cyclical monitoring is activated. After the time has elapsed, the switching output is switched off. The cycle time can be configured.

i If cyclical monitoring is activated, the following functions cannot be configured: Time delays, staircase function, logic operation and scene.

i The disabling and forced position function has a higher priority than the cyclical monitoring.

11.4.1 Cyclical monitoring parameters

Relay outputs -> O...

Cyclical monitoring	**no** yes, "ON" when time has elapsed yes, "OFF" when time has elapsed
The actuator offers the option of monitoring individual switching outputs cyclically for the arrival of switching telegrams. In this way, the objects which must be updated cyclically by the KNX can be monitored. In so doing, the polarity of the telegram update ("OFF" or "ON") is insignificant. If there is no update of the monitored objects within a specifically configured monitoring time, then the affected switching outputs set themselves to the preferred predefined contact position. However, this does not disable the outputs, so that, after the reception of a further switching telegram, the new switching state is set at the output. no: Cyclical monitoring is deactivated. yes, 'ON' when time has elapsed: Cyclical monitoring is activated. After the time has elapsed, the switching output is switched on. yes, 'OFF' when time has elapsed: Cyclical monitoring is activated. After the time has elapsed, the switching output is switched off.	

Cycle time	**0**...23 h 0...**2**...59 min **0**…59 s
The monitoring time for cyclical monitoring is set here. This parameter is only visible if cyclical monitoring is enabled.	

11.5 Status information

The actuator can track the current switching state of a switching output via a status object and can also transmit them to the KNX. On each switching operation, the actuator determines the object value of the status. The actuator tracks the switching state and updates the status object even when a switching output, for example, is activated by a supplementary function or scene function.

The status object for the switching status is updated after the following events...

- Immediately after switch-on of a switching output (if necessary, first after a switch-on delay has elapsed / also after a staircase function).
- After switch-off of a switching output (if necessary, only after a switch-off delay has elapsed / also after a staircase function).
- During updating of the switching state from "ON" to "ON" or "OFF" to "OFF" when the switching output is already switched on or off. However, only if the parameter "Update of the object value" is configured to "On each update of object 'Switching'/'Central'".
- At the start or end of a disabling or forced position function, if a state changes as a result.
- Whenever the bus voltage returns or at the end of any ETS programming operation (if necessary, also delayed).

i In the case of disabling function as supplementary function: A "flashing" switching channel is always reported as "switched on".

Activating the switching status

The switching status is also directly transmitted to the KNX whenever it is updated. Optionally, the actuator can also feed back the status of an independent switching output in inverted form.
The parameter "Switching status" exists separately for each switching output on the parameter page "Relay outputs -> O... -> Status".

Prerequisite:
The status functions must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Activate the checkbox "Status object switching".

  A switching status is transmitted as soon as it is updated. An automatic telegram transmission of the status takes place after the bus voltage returns or after programming with the ETS. The switching status is written to the object in non-inverted form.

- Optionally activate the checkbox "Invert".

  A switching status is transmitted as soon as it is updated. An automatic telegram transmission of the status takes place after the bus voltage returns or after programming with the ETS. The switching status is written to the object in inverted form.

- Deactivate the checkbox "Status object switching".

The switching status of the affected switching output is deactivated.

Depending on the configured relay operating mode and an inverted or non-inverted evaluation, a status feedback has the following meanings:
NO contact not inverted: Status = "ON" -> Relay closed, status = "OFF" -> Relay opened
NO contact inverted: Status = "ON" -> Relay opened, status = "OFF" -> Relay closed
NC contact not inverted: Status = "ON" -> Relay opened, status = "OFF" -> Relay closed
NC contact inverted: Status = "ON" -> Relay closed, status = "OFF" -> Relay opened

A status function is not possible via the "Switching" object.

Setting the updating of the switching status

In the ETS, it can be defined when the actuator updates the switching status. The object value updated by the actuator is then signalled actively to the KNX.
The "Update of the object value" parameter can be preset separately for each switching output on the parameter page "Relay outputs -> O... -> Status".

Prerequisite:
The status functions must be enabled on the parameter page "Relay outputs -> O...-> Enabled functions".

- Set the parameter to "after each update object 'Switching'/'Central'".

  The actuator updates the status in the object once a new telegram is received on the input objects "Switching" or "Central switching" or the switching state changes internally (e. g. through a time function). A new telegram is also then actively transmitted to the KNX each time. The telegram value of the status does not necessarily have to change. Consequently, in the case of cyclical telegrams to the "Switching" object, for example, a corresponding switching status telegram is also generated.

- Set the parameter to "Only on change of the status value".

  The actuator only updates the status in the object if the telegram value (e. g. "OFF" to "ON") also changes or the switching state changes internally (e. g. through a time function). If the telegram value of the status does not change (e. g. in the case of cyclical telegrams to the "Switching" object with the same telegram value), the actuator does not transmit any switching status telegrams. Consequently, no telegram with the same content is output repeatedly either.
  This setting is recommended, for instance, if the objects "Switching" and "Switching - Status" are linked to an identical group address. This is often the case when activating by means of light scene push-button sensors (recall and storage function).

If cyclical monitoring of a switching output is activated, the switching status is always updated if a preferred position (ON or OFF) is set when the monitoring time expires. The switching status is then always sent.

Activating switching status on bus voltage return or after programming with the ETS

The switching status states are transmitted to the KNX after the bus voltage returns or after an ETS programming operation. In these cases, the status telegram can be time-delayed, with the delay being preset globally for all switching outputs together.

- Activate the "Delay after bus voltage return" parameter on the parameter page "Relay outputs -> O... -> Status".

  The switching status telegram will be transmitted with a delay after bus voltage return or after programming with the ETS. No status telegram is transmitted during a running delay, even if the switching state changes during this delay.
- Deactivate the parameter.

  The switching status telegram will be transmitted immediately after bus voltage return or after programming with the ETS.

Setting the cyclical transmission of the switching status

The switching status telegrams can also be transmitted cyclically, in addition to the transmission after updating.

- Activate the parameter "Cyclical transmission" on the parameter page "Relay outputs -> O... -> Status".

  Cyclical transmission is activated. The cycle time for the switching status can be configured separately for the parameter "Time for cyclical transmission".
- Deactivate the parameter.

  Cyclical transmission is deactivated so that the switching status telegram is transmitted to the KNX only when updated by the actuator.

In addition to switching status feedback, the actuator can also report back enlarged status information messages and transmit them actively to the KNX.

Particularly for simple connection to visualisations or for diagnostics, the actuator can also transmit various status information in combined data points. This can significantly reduce the telegram load. Two different types of data points are available. Both communication objects transmit in the case of a change of status.

Activating the combined function status

Particularly for simple connection to visualisations or for diagnostics, the actuator can also transmit various status information in combined data points. This can significantly reduce the telegram load. Two different types of data points are available. Both communication objects transmit in the case of a change of status.

The combined function status can be enabled and configured independently for each output.

The feedback functions of an output must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions". Only then are the parameters for the status functions visible on the parameter page "Relay outputs -> O... -> Status".

- Activate the checkbox "Function status (KNX standard)".

  The standardised status object is activated. In addition to the current brightness value (for the switch actuator either 0% or 100%), it contains various bit-coded status information. A telegram is transmitted as soon as there is a change.

The status functions of an output must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions". Only then are the parameters for the status functions visible on the parameter page "Relay outputs -> O... -> Status".

- Activate the checkbox "Function status (KNX extended)".

  The status object is activated. It contains various bit-coded status information and an enumeration of the various statuses with higher priorities. A telegram is transmitted as soon as there is a change.

11.5.1 Status information parameter

Relay outputs -> O... -> Enabled functions

Status	Checkbox (**yes** / no)
This status functions can be disabled or enabled here.	

Relay outputs -> O... -> Status

Switching status	Checkbox (**active**/inactive)
The current switching state of the switching output can be reported separately back to the KNX. inactive: The switching status of the affected switching channel is deactivated. active: A switching status is transmitted as soon as it is updated. An automatic telegram transmission of the feedback takes place after the bus voltage returns or after programming with the ETS.	

Invert	Checkbox (active/**inactive**)
The current switching state of the switching output can be reported separately back to the KNX. inactive: The switching status is written to the object in non-inverted form. active: The switching status is written to the object in inverted form.	

Updating of the object value	after each update object "Switching"/"Central" **only when the status value changes**
Here, you can specify when the actuator should update the feedback value for the switching status (object "Switching feedback") in case of an actively transmitting communication object. The object value updated by the actuator is then signalled actively to the KNX. This parameter is only visible if the switching status is activated. after each update object "Switching"/"Central": The actuator updates the status in the object once a new telegram is received on the input objects "Switching" or "Central switching" or the switching state changes internally (e. g. through a time function). A new telegram is also then actively transmitted to the KNX each time. The telegram value of the status does not necessarily have to change. Consequently, in the case of cyclical telegrams to the "Switching" object, for example, a corresponding switching status telegram is also generated. only when the status value changes: The actuator only updates the status in the object if the telegram value (e. g. "OFF" to "ON") also changes or the switching state changes internally (e. g. through a time function). If the telegram value does not change (e. g. in the case of cyclical telegrams to the "Switching" object with the same telegram value), the actuator does not transmit any status telegrams. Consequently, no telegram with the same content is output repeatedly either.	

Delay after bus voltage return	Checkbox (yes / **no**)
The states of the switching status can be transmitted to the KNX with a delay after the bus voltage returns or after an ETS programming operation. The activated parameter causes a delay when the bus voltage returns. The delay time is configured on the "General" parameter page. This parameter is only visible if the switching status is enabled.	

Cyclical transmission	Checkbox (yes / **no**)
The switching status can also be transmitted cyclically in addition to being transmitted when updated. This parameter is only visible if the switching status is enabled. Parameter activated: Cyclical transmission is activated. Parameter deactivated: Cyclical transmission is deactivated so that the switching status is transmitted to the KNX only when updated by the actuator.	

Time for cyclical transmission	**0**...23 h 0...**2**...59 min **0**…59 s
This parameter defines the time for the cyclical transmission of the switching status. This parameter is only available if cyclical transmission is activated.	

Function state (KNX standard)	Checkbox (active/**inactive**)
The actuator can report a combined function status to the KNX via a 2-byte communication object with the data point type 207,600 (DPT_StatusLightingActuator). This includes the brightness value and bit-coded status information. active: The function status and the object are activated. A telegram is sent each time an individual status changes. inactive: There is no function status for the output.	

Function state (extended)	Checkbox (active/**inactive**)
The actuator can report a combined function status to the KNX via a 3-byte communication object with a non-standardised data point type. This includes bit-coded status information and an enumeration of the possible statuses that can disable direct operation due to a higher priority. active: The combined function status and the object are activated. A telegram is sent each time an individual status changes. inactive: There is no combined function status for the output.	

11.5.2 Status information object list

Function	Name	Type	DPT	Flag
Switching - Status	Switching... - Output	1-bit	1,001	C, R, -, T, A
1-bit object for status signalling of a state of a switching output ("1" = on / "0" = off) to the bus. Depending on the configured relay operating mode, the status value should be interpreted differently: NO contact operation: Status = "0" -> Relay open, status = "1" -> Relay closed NC contact operation: Status = "0" -> Relay closed, status = "1" -> Relay open				

Function	Name	Type	DPT	Flag
Function state (KNX standard)	Switching... - Output	2-byte	207,600	C, R, -, T, A
The following states are signalled to the KNX using this 2-byte output object: Byte 1 (bit 8 ... Bit 15): Brightness value in percent (switched on = 100%, switched off = 0%) Bit 7: Error (always "0", the object "Heartbeat" is used for evaluating the device status) Bit 6: Output has been overridden by manual operation. The bit remains active as long as the status set by the manual operation is active. Bit 5: always "0" Bit 4: Staircase function active Bit 3: always "0" Bit 2: Restraint active Bit 1: Disabling function active Bit 0: Brightness value (byte 1) valid				

Function	Name	Type	DPT	Flag
Function state (extended)	Switching... - Output	3-byte	---	C, R, -, T, A
The following states are signalled to the KNX using this 3-byte output object: Bit 23 ... Bit 9: Reserved (always "0") Bit 8: Staircase function active (any active pre-warning times are not displayed here) Bit 7: Switch-off delay active Bit 6: Switch-on delay active Bit 5: ... Bit 0: Enumeration of various statuses with higher priority (in the case of multiple active statuses, the one with the highest priority is output) The following statuses (numerical values) are defined for the lower-value 6-bits: 0: No disabling active 1: No information (reserved) 2: Restraint active 3: Disabling function without acknowledgement active 4: Disabling function with acknowledgement active 5 ... 63: Not used				

11.6 Time delays

Up to two time functions can be preset for each switching output, independently of each other. The time functions affect the communication objects "Switching" or "Central switching" only (if at least one of the central functions is activated for the output concerned) and delay the object value received depending on the telegram polarity.

i At the end of a disabling function or forced position function, the switching state received during the function or set before the function can be tracked. Residual times of time functions are also tracked if these had not yet fully elapsed at the time of the reactivation or forced control.

i The time delays do not influence the staircase function if this is enabled.

i A time delay still in progress will be fully aborted by a reset of the actuator (bus voltage failure or ETS programming).

Activating switch-on delay

The switch-on delay can be activated separately in the ETS for each switching output.

Prerequisite:
The time delays must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Activate the checkbox "Switch-on delay". Configure the desired switch-on delay.

  The switch-on delay is enabled. After receipt of an ON telegram via the "switching" or "central switching" object, the configurable time is started. Another ON-telegram triggers the time only when the parameter "Switch-on delay retriggerable" is activated. An OFF-telegram received during the switch-on delay will end the delay and set the switching status to "OFF".

Activating switch-off delay

The switch-off delay can be activated separately in the ETS for each switching output.

Prerequisite:
The time delays must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Activate the checkbox "Switch-off delay". Configure the desired switch-off delay.

  The switch-off delay is enabled. After reception of an OFF telegram via the "switching" or "central switching" object, the configurable time is started. Another OFF-telegram triggers the time only when the parameter "Switch-off delay retriggerable" is activated. An ON-telegram received during the switch-off delay will end the delay and set the switching status to "ON".

11.6.1 Time delays parameters

Relay outputs -> O... -> Enabled functions

Time delays	Checkbox (yes / **no**)
This parameter can be used to disable or to enable the time delays. The parameter is deactivated if cyclical monitoring is enabled.	

Relay outputs -> O... -> Time delays

Switch-on delay	Checkbox (yes / **no**)
The communication objects "Switching" or "Central switching" can be evaluated after a time delay. This parameter enables the switch-on delay and thereby activates the necessary parameters.	

Delay time	**0**…59 min 0...**10**…59 s
This parameter is used for setting the duration of the switch-on delay.	

Switch-on delay retriggerable	Checkbox (yes / **no**)
A switch-on delay still in progress can be retriggered by another "ON" telegram (parameter activated). Alternatively, the retriggering time (parameter deactivated) can be suppressed. This parameter is only visible if switch-on delay is activated.	

Switch-off delay	Checkbox (yes / **no**)
The communication objects "Switching" or "Central switching" can be evaluated after a time delay. This parameter enables the switch-off delay and thereby activates the necessary parameters.	

Delay time	**0**…59 min 0...**10**…59 s
This parameter is used for setting the duration of the switch-off delay.	

Switch-off delay retriggerable	Checkbox (yes / **no**)
A switch-off delay still in progress can be retriggered (parameter activated) by another "OFF" telegram. Alternatively, the retriggering time (parameter deactivated) can be suppressed. This parameter is only visible if switch-off delay is activated.	

11.7 Staircase function

The staircase function can be used for implementing time-controlled lighting of a staircase or for function-related applications. The staircase function must be enabled in the ETS on the parameter page "Relay outputs -> SO... - General -> Enabled functions", in order for the required communication objects and parameters to be switched to visible.

The staircase function is activated via the communication object "Staircase function Start/Stop" and is independent of the "Switching" object of a switching output. In this way, parallel operation of time and normal control is possible, whereby the command last received is always executed: A telegram to the "switching" object or a scene recall at the time of an active staircase function aborts the staircase time prematurely and presets the switching state according to the received object value (the time delays are also taken into account) or scene value. Likewise, the switching state of the "switching" object can be overridden by a staircase function.

Time-independent continuous light switching can also be implemented in combination with a disabling function because the disabling function has a higher priority and overrides the switching state of the staircase function.
The staircase function can also be extended by means of a supplementary function. At the same time, it is possible activate a time extension. The "Time extension" permits retriggering of an activated staircase via the object "Staircase function - Start/Stop" n times. Alternatively, the "time preset via the bus" can be set. With this supplementary function, the configured staircase time can be multiplied by a factor received via the bus, thus it can be adapted dynamically.
Furthermore, an extension of the staircase function can be implemented by means of a separate switch-on delay and pre-warning function. The pre-warning should, according to DIN 18015-2, warn any person still on the staircase that the light will soon be switched off.

Specifying switch-on behaviour of the staircase function

An ON telegram to the "Staircase function - Start/Stop" object activates the staircase time (T_{ON}), the duration of which is defined by the "Staircase time" parameters. In addition, a switch-on delay (T_{Delay}) can be activated (see "presetting switch-on delay of the staircase function"). At the end of the staircase time, the output switches off or activates optionally the pre-warning time ($T_{Prewarn}$) of the pre-warning function (see "presetting pre-warning function of the staircase function"). Taking into account any possible switch-on delay and pre-warning function, this gives rise to the switch-on behaviour of the staircase function as shown in the following diagram.

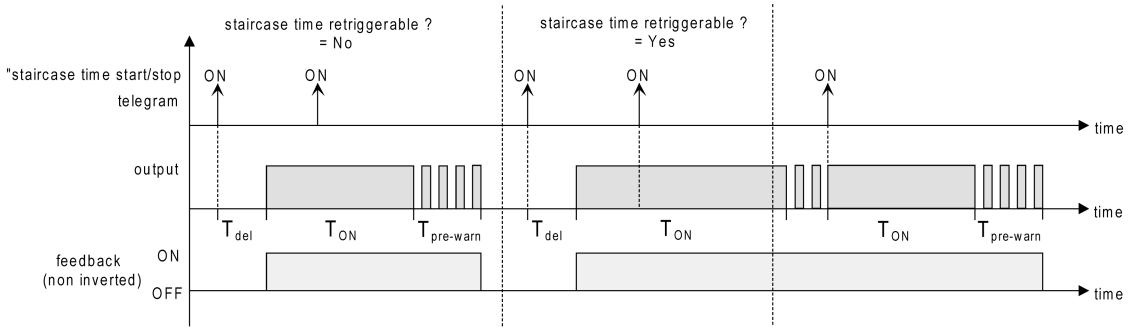


Figure 8: Switch-on behaviour of the staircase function

The parameter "Retriggerable" specifies whether the staircase time can be retriggered.

Prerequisite:
The staircase function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Activate the parameter "Retriggerable".

  Every ON telegram received during the ON phase of the staircase time retriggers the staircase time completely.

- Deactivate the parameter "Retriggerable".

  ON telegrams received during the ON phase of the staircase time are rejected. The staircase time is not retriggered.

i An ON telegram received during the pre-warning time always retriggers the staircase time independently of the parameter "Staircase time retriggerable".

i When the supplementary function "Time extension" is preset, the parameter "Retriggerable" cannot be adjusted. In this case, it is permanently deactivated.

Setting the switch-on delay of the staircase function

An ON telegram for activation of the staircase function can also be evaluated with a time delay. This switch-on delay can be activated separately for the staircase function and has no influence on the configurable time delays for the object "switching".

Prerequisite:
The staircase function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O... -> Staircase function", deactivate the parameter "Switch-on delay".

  The switch-on delay is deactivated. The staircase time is activated immediately after receiving an ON telegram on the object
  "Staircase function - Start/Stop" and the output switched on.

- Activate the parameter "switch-on delay".

The switch-on delay for the staircase function is enabled. The desired switch-on delay time can be specified. After receipt of an ON telegram on the object "Staircase function - Start/Stop", the switch-on delay is started. Another ON-telegram triggers the time only when the parameter "Switch-on delay retriggerable" is activated. The staircase time is activated and the output is switched on only after the time delay has elapsed.

An OFF telegram via the object "Staircase function - Start/Stop" during the switch-on delay only terminates the delay if the parameter "Reaction to OFF-telegram" is set to "Switch off". Otherwise, the OFF telegram is ignored.

When the supplementary function "Time extension" is preset, the parameter "Switch-on delay retriggerable" cannot be adjusted. In this case, it is permanently deactivated.

Specifying switch-off behaviour of the staircase function

In the case of a staircase function, the reaction to an OFF telegram can also be configured to the object "Staircase function - Start/Stop". Without the receipt of an OFF telegram the output switches off after the pre-warning time elapses, if necessary. Taking into account any possible switch-on delay and pre-warning function, this gives rise to the switch-off behaviour of the staircase function as shown in the following diagram.

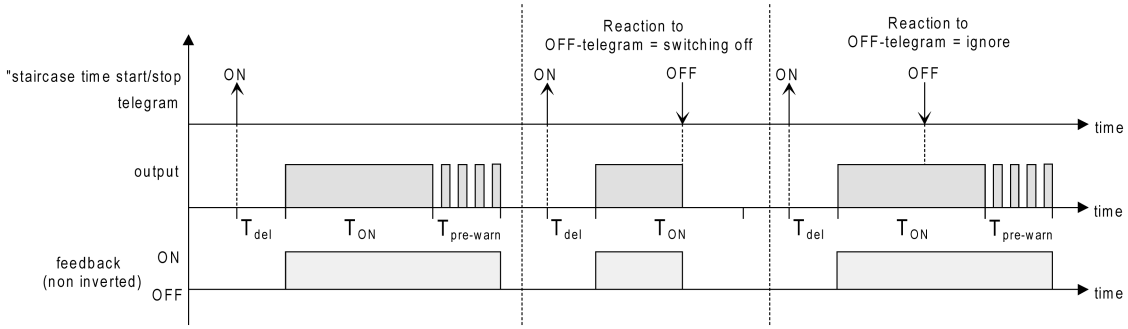


Figure 9: Switch-off behaviour of the staircase function

The parameter "Reaction to OFF-telegram" defines whether the staircase time (T_{ON}) of the staircase function can be aborted prematurely.

Prerequisite:
The staircase function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Set parameter "Reaction to OFF-telegram" to "switch off".

  The output switches off immediately as soon as an OFF telegram is received by means of the object "Staircase function - Start/Stop" during the ON phase of the staircase time. If the staircase time is stopped prematurely by such a telegram, there is no pre-warning, i. e. the pre-warning time is not started.

- Set parameter "Reaction to OFF-telegram" to ignore".

OFF telegrams received during the ON phase of the staircase time are rejected. The staircase time will be executed completely to the end with pre-warning if necessary.

With the supplementary function "time preset via the bus", the staircase time of the staircase function can also be started by the reception of a new time factor. In this case, received "0" factors are interpreted as an OFF telegram. Here too, the parameter "Reaction to OFF telegram" is evaluated so that a staircase time can be cancelled early.

The parameter "Reaction to OFF telegram" does not influence the reception and the evaluation of OFF telegrams via the "Switching" object.

Setting supplementary function of the staircase function – time extension

With the time extension function, the staircase time can be retriggered several times, i.e. extended, via the "Staircase function - Start/Stop" object. The duration of the extension is predefined by several operations at the control section (several ON telegrams in succession). The configured staircase time can be extended in this way by the configured factor (a maximum of 5-fold). The time is then always extended automatically at the end of a single staircase time (T_{ON}) (see figure 10).

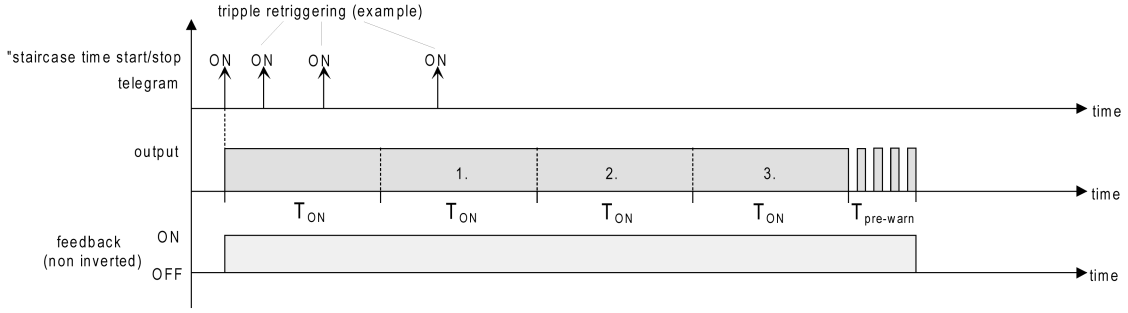


Figure 10: Time extension of the staircase function

With this function, the lighting time in a staircase can be extended (e. g. by a person after shopping) by a defined length without having to retrigger the lighting every time the lighting shuts off automatically.

Prerequisite:
The staircase function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O... -> Staircase function", set the "Supplementary function" parameter to "Time extension" and set the maximum desired factor on the "Maximum time extension" parameter.

  The staircase time is retriggered each time an ON telegram is received on the "Staircase time - Start/Stop" object after the staircase time has elapsed, depending on the number of telegrams received, but only as often as pre-defined by the configured factor.
  For example, the "3-fold time" setting means that after the started staircase time has elapsed, it can be retriggered automatically a maximum of three additional times. The time is therefore extended a maximum of four fold.

A time extension can be triggered during the entire staircase time (T_{ON}). There is no time limit between two telegrams for the time extension. Telegrams for the time extension are only evaluated during the staircase time. An ON telegram during the pre-warning function triggers the staircase time as a restart, which means that a new time extension is possible.
If a switch-on delay was configured, the time extension is recorded during the switch-on delay.

If a time extension was configured as a supplementary function, the parameters "Staircase time retriggerable" and "Switch-on delay retriggerable" are permanently deactivated since the staircase time can be retriggered by the time extension.

Setting supplementary function of the staircase function – time preset via the bus

With time specification via the bus, the configured staircase time can be multiplied by an 8-bit factor received via the KNX, thus it can be adapted dynamically. With this setting, the factor is derived from the object "Staircase - Time factor". The possible factor value for setting the staircase time is between 1…255.

The entire staircase time arises as a product from factor (object value) and the configured staircase time as a basis as follows...

Staircase time = (object value "Time factor") x (parameter "Staircase time")

Example:
Object value "Staircase function - Time factor" = 5; parameter "Staircase time" = 10 s.
-> set staircase time = 5 x 10 s = 50 s.

Alternatively, the staircase function parameter can define whether the receipt of a new factor also starts the staircase time of the staircase function at the same time. In this case, the object "Staircase function - Start/Stop" is not necessary and the received factor value determines the starting and stopping.

Prerequisite:
The staircase function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O... -> Staircase function", set the "Supplementary function" parameter to "Time preset via bus" and deactivate the parameter "Staircase function activatable via 'Staircase time' object".

  The staircase time can be adapted dynamically by the "Staircase function - Time factor" object. A value "0" is interpreted as value "1". The staircase function is started and stopped exclusively via the "Staircase function - Start/Stop" object.
- Activate the parameter "supplementary function" to "time preset via the bus" and activate the parameter "staircase function activatable via 'staircase time' object".

The staircase time can be adapted dynamically by the "Staircase function - Time factor" object. In addition, the staircase function is started with the new staircase time (the object "Staircase function - Start/Stop" is not necessary). A factor value "0" is interpreted as an OFF telegram, whereby in this case, the configured reaction to an OFF telegram is evaluated, too.
A larger staircase with several floors is an example as an application for the time preset via the bus with automatic starting of the staircase time. On each floor there is a push-button sensor that transmits a factor value to the staircase function. The higher the floor, the greater the factor value transmitted so that the lighting stays switched on longer if the passing through the staircase needs more time. When a person enters a staircase and a pushbutton is pressed, the staircase time is now adjusted dynamically to the staircase time and switches on the lighting at the same time, too.

The staircase function is started via the reception of a new factor: A factor > 0 received during a pre-warning time always triggers the staircase time independently of the parameter "Staircase time retriggerable".

After a reset (bus voltage return or ETS programming) the "Staircase function - Time factor" object is always initialised with "1". However, the staircase function is not started automatically solely as the result of this (see "Set behaviour of staircase function after bus voltage returns").

The two supplementary functions "time extension" and "time preset via the bus" can only be configured alternatively.

Setting the pre-warning function of the staircase function

The pre-warning should, according to DIN 18015-2, warn persons still on the staircase that the light will soon be switched off. The lighting connected on the output is briefly switched off repeatedly as a pre-warning, before the output is switched off permanently. At the same time, the pre-warning time ($T_{Prewarn}$), the duration of the interruptions during the pre-warning($T_{Interrupt}$) and the number of pre-warning interruptions are configurable (see figure 11). The pre-warning time is added to the staircase time (T_{ON}). The pre-warning time influences the value of the feedback object so that the value "OFF" (in the case of non-inverted transmission) is first tracked after the pre-warning time in the object has elapsed.

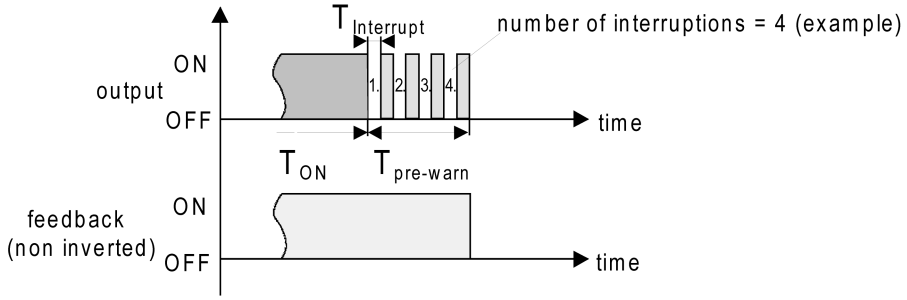


Figure 11: The pre-warning function of the staircase function (example)

Prerequisite:
The staircase function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O... -> Staircase function", set the parameter "At the end of the staircase time" to "activate pre-warning time".

  The pre-warning function is enabled. The desired pre-warning time ($T_{Prewarn}$) can be preset.

- Set the parameter "Number of pre-warnings" to the desired value (1…10).

  Within the pre-warning time, the lighting connected on the output is switched off just as often as configured here. The 1st pre-warning is always executed at the beginning of the entire pre-warning time.

- Set the parameters "Time for pre-warning interruptions" to the desired value.

  An interruption ($T_{Interrupt}$) during the pre-warning time is just as long as configured here. The adjustable interruption time allows the switch-off phase of the lighting to be adapted individually to the lamps used.

i It should be noted that the "number of pre-warnings" and the "time for pre-warning interruptions" must be attuned to the duration of the entire "pre-warning time". Hence, the entire switch-off phase during a pre-warning ("number of pre-warnings" + "time for pre-warning interruptions") must not be set longer than the pre-warning time! Otherwise, malfunctions can be expected.

i An ON telegram to the object "Staircase function - Start/Stop" while a pre-warning function is still in progress stops the pre-warning time and always restarts the staircase time (independently of the parameter "Staircase time retriggerable"). Even during the pre-warning time, the parameter "reaction to OFF telegram" is evaluated so that a pre-warning in progress can be terminated early by switching off.

Setting the behaviour of the staircase function after the bus voltage returns

The staircase function can optionally be started automatically after the bus voltage returns.

Prerequisite:
The staircase function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O...", set the parameter "After bus voltage returns" to "Activate staircase function".

  The staircase time of the staircase function is started immediately after the bus voltage returns.

i When automatically starting the staircase function after the bus voltage returns, no switch-on delay is started if the staircase function has configured such a delay.

The device only executes the configured "Behaviour on bus voltage return" only if the last ETS programming of the application or of the parameters ended at least approx. 20 s prior to switching on the bus voltage. Otherwise (T_{ETS} < 20 s) the behaviour "after ETS programming" will be adopted also in case of bus voltage return.

The configured behaviour will be executed only if no forced position after the bus voltage returns has been activated.

11.7.1 Staircase function parameters

Relay outputs -> O... -> Enabled functions

Staircase function	Checkbox (yes / **no**)
This parameter can be used to disable or to enable the staircase function. The parameter is deactivated if cyclical monitoring is enabled.	

Relay outputs -> O... -> Staircase function

Staircase time	**0**...23 h 0...**3**...59 min **0**…59 s
The duration of the switch-on time for the staircase function is configured here. Minimum staircase time = 1 s.	

Staircase time retriggerable	Checkbox (yes / **no**)
An active switch-on time can be retriggered (parameter activated). Alternatively, the retriggering time (parameter deactivated) can be suppressed. This parameter is preset to deactivated if the supplementary function "Time extension" is configured. Re-triggering will not be possible.	

Switch-on delay	Checkbox (yes / **no**)
The staircase function enables the activation of an own switch-on delay. This switch-on delay affects the trigger result of the staircase function and thus delays the switch-on. activated: The switch-on delay for the staircase function is enabled. After receipt of an ON telegram on the object "Staircase function start/stop", the switch-on delay is started. Another ON-telegram triggers the time only when the parameter "Switch-on delay retriggerable" is activated. The staircase time is activated and the output is switched on only after the time delay has elapsed. deactivated: The switch-on delay is deactivated. After receipt of an ON telegram on the object "Staircase function start/stop", the staircase time is activated immediately and the output switched on.	

Switch-on delay	**0**...23 h **0**...59 min 0...**30**...59 s
This parameter is used for setting the duration of the switch-on delay.	

Switch-on delay retriggerable	Checkbox (yes / **no**)
An active switch-on delay can be retriggered (parameter activated). Alternatively, the retriggering time (parameter deactivated) can be suppressed. This parameter is deactivated if the supplementary function "Time extension" is configured. Re-triggering will not be possible. The parameters for the switch-on delay are only visible when the switch-on delay is used.	

Reaction to OFF-telegram	**Switch off** ignore
An active switch-on time can be aborted prematurely by switching off the staircase function. switch off: The switch-on time is aborted after receipt of an OFF telegram on the object "Staircase time start/stop". With the supplementary function "time preset via the bus" and the setting "Staircase function activatable via object 'Staircase time' = activated" the switch-on time can also be prematurely ended by a factor of "0". ignore: OFF Telegrams or "0" factors are ignored. The switch-on time will be executed completely to the end.	

Supplementary function	**no supplementary function** Time extension Time preset via the bus
The staircase function can be extended by the two supplementary functions "Time extension" and "Time specifications via bus", which should be used alternatively. This parameter enables the desired supplementary function and thereby activates the necessary parameters or objects. no supplementary function: No supplementary function is enabled. Time extension: The time extension is activated. This function permits retriggering an activated staircase lighting time span n-times via the object "Staircase function start/stop. Time preset via the bus: The time preset via the bus is activated. With this supplementary function, the configured switch-on time can be multiplied by a factor received via the KNX, thus it can be adapted dynamically.	

Maximum time extension	**1-fold staircase time** 2-fold staircase time 3-fold staircase time 4-fold staircase time 5-fold staircase time
In case of a time extension (retriggering the lighting time n-times via the object "Staircase function start/stop), the parameterized staircase lighting time will be extended by the value programmed in this parameter. "1-fold staircase time" means that after the started staircase time has elapsed, it can be retriggered a maximum of one more time. The time is therefore extended two fold. The other settings behave in a similar manner. This parameter is visible only if the supplementary function "time extension" is set.	

Staircase function activatable via "Staircase time" object	Checkbox (yes / **no**)
A time preset via the bus can specify here whether the receipt of a new time factor also starts the switch-on time (parameter activated). At the same time, the object "Staircase function start/stop" is hidden. If the parameter is deactivated, the switch-on time can be activated exclusively via the object "Staircase function start/stop". This parameter is visible only if the supplementary function "time preset via the bus" is set.	

At the end of staircase time	**Switch off** Activate pre-warning time
At the end of the staircase time, the actuator for the switching output concerned displays the configured behaviour here. The output can be set to switch off immediately or alternatively to execute a pre-warning function. switch off: At the end of the staircase time, the actuator switches off the switching output concerned. Activate pre-warning time: At the end of the staircase time, the switching output can generate a pre-warning prior to switching off. The pre-warning, for example, should warn any person still on the staircase that the light will soon be switched off.	

Pre-warning time	**0**...59 min 0...**30**...59 s
This parameter is used for setting the duration of the pre-warning time. The pre-warning time is added to the switch-on time.	

Time for pre-warning interruptions	**0**…59 s 0...**500**...900 ms
This parameter defines the duration of a pre-warning interruption, i.e. how long the switching output is to remain off during a pre-warning interruption. The time should be customized individually to the switch-off behaviour of the lamp used.	

Number of pre-warnings	1...**3**..10
This parameter defines how often the switching output is to switch off within the pre-warning time. i.e. how many pre-warnings will be generated.	

11.7.2 Object list staircase function

Function	Name	Type	DPT	Flag
Staircase function - Start/Stop	Switching... - Input	1-bit	1,010	C, -, W, -, U
1-bit object to activate or deactivate the switch-on time of the staircase function of a switching output ("1" = switch-on / "0" = switch-off).				

Function	Name	Type	DPT	Flag
Staircase time - time factor	Switching... - Input	1-byte	5,010	C, -, W, -, U
1-byte object to specify a time factor for the switch-on time of the staircase function (value range: 0... 255).				

11.8 Scene function

Up to 64 scenes can be programmed and scene values stored separately for each switching output. The scene values are recalled or stored via a separate scene extension object. The data point type of the extension object allows all 64 scenes to be addressed.

The scene function must be enabled on the parameter page "Relay outputs -> O... ->Enabled functions" for each switching output, in order for the required communication objects and parameters (on the parameter page "Relay outputs -> O... -> Scenes") to become visible.

The scene configuration selected in the configuration decides whether the number of scenes is either variable (1 ... 64) or alternatively fixed to the maximum (64).

– Scene configuration = "Variable (1 ... 64 scenes)"
  In this setting, the number of scenes used can be selected anywhere within a range of 1 to 64. The "Number of scenes" parameter decides how many scenes are visible for the switching output in the ETS and can therefore be used. It is possible to specify which scene number (1 ... 64) controls each scene.
– Scene configuration = "Fixed (64 scenes)"
  In this setting, all scenes are always visible and can therefore be used. The scenes are actuated by permanently assigned scene numbers (1 ... 64) (scene number 1 -> scene 1, scene number 2 -> scene 2 ...). Individual scenes can be deactivated if necessary.

The scene function can be combined together with other functions of a switching output, whereby the last received or preset state is always executed:
Telegrams to the "Switching" objects, a scene recall or scene storage telegram at the time of an active staircase function aborts the staircase time prematurely and presets the brightness state according to the received object value (time delays are also taken into account) or scene value.
Similarly, the state of the switching output, which was preset by the "Switching", "Dimming" or "Brightness value" objects or by a scene recall, can be overridden by a staircase function.

Setting a scene call-up delay

Each scene recall of a switching output can optionally also be delayed. In this way, dynamic scene sequences can be configured if several scene outputs are combined with cyclical scene telegrams.

Prerequisite
The scene function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O... -> Scenes", activate the parameter "Delay scene recall".

The delay time is activated and can be configured separately. The delay only influences the scene recall of the switching output. The delay time is started when a call-up telegram arrives. The corresponding scene will be recalled and the switching output set to the switching state value only after this time has elapsed.

i Each scene call-up telegram restarts the delay time and retriggers it. If a new scene recall telegram is received while a delay is active (scene recall not yet executed), the old (and not yet recalled scene) will be rejected and only the scene last received executed.

i The scene call-up delay has no influence on the storage of scene values. A scene storage telegram within a scene call-up delay will terminate the delay and thus the scene call-up.

Setting the behaviour during ETS programming

When a scene is saved, the switching states are saved permanently in the device. To prevent the stored values from being replaced during ETS programming of the application or parameters by the originally programmed scene switching states, the actuator can inhibit overwriting of the switching states. As an alternative, the original values can be reloaded into the device during each programming run of the ETS.

Prerequisite
The scene function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O... -> Scenes", activate the parameter "Overwrite values stored in the device during the ETS programming operation".

  During each ETS programming operation of the application or of the parameters, the scene switching states configured in the ETS for the switching output concerned will be programmed into the actuator. Scene switching states stored in the device by means of a storage function will be overwritten, if any.
- Deactivate the parameter "Overwrite values stored in the device during the ETS programming operation".

  Scene switching states stored in the device with a storage function will be maintained. If no scene switching states have been stored, the switching states last programmed in the ETS remain valid.

i When the actuator is commissioned for the first time, this parameter should be activated so that the switching output is initialised with valid scene switching states.

Configuring an extended scene call-up

The extended scene recall allows recalling of up to 64 scenes of the switching output in sequence. Scene are called up by means of the 1-bit communication object "Extended scene call-up". Each ON telegram received by means of this object calls up the next of the available scenes in the configuration. Each OFF telegram received

calls up the previous scene.
With the extended scene recall, the actuator always recalls the neighbouring scene - starting with the scene most recently recalled via the extended recall. It is irrelevant whether the scene is active on the appropriate switching output (scene number = "1...64" or scene active) or inactive (scene number = "0" or scene inactive). If an inactive scene is recalled via the extended scene recall, the appropriate switching output with not react.
Only the scenes available in the scene configuration can be selected by the extended scene call-up (defined by the parameter "Number of scenes" with "Variable", always all 64 scenes with "Fixed"). An ON or OFF telegram always calls up scene 1 first after a reset (bus voltage return, ETS programming operation).

The scene sequence of the extended scene call-up is not influenced by calling up a scene by means of the 1-byte extension object. The two call-up functions work independently of each other.

- Activate the parameter "Extended scene recall" on the parameter page "Relay outputs -> O... -> Scenes".

  The object "Extended scene recall" is available. Each ON telegram calls up the next scene. Each OFF telegram calls up the previous scene.

- Deactivate the parameter "Use extended scene recall".

  The extended scene call-up is deactivated. A scene can be called up only by means of the 1-byte scene extension object.

The extended scene call-up can take place with or without overflow at the scene limits. An overflow occurs when the last scene of the selected configuration is reached when counting up or scene 1 is reached when counting down and an additional telegram in the last counting direction is received by the actuator. The overflow behaviour is defined in the ETS.

- Activate the "With overflow" parameter.

  After reaching the last scene of the selected configuration, the overflow is executed and scene 1 called up by another ON telegram. Similarly, after reaching scene 1, the overflow is executed by another OFF telegram and the last scene of the selected configuration is called up.

- Deactivate the parameter "With overflow".

  A scene overflow is not possible. After reaching the last scene of the selected configuration, further ON telegrams of the extended scene call-up are ignored. In the same way, the actuator ignores further OFF telegrams if scene 1 was called up last.

Setting scene numbers and scene switching states

The presetting of the scene number depends on the selected scene configuration. With variable configuration the scene number (1...64) with which the scene is addressed, i.e. recalled or stored, must be determined for each scene of the switching

output. With a fixed scene configuration, the number of a scene is preset invariably. The data point type of the scene extension object allows up to a maximum of 64 scenes to be addressed.

In addition to specifying the scene number, it is necessary to define which scene command (ON, OFF) should be set on the switching output during a scene recall.

Prerequisite
The scene function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Only with variable scene configuration: On the parameter page "Relay outputs -> O... -> Scenes", set the "Scene number" parameter for each scene to the number used to address the scenes.

  A scene can be addressed with the configured scene number. A setting of "0" deactivates the corresponding scene to prevent it from being called up or stored.
- Only with fixed scene configuration: On the parameter page "Relay outputs -> O... -> Scenes", select or deselect the parameter "Scene active" if necessary.

  Only selected scenes can be used. A deselected scene is deactivated and cannot be recalled or stored via the scene extension unit.

i If with variable scene configuration the same scene number is configured for several scenes, only the scene with the lowest sequential number will be addressed. In this case, the other scenes will be ignored.

- On the parameter page "Relay outputs -> O... -> Scenes", set the "Switching state" parameter for each scene to the desired switching command.

  During a scene recall, the configured switching state is recalled and set on the switching output.

i The configured switching state is adopted in the actuator during programming with the ETS only if the parameter "Overwrite values stored in the device during ETS download" is activated.

Setting the storage behaviour

The switching state set for the switching output can be stored internally via the extension object on reception of a scene storage telegram. In this case, the switching state can be influenced before the storage by all functions of the switching output provided that the individual functions have been enabled (e. g. also the disabling function, forced-control position function etc.).

Prerequisite
The scene function must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- On the parameter page "Relay outputs -> O... -> Scenes", activate the "Storage function" parameter for each scene.

The storage function is activated for the scene in question. On receipt of a storage telegram by means of the "Extension unit" object, the current switching state will be stored internally.

- Deactivate the parameter "storage function" for each scene.

  The storage function is deactivated for the scene in question. A storage telegram received via the "Extension unit" object will be rejected.

Optionally, a visual feedback via the switching output can be signalled when executing a storage command. The channel flashes once as feedback in the configured flashing time. This enables the system operator to determine locally whether the desired scene switching state has been saved correctly in the actuator. A switching state feedback on the KNX is not generated.

- On the parameter page "Relay outputs -> O... -> Scenes", activate the parameter "Visual feedback for storage function". In the parameter "Flashing time", set the time in which the visual feedback is to be executed.

  When a storage function is executed, the visual feedback is activated immediately. The output switches to the opposite switching state for the duration of the configured flashing time and then back to the saved scene command.

- Deactivate the parameter "visual feedback for storage function".

  When storing a scene, the visual feedback is not executed. The actuator adopts the current switching state of the output without special feedback.

i The visual feedback is only executed if no other function with a higher priority (e. g. disabling function) is active in the moment when the memory function is active.

11.8.1 Scene function parameters

Relay outputs -> O... -> Enabled functions

Scene function	Checkbox (yes / **no**)
This parameter can be used disable or to enable the scene function. The parameter is deactivated if cyclical monitoring is enabled.	

Relay outputs -> O... -> Scenes

Delay scene recall	Checkbox (yes / **no**)
A scene is called up by means of the scene extension object. The scene call-up can be delayed after receiving a call-up telegram (parameter activated) if necessary. Alternatively, the scene will be called immediately after receiving the telegram (parameter deactivated).	

Delay time	**0**...59 min 0...**10**...59 s
This parameter specifies the length of the scene delay time.	

Visual feedback for storage function	Checkbox (yes / **no**)
Optionally, a visual feedback via the switching output can be signalled when executing a storage command. The channel flashes once as feedback in the configured flashing time. Parameter activated: When a storage function is executed, the visual feedback is activated immediately. The output switches to the opposite switching state for the duration of the configured flashing time and then back to the saved scene command. Parameter deactivated: When storing a scene, the visual feedback is not executed. The actuator adopts the current switching state of the output without special feedback.	

Flashing time	0...**5**...10 s
The flashing time in which the visual feedback is to be executed is set here. This parameter is only visible when visual feedback is used.	

Overwrite values stored in the device during the ETS programming operation	Checkbox (**yes** / no)
During storage of a scene, the scene values (current states of the switching outputs concerned) are stored internally in the device. To prevent the stored values from being replaced during ETS programming by the originally programmed scene values, the actuator can inhibit overwriting of the scene values (parameter deactivated). As an alternative, the original values can be reloaded into the device during each programming run of the ETS (parameter activated).	

Use extended scene recall	Checkbox (yes / **no**)
The extended scene recall allows recalling of up to 64 scenes of the switching output in sequence. Scene are called up by means of the 1-bit communication object "Extended scene call-up". Each ON telegram received by means of this object calls up the next scene. Each OFF telegram received calls up the previous scene. This parameter enables the extended scene call-up, if necessary.	

With overflow	Checkbox (yes / **no**)
The extended scene call-up can take place with or without overflow at the scene limits. An overflow occurs when the last scene of the selected configuration is reached when counting up or scene 1 is reached when counting down and an additional telegram in the last counting direction is received by the actuator. Parameter activated: After reaching the last scene of the selected configuration, another ON telegram of the overflow is executed and scene 1 is called up. Similarly, after reaching scene 1, the overflow is executed by another OFF telegram and the last scene of the selected configuration is called up. Parameter deactivated: A scene overflow is not possible. After reaching the last scene of the selected configuration, further ON telegrams of the extended scene call-up are ignored. In the same way, the actuator ignores further OFF telegrams if scene 1 was called up last. This parameter is visible only if the extended scene call-up is used.	

Scene configuration	**Variable (1...64 scenes)** Fixed (64 scenes)
The scene configuration selected here decides whether the number of scenes is either variable (1 ... 64) or, alternatively, fixed to the maximum (64). Variable (1...64 scenes): In this setting, the number of scenes used can be selected anywhere within a range of 1 to 64. The "Number of scenes" parameter decides how many scenes are visible for the switching output in the ETS and can therefore be used. It is possible to specify which scene number (1 ... 64) controls each scene. Fixed (64 scenes): In this setting, all scenes are always visible and can therefore be used. The scenes are actuated by permanently assigned scene numbers (1 ... 64) (scene number 1 -> scene 1, scene number 2 -> scene 2 ...). Individual scenes can be deactivated if necessary.	

Number of scenes	1...**10**...64
This parameter is only available with variable scene configuration and defines how many scenes are visible for the switching output in the ETS and can therefore be used.	

Scene number	0...**1***...64 *: The predefined scene number depends on the scene (1...64).
With variable scene configuration, the number of scenes used can be selected anywhere in the range 1 to 64. It is then possible to preset which scene number (1 ... 64) controls each scene. A setting of "0" deactivates the corresponding scene to prevent it from being called up or stored. If the same scene number is configured for several scenes, only the scene with the lowest sequential number will be addressed. In this case, the other scenes will be ignored. This parameter is only available with variable scene configuration.	

Scene active	Checkbox (**yes** / no)
With a fixed scene configuration, individual scenes can be activated or deactivated. Only activated scenes can be used. A deactivated scene cannot be recalled or stored via the scene extension unit. This parameter is only available with fixed scene configuration.	

Switching state	ON **OFF**
This parameter is used for configuring the switching state which is set when the scene is recalled.	

Memory function	Checkbox (yes / **no**)
If the parameter is activated, the storage function of the scene is enabled. The current switching state can then be stored internally via the extension object on receipt of a storage telegram. If the parameter is deactivated, the storage telegrams are rejected.	

11.8.2 Object list scene function

Function	Name	Type	DPT	Flag
Scenes - Extension unit	Switching... - Input	1-byte	18,001	C, -, W, -, U
1-byte object for calling or saving a scene.				

Function	Name	Type	DPT	Flag
Scenes - Extended scene recall	Switching... - Input	1-bit	1,001	C, -, W, -, U
1-bit object for extended scene call-up. Each ON telegram received recalls the next scene of a switching output in sequence. Each OFF telegram received calls up the previous scene. An ON or OFF telegram always calls up scene 1 first after a reset (bus voltage return, ETS programming operation).				

11.9 Disabling function and forced position

A disabling function, or alternatively, a forced position function can be configured for each switching output. In this respect, only one of these functions can be enabled for one switching output.

Setting the disabling function

During an active disabling function, the KNX operation of the switching output concerned is overridden and locked. Continuous light switching, for example, can also be overridden. The deactivation of the disabling function can optionally take place using an additional 1-bit acknowledgement object. This prevents the deactivation of the disabling function by the disabling object.

- On the parameter page "Relay outputs -> O... -> Enabled functions", set the parameter "Disabling function/Forced position" to "Disabling function".

  The disabling function is enabled. The communication object "Disabling function - Activate / deactivate" and the parameters of the disabling function on the parameter page "Relay outputs -> O... -> Disabling function" become visible.
- Set the parameter "Object polarity" to the desired polarity.
- Set the parameter "Beginning of the disabling function" to the required behaviour.

  At the beginning of the disabling function, the configured behaviour will be executed and bus operation of the switching output locked.

  When the setting "No change of switching state" is selected, the relay of the output shows no reaction and remains in the switching state last set (switching state in acc. with last non-inverted feedback telegram).

  In the "Flashing" setting, the switching output is switched on and off cyclically during the disabling. The "Time for flashing of the disabling functions" is configured individually for each switching output. During flashing, the logical switching state of the switching output is fed back as "Switched on".

For disabling function without acknowledgement object...

- Deactivate the checkbox "Acknowledgement".

  No additional acknowledgement object is available. The disabling function is deactivated by the disabling object according to the set polarity.
- Set the parameter "End of the disabling function" to the required behaviour.

  At the end of the disabling function, the configured behaviour will be executed and the bus operation of the switching output enabled again.

  In the "No change of switching state" setting, the relay of the output shows no reaction and remains in the state last set by the disabling function.

  In "Set tracked state", the last switching state received during the disabling function or the switching state set before the disabling function will be tracked. Any time functions still in progress will also be taken into account if necessary.

In the "Flashing" setting, the switching output is switched on and off cyclically after the disabling. The "Time for flashing of the disabling functions" is configured individually for each switching output. During flashing, the logical switching state of the output is fed back as "Switched on". The flashing state remains active until another KNX command is received and thereby predefines another switching state.

For disabling function with acknowledgement object...

- Activate the checkbox "Use acknowledgement".

  The acknowledgement object is available. The disabling function can only be deactivated using the acknowledgement object by an ON telegram. Telegrams to the disabling object according to the "Deactivate disabling" polarity are ignored by the actuator.

i "OFF" telegrams to the acknowledgement object do not product a reaction.

- Set the parameter "End of the disabling function after acknowledgement" to the required behaviour.

  After an acknowledgement, the configured behaviour will be executed and the bus operation of the switching output enabled again.

  In the "No change of switching state" setting, the relay of the output shows no reaction and remains in the state last set by the disabling function.

  On acknowledgement in "Set tracked state", the last switching state received during the disabling function or the switching state set before the disabling function will be tracked. Any time functions still in progress will also be taken into account if necessary.

  In the "Flashing" setting, the switching output is switched on and off cyclically after the acknowledgement. The "Time for flashing of the disabling functions" is configured individually for each switching output. During flashing, the logical switching state of the output is fed back as "Switched on". The flashing state remains active until another KNX command is received and thereby predefines another switching state.

i After a bus voltage failure or after programming the application or the parameters with the ETS, the disabling function is always deactivated (object value "0"). With the inverted setting ("1 = enabled; 0 = disabled"), a telegram update "0" must first be carried out after the initialisation until the disabling is activated.

i Updates of the disabling object from "activated" to "deactivated do not produce a reaction.

i The relay of a switching output disabled via the KNX can still be operated manually!

In the setting "Set tracked state": During a disabling function, the overridden functions of the actuator (switching, scenes) continue to be executed internally. Consequently, newly received bus telegrams are evaluated and time functions are triggered as well. At the end of the disabling, the tracked states are set.

Setting forced position function

The forced position function can also be combined with other functions of a switching output. With an active forced position, functions with a lower priority are overridden so that the switching output concerned is locked.
The forced position function possesses a separate 2-bit communication object. The first bit (bit 0) of the object "Forced position" indicates whether the switching output is switched off or switched on by force. The second bit (bit 1) activates or deactivates the restraint (see table below).
The behaviour of a switching output at the end of the forced position can be configured. In addition, the forced object can be initialised when the bus voltage returns.

Bit 1	Bit 0	Function
0	x	Forced position not active -> normal control
1	0	Forced position active: switch off
1	1	Forced position active: switch on

Table 1: Bit coding of forced position

- On the parameter page "Relay outputs -> O... -> Enabled functions", set the parameter "Disabling function/Forced position" to "Forced position".

  The forced position function is enabled. The communication object "Forced position" and the parameters of the forced position function on the parameter page "Relay outputs -> O... -> Forced position" become visible.

- Set the parameter "forced position end 'inactive'" to the required behaviour.

  At the end of the forced position, the configured behaviour will be executed and the bus operation of the switching output enabled again.

  In the "No change of switching state" setting, the relay of the output shows no reaction and remains in the state last set by the forced position.

  In the "Track switching state", the state received during the forced position function or the switching state set before the function can be tracked at the end of the forced position. Any time functions still in progress will also be taken into account if necessary.

Updates of the forced position object from "Forced position active" to "Forced position active" while maintaining the switching status or from "Forced position inactive" to "Forced position inactive" show no reaction.

A switching output forcibly activated via the KNX can be still be operated manually!

In the setting "Track switching state" at the end of the forced position: During a forced position, the overridden functions of the actuator (switching, scenes) continue to be executed internally. Consequently, newly received bus telegrams are evaluated and time functions are triggered as well. At the forced end, the tracked states are set.

The current state of the forced position object will be stored in case of bus voltage failure.

- Set the parameter "After bus voltage returns" to the required behaviour.

  After the bus voltage returns, the configured state is transferred to the "Forced position" communication object. When a forced position is activated, the switching output is immediately activated and interlocked accordingly by forced control after the bus voltage returns until a forced position is enabled via the KNX. The parameter "After bus voltage return" on the parameter page "Relay outputs - O... " is not evaluated for the affected switching output in this case.

  In the "state before bus voltage failure" setting, the forced position state last selected and internally stored before bus voltage failure will be tracked after the bus voltage returns. An ETS programming operation deletes the stored state (reaction in that case same as with "no forced position active").

  If the tracked state corresponds to "No forced position", the force-independent parameter "After bus voltage return" (parameter page "Relay outputs - O... ") is executed.

After programming the application or parameters with the ETS, the forced position function is always deactivated (object value "0").

11.9.1 Disabling function and forced position parameters

Relay outputs -> O... -> Enabled functions

Disabling function / Forced position	**no selection** Disabling function Priority control
It can be defined here whether a disabling function or a forced position for the switching output should be available. The disabling function is only configurable as an alternative to the forced position function.	

Relay outputs -> O... -> Disabling function

Time for flashing the disabling functions	**1 s** 2 s 5 s 10 s
Switching outputs can flash in the disabled state (cyclical switching on and off). The flashing time for the switching output is configured here.	

Status object	Checkbox (yes / **no**)
If disabling is active, the switching output can transmit the status via a 1-bit communication object. Parameter activated: The status object is available. When the disabling function is activated, it sends a telegram with the value "1" (="enabled"). When the disabling function is deactivated, it sends a telegram with the value "0" (="not enabled"). Parameter deactivated: No additional status object is available.	

Acknowledgement	Checkbox (yes / **no**)
The deactivation of the disabling function can optionally take place using an additional 1-bit acknowledgement object. This prevents the deactivation of the disabling function by the disabling object. Alternatively, the acknowledgement object is not available. In this case, disabling is deactivated via the disabling object. Parameter activated: The acknowledgement object is available. The disabling function can only be deactivated using the acknowledgement object by an ON telegram. Telegrams to the disabling object according to the "Deactivate disabling" polarity are ignored by the actuator. Parameter deactivated: No additional acknowledgement object is available. The disabling function is deactivated by the disabling object according to the set polarity.	

Disabling object polarity	**0 = disabled;** **1 = enabled** 1 = enabled; 0 = disabled
This parameter defines the polarity of the disabling object. This parameter is visible only if the disabling function is enabled.	

Beginning of disabling function	no change to the switching state Switch off **Switch on** Flashing
The behaviour of the switching output at the beginning of the disabling function can be configured. This parameter is visible only if the disabling function is enabled. no change of switching state: The relay of the output shows no reaction and remains in the switching state last set (switching state in acc. with last non-inverted feedback telegram). Switch off: At the beginning of the disabling function, the switching output is switched off and locked. Switch on: At the beginning of the disabling function, the switching output is switched on and locked. Flash: The switching output is switched on and off cyclically during the disabling. The "Time for flashing" is generally configured on the parameter page "Switching outputs (SO)". During flashing, the logical switching state of the switching output is fed back as "Switched on".	

End of disabling function	no change to the switching state Switch off Switch on **set tracked state** Flashing
The behaviour of the switching output at the end of the disabling function can be configured. This parameter is visible only if the disabling function is enabled and acknowledgement is not used. no change of switching state: The relay of the output shows no reaction and remains in the state last set by the disabling function. Switch off: At the end of the disabling function, the switching output is switched off and enabled again. Switch on: At the end of the disabling function, the switching output is switched on and enabled again. set tracked state: The last switching state received during the disabling function or the switching state set before the disabling function will be tracked. Any time functions still in progress will also be taken into account if necessary. Flash: The switching output is switched on and off cyclically after the disabling. The flashing time is configured generally on the parameter page "General -> Switching outputs (SO)". During flashing, the logical switching state of the output is fed back as "Switched on". The flashing state remains active until another KNX command is received and thereby predefines another switching state.	

End of disabling function after acknowledgement	no change to the switching state Switch off Switch on **set tracked state** Flashing
The behaviour of the switching output at the end of the disabling function after acknowledgement can be configured. This parameter is visible only if the disabling function is enabled and acknowledgement is not used. no change of switching state: The relay of the output shows no reaction on acknowledgement and remains in the state last set by the disabling function. Switch off: On acknowledgement, the switching output is switched off and enabled again. Switch on: On acknowledgement, the switching output is switched on and enabled again. set tracked state: On acknowledgement, the last switching state received during the disabling function or the switching state set before the disabling function will be tracked. Any time functions still in progress will also be taken into account if necessary. Flash: The switching output is switched on and off cyclically after the acknowledgement. The flashing time is generally configured on the parameter page "General". During flashing, the logical switching state of the output is fed back as "Switched on". The flashing state remains active until another KNX command is received and thereby predefines another switching state.	

Relay outputs -> SO... - General -> Forced position

Forced position "active, switch-on"	**Switch on**
If the forced position is activated and restraint is "ON", the switching output is always switched on. This parameter cannot be edited and is only visible when the forced position function is enabled.	

Forced position "active, switch-off"	**Switch off**
If the forced position is activated and restraint is "OFF", the switching output is always switched off. This parameter cannot be edited and is only visible when the forced position function is enabled.	

Forced position end "inactive"	Tracking the switching state **no change to the switching state** Switch off Switch on
The behaviour of the switching output at the end of the forced-position can be configured here. This parameter is only visible when the forced position function is enabled. Track switching state: The state received during the forced position function or the switching state set before the function can be tracked at the end of the forced position. Any time functions still in progress will also be taken into account if necessary. no change of switching state: The relay of the output shows no reaction and remains in the state last set by the forced position. Switch off: At the end of the forced position, the switching output is switched off and enabled again. Switch on: At the end of the forced position, the switching output is switched on and enabled again.	

After the bus voltage returns	**No forced position** Forced position active, Switch on Forced position active, Switch off State before bus voltage failure
The forced position communication object can be initialised after the bus voltage returns. The switching state of the output can be influenced when the forced position function is being activated. This parameter is only visible when the forced position function is enabled. No forced position: The force-independent parameter "After bus voltage return" (parameter page "Relay outputs -> O...") is executed. Forced position active, switch on: The forced position is activated. The switching output is switched on under forced control. Forced position active, switch off: The forced position is activated. The switching output is switched off under forced control. State before bus voltage failure: The forced position state last selected and internally stored before bus voltage failure will be tracked after the bus voltage returns. An ETS programming operation deletes the stored state (reaction in that case same as with "no forced position active"). If the tracked state corresponds to "No forced position", the force-independent parameter "After bus voltage return" (parameter page "Relay outputs -> SO... - General") will be executed when the bus voltage returns.	

11.9.2 Object list disabling function and forced position

Function	Name	Type	DPT	Flag
Disabling function - Activate/Deactivate	Switching... - Input	1-bit	1,003	C, -, W, -, U
1-bit object for disabling a switching output (polarity configurable).				

Function	Name	Type	DPT	Flag
Disabling function - Acknowledgement	Switching... - Input	1-bit	1,016	C, -, W, -, U
1-bit object to acknowledge an active disabling function of a switching output. This object is visible only if the acknowledgement is to be used with the disabling function ("1" = disabling function is deactivated / "0" = disabling function remains active).				

Function	Name	Type	DPT	Flag
Disabling function - Status	Switching... - Output	1-bit	1,003	C, R, -, T, A
1-bit object for signalling an active disabling function of a switching output. This object is only visible if the status message of the disabling function is enabled. When the disabling function is activated, it sends a telegram with the value "1" (="enabled"). When the disabling function is deactivated, it sends a telegram with the value "0" (="not enabled").				

Function	Name	Type	DPT	Flag
Forced position - Activate/Deactivate	Switching... - Input	2-bit	2,001	C, -, W, -, U
2-bit object for the forced position of a switching output. The polarity is fixed by the telegram.				

11.10 Logic operation function

A logic function can be configured separately for each switching output. This function allows the logic operation of the "Switching" object state and an additional logic operation object. The state of the communication object for "switching" can also be evaluated with a time delay if a switch-on delay or switch-off delay is set.
The logic function can also be combined with other functions of a switching output. A combination with the staircase function is not possible, however.

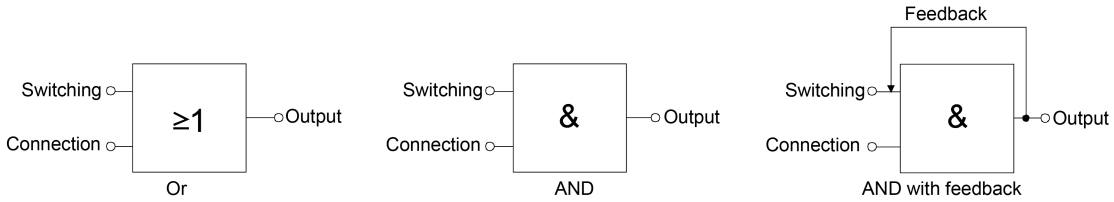


Figure 12: Logic operation types of the logic operation function

"AND with feedback":
With a logic object = "0", the switching output is always "0" (logic AND). In this case, the feedback signal from the output to the "switching" input will directly reset this input when it is being set. The output of the switching output can assume the logical state "1" by a newly received "1" on the input "switching" only when the logic object is = "1".

The object "Logic operation" can be initialised with a configured value after the bus voltage returns or after an ETS programming operation so that a correct logic operation result can be determined immediately and set on the output of the switching output during a telegram update on the "Switching" object.

- On the parameter page "Relay outputs -> O... -> Enabled functions", activate the "Logic operation function" parameter.

  The logic operation function is enabled. The communication object "Logic operation function - Input" and the parameters of the logic operation function on the parameter page "Relay outputs -> O... -> Logic operation function" become visible.
- Set the parameter "Type of logic operation function" to the desired logic operation type.
- Set the parameters "Object value after bus voltage returns" and "Object value after ETS programming" to the required initial states.

  The "Logic operation - Input" object is initialised immediately with the set switching states after the bus voltage returns or after an ETS programming of the application program or parameters.

The logic operation function after a reset of the actuator (bus voltage return or ETS programming operation) is first executed when the switching object is updated as the input of the logic operation by at least one telegram.

The states or switching states specified at the end of a disabling function or forced position function, which are set after programming in the ETS, in the case of bus voltage failure or after the bus voltage returns, override the logic

operation function. The configured logic operation is first re-executed and the result set on the switching output when the switching object is updated as the input of the logic operation by at least one telegram.

11.10.1 Logic operation function parameters

Relay outputs -> O... -> Enabled functions

Logic operation function	Checkbox (yes / **no**)
The logic operation function can be enabled here. The parameter is deactivated and unchangeable if the staircase function or cyclical monitoring is enabled.	

Relay outputs -> O... -> Logic operation function

Type of logic operation function	**OR** AND AND with feedback
This parameter defines the logical type of the logic operation function. The object "Logic operation - Input" is linked to the logic switching state of the switching output (object "Switching" after evaluation of any configured time delays) on the basis of the logic operation function set here. This parameter is only visible when the logic operation function is enabled.	

Object value after bus voltage returns	**0 (OFF)** 1 (ON)
After the bus voltage returns, the object value of the logic operation object is initialised here with the preset value. This parameter is only visible when the logic operation function is enabled.	

Object value after ETS download	**0 (OFF)** 1 (ON)
After programming the application or the parameters in the ETS, the object value of the logic operation object is initialised here with the preset value. This parameter is only visible when the logic operation function is enabled.	

11.10.2 Object list logic operation function

Function	Name	Type	DPT	Flag
Logic operation function - Input	Switching... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as input of the logical link of an switching output. After the bus voltage returns or after programming with the ETS, the object value can be predefined by means of a parameter.				

11.11 Operating hours counter

The operating hours counter determines the switch-on time of a switching output. For the operating hours counter, an output is actively on when the relay contact is closed, i.e. when current is flowing to the load. In consequence, a closed contact is always evaluated, irrespective of the set relay operating mode (NO or NC contact) and the switching status.
The operating hours counter can either be configured as a second counter or alternatively as an hour counter.

– Second counter
  The actuator adds up the determined switch-on time accurately to the second for a closed relay contact. The totalled operating seconds are added in a 4-byte meter and stored permanently in the device. The current meter reading can be transmitted cyclically to the KNX by the "Operating hours counter - Meter reading - Status" communication object or when there is a change in an interval value in accordance with DPT 13.100.

– Hour counter
  The actuator adds up the determined switch-on time accurately to the minute for a closed relay contact in full operating hours. The totalled operating hours are added in a 2-byte meter and stored permanently in the device. The current meter reading can be transmitted cyclically to the KNX by the "Operating hours counter - Meter reading - Status" communication object or when there is a change in an interval value in accordance with DPT 7.007.

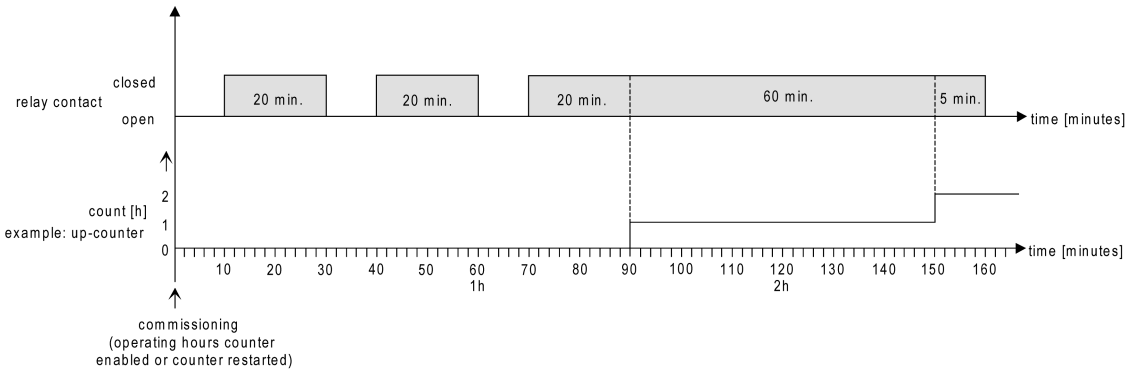


Figure 13: Function of the operating hours counter (using the example of counted hours)

In the delivery state, all values of the actuator are "0". If the operating hours counter is not enabled in the configuration of an output, no operating hours or operating seconds will be counted for the output concerned. Once the operating hours counter is enabled in the ETS, however, the operating hours or operating seconds will be determined and added up by the ETS immediately after commissioning the actuator.
If the operating hours counter is subsequently disabled again in the parameters and the actuator is programmed with this disabling function, all the operating hours or operating seconds previously counted for the output concerned will be deleted. When enabled again, the meter reading of the operating hours counter is always set to "0".

The operating hours values (full hours) or operating seconds stored in the device will not be lost in case of a bus voltage failure or by ETS programming.
On the hour counter: Any summed up operating minutes (full hour not yet reached) will be rejected in this case, however.

After the bus voltage returns or after an ETS programming operation, the actuator passively updates the "Operating hours counter - Meter reading - Status" communication object for each output. The object value can be read out if the read-flag is set. The object value, depending on the configuration for the automatic transmission, is actively transmitted if necessary to the KNX once the configured transmission delay has elapsed after the bus voltage returns (see "Set transmission behaviour of the operating hours counter").

Activating the operating hours counter

- On the parameter page "Relay outputs -> O... -> Enabled functions", activate the parameter "Operating hours counter".

  The operating hours counter is activated.
- Deactivate the "operating hours counter".

  The operating hours counter is deactivated.

Disabling of the operating hours counter and subsequent programming with the ETS resets the counter status to "0".

Setting the counting direction

The operating hours counter can optionally be configured as an up-counter or down-counter. Depending on this counting direction, a signal value or start value can optionally be set; in this way it is possible, for example, to monitor the operating time of a lamp by restricting the counter range.

Up-counter:
After activating the operating hours counter by enabling in the ETS or by restarting, the operating hours are counted starting at "0". A maximum of 65,535 hours or 2,147,483,647 can be counted (corresponds to approx. 66 years) before the meter stops and signals a meter operation by means of the object "Operating hours counter - Counter elapsed - Status".
A signal value can optionally be set in the ETS or specified via the communication object "Operating hours counter - Signal value". In this case, the counter operation is signalled to the KNX via the "Operating hours counter - Counter elapsed - Status" object if the limiting value is reached, but the meter continues counting - if it is not restarted - up to the maximum value and then stops. Only a restart initiates a new counting operation.

Down-counter:
After enabling the operating hours counter in the ETS, the meter reading is on "0" and the actuator signals a counter operation for the output concerned after the programming operation or after the bus voltage returns by means of the object "Operating hours counter – Counter elapsed - Status". Only after a restart is the down-counter set to the maximum value of 65,535 hours or 2,147,483,647 seconds (cor-

responds to approx. 66 years) and the meter operation is started.
Optionally, a start value can be set in the ETS or specified by means of the communication object "Start value for operating hours counter". If a start value is set, the down-counter is initialised with this value instead of the maximum value after a restart. The meter then counts the start value downwards by the hour. When the down-meter reaches the value "0", the meter operation is signalled to the KNX by means of the "Operating hours counter - Meter elapsed - Status" object and the counting is stopped. Only a restart initiates a new counting operation.

The operating hours counter must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Set the parameter "Counting direction" on the parameter page "Relay outputs -> O... -> Operating hours counter" to "Forward". Set the parameter "Preset value" to "Via parameter" or "Via object" if monitoring is required. In the "Via parameter" setting, specify the required value.

  The meter counts the operating hours forwards starting from "0". If monitoring is activated, the actuator transmits an "ON" telegram via the object "Operating hours counter - Meter elapsed - Status" for the output concerned as soon as the specified value is reached. Otherwise, the counter operation is first transmitted when the maximum value is reached.

- Set the parameter "Counter type" to "Down-counter". Set the parameter "Start value" to "Via parameter" or "Via object" if a preset value is required. In the "Via parameter" setting, specify the required value.

  The meter counts the operating hours down to "0" after a restart. With a start value preset, the start value is counted down, otherwise the counting operation starts at the maximum value. The actuator transmits an "ON" telegram via the object "Operating hours counter – Meter elapsed - Status" for the output concerned as soon as the value "0" is reached.

i The value of the communication object "Operating hours counter - Meter elapsed - Status" is permanently stored internally. On switching on the bus voltage or after an ETS programming operation, the object is initialised with the most recently saved value. If an operating hours counter is in this case identified as elapsed, i. e. if the object value is a "ON", an additional telegram will be actively transmitted to the KNX as soon as the configured transmit delay has elapsed after the bus voltage returns. If the meter has not yet elapsed (object value "OFF"), no telegram is transmitted on bus voltage return or after an ETS programming operation.

i In the case of a signal value or start value preset via communication object: The values received via the object are not accepted as valid and permanently saved internally until the operating hours counter is restarted. On switching on the supply voltage or after an ETS programming operation, the object is initialised with the most recently saved value. The values received will be lost in the case of a bus voltage failure or by an ETS programming operation if no counter restart was executed before. For this reason, when specifying a new start or signal value, it is advisable always to execute a counter restart afterwards as well. A standard value of 65,535 hours or 2,147,483,647 seconds is

predefined provided that no signal value or start value has been received yet via the object. The values received and stored via the object are reset to the standard value if the operating hours counter is disabled in the parameters of the ETS and an ETS programming operation is being performed.

i With a signal or start value predefined via object: If the signal value or start value is predefined with "0", the actuator will ignore a counter restart to avoid an undesired reset (e. g. in construction site mode -> operating hours already counted by manual operation).

i If the counter direction of an operating hours counter is reversed by reconfiguration in the ETS, a restart of the meter should always be performed after programming the actuator so that the meter is reinitialised.

Restarting the operating hours counter

The meter reading of the operating hours can be reset at any time by the communication object "Operating hours counter - Reset". The polarity of the reset telegram is predefined: "1" = Restart / "0" = No reaction.
In the up-counter the meter is initialised with the value "0" after a restart and in the down-counter initialised with the start value. If no start value was configured or predefined by the object, the start value is preset to 65,535 hours or 2,147,483,647 seconds.
During every counter restart, the initialised meter reading is transmitted actively to the KNX.
After a restart, the signal of a counter operation is also reset. At the same time, an "OFF" telegram is transmitted to the KNX via the object "Operating hours counter – Meter elapsed - Status". In addition, the limiting or start value is initialised.

i If a new limiting or start value was predefined via the communication object, a counter restart should always be performed afterwards, too. Otherwise, the values received will be lost in the case of a bus voltage failure or by an ETS programming operation.

i If a start value or signal value is specified with "0", there are different behaviours after a restart, depending on the principle of the preset value...
Preset as parameter:
The meter elapses immediately after a counter restart.
Preset via object:
A counter restart will be ignored to avoid an undesired reset (e. g. after installation of the devices with operating hours already being counted by manual operation). A start value or signal value greater than "0" must be specified in order to perform the restart.

Setting the transmission behaviour

The current value of the operating hours counter is continuously tracked in the communication object "Operating hours counter – Meter reading - Status". The content of the object is transmitted to the KNX when there is a change by the set count interval or cyclically active. The object value can also be read out at any time (set read flag).

The operating hours counter must be enabled on the parameter page "Relay outputs -> O... -> Enabled functions".

- Set the parameter "Transmission behaviour" on the parameter page "Relay outputs -> O... -> Operating hours counter" to "After change by interval value". Set the parameter "Counting interval" to the desired value.

  The meter reading is transmitted to the KNX as soon as it changes by the specified counting interval. After the bus voltage returns or after an ETS programming operation, the object value is transmitted automatically after "Delay after bus voltage returns" has elapsed if the current meter reading corresponds to the counting interval or a multiple thereof. A meter reading "0" is always transmitted in this case.

- Set the parameter "Transmission behaviour" to "Cyclical".

  The counter value is transmitted cyclically. The cycle time is defined via the parameter of the same name. After the bus voltage returns or an ETS programming operation, the meter reading is transmitted to the KNX for the first time after the configured cycle time has elapsed.

11.11.1 Operating hours counter parameters

Relay outputs -> O... -> Enabled functions

Operating hours counter	Checkbox (yes / **no**)
The operating hours counter can be disabled or enabled here.	

Relay outputs -> O... -> Operating hours counter

Counting method	**Seconds** Hours
The operating hours counter can either be configured as a second counter or alternatively as an hour counter. Second counter: The actuator adds up the determined switch-on time accurately to the second for a closed relay contact. The totalled operating seconds are added in a 4-byte meter and stored permanently in the device. The current meter reading can be transmitted cyclically to the KNX by the "Value operating hours counter reading" communication object or when there is a change in an interval value in acc. with DPT 13.100. Hour counter: The actuator adds up the determined switch-on time accurately to the minute for a closed relay contact in full operating hours. The totalled operating hours are added in a 2-byte meter and stored permanently in the device. The current meter reading can be transmitted cyclically to the KNX by the "Value operating hours counter reading" communication object or when there is a change in an interval value in acc. with DPT 7.007.	

Counting direction	**Forwards** Backwards
The operating hours counter can be configured as an up-counter or down-counter. The setting here influences the visibility of the other parameters and objects of the operating hours counter.	

Specifying a signal value	Checkbox (yes / **no**)
If the up-counter is used, a signal value can optionally be predefined. This parameter specifies whether the signal value is to be used. The setting "No" deactivates the reporting value. This parameter is only visible in the configuration "Counting direction = Forward".	

Preset value	**via parameter** via object
If the up-counter is used, a signal value can optionally be predefined. This parameter defines whether the signal value can be set via a separate parameter or adapted individually by a communication object from the bus. This parameter is only visible in the configuration "Counting direction = Forward".	

Signal value	0...**2147483647** s * 0...**65535** h **
Here the reporting value of the up counter is set. Once this signal value is reached, an "ON" telegram is transmitted via the object "Operating hours counter - Meter elapsed - Status". The meter itself continues until the maximum meter reading is reached and then stops. *: With second counter **: With hours counter This parameter is only visible if the parameter "Preset value" is set to "Via parameter".	

Specify start value	Checkbox (yes / **no**)
If the down-counter is used, a start value can optionally be predefined. This parameter specifies whether the start value is to be used. The setting "No" deactivates the start value. This parameter is only visible in the configuration "Type of counter = down-counter".	

Start value preset	via parameter via object
If the down-counter is used, a start value can optionally be predefined. This parameter defines whether the start value can be set via a separate parameter or adapted individually by a communication object from the bus. This parameter is only visible in the configuration "Counting direction = Backward".	

Start value	0...**2147483647** s * 0...**65535** h **
The start value of the down-counter is set here. After initialisation, the meter starts counting down from the predefined value to the value "0". If this end value is reached, an "ON" telegram is transmitted via the object "Operating hours counter - Meter elapsed - Status". *: With seconds counter **: With hours counter This parameter is only visible if the parameter "Start value preset" is set to "Via parameter".	

Transmission behaviour	**Cyclically** after change by interval value
The current meter reading of the operating hours meter can be transmitted actively to the KNX via the communication object "Operating hours counter – Meter reading – Status". cyclical: The meter reading is transmitted cyclically to the KNX and when there is a change. after change by interval value: The meter reading is transmitted to the KNX only when there is a change.	

Cycle time	**0**...23 h 0...**15**...59 min **10**…59 s
This parameter defines the cycle time for the cyclical transmission.	

Counting interval	0...**3600**...2147483647 s* 0...**1**...65535 h**
The interval of the counter value is set here for automatic transmission. The current meter reading is transmitted to the KNX after the counting interval configured here. *: With second counter **: With hours counter This parameter is only visible if the parameter "Transmission behaviour" is set to "on change by interval value".	

11.11.2 Object list operating hours counter

Function	Name	Type	DPT	Flag
Operating hours counter - Signal value	Switching... - Input	4-byte	13,100	C, -, W, -, U
Operating hours counter - Start value	Switching... - Input	4-byte	13,100	C, -, W, -, U
4-byte object for external preset of a signal value of the operating hours counter of a switching output in the case of an up-counter or a start value in the case of a down-counter. Value range: 0...2147483647 seconds This object is only available with the second counter.				

Function	Name	Type	DPT	Flag
Operating hours counter - Signal value	Switching... - Input	2-byte	7,007	C, -, W, -, U
Operating hours counter - Start value	Switching... - Input	2-byte	7,007	C, -, W, -, U
2-byte object for external preset of a signal value of the operating hours counter of a switching output in the case of an up-counter or a start value in the case of a down-counter. Value range: 0...65,535 hours This object is only available with the hour counter.				

Function	Name	Type	DPT	Flag
Operating hours counter - Restart	Switching... - Input	1-bit	1,015	C, -, W, -, U
1-bit object for resetting the operating hours counter of a switching output ("1" = re-start, "0" = no reaction).				

Function	Name	Type	DPT	Flag
Operating hours counter - Meter reading - Status	Switching... - Output	4-byte	13,100	C, R, -, T, A
4-byte object to transmit or read out the current counter level of the operating hours counter of a switching output. Value range: 0...2,147,483,647 seconds In the event of a bus voltage failure, the value of the communication object is not lost and is actively transmitted to the bus after the bus voltage returns or after an ETS programming operation. In the as-delivered state, the value is "0". This object is only available with the second counter.				

Function	Name	Type	DPT	Flag
Operating hours counter - Meter reading - Status	Switching... - Output	2-byte	7,007	C, R, -, T, A
2-byte object to transmit or read out the current counter level of the operating hours counter of a switching output. Value range: 0...65,535 hours In the event of a bus voltage failure, the value of the communication object is not lost and is actively transmitted to the bus after the bus voltage returns or after an ETS programming operation. In the as-delivered state, the value is "0". This object is only available with the hour counter.				

Function	Name	Type	DPT	Flag
Operating hours counter - Meter elapsed - Status	Switching... - Output	1-bit	1,002	C, R, -, T, A
1-bit object to sign that the operating hours counter has elapsed (forwards counter = limit value reached / backwards counter = value "0" reached). With a message, the object value is actively transmitted to the KNX ("1" = message active / "0" = message inactive). In the event of a bus voltage failure, the value of the communication object is not lost and is actively transmitted to the bus after the bus voltage returns or after an ETS programming operation.				

12 Logic functions

The device contains up to 8 logic functions. These functions can be used to perform simple logical operations in a KNX installation. Logic functions can be networked, enabling the execution of complex operations, by linking input and output objects.

Enabling and configuring the number of logic functions

To be able to use logic functions, they must be enabled centrally on the "General" parameter page.

- Activate the parameter "Logic functions".

  The logic functions can be used. The "Logic functions" parameter node becomes available, which contains additional parameter pages. The configuration of the logic functions takes place in this parameter node.

Logic functions can be enabled in steps so that the number of visible functions and, in consequence, the available parameters and communication objects are visible in the ETS. The number of available logic functions can be defined on the "Logic functions" parameter page.

- Configure the "Number of logic functions" parameter to the desired value.

  As many logic functions are created as have been selected.

The application program deletes existing logic functions from the configuration if the number of available functions is reduced.

12.1 Logic functions parameters

General

Logic functions	Checkbox (yes / **no**)
This parameter enables the logic functions globally. If the parameter is activated, the "Logic functions" parameter node becomes available, which contains additional parameter pages. The configuration of the logic functions takes place in this parameter node.	

Number of logic functions (1...8)	**1**...8
The number of required logic functions is defined here.	

Logic functions -> Logic function...

Name of logic function	Free text
The text entered in this parameter is applied to the name of the communication objects and is used to label the logic function in the ETS parameter window (e. g. "limit value switch outside temperature", disabling of venetian blind garden door). The text is not programmed in the device.	

Type of logic function	**Logic gate** Converter (1-bit -> 1-byte) Disabling element (filtering/time) Comparator Limit value switch with hysteresis

It is possible to be define which logical operation is to be executed for each logic function. This parameter is only visible if the logic functions have been enabled on the "General" parameter page.

Logic gate: The logic function works as a Boolean logic gate with optionally 1 ... 4 inputs and one output.

Converter (1-bit -> 1-byte): The logic function is configured as a converter. The converter has a 1-bit input and 1-byte output and also a disabling object. ON/ OFF telegrams can be converted to pre-configured values. The disabling object can deactivate the converter.

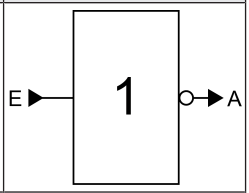
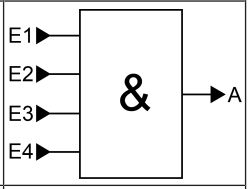
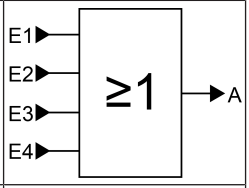
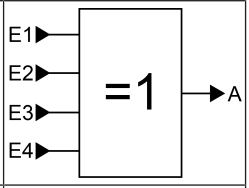
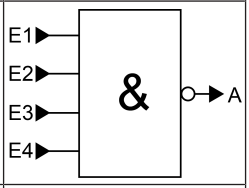
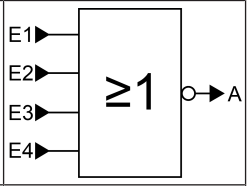
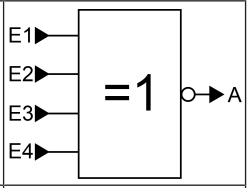
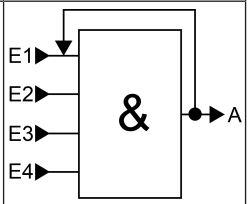
Disabling element (filtering/time): The logic function is configured as a disabling element. The disabling element has a 1-bit input and a 1-bit output. This logic function can delay input signals depending on the state (ON or OFF) and output them filtered at the output. A disabling object is also available, which can be used to deactivate the disabling element.

Comparator: The logic function works as a comparator with an input whose data format can be configured, and with a 1-bit output used to output the result of the comparison operation. The reference function and the reference value are configured in the ETS.

Limit value switch with hysteresis: The logic function acts like a limit switch with hysteresis. An input with a configurable data format and a 1-bit output are available. The hysteresis is determined by an upper and lower threshold. The threshold values can be configured in the ETS. The input value is compared to the threshold values. The command issued at the output (ON/OFF) when the value exceeds or falls below the configured threshold values can be configured.

12.2 Logic gate

A logic gate has up to 4 (1-bit) boolean inputs and one (1-bit) logic output. In consequence, a logic operation only supports the 1-bit data format. The following table shows configurable logic gates and explains their function.

Logic gate	Description	Icon
Invert (NOT)	The logic gate has only one input. The input is forwarded inverted to the gate output.	
And (AND)	The logic gate has 4 inputs. The output is "1" if all inputs are "1". Otherwise the output is "0".	
Or (OR)	The logic gate has 4 inputs. The output is "0" if all inputs are "0". Otherwise the output is "1".	
Exclusive OR (XOR)	The logic gate has 4 inputs. The output is "1" if only one input is "1". Otherwise the output is "0".	
Inverted And (NAND)	The logic gate has 4 inputs. The output is "0" if all inputs are "1". Otherwise the output is "1".	
Inverted Or (NOR)	The logic gate has 4 inputs. The output is "1" if all inputs are "0". Otherwise the output is "0".	
Inverted Exclusive OR (NXOR)	The logic gate has 4 inputs. The output is "0" if only one input is "1". Otherwise the output is "1".	
AND with feedback (ANDR)	The logic gate has 4 inputs. The output is fed back to the first input of the gate. The output is "1" if all inputs are "1". Otherwise the output is "0". If input 1 is set to "1" and the output is still "0", the feedback of input 1 will also be reset to "0". Only if	

Logic gate	Description	Icon
	inputs 2 ... 4 are "1" will a newly received "1" at input 1 cause the output to assume the logical state "1". Application: switching the light manually only at twilight -> Switch at input 1, twilight sensor at input 2 -> The manual switching signal is ignored as long as the twilight sensor has not issued an enabling signal. The manual switching signal is executed only at twilight.	

Inputs of a logic gate can be activated or deactivated separately. This allows gates with an individual number of inputs (1 ... 4) to be implemented. As an option, it is possible to invert inputs.

The transmission behaviour of the gate output can be configured.

12.2.1 Logic gate parameters

Logic functions -> Logic function...

Logic gate selection	Invert (NOT) **And (AND)** Or (OR) Exclusive OR (XOR) Inverted And (NAND) Inverted Or (NOR) Inverted Exclusive OR (NXOR) AND with feedback (ANDR)
This parameter defines the function of the logic gate and is visible only if "Type of logic function = logic gate". Invert (NOT): The inverter is configured. The gate has one input and one output. The boolean data value of the input is forwarded inverted to the output. And (AND): An AND gate is configured. The gate has 1...4 inputs and one output. The inputs are logically AND-linked. The result is forwarded to the output. OR (OR): An OR gate is configured. The gate has 1...4 inputs and one output. The inputs are logically OR-linked. The result is forwarded to the output. Exclusive-OR (XOR): An exclusive-OR gate is configured. The gate has 1...4 inputs and one output. The inputs are logically Exclusive-OR-linked. The result is forwarded to the output. Inverted AND (NAND): An inverted AND gate is configured. The gate has 1...4 inputs and one output. The inputs are logically AND-linked. The result is forwarded inverted to the output. Inverted OR (NOR): An OR gate is configured. The gate has 1...4 inputs and one output. The inputs are logically OR-linked. The result is forwarded inverted to the output. Inverted Exclusive OR (NXOR): An inverted Exclusive OR gate is configured. The gate has 1...4 inputs and one output. The inputs are logically Exclusive-OR-linked. The result is forwarded inverted to the output. AND with feedback (ANDR): An AND gate with feedback is configured. The gate has 1...4 inputs and one output. The output is fed back to the first input of the gate.	

Input 1	Deactivated **Input object**
Inputs of a logic gate can be activated or deactivated separately. This allows gates with an individual number of inputs (1 ... 4) to be implemented. This parameter defines whether the first input of the gate is to be used. This parameter is visible only if "Type of logic function = logic gate".	

Input 2	Deactivated **Input object**
Inputs of a logic gate can be activated or deactivated separately. This allows gates with an individual number of inputs (1 ... 4) to be implemented. This parameter defines whether the second input of the gate is to be used. This parameter is visible only if "Type of logic function = logic gate".	

Input 3	**Deactivated** Input object
Inputs of a logic gate can be activated or deactivated separately. This allows gates with an individual number of inputs (1 ... 4) to be implemented. This parameter defines whether the third input of the gate is to be used. This parameter is visible only if "Type of logic function = logic gate".	

Input 4	**Deactivated** Input object
Inputs of a logic gate can be activated or deactivated separately. This allows gates with an individual number of inputs (1 ... 4) to be implemented. This parameter defines whether the fourth input of the gate is to be used. This parameter is visible only if "Type of logic function = logic gate".	

Invert input	Checkbox (yes / **no**)
It is possible to invert inputs of the logic gate as an option. This parameter is available for each input of the gate and defines whether the respective input is to be evaluated unchanged or inverted. This parameter is visible only if "Type of logic function = logic gate".	

Transmission criteria	**Always transmit when input is updated** Transmit only if the output changes Transmit cyclically
The transmission behaviour of the output can be configured here. Always transmit when input is updated: The output transmits the current object value to the KNX each time a telegram is received at the input. Transmit only if the output changes: The output transmits the current object value only if the object value has changed compared to the last transmission process. The output always transmits when the first telegram is received at an input after the bus voltage returns or after an ETS programming operation. Transmit cyclically: In this setting, the output transmits the current object value cyclically to the KNX. After the bus voltage returns or after an ETS programming operation, the cyclical transmission is not started until the first telegram has been received at the input. The output also transmits as soon as a new telegram is received at the input. At the same time, the cycle time for cyclical transmission is restarted!	

Transmission delay for sending the hours result (0...99)	**0**...99
Optionally, a delay before the result is transmitted (telegram at output) can be configured. In the setting "Always transmit when input is updated", telegrams at the output are transmitted only once the delay has elapsed. The delay time is restarted by each telegram at the input. In the setting "Only transmit if the output changes", telegrams are sent only if the object value changes at the output once the delay has expired. If the logic function is reprocessed by a new telegram at the input within the delay time and the object value changes again, the delay will restart. If the object value of the output does not change due to new input telegrams, the delay will not restart. This parameter defines the hours of the delay time.	

Minutes (0...59)	**0**...59
This parameter defines the minutes of the delay time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the delay time. The parameters for the transmission delay are only visible for "Transmission criteria" = "Always transmit when the input is updated" and "Only transmit when the output changes".	

Cycle time hours (0...99)	**0**...99
This parameter defines the cycle time for the cyclical transmission of the output. Setting the cycle time hours.	

Minutes (0...59)	0...**5**...59
This parameter defines the minutes of the cycle time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the cycle time. The parameters for the cycle time are visible only if "Transmission criteria" = "Transmit cyclically".	

12.2.2 Object list for logic gate

Function	Name	Type	DPT	Flag
Logic gate... Input 1	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as input 1 of a logic gate (1...8). The input state can be inverted optionally. This object is available only if the type of logic function is configured to "logic gate" and input 1 is used.				

Function	Name	Type	DPT	Flag
Logic gate... Input 2	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as input 2 of a logic gate (1...8). The input state can be inverted optionally. This object is available only if the type of logic function is configured to "logic gate" and input 2 is used.				

Function	Name	Type	DPT	Flag
Logic gate... Input 3	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as input 3 of a logic gate (1...8). The input state can be inverted optionally. This object is available only if the type of logic function is configured to "logic gate" and input 3 is used.				

Function	Name	Type	DPT	Flag
Logic gate... Input 4	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as input 4 of a logic gate (1...8). The input state can be inverted optionally. This object is available only if the type of logic function is configured to "logic gate" and input 4 is used.				

Function	Name	Type	DPT	Flag
Logic gate output	Logic... - Output	1-bit	1,002	C, R, -, T, A
1-bit object as output of a logic gate (1...8). This object is available only if the type of logic function is configured to "logic gate".				

12.3 Converter (1-bit -> 1-byte)

The converter has a 1-bit input and 1-byte output and also a disabling object. ON/ OFF telegrams can be converted to pre-configured values. The disabling object can deactivate the converter.

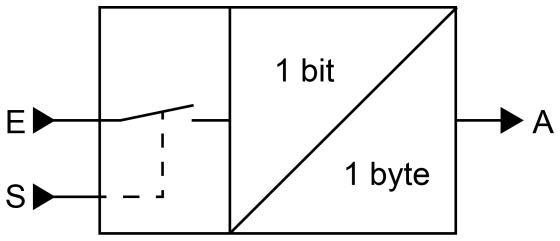


Figure 14: Converter (1-bit -> 1-byte)

The converter can react differently to input states. The parameter "Reaction at input to" defines whether the converter reacts to ON and OFF commands or alternatively only processes ON or OFF telegrams.
A concrete 1-byte output value can be assigned to each 1-bit input state. The two output values can be configured anywhere within a range 0 ... 255 as desired. The data format of the converter output object is set to DPT 5.001 (0...100%).

The disabling object can be deactivated by means of the converter. A deactivated converter no longer processes input states and consequently does not convert any new output values (the last value is retained and transmitted cyclically, if necessary). At the end of a disabling function, the converter is enabled again. The converter then waits for the next telegram at the input.
The telegram polarity of the disabling object can be configured.

The transmission behaviour of the converter output can be configured.

12.3.1 Converter parameters

Logic functions -> Logic function...

Reaction at input to	**ON and OFF telegrams** ON telegrams OFF telegrams
The converter can react differently to input states. It is defined here whether the converter reacts to ON and OFF commands or alternatively only processes ON or OFF telegrams.	

Disabling object polarity	**0 = enabled / 1 = disabled** 0 =disabled/ 1 = enabled
This parameter defines the polarity of the disabling object.	

Output value for ON (0...255)	0...**255**
A concrete 1-byte output value can be assigned to each 1-bit input state. This parameter defines the output value for ON telegrams. This parameter is visible only if the input is to react to ON telegrams.	

Output value for OFF (0...255)	**0**...255
A concrete 1-byte output value can be assigned to each 1-bit input state. This parameter defines the output value for OFF telegrams. This parameter is visible only if the input is to react to OFF telegrams.	

Transmission criteria	**Always transmit when input is updated** Transmit only if the output changes Transmit cyclically
The transmission behaviour of the output can be configured here. Always transmit when input is updated: The output transmits the current object value to the KNX each time a telegram is received at the input. Transmit only if the output changes: The output transmits the current object value only if the object value has changed compared to the last transmission process. The output always transmits when the first telegram is received at an input after the bus voltage returns or after an ETS programming operation. Transmit cyclically: In this setting, the output transmits the current object value cyclically to the KNX. After the bus voltage returns or after an ETS programming operation, the cyclical transmission is not started until the first telegram has been received at the input. The output also transmits as soon as a new telegram is received at the input. At the same time, the cycle time for cyclical transmission is restarted!	

Transmission delay for sending the hours result (0...99)	**0**...99
Optionally, a delay before the result is transmitted (telegram at output) can be configured. In the setting "Always transmit when input is updated", telegrams at the output are transmitted only once the delay has elapsed. The delay time is restarted by each telegram at the input. In the setting "Only transmit if the output changes", telegrams are sent only if the object value changes at the output once the delay has expired. If the logic function is reprocessed by a new telegram at the input within the delay time and the object value changes again, the delay will restart. If the object value of the output does not change due to new input telegrams, the delay will not restart. This parameter defines the hours of the delay time.	

Minutes (0...59)	**0**...59
This parameter defines the minutes of the delay time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the delay time. The parameters for the transmission delay are only visible for "Transmission criteria" = "Always transmit when the input is updated" and "Only transmit when the output changes".	

Cycle time hours (0...99)	**0**...99
This parameter defines the cycle time for the cyclical transmission of the output. Setting the cycle time hours.	

Minutes (0...59)	0...**5**...59
This parameter defines the minutes of the cycle time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the cycle time. The parameters for the cycle time are visible only if "Transmission criteria" = "Transmit cyclically".	

12.3.2 Converter object list

Function	Name	Type	DPT	Flag
Converter input	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as input of a converter. It is possible to configure whether the converter responds to ON and OFF commands or alternatively processes only ON or only OFF telegrams. This object is available only if the type of logic function is configured to "Converter".				

Function	Name	Type	DPT	Flag
Converter disabling function	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as disabling input of a converter. A disabled converter will no longer process input states and will consequently not convert any new output values (the last value is retained and transmitted cyclically, if necessary). The telegram polarity can be configured. This object is available only if the type of logic function is configured to "Converter".				

Function	Name	Type	DPT	Flag
Converter output	Logic... - Output	1-byte	5,001	C, R, -, T, A
1-byte object as value output of a converter. This object is available only if the type of logic function is configured to "Converter".				

12.4 Disabling element (filtering/time)

The disabling element has a 1-bit input and 1-bit output as well as a disabling object. Input states (ON/OFF) can be delayed separately and filtered at the output before being output. The filter makes it possible to invert the states of the output
(e.g. ON -> OFF) or to suppress them completely
(e.g. OFF -> ---, OFF is not transmitted). If the filter is not used, the disabling element will work only with the time functions if required. Alternatively, it is possible to use only the filter (without delays).
The disabling object can deactivate the disabling element.

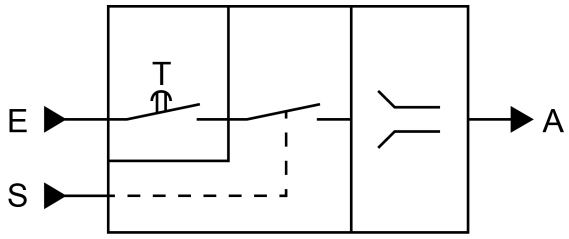


Figure 15: Disabling element (filtering/time)

The "Time function" parameter is used to define whether ON or OFF telegrams or both states are evaluated with a delay after being received at the input. If a delay is intended, the delay time can be configured separately for ON and OFF telegrams. The delay will be effective only if the delay time is set to greater than "0". Each telegram received at the input re-triggers the respective delay time.
If no delay is configured, the input telegrams go directly into the filter.

Special feature when using delays: If no telegram is received at the input, a configured delay time (time > 0) will act like an automatic cyclical trigger of the filter. The most recently received input state will then be forwarded automatically and repeatedly to the filter after the delay has elapsed. It will then work according to its configuration and forward the result to the output of the disabling element. Consequently, the output will then also transmit telegrams depending on the transmission criteria set. If cyclical transmission of the output is not desired due to the automatic triggering of the filter, the transmission criterion must be set to "Only transmit if the output changes".
If no delay is intended, the filter is always only triggered automatically by means of the received telegrams and thus not automatically.

After the bus voltage returns or after an ETS programming operation, the delays are triggered automatically.

The filter is set by the "Filter function" parameter according to the following table.

Filter function	Result
ON -> ON / OFF -> OFF	Input telegrams are forwarded unchanged to the output. Filter deactivated.
ON -> --- / OFF -> OFF	ON telegrams are filtered and not forwarded to the output. OFF telegrams are forwarded unchanged to the output.

Filter function	Result
ON -> ON / OFF -> ---	OFF telegrams are filtered and not forwarded to the output. ON telegrams are forwarded unchanged to the output.
ON -> OFF / OFF -> ON	ON telegrams are converted to OFF telegrams and OFF telegrams converted to ON telegrams and forwarded to the output.
ON -> --- / OFF -> ON	ON telegrams are filtered and not forwarded to the output. OFF telegrams are converted to ON telegrams and forwarded to the output.
ON -> OFF / OFF -> ---	OFF telegrams are filtered and not forwarded to the output. ON telegrams are converted to OFF telegrams and forwarded to the output.

The disabling element can be deactivated by the disabling object. A deactivated disabling element no longer forwards any input states to the filter and consequently does not convert any new output values (the last value is retained and transmitted cyclically, if necessary). However, the input states are still evaluated (even with effective delays). At the end of a disabling function, the disabling element is enabled again. The disabling element waits for the next telegram at the input or for the next cycle of configured delay times.
The telegram polarity of the disabling object can be configured.

The transmission behaviour of the disabling element output can be configured.

12.4.1 Disabling element parameters

Logic functions -> Logic function...

Time function	**No delay** Delay only ON telegrams Delay only OFF telegrams Delay ON and OFF telegrams
This parameter is used to define whether ON or OFF telegrams or both states are evaluated with a delay after being received at the input. If a delay is intended, the delay time can be configured separately for ON and OFF telegrams. If no delay is configured, the input telegrams go directly into the filter.	

Delay for ON telegrams Minutes (0...59)	**0**...59
The delay for ON telegrams is configured here. The delay will be effective only if the delay time is set to greater than "0". Each ON telegram received at the input re-triggers the delay time. Special feature when using delays: If no telegram is received at the input, a configured delay time (time > 0) will act like an automatic cyclical trigger of the filter. The most recently received input state will then be forwarded automatically and repeatedly to the filter after the delay has elapsed. It will then work according to its configuration and forward the result to the output of the disabling element. Consequently, the output will then also transmit telegrams depending on the transmission criteria set. If cyclical transmission of the output is not desired due to the automatic triggering of the filter, the transmission criterion must be set to "Only transmit if the output changes". After the bus voltage returns or after an ETS programming operation, the delays are triggered automatically. Setting the ON delay time minutes.	

Seconds (0...59)	0...**10**...59
Setting the seconds of the ON delay time. The parameters for the ON delay are available only if the parameter "Time function" is set to "Only delay ON telegrams" or "Delay ON and OFF telegrams".	

Delay for OFF telegrams Minutes (0...59)	**0**...59
The delay for OFF telegrams is configured here. The delay will be effective only if the delay time is set to greater than "0". Each OFF telegram received at the input re-triggers the delay time. Special feature when using delays: If no telegram is received at the input, a configured delay time (time > 0) will act like an automatic cyclical trigger of the filter. The most recently received input state will then be forwarded automatically and repeatedly to the filter after the delay has elapsed. It will then work according to its configuration and forward the result to the output of the disabling element. Consequently, the output will then also transmit telegrams depending on the transmission criteria set. If cyclical transmission of the output is not desired due to the automatic triggering of the filter, the transmission criterion must be set to "Only transmit if the output changes". After the bus voltage returns or after an ETS programming operation, the delays are triggered automatically. Setting the OFF delay time minutes.	

Seconds (0...59)	0...**10**...59
Setting the OFF delay time seconds. The parameters for the OFF delay are available only if the "Time function" parameter is set to "Only delay OFF telegrams" or "Delay ON and OFF telegrams".	

Disabling object polarity	**0 = enabled / 1 = disabled** 0 =disabled/ 1 = enabled
This parameter defines the polarity of the disabling object.	

Filter function	ON -> ON / OFF -> OFF ON -> --- / OFF -> OFF ON -> ON / OFF -> --- ON -> OFF / OFF -> ON ON -> --- / OFF -> ON ON -> OFF / OFF -> ---

This parameter defines the function of the filter.

ON -> ON / OFF -> OFF: Input telegrams are forwarded unchanged to the output. Filter deactivated.

ON -> --- / OFF -> OFF: ON telegrams are filtered and not forwarded to the output. OFF telegrams are forwarded unchanged to the output.

ON -> ON / OFF -> ---: OFF telegrams are filtered and not forwarded to the output. ON telegrams are forwarded unchanged to the output.

ON -> OFF / OFF -> ON: ON telegrams are converted to OFF telegrams and OFF telegrams are converted to ON telegrams and forwarded to the output.

ON -> --- / OFF -> ON: ON telegrams are filtered and not forwarded to the output. OFF telegrams are converted to ON telegrams and forwarded to the output.

ON -> OFF / OFF -> ---: OFF telegrams are filtered and not forwarded to the output. ON telegrams are converted to OFF telegrams and forwarded to the output.

Transmission criteria	**Always transmit when input is updated** Transmit only if the output changes Transmit cyclically

The transmission behaviour of the output can be configured here.

Always transmit when input is updated: The output transmits the current object value to the KNX each time a telegram is received at the input. In addition, transmission at the output is repeated if no telegram was received at the input using the delay times and the configured time has expired.

Transmit only if the output changes: The output transmits the current object value only if the object value has changed compared to the last transmission process. After the bus voltage returns or an ETS programming operation, the output always transmits.

Transmit cyclically: In this setting, the output transmits the current object value cyclically to the KNX. After the bus voltage returns or after an ETS programming operation, the cyclical transmission is not started until the first telegram has been received at the input. If the ON/OFF delay is used, the cyclical transmission starts automatically once the delay time has expired after the bus voltage returns or after an ETS programming operation. The output also transmits as soon as a new telegram is received at the input. At the same time, the cycle time for cyclical transmission is restarted!

Cycle time hours (0...99)	**0**...99
This parameter defines the cycle time for the cyclical transmission of the output. Setting the cycle time hours.	

Minutes (0...59)	0...**5**...59
This parameter defines the minutes of the cycle time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the cycle time. The parameters for the cycle time are visible only if "Transmission criteria" = "Transmit cyclically".	

12.4.2 Object list for disabling element

Function	Name	Type	DPT	Flag
Disabling element input	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as input of a disabling element. This object is available only if the type of logic function is configured to "Disabling element".				

Function	Name	Type	DPT	Flag
Disabling element disabling function	Logic... - Input	1-bit	1,002	C, -, W, -, U
1-bit object as disabling input of a disabling element. A disabled disabling element will no longer forward any input states to the filter and will consequently not convert any new output values (the last value is retained and transmitted cyclically, if necessary). The telegram polarity can be configured. This object is available only if the type of logic function is configured to "Disabling element".				

Function	Name	Type	DPT	Flag
Disabling element output	Logic... - Output	1-bit	1,002	C, R, -, T, A
1-bit object as output of a disabling element. This object is available only if the type of logic function is configured to "Disabling element".				

12.5 Comparator

The comparator works with an input, whose data format can be configured, and with a 1-bit output used to output the result of the comparison operation. The comparator compares the value received at the input with a configured reference value and evaluates whether the reference is correct (result = true) or not (result = false) according to the specified reference function.
The reference function and the reference value are configured in the ETS.

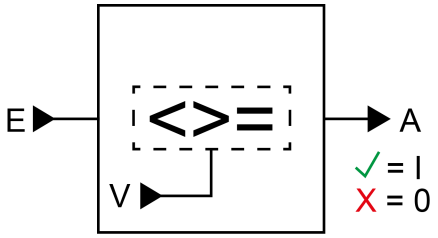


Figure 16: Comparator

The "Data format" parameter defines the size and format of the input object according to the following table. The output object is permanently set to 1-bit (DPT 1.002) and outputs the result of the comparison operation (ON = true / OFF = false). The reference value that can be set in the ETS is adapted to the input data format.

Data format	KNX DPT
4-bit dimming	3,007
1-byte operating mode switchover	20,102
1-byte scene extension unit	18,001
1-byte value 0...255	5,010
1-byte brightness value 0...100%	5,001
2-byte value 0...655535	7,001
2-byte value -32768...32767	8,001
2-byte floating-point number	9.0xx
4-byte value -2147483648...2147483647	13,001

The following table shows the possible reference functions (I = input value, R = reference value).

Reference function	Functionality
Equal (I = R)	The comparator output is "ON" (true) if the input is equal to the reference value. Otherwise the output is "OFF" (false).
Not equal (I ≠ R)	The comparator output is "ON" (true) if the input is unequal to the reference value. If the input value is equal to the reference value, the output is "OFF" (false).
Greater than (I > R)	The comparator output is "ON" (true) if the input is greater than the reference value. If the input value is less than or equal to the reference value, the output will switch "OFF" (false).

Reference function	Functionality
Greater than or equal (I ≥ R)	The comparator output is "ON" (true) if the input is greater than the reference value or equal to the reference value. If the input value is smaller than the reference value, the output will switch "OFF" (false).
Smaller than (I < R)	The comparator output is "ON" (true) if the input is less than the reference value. If the input value is greater than or equal the reference value, the output will switch "OFF" (false).
Smaller than or equal (I ≤ R)	The comparator output is "ON" (true) if the input is less than the reference value or equal to the reference value. If the input value is greater than the reference value, the output will switch "OFF" (false).
Range testing less than (R1 < I < R2)	There are two reference values. The comparator output is "ON" (true) if the input is greater than the first reference value or less than the second reference value. If the input value is less than the first reference value or equal the first reference value or greater than the second reference value or equal the second reference value, the output will switch "OFF" (false).
Range testing less than or equal to (R1 ≤ I ≤ R2)	There are two reference values. The comparator output is "ON" (true) if the input is greater than or equal the first reference value and smaller than or equal the second reference value. If the input value is smaller than the first reference value or greater than the second reference value, the output will switch "OFF" (false).

The transmission behaviour of the comparator output can be configured.

12.5.1 Comparator parameters

Logic functions -> Logic function...

Data format	4-bit dimming (DPT 3.007) 1-byte operating mode switchover (DPT 20.102) 1-byte scene extension unit (DPT 18.001) **1-byte value 0...255 (DPT 5.010)** 1-byte brightness value 0...100% (DPT 5.001) 2-byte value 0...655,535 (DPT 7.001) 2-byte value -32768...32767 (DPT 8.001) 2-byte floating-point number (DPT 9.0xx) 4-byte value -2147483648...2147483647 (DPT 13.001)
This parameter defines the size and format of input object. The output object is permanently set to 1-bit (DPT 1.002) and outputs the result of the comparison operation (ON = true / OFF = false).	

Reference function	**Equal (I = R)** Not equal (I ≠ R) Greater than (I > R) Greater than or equal (I ≥ R) Smaller than (I < R) Smaller than or equal (I ≤ R) Range testing less than (R1 < I < R2) Range testing less than or equal to (R1 ≤ I ≤ R2)
The comparator compares the value received at the input (E) with a configured reference value (V) and evaluates whether the comparison is correct (result = true) or not (result = false) according to the specified reference function here. Equal (I = R): The comparator output is "ON" (true) if the input is equal the reference value. Otherwise the output is "OFF" (false). Not equal (I ≠ R): The comparator output is "ON" (true) if the input is unequal to the reference value. If the input value is equal to the reference value, the output is "OFF" (false). Greater than (I > R): The comparator output is "ON" (true) if the input is greater than the reference value. If the input value is less than or equal to the reference value, the output will switch "OFF" (false). Greater than or equal (I ≥ R): The comparator output is "ON" (true) if the input is greater than the reference value or equal to the reference value. If the input value is smaller than the reference value, the output will switch "OFF" (false). Smaller than (I < R): The comparator output is "ON" (true) if the input is less than the reference value. If the input value is greater than or equal the reference value, the output will switch "OFF" (false). Smaller than or equal (I ≤ R): The comparator output is "ON" (true) if the input is smaller than the reference value or equal to the reference value. If the input value is greater than the reference value, the output will switch "OFF" (false). Range testing less than (R1 < I < R2): There are two reference values. The comparator output is "ON" (true) if the input is greater than the first reference value or less than the second reference value. If the input value is less than the first reference value or equal the first reference value or greater than the second reference value or equal the second reference value, the output will switch "OFF" (false). Range testing less than or equal to (R1 ≤ I ≤ R2): There are two reference values. The comparator output is "ON" (true) if the input is greater than or equal the first reference value and smaller than or equal the second reference value. If the input value is smaller than the first reference value or greater than the second reference value, the output will switch "OFF" (false).	

Reference value (R)	**Dimming darker, stop (0)** Dimming darker, 100% (1) Dimming darker, 50% (2) Dimming darker, 25% (3) Dimming darker, 12.5% (4) Dimming darker, 6% (5) Dimming darker, 3% (6) Dimming darker, 1.5% (7) Dimming brighter, stop (8) Dimming brighter, 100% (9) Dimming brighter, 50% (10) Dimming brighter, 25% (11) Dimming brighter, 12.5% (12) Dimming brighter, 6% (13) Dimming brighter, 3% (14) Dimming brighter, 1.5% (15)
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "4-bit dimming (DPT 3.007)".	

Reference value (R)	**Automatic (0)** Comfort mode (1) Standby mode (2) Night mode (3) Frost/heat protection (4)
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "1-byte operating mode switchover (DPT 20.102)".	

Reference value (R)	**Call up scene 1 (0)** Call up scene 2 (1) ... Call up scene 64 (63) Save scene 1 (128) Save scene 2 (129) ... Save scene 64 (191)
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "1-byte scene extension unit (DPT 18.001)".	

Reference value (R) (0...255)	**0**...255
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "1-byte value -0...255 (DPT 5.010)".	

Reference value (R) (0...100%)	**0**...100
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "1-byte brightness value 0...100% (DPT 5.001)".	

Reference value (R) (0...65535)	**0**...65535
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "2-byte value 0...65535 (DPT 7.001)".	

Reference value (R) (-32768...32767)	-32768...**0**...32767
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "2-byte value -32768...32767 (DPT 8.001)".	

Reference value (R) (-671088...670760)	-671088...**0**...670760
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "2-byte floating point value (DPT 9.0xx)".	

Reference value (R) (-2147483648...2147483647)	-2147483648...**0**...2147483647
This parameter is used to define the internal reference value (V) for the reference function. This parameter is available only if the "Data format" is set to "4-byte value -2147483648...2147483647 (DPT 13.001)".	

Two reference values (R1 & R2) can be configured if the range testing is configured as "Reference function". In this case, the setting options are identical.

Transmission criteria	**Always transmit when input is updated** Transmit only if the output changes Transmit cyclically
The transmission behaviour of the output can be configured here. Always transmit when input is updated: The output transmits the current object value to the KNX each time a telegram is received at the input. Transmit only if the output changes: The output transmits the current object value only if the object value has changed compared to the last transmission process. The output always transmits when the first telegram is received at an input after the bus voltage returns or after an ETS programming operation. Transmit cyclically: In this setting, the output transmits the current object value cyclically to the KNX. After the bus voltage returns or after an ETS programming operation, the cyclical transmission is not started until the first telegram has been received at the input. The output also transmits as soon as a new telegram is received at the input. At the same time, the cycle time for cyclical transmission is restarted!	

Transmission delay for sending the hours result (0...99)	**0**...99
Optionally, a delay before the result is transmitted (telegram at output) can be configured. In the setting "Always transmit when input is updated", telegrams at the output are transmitted only once the delay has elapsed. The delay time is restarted by each telegram at the input. In the setting "Only transmit if the output changes", telegrams are sent only if the object value changes at the output once the delay has expired. If the logic function is reprocessed by a new telegram at the input within the delay time and the object value changes again, the delay will restart. If the object value of the output does not change due to new input telegrams, the delay will not restart. This parameter defines the hours of the delay time.	

Minutes (0...59)	**0**...59
This parameter defines the minutes of the delay time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the delay time. The parameters for the transmission delay are only visible for "Transmission criteria" = "Always transmit when the input is updated" and "Only transmit when the output changes".	

Cycle time hours (0...99)	**0**...99
This parameter defines the cycle time for the cyclical transmission of the output. Setting the cycle time hours.	

Minutes (0...59)	0...**5**...59
This parameter defines the minutes of the cycle time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the cycle time. The parameters for the cycle time are visible only if "Transmission criteria" = "Transmit cyclically".	

12.5.2 Object list for comparator

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	4-bit	3,007	C, -, W, -, U
4-bit object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "4-bit dimming (DPT 3.007)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	1-byte	20,102	C, -, W, -, U
1-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "1-byte operating mode switchover (DPT 20.102)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	1-byte	18,001	C, -, W, -, U
1-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "1-byte scene extension unit (DPT 18.001)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	1-byte	5,010	C, -, W, -, U
1-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "1-byte value 0...255 (DPT 5.010)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	1-byte	5,001	C, -, W, -, U
1-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "1-byte brightness value 0...100% (DPT 5.001)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	2-byte	7,001	C, -, W, -, U
2-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "2-byte value 0...65535 (DPT 7.001)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	2-byte	8,001	C, -, W, -, U
2-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "2-byte value -32768...32767 (DPT 8.001)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	2-byte	9,xxx	C, -, W, -, U
2-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "2-byte floating point value (DPT 9.0xx)".				

Function	Name	Type	DPT	Flag
Comparator input	Logic... - Input	4-byte	13,001	C, -, W, -, U
4-byte object as input of a comparator. This object is available only if the type of logic function is configured to "Comparator" and the data format is configured to "4-byte value -2147483648...2147483647 (DPT 13.001)".				

Function	Name	Type	DPT	Flag
Comparator output	Logic... - Output	1-bit	1,002	C, R, -, T, A
1-bit object as output of a comparator. The output object is permanently set to 1-bit (DPT 1.002) and outputs the result of the comparison operation (ON = true / OFF = false). This object is available only if the type of logic function is configured to "Comparator".				

12.6 Limit value switch

The limit value switch works with an input, whose data format can be configured, and with a 1-bit output to output the result of the threshold evaluation. The limit value switch compares the value received at the input with hysteresis threshold values that can be set via parameters or communication objects. Once the upper threshold value (H2) is reached or exceeded, the output can transmit a switching telegram (e.g. ON = true). If the value falls below the lower threshold value (H1), the output can transmit another switching telegram (e.g. OFF = false).
The switching telegrams can always be configured in the ETS when the threshold values are exceeded or not reached.

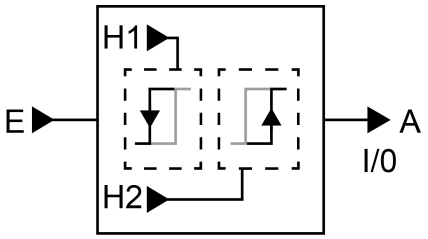


Figure 17: Limit value switch

The two threshold values define a hysteresis. The hysteresis prevents the output from switching back and forth frequently, provided the input value changes continuously at small intervals. Only when the change in value at the input exceeds the hysteresis as a whole, does the output switch the state.

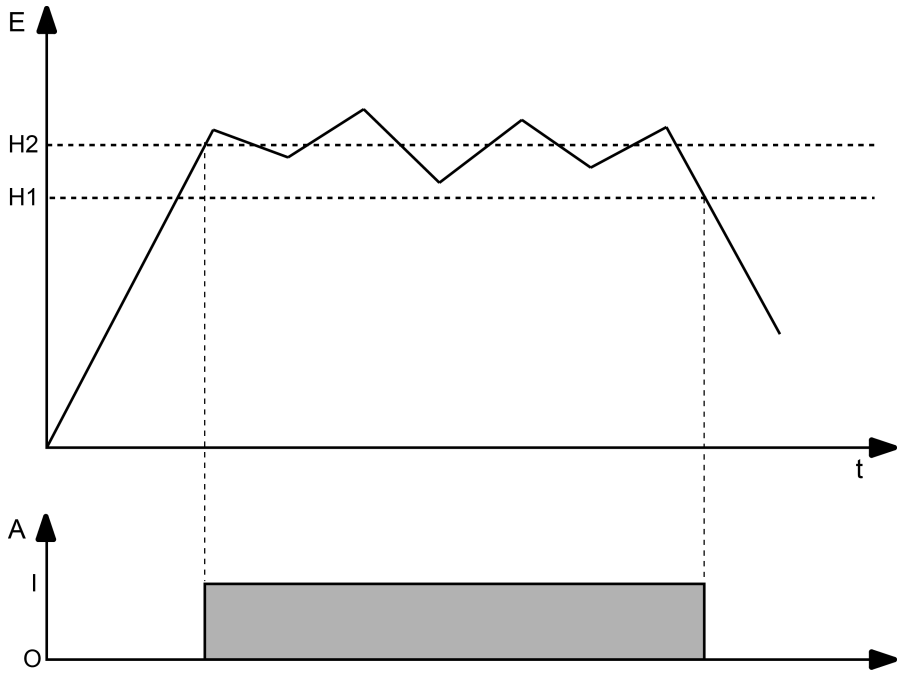


Figure 18: Example of a hysteresis evaluation by upper and lower threshold value

The two threshold values can be freely configured in the ETS. Make sure the upper threshold value is greater than the lower one!

After the bus voltage returns or after an ETS programming operation, the output always transmits a telegram when the first value has been received at the input. The telegram depends on whether the value reaches or exceeds the upper threshold (H2) or not. If the value is less than the upper threshold, a telegram is transmitted in accordance with "Telegram upon falling below the lower threshold value". Otherwise the output will transmit the "Telegram on exceeding the upper threshold value".

If the threshold values are set via communication objects, they have the value "0" after a restart of the device. The threshold values are not saved permanently.

The "Data format" parameter defines the size and format of the input object according to the following table. The output object is permanently set to 1-bit (DPT 1.002) and outputs the result of the threshold value evaluation (ON = true / OFF = false). The threshold values that can be set in the ETS are adapted to the input data format.

Data format	KNX DPT
4-bit dimming	3,007
1-byte operating mode switchover	20,102
1-byte scene extension unit	18,001
1-byte value 0...255	5,010
1-byte brightness value 0...100%	5,001
2-byte value 0...655535	7,001
2-byte value -32768...32767	8,001
2-byte floating-point number	9.0xx
4-byte value -2147483648...2147483647	13,001

The transmission behaviour of the limit value switch can be configured.

12.6.1 Limit value switch parameters

Logic functions -> Logic function...

Data format	4-bit dimming (DPT 3.007) 1-byte operating mode switchover (DPT 20.102) 1-byte scene extension unit (DPT 18.001) **1-byte value 0...255 (DPT 5.010)** 1-byte brightness value 0...100% (DPT 5.001) 2-byte value 0...655,535 (DPT 7.001) 2-byte value -32768...32767 (DPT 8.001) 2-byte floating-point number (DPT 9.0xx) 4-byte value -2147483648...2147483647 (DPT 13.001)
This parameter defines the size and format of input object. The output object is permanently set to 1-bit (DPT 1.002) and outputs the result of the threshold value evaluation (ON = true / OFF = false).	

Input selection (H1) / Input selection (H2)	**Constant** Input object
This parameter defines whether a constant value is set as the threshold value with the following parameter or whether the threshold value can be set during operation by means of an object.	

Lower threshold value (H1)	**Dimming darker, stop (0)** Dimming darker, 100% (1) Dimming darker, 50% (2) Dimming darker, 25% (3) Dimming darker, 12.5% (4) Dimming darker, 6% (5) Dimming darker, 3% (6) Dimming darker, 1.5% (7) Dimming brighter, stop (8) Dimming brighter, 100% (9) Dimming brighter, 50% (10) Dimming brighter, 25% (11) Dimming brighter, 12.5% (12) Dimming brighter, 6% (13) Dimming brighter, 3% (14) Dimming brighter, 1.5% (15)
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "4-bit dimming (DPT 3.007)".	

Lower threshold value (H1)	**Automatic (0)** Comfort mode (1) Standby mode (2) Night mode (3) Frost/heat protection (4)
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte operating mode switchover (DPT 20.102)".	

Lower threshold value (H1)	**Call up scene 1 (0)** Call up scene 2 (1) ... Call up scene 64 (63) Save scene 1 (128) Save scene 2 (129) ... Save scene 64 (191)
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte scene extension unit (DPT 18.001)".	

Lower threshold value (H1) (0...255)	**0**...255
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte value -0...255 (DPT 5.010)".	

Lower threshold value (H1) (0...100%)	**0**...100
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte brightness value 0...100% (DPT 5.001)".	

Lower threshold value (H1) (0...65535)	**0**...65535
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "2-byte value 0...65535 (DPT 7.001)".	

Lower threshold value (H1) (-32768...32767)	-32768...**0**...32767
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "2-byte value -32768...32767 (DPT 8.001)".	

Lower threshold value (H1) (-671088...670760)	-671088...**0**...670760
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "2-byte floating point value (DPT 9.0xx)".	

Lower threshold value (H1) (-2147483648...2147483647)	-2147483648...**0**...2147483647
This parameter defines the lower threshold value (H1) of the limit value switch. This parameter is available only if the "Data format" is set to "4-byte value -2147483648...2147483647 (DPT 13.001)".	

Upper threshold value (H2)	**Dimming darker, stop (0)** Dimming darker, 100% (1) Dimming darker, 50% (2) Dimming darker, 25% (3) Dimming darker, 12.5% (4) Dimming darker, 6% (5) Dimming darker, 3% (6) Dimming darker, 1.5% (7) Dimming brighter, stop (8) Dimming brighter, 100% (9) Dimming brighter, 50% (10) Dimming brighter, 25% (11) Dimming brighter, 12.5% (12) Dimming brighter, 6% (13) Dimming brighter, 3% (14) Dimming brighter, 1.5% (15)
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "4-bit dimming (DPT 3.007)".	

Upper threshold value (H2)	**Automatic (0)** Comfort mode (1) Standby mode (2) Night mode (3) Frost/heat protection (4)
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte operating mode switchover (DPT 20.102)".	

Upper threshold value (H2)	**Call up scene 1 (0)** Call up scene 2 (1) ... Call up scene 64 (63) Save scene 1 (128) Save scene 2 (129) ... Save scene 64 (191)
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte scene extension unit (DPT 18.001)".	

Upper threshold value (H2) (0...255)	**0**...255
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte value -0...255 (DPT 5.010)".	

Upper threshold value (H2) (0...100%)	**0**...100
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "1-byte brightness value 0...100% (DPT 5.001)".	

Upper threshold value (H2) (0...65535)	**0**...65535
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "2-byte value 0...65535 (DPT 7.001)".	

Upper threshold value (H2) (-32768...32767)	-32768...**0**...32767
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "2-byte value -32768...32767 (DPT 8.001)".	

Upper threshold value (H2) (-671088...670760)	-671088...**0**...670760
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "2-byte floating point value (DPT 9.0xx)".	

Upper threshold value (H2) (-2147483648...2147483647)	-2147483648...**0**...2147483647
This parameter defines the upper threshold value (H2) of the limit value switch. This parameter is available only if the "Data format" is set to "4-byte value -2147483648...2147483647 (DPT 13.001)".	

Telegram on reaching or exceeding the upper threshold value	**ON telegram** OFF telegram
The telegram of the output when reaching or exceeding the upper threshold can be configured here.	

Telegram when falling below the lower threshold value	ON telegram **OFF telegram**
The telegram of the output when not reaching the lower threshold can be configured here.	

Transmission criteria	**Always transmit when input is updated** Transmit only if the output changes Transmit cyclically
The transmission behaviour of the output can be configured here. Always transmit when input is updated: The output transmits the current object value to the KNX each time a telegram is received at the input. Transmit only if the output changes: The output transmits the current object value only if the object value has changed compared to the last transmission process. The output always transmits when the first telegram is received at an input after the bus voltage returns or after an ETS programming operation. Transmit cyclically: In this setting, the output transmits the current object value cyclically to the KNX. After the bus voltage returns or after an ETS programming operation, the cyclical transmission is not started until the first telegram has been received at the input. The output also transmits as soon as a new telegram is received at the input. At the same time, the cycle time for cyclical transmission is restarted!	

Transmission delay for sending the hours result (0...99)	**0**...99
Optionally, a delay before the result is transmitted (telegram at output) can be configured. In the setting "Always transmit when input is updated", telegrams at the output are transmitted only once the delay has elapsed. The delay time is restarted by each telegram at the input. In the setting "Only transmit if the output changes", telegrams are sent only if the object value changes at the output once the delay has expired. If the logic function is reprocessed by a new telegram at the input within the delay time and the object value changes again, the delay will restart. If the object value of the output does not change due to new input telegrams, the delay will not restart. This parameter defines the hours of the delay time.	

Minutes (0...59)	**0**...59
This parameter defines the minutes of the delay time.	

Seconds (0...59)	**0**...59
This parameter defines the seconds of the delay time. The parameters for the transmission delay are only visible for "Transmission criteria" = "Always transmit when the input is updated" and "Only transmit when the output changes".	

Cycle time hours (0...99)	**0**...99
This parameter defines the cycle time for the cyclical transmission of the output. Setting the cycle time hours.	

Minutes (0...59)	0...**5**...59
This parameter defines the minutes of the cycle time.	

Seconds (0...59)	0...59
This parameter defines the seconds of the cycle time. The parameters for the cycle time are visible only if "Transmission criteria" = "Transmit cyclically".	

12.6.2 Object list for limit value switch

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	4-bit	3,007	C, -, W, -, U
4-bit object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "4-bit dimming (DPT 3.007)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	1-byte	20,102	C, -, W, -, U
1-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte operating mode switchover (DPT 20.102)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	1-byte	18,001	C, -, W, -, U
1-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte scene extension unit (DPT 18.001)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	1-byte	5,010	C, -, W, -, U
1-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte value 0...255 (DPT 5.010)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	1-byte	5,001	C, -, W, -, U
1-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte brightness value 0...100% (DPT 5.001)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	2-byte	7,001	C, -, W, -, U
2-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte value 0...65535 (DPT 7.001)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	2-byte	8,001	C, -, W, -, U
2-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte value -32768...32767 (DPT 8.001)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	2-byte	9,xxx	C, -, W, -, U
2-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte floating point value (DPT 9.0xx)".				

Function	Name	Type	DPT	Flag
Limit value switch input	Logic... - Input	4-byte	13,001	C, -, W, -, U
4-byte object as input of a limit value switch. This object is available only if the type of logic function is configured to "Limit value switch" and the data format is configured to "4-byte value -2147483648...2147483647 (DPT 13.001)".				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	4-bit	3,007	C, -, W, -, U
4-bit object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "4-bit dimming (DPT 3.007)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	1-byte	20,102	C, -, W, -, U
1-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1byte operating mode switchover (DPT 20.102)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	1-byte	18,001	C, -, W, -, U
1-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte scene extension unit (DPT 18.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	1-byte	5,010	C, -, W, -, U
1-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte value 0...255 (DPT 5.010)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	1-byte	5,001	C, -, W, -, U
1-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte brightness value 0...100% (DPT 5.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	2-byte	7,001	C, -, W, -, U
2-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte value 0...65535 (DPT 7.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	2-byte	8,001	C, -, W, -, U
2-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte value -32768...32767 (DPT 8.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	2-byte	9,xxx	C, -, W, -, U
2-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte floating-point number (DPT 9.0xx)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch lower threshold value (H1)	Logic... - Input	4-byte	13,001	C, -, W, -, U
4-byte object as the lower threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "4-byte value -2147483648...2147483647 (DPT 13.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	4-bit	3,007	C, -, W, -, U
4-bit object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "4-bit dimming (DPT 3.007)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	1-byte	20,102	C, -, W, -, U
1-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1byte operating mode switchover (DPT 20.102)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	1-byte	18,001	C, -, W, -, U
1-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte scene extension unit (DPT 18.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	1-byte	5,010	C, -, W, -, U
1-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte value 0...255 (DPT 5.010)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	1-byte	5,001	C, -, W, -, U
1-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "1-byte brightness value 0...100% (DPT 5.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	2-byte	7,001	C, -, W, -, U
2-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte value 0...65535 (DPT 7.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	2-byte	8,001	C, -, W, -, U
2-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte value -32768...32767 (DPT 8.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	2-byte	9,xxx	C, -, W, -, U
2-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "2-byte floating-point number (DPT 9.0xx)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch upper threshold value (H2)	Logic... - Input	4-byte	13,001	C, -, W, -, U
4-byte object as the upper threshold value of a limit value switch. This object is only available if the type of logic function is configured to "Limit value switch" and the data format is configured to "4-byte value -2147483648...2147483647 (DPT 13.001)" and the input selection is configured to input object.				

Function	Name	Type	DPT	Flag
Limit value switch output	Logic... - Output	1-bit	1,002	C, R, -, T, A
1-bit object as output of a limit value switch. The output object is permanently set to 1-bit (DPT 1.002) and outputs the result of the threshold value evaluation (ON = true / OFF = false). This object is available only if the type of logic function is configured to "Limit value switch".				

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