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# *ELAUSYS*

# Universal KNX Actuator System
# User Manual

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# 1. INTRODUCTION

The Universal KNX Actuator System is a fully modular actuator system where extension modules can be plugged-in to extend the number of output channels as needed. Up to 72 channels can be combined for switching, shutter or blind, heating, dimming, analog 0-10V or LED drivers with various size and power.

Extension modules can be plugged-in next to the master module to add extra channels using more than 10 different types of extension to fit exactly the project requirements.

Up to 8 extension modules can be added to the master actuator. Depending on the extension type, you can drive **up to 72 outputs** with the actuator system using a **single KNX interface.**

The system uses limited space with compact modules. The Master actuator is made for **mounting on DIN rail** and covers **4TE**.

Each channel of the master module and the switching extensions can be configured as a switch or a shutter actuator, this gives a high level of flexibility and can be used in any application. Therefore, the universal actuator combines the advantages of the shutter actuators with the one of the switching actuators.

In shutter/blinds operation the relay contacts of the actuator can be used to control electrically driven blinds, shutters, awnings, venting louvers or similar curtains for 230 V AC mains voltage. Alternatively, the actuator can switch electrical loads, such as lighting systems in switching operation including staircase, flashing or PWM valve control functions.

The controls on the front panel of the master device (4 pushbuttons) permit switching the outputs ON and OFF manually in parallel with the KNX bus, even without bus voltage or in a non-programmed state. This feature permits fast checking of connected loads for proper functioning.

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# 2. OVERVIEW

## 2.1 FUNCTIONS

Using the master actuator and its extension modules, several types of channels are available.
When configuring the extensions used on the system, the following types of actuators are available:

- Switching actuator (4 / 8 / 12 / 16 / 24 chan.)
- Heating actuator
- Dimming actuator
- Analog actuator
- LED actuator
- Virtual Logic module

- Each channel state is displayed by a LED. The LED is ON when the channel is energized.
- Channel description can be defined for each channel, this description is displayed in the parameters tab and in the group objects description to allow easy identification of the channels for group addressing.
- Advanced logic functions are available as virtual extension modules. Each logic module includes 8 logic functions.
- Manual control of outputs independent of the bus (for instance, building site operation) with LED status indicators.
- Each output offers the full scope of functions without any restrictions. All channel-oriented functions can be parameterized separately for each output.
- Behavior in case of bus voltage failure and bus voltage return as well as after ETS programming is presettable.

### 2.1.1 Switching channels

- Switching channels can be configured has:
  - Switch ON/OFF
  - Staircase lighting/pulses
  - Flash
  - Valve control
    - ON/OFF Valve control
    - PWM Valve control
    - Limit values control
    - PI temperature control
    - 2-points temperature control
  - Shutter Control
  - Blind Control

### 2.1.2 Heating channels

- Switching channels can be configured has:
  - Valve control
    - ON/OFF Valve control
    - PWM Valve control
    - Limit values control
    - PI temperature control
    - 2-points temperature control

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### 2.1.3 Dimming channels

- Dimming channels can be configured has:
  - Single (1 chan.) or combined channels (2 chan.)
  - Day/Night switching
  - Leading/trailing edge Dimming
  - Dimming curve selection

### 2.1.4 Analog channels

- Analog channels can be configured has:
  - Analog output
  - PI temperature control
  - Dimmer (1 chan.)
  - RGB dimmer (3 chan.)
  - RGBW dimmer (4 chan.)

### 2.1.5 LED channels

- LED channels can be configured has:
  - Dimmer (1 chan.)
  - Tunable White (TW) dimmer (2 chan.)
  - RGB dimmer (3 chan.)
  - RGBW dimmer (4 chan.)

### 2.1.6 Logic channels

- For each logic channel, the following logic function can be configured:
  - Logic Gate
  - Sequence
  - Trigger
  - Math

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### 2.1.7 Functions Summary

| CHANNEL TYPE | EXTENSION TYPE | COMPATIBLE MODULES |
|---|---|---|
| Switch ON/OFF | Master<br>Switching Actuators | MSA-810<br>SAE-410 / SAE-810 / SAE-1210 / SAE-2410<br>SAE-416 / SAE-816<br>DOE-825 |
| Staircase lighting/pulses | | |
| Flash | | |
| Shutter Control | | |
| Blind Control | | |
| ON/OFF Valve control | Master<br>Switching Actuators<br>Heating Actuators | MSA-810<br>SAE-410 / SAE-810 / SAE-1210 / SAE-2410<br>SAE-416 / SAE-816<br>DOE-825<br>HAE-805 |
| PWM Valve control | | |
| Limit values control | | |
| PI temperature control | | |
| 2-points temperature control | | |
| Phase dimmer (1 chan.) | Dimming Actuators | DAE-225 |
| Analog output | Analog Actuators | AAE-410 |
| PI temperature control | | |
| Dimmer (1 chan.) | Analog Actuators<br>LED Actuators | AAE-410<br>LAE-802 |
| RGB(W) dimmer (3-4 chan.) | | |
| Tunable White (TW) dimmer (2 chan.) | LED Actuators | LAE-802 |
| Logic Gate | Virtual Logic modules | MSA-810 |
| Sequence | | |
| Trigger | | |
| Math | | |

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## 2.2 MASTER ACTUATOR

The actuator system is based on a master actuator, MSA-810, which includes 8 switching channels 10A. If additional channels are required, extension modules can be plugged in.

The switching functions described above are applicable to any switching channel, on the master or any of the switching extensions. Any supposable mixed form of switching outputs and shutter output is possible.

## 2.3 EXTENSIONS

When configuring the actuator system, up to 8 extension modules can be added to the master. Each extension must be connected to the previous module using the left side connector. Extensions can only be used on the same row as the master actuator.

The following types of extensions are available :

General purpose switching channels :

- SAE-410: Switching Extension **4-fold / 10A**
- SAE-810: Switching Extension **8-fold / 10A**
- SAE-1210: Switching Extension **12-fold / 10A**
- SAE-1610: Switching Extension **16-fold / 10A**
- SAE-2410: Switching Extension **24-fold / 10A**

High power switching channels:

- SAE-416: Switching Extension **4-fold / 16A**
- SAE-816: Switching Extension **8-fold / 16A**

Other types of extensions :

- DOE-825 : Digital Output Extension **8-fold / 0,25A - 12-30VDC**
- HAE-805 : Heating Extension **8-fold / 24-230VAC**
- AAE-410 : Analog Extension **4-fold / 0-10V**
- LAE-802 : LED Extension **8-fold / 2A – 12-24VDC**
- DAE-225 : Dimmer Extension **2-fold / 250W**

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## 2.4 USAGE & LIMITATION

A maximum of 8 extensions can be connected behind the master actuator, which makes a potential of 72 outputs depending on the extensions used. Multiple master actuator systems can be used to extend the installation beyond these limits.

Switching outputs 10A are limited to maximum 40 channels on one master actuator. This includes the channels of the following modules:

- MSA-810 (8 channels 10A)
- SAE-410 (4 channels 10A)
- SAE-810 (8 channels 10A)
- SAE-1210 (12 channels 10A)
- SAE-2410 (24 channels 10A)

Ex: 1 Master + 1 SAE-2410 + 1 SAE-810 = 40 channels 10A

All other types of extensions can be used in addition to a maximum of 8 extensions on a master.
Additional switching channels 16A can be used on the same master without limitation.
If additional channels 10A are required, a new master should be used.

**CAUTION!**
**A maximum of 40 switching channels 10A (Combined on MSA-810 / SAE-410 / SAE-810 / SAE-1210) can be used in a single actuator system, for additional switching extensions prefer the use of low power extensions SAE-816 and SAE-416.**

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# 3. CONFIGURATION

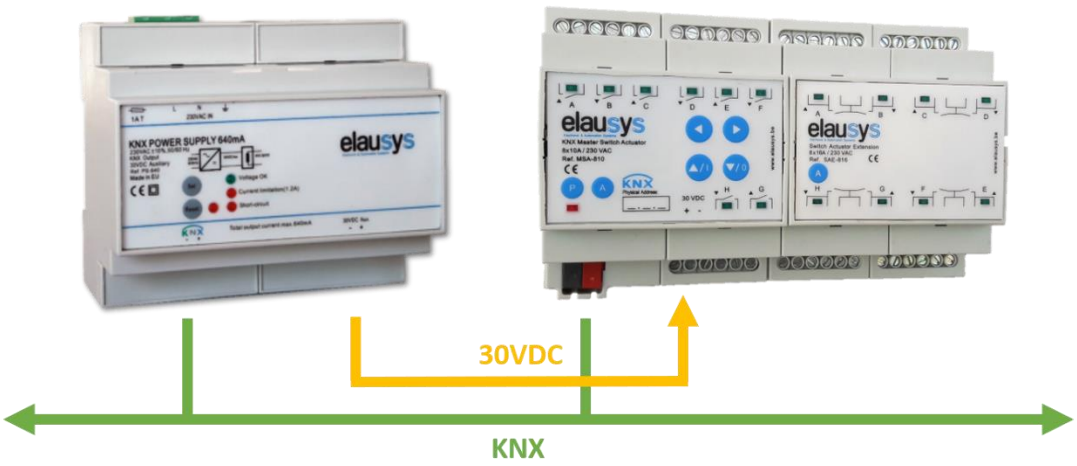
## 3.1 MOUNTING

Each module of the system is mounted on a DIN rail. After mounting the master actuator, each additional extension module must be installed on the right side of the master and interconnected with the side connector provided for that purpose.

**CAUTION!**
**Mounting or dismounting of extension modules must be done with the power supply switched OFF.**

## 3.2 POWER SUPPLY

The master actuator requires an external 30VDC power supply in addition to the KNX bus. This power supply is provided by the auxiliary output of the ELAUSYS PS-640 KNX power supply. When using the auxiliary output of the PS-640 to supply the master actuator, the 30VDC should not be used for any other purpose.




## 3.3 CONNECTIONS

Refer to the product datasheet of each module for wiring diagram and technical specifications.

**DANGER!**
**All activities on the device should only be done by an electrical specialist. The country specific regulations have to be observed. Use appropriate overload protections. Electrical shock when live parts are touched. Electrical shocks can be fatal. Before working on the device, disconnect the power supply and cover up live parts in the working environment.**

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**DANGER!**
**Electrical shock on all SELV/PELV circuits when loads for mains voltage and SELV/PELV are both connected to an actuator.**
**Electrical shocks can be fatal. Danger of destruction of all devices connected to the SELV/PELV. Do not connect any loads for SELV/PELV/FELV!**

**CAUTION!**
**Overloading the device leads to excessive heating.**
**Damage to the device and the connected cables may result.**
**Do not exceed the maximum current carrying capacity of each modules (refer to the datasheet).**

**CAUTION!**
**Danger of destruction if several motors are connected in parallel to one output.**
**Limit switch contacts can weld together and motors, blinds/shutters and the venetian blind actuator can be destroyed.**
**Observe the manufacturer's instructions.**

**CAUTION!**
**The device must not be used with devices, which serve directly or indirectly the purpose of human, health- or lifesaving. Further the devices must not be used if their usage can occur danger for humans, animals or material assets.**

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### 3.4 ADRESSING

Before using the actuator system, each of the extension modules mounted on the system must be known by the master actuator. A simple procedure must be followed to address each module.

Turn on the auxiliary power supply. After the power up phase (all LED blinking) make a long press (> 1s) on the addressing button “A” of the master actuator. All LED of the actuator start blinking while the addressing mode is active. It will automatically end after a delay of 5 minutes.

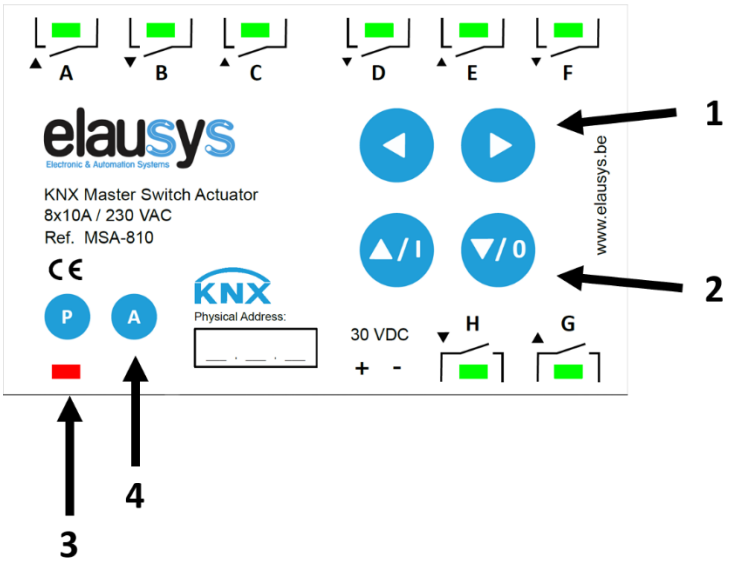
Once the addressing mode is active, press successively on the addressing button “A” of each extension module. All LED of the extension module will blink a few times to indicate the module is now registered. Proceed the same way with each extension module mounted on the system starting from the left side to the right side.

At the end of the procedure, make a short press on the addressing button of the master to end the addressing mode. All LED will return to their previous state.

All extensions modules are now registered and ready to use.

### 3.5 MANUAL OPERATION

Manual operation of each channel can be done using the four push-buttons on the master device.
If necessary, manual operation can be disabled by setting the “manual control” to disabled in ETS.




The first two buttons on the top (1) are used to select a channel. When a channel is selected for manual operation, its LED blinks for 30s then returns to the current state of the channel. Each press on a button will move the selection to the next channel. When the last channel of a module is reached, an additional press will move the selection to the first channel of the next configured extension module. To quickly move the selection from one module to another, you can press the button longer (> 0,5s), after each long press, the selection moves to the first channel of the next module. The same applies to the previous channel using the left button, a short press will move the selection to the previous channel while a longer press will move the selection the previous module.

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In case a channel is configured for shutter/blind operation using ETS, both channels (Up / Down) and blinking together.

Depending on the selected function, the channel can be turned ON/OFF manually (switching mode) or moved Up/Down (shutter/blind mode) using the two buttons below (2). For shutter/blind channels, a long press on one of these buttons will move the shutter/blind to the upper/lower position while a short press will stop an active channel or perform a step move in the upper/lower direction.

**When no application is loading in ETS (or if the KNX was not connected) all channels are set to switching mode by default. Therefore, it is be possible to turn ON any channel manually. Make sure NOT to turn ON both channels of a shutter/blind simultaneously!**

The button “P” (3) is the KNX programming mode button. A red light is ON when the programming mode is active.

The button “A” (4) is the addressing mode button for the extension modules. All channels of the master device are blinking while the addressing mode is active. Extensions modules must be addressed once by the master before they can be used in the system. See “Addressing” chapter for the complete procedure.

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# 4. FUNCTIONS

## 4.1 SOFTWARE

The Universal KNX Actuator system is configured using ETS tool, the free ETS Demo version can be downloaded from the website of KNX Association. It allows to configure up to 5 KNX modules, the KNX actuator system is only one KNX device, regardless of how many extensions are used. Therefore, all outputs can be configured using this version.

No programming is required on the extensions, the complete configuration is performed on the master, therefore simplifying and reducing the commissioning phase to a single download using ETS tool.

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## 4.2 GENERAL SETTINGS

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Manual Control | ▪ **Enabled (default)**<br>▪ Disabled | Enabled by default, this setting allows to use the manual mode with the pushbuttons of the master actuator. When disabled, no manual control is allowed. |
| Send Channel status behavior | ▪ Do not send<br>▪ On change<br>▪ **On change + restart** | Choosing when the channel state should be sent to the bus. |
| *Switching, dimming & LEDS* | | |
| Switches – Behavior at bus power down | ▪ OFF<br>▪ ON<br>▪ **No Changes (default)** | Behavior when the KNX bus is disconnected. |
| Behavior at bus power up | ▪ OFF<br>▪ ON<br>▪ **No Changes (default)** | Behavior when the KNX bus is Connected. |
| Behavior at auxiliary power up | ▪ OFF<br>▪ ON<br>▪ **Last state (default)** | Behavior when the 30VDC auxiliary power supply is connected. |
| Day/Night switch reaction | ▪ **Next switch on (default)**<br>▪ Direct | On dimming channels, choose different settings for day and night. These settings are applied when a new switch ON is received. By choosing “Direct” reaction, the new settings are applied directly at the Day/Night switch. |
| *Blinds & Shutters* | | |
| Behavior at bus power down | ▪ Move up<br>▪ Move down<br>▪ **No action (default)** | Behavior when the KNX bus is disconnected. |
| Behavior at bus power up | ▪ Move up<br>▪ Move down<br>▪ **No action (default)** | Behavior when the KNX bus is Connected. |
| Behavior at auxiliary power up | ▪ Move up<br>▪ Move down<br>▪ **No action (default)** | Behavior when the 30VDC auxiliary power supply is connected. |
| Dimming function for single speed motors | ▪ **Continuous (default)**<br>▪ Pulsed | Shutter/Slat dimming object behavior, by default the motor is driven continuously during the dimming operation. By setting this parameter to “Pulsed” the motor will be driven step by step to allow the user to make a more accurate adjustment of the position. |
| Reaction on shutter/blind alarm 1 – Low priority | ▪ No action (default)<br>▪ **Move up (default)**<br>▪ Move down | Reaction when the group object “Shutter/Blind Safety alarm 1” is switched on. |
| Reaction after shutter/blind alarm 1 – low priority | ▪ **No action (default)**<br>▪ Move up<br>▪ Move down | Reaction when the group object “Shutter/Blind Safety alarm 1” is switched off. |

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|---|---|---|
| Reaction on shutter/blind alarm 2 | ▪ No action (default)<br>▪ **Move up (default)**<br>▪ Move down | Reaction when the group object “Shutter/Blind Safety alarm 2” is switched on. |
| Reaction after shutter/blind alarm 2 | ▪ **No action (default)**<br>▪ Move up<br>▪ Move down | Reaction when the group object “Shutter/Blind Safety alarm 2” is switched off. |
| Reaction on shutter/blind alarm 3 – High priority | ▪ No action (default)<br>▪ **Move up (default)**<br>▪ Move down | Reaction when the group object “Shutter/Blind Safety alarm 3” is switched on. This alarm has the highest priority |
| Reaction after shutter/blind alarm 3 – High priority | ▪ **No action (default)**<br>▪ Move up<br>▪ Move down | Reaction when the group object “Shutter/Blind Safety alarm 3” is switched off. This alarm has the highest priority |
| *Temperature controllers* | | |
| Temperature setpoint in frost mode | ▪ **7°C (default)**<br>(4 – 13°C) | Temperature setpoint for the temperature controller that are set to Frost mode. |
| Setpoint offset | ▪ **0.5°C (default)**<br>▪ (0.1 – 1°C) | Setpoint change applied to the temperature setpoint each time a value is receive on the group object “Setpoint offset”. A value of 0 will decrease the setpoint, a value of 1 will increase the setpoint by the offset. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Module status | Status code | 1 byte | CRT | 20.011 - System error class |
| 2 | Firmware version | Text String | 14 bytes | CRT | 16.000 - Character string |
| 3 | Heating/Cooling switch | Heat/Cool | 1 bit | CW | 1.100 - cooling/heating |
| 4 | Maximum temperature control output | Value | 1 byte | CRT | 5.001 - percentage |
| 5 | Date/Time | | 8 bytes | CW | 19.001 – date time |
| 6 | Shutter/Blind safety alarm 1 | On/Off | 1 bit | CW | 1.005 – alarm |
| 7 | Shutter/Blind safety alarm 2 | On/Off | 1 bit | CW | 1.005 – alarm |
| 8 | Shutter/Blind safety alarm 3 | On/Off | 1 bit | CW | 1.005 – alarm |

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### 4.3 EXTENSIONS USED

The extensions section defines which extension modules are used in the system. Up to 8 extensions may be configured.

Configuring an extension is limited to choosing its type from the dropdown list:

| EXTENSION TYPE |
|---|
| Not used |
| Switching Actuator 4-fold |
| Switching Actuator 8-fold |
| Heating Actuator 8-fold |
| Dimming Actuator 8-fold |
| Analog Actuator 4-fold |
| LED Actuator 8-fold |
| Switching Actuator 12-fold (2 ext.) |
| Switching Actuator 16-fold (2 ext.) |
| Switching Actuator 24-fold (3 ext.) |
| Virtual Logic module 8-fold |

Once an extension is selected, a new tab is created to configure the channels of this extension.
The extension number correspond to its position on the actuator system starting on the left side just after the master actuator until the last extension to right.

For extension modules above 8 channels (12, 16, 24), selecting the extension type in the list will automatically use two or three extensions positions in the application. The first extension will be used to configure the first 8 channels of the module and the so on.

Virtual Logic extensions can be selected instead of physical extensions to add logic features to the application. Logic extensions must only be selected after all physical extensions.

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## 4.4 SWITCHING FUNCTIONS

### 4.4.1 CHANNEL USE

In case of a switching module (master or switch extension), for each group of 2 channels, it is possible to use them individually for switching functions or use them together to control a shutter or a blind.

| CHANNEL USE |
|---|
| Not used |
| Switch / Staircase / Flash / Valve |
| Shutter / Blind |

### 4.4.2 SWITCH/STAIRCASE OPERATION

- Independent switching of the switching outputs.
- Switching feedback mode active (transmitting after changes) or passive (object readout) feedback function.
- Blocking function can be set by a group object for each channel to prevent operating the channel from the bus.
- Timing functions (switch-on delay, switch-off delay, minimum on time and off time).
- A resettable hour counter can be enabled for switches to monitor the operating time of a channel and to trigger a warning after a certain time (ex. for maintenance purpose).
- Staircase function with an optional pre-warning function. Option to extend the staircase duration and to allow manual switch off during the staircase delay.
- Pulses can also be configured using the staircase function (minimum 1 second pulse).
- Valve control using ON/OFF commands, limit values, PWM or temperature control. A valve protection function can be enabled to activate the valve on a regular basis when no heating/cooling is required for long periods. Valve type (normally open/closed) can be configured.
- Up to 4 internal scenes configurable per output.

For each pair of switching channels, the main function can be selected :

| FUNCTION |
|---|
| Switch |
| Staircase |
| Flashing |
| Valve control |

The channel can be blocked from the KNX bus using the “Block” communication object. When a channel is blocked, the output stays in the last state it was before being blocked.

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### 4.4.3 SHUTTER/BLIND OPERATION

- Operating mode configurable: control of blinds with slats or shutters.
- Configuration of single speed or multiple speed motors
- Separately configurable blind travelling times for moves into the upper end and bottom end position.
- For blinds with slats, a slat moving time can be independently configured.
- Travel direction change-over time and the times for short and long-time operation (Step, Move) presettable.
- Relative positioning using steps and full moves or absolute positioning using position setpoint as percentage.
- Blind/shutter or slat absolute position feedbacks.
- Blocking function can be set by a group object for each channel to prevent operating the channel from the bus.
- Dimming function to allow motor operation while a button is pressed (start/stop) using a 4-bits dimming object.
- Configurable reaction on repeated or reversed commands.
- Additional time at full up/down positions for position correction.
- Configuration of up to 3 safety alarms
- Up to 4 internal scenes configurable per output.

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### 4.5 SWITCH ON/OFF

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Minimum ON duration<br>Minimum OFF duration | ▪ No delay<br>▪ 100ms to 5 min. | Minimum duration the channel must remain in ON or OFF state before the next switching is allowed.<br>In case of switching before the delay is elapsed, the switching action is delayed by the remaining time. |
| Switch ON delay<br>Switch OFF delay | ▪ No delay<br>▪ 250ms to 60 min. | The ON or OFF delay causes a delayed switch of the channel. At sending a new switch signal to the channel, first the adjusted delay time expires and afterwards the channel will be switched. |
| Working hour counters | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, a counter records the number of operating hours of the channel. The counter can be reset and a warning can be defined using the parameter below. |
| Working hours warning | ▪ **0 (default)**<br>1 to 65535 | Number of hours of operation to trigger a warning. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Switch On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |
| 6 | Hours counter | Hours | 2 bytes | CRT | DPT Time (Hour) |
| 7 | Reset counter | On/Off | 1 bit | CW | DPT_Reset |
| 8 | Warning working hours | On/Off | 1 bit | CRT | DPT_Switch |

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## 4.6 STAIRCASE/PULSE

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Staircase duration | ▪ 1s to 12h | Total duration of the staircase lighting. The channel is automatically switched OFF after this delay. |
| Extend staircase duration | ▪ Disabled<br>▪ **Enabled (default)** | When enabled, the staircase duration is extended each time a ON telegram is received on the staircase object. |
| Manual switching OFF | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, the channel is switched OFF when receiving a OFF telegram on the staircase object. |
| Prewarning time | ▪ **No warning (default)**<br>▪ 5s to 5 min. | A prewarning can be set before the end of the staircase delay. The channel is switched OFF for 1s and switched ON again until the end of the staircase duration. Prewarning time is the time before the end of the staircase duration. |
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Minimum ON duration<br>Minimum OFF duration | ▪ No delay<br>▪ 100ms to 5 min. | Minimum duration the channel must remain in ON or OFF state before the next switching is allowed.<br>In case of switching before the delay is elapsed, the switching action is delayed by the remaining time. |
| Switch ON delay | ▪ No delay<br>▪ 250ms to 60 min. | The ON delay causes a delayed switch of the channel. At sending a new switch ON signal to the channel, first the adjusted delay time expires and afterwards the channel will be switched ON. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Switch On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 4 | Staircase | On/Off | 1 bit | CW | DPT_Start |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |

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### 4.7 FLASH

The flashing function is activated by sending a “Start” command to the Flash object. The channel continues flashing at the frequency defined by the parameter until a “stop” command is received on the Flash object or until a switch command is received.

**The flashing function should only be used for limited period otherwise the contact life of the channel will be greatly reduced.**

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Flash duration | ▪ No delay<br>▪ 700ms to 5min | Flash ON period<br>Flash OFF period is identical. |

Other parameters of the standard switch remain applicable.

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Switch On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 4 | Flash | On/Off | 1 bit | CW | DPT_Start |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |

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## 4.8 VALVE CONTROL

To control valves, five operating modes are available:

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Control | ▪ **On/Off (default)**<br>▪ Limit values<br>▪ PWM<br>▪ PI Temperature control<br>▪ 2-points Temperature control | Depending on the control mode, specific parameters are displayed. |
| Type | ▪ **Normally closed (default)**<br>▪ Normally open | In case of normally open valve, the output state is inverted. |
| Valve protection | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, the valve is automatically activated for 5 minutes every 24h as a protection for long durations without activation. |
| Send output status | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, the valve output status is send using a dedicated status object. |

### 4.8.1 On/Off Control

On/Off control is used to control the valve directly using the corresponding group object. The output follows the state of the input command.

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 3 | Valve On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |

### 4.8.2 Limit Values Control

The valve control is performed by percentages. When this option is enabled, it is necessary to configure 2 parameters that define the hysteresis value.

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| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Upper limit (%) | ▪ From 0 to 100% | The upper limit determines when the valve is activated (it must be greater than 0). |
| Lower limit (%) | ▪ From 0 to 100% | The lower limit determines when the valve is deactivated (value must be smaller than the upper limit). |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |
| 7 | Control value | Percent | 1 byte | CW | DPT_Percent |

### 4.8.3 PWM Control

The PWM cycle time is used for calculating the on and off pulses of the control value. This calculation is based on the incoming control value. A PWM cycle includes the whole time which elapses from one switch-on pulse to the next.

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| PWM cycle (min) | ▪ From 1 to 255 min. | Defines the cycle period for the PWM control. |
| Upper limit (%) | ▪ From 0 to 100% | The upper limit of the input command value. The received value will be limited by this setting. |
| Lower limit (%) | ▪ From 0 to 100% | The lower limit of the input command value. The received value will be limited by this setting. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |
| 7 | Control value | Percent | 1 byte | CW | DPT_Percent |

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### 4.8.4 PI Temperature Control

The PI temperature controller allows to directly control the valve based on the room temperature. The temperature controller can be used for heating, cooling or combined heating and cooling.

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| PWM cycle (min) | ▪ From 1 to 255 min. | Defines the cycle period for the PWM output of the control. |
| Proportional band | ▪ **4 (default)**<br>▪ 1 – 20 | Proportional band of the PI controller |
| Reset time | ▪ **120 min. (default)**<br>▪ 15 – 240 min | Reset time of the PI controller |
| Minimum output | ▪ **0% (default)**<br>▪ 0 – 100 % | Minimum output of the controller |
| Maximum output | ▪ **100% (default)**<br>▪ 0 – 100 %<br>▪ | Maximum output of the controller |
| Heating/Cooling mode | ▪ Cooling<br>▪ **Heating (default)**<br>▪ Cooling/Heating group object | Operating mode of the controller. When choosing the mode from the group object, a general “Heating/Cooling switch” object is used to change the operating mode of all temperature controllers. |
| Comfort setpoint | ▪ **21°C (default)**<br>▪ 14-25°C | Temperature setpoint in comfort mode |
| Standby reduction for heating | ▪ **3°C (default)**<br>▪ 0-10°C | Temperature setpoint reduction in standby mode for heating |
| Night reduction for heating | ▪ **1.5°C (default)**<br>▪ 0-10°C | Temperature setpoint reduction in night mode for heating |
| Standby increase for cooling | ▪ **3°C (default)**<br>▪ **0-10°C** | Temperature setpoint increase in standby mode for cooling |
| Night increase for cooling | ▪ **1.5°C (default)**<br>▪ **0-10°C** | Temperature setpoint increase in night mode for cooling |

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|---|---|---|
| Standby reduction for heating | ▪ **3°C (default)**<br>▪ 0-10°C | Temperature setpoint reduction in standby mode for heating |
| Night reduction for heating | ▪ **1.5°C (default)**<br>▪ 0-10°C | Temperature setpoint reduction in night mode for heating |

Setting the proportional band and reset time depending on the type of installation:

- Warm water heating: (4 / 120min)
- Underfloor heating: (4 / 150min)
- Split Unit: (4 / 60min)

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_Scene |
| 3 | Setpoint Offset (0 = - / 1 = +) | +/- | 1 bit | CW | DPT_Step |
| 4 | Mode selection | Mode | 1 byte | CW | DPT_HVACMode |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |
| 6 | Comfort setpoint | Value | 2 bytes | CW | DPT_Value_Temp |
| 7 | Temperature value | Value | 2 bytes | CW | DPT_Value_Temp |
| 8 | Controller output value | Percent | 1 byte | CRT | DPT_Scaling |
| 9 | Mode Status | Mode | 1 byte | CRT | DPT_HVACMode |
| 10 | Current setpoint | Value | 2 bytes | CRT | DPT_Value_Temp |

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### 4.8.5 2-points Temperature Control

The 2-points temperature controller allows to directly control the valve based on the room temperature. The temperature controller can be used for heating, cooling or combined heating and cooling.

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Switching hysteresis | ▪ **0.5°C (default)**<br>▪ 0-10°C | The switching hystereris defines the switch on and off triggers for the channel output. The channel is switched on if the temperature is lower than the setpoint - hysteresis and is is switched off if the temperature is greater or equal to the setpoint. |
| Heating/Cooling mode | ▪ Cooling<br>▪ **Heating (default)**<br>▪ Cooling/Heating group object | Operating mode of the controller. When choosing the mode from the group object, a general “Heating/Cooling switch” object is used to change the operating mode of all temperature controllers. |
| Comfort setpoint | ▪ **21°C (default)**<br>▪ 14-25°C | Temperature setpoint in comfort mode |
| Standby reduction for heating | ▪ **3°C (default)**<br>▪ 0-10°C | Temperature setpoint reduction in standby mode for heating |
| Night reduction for heating | ▪ **1.5°C (default)**<br>▪ 0-10°C | Temperature setpoint reduction in night mode for heating |
| Standby increase for cooling | ▪ **3°C (default)**<br>▪ **0-10°C** | Temperature setpoint increase in standby mode for cooling |
| Night increase for cooling | ▪ **1.5°C (default)**<br>▪ **0-10°C** | Temperature setpoint increase in night mode for cooling |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_Scene |
| 3 | Setpoint Offset (0 = - / 1 = +) | +/- | 1 bit | CW | DPT_Step |
| 4 | Mode selection | Mode | 1 byte | CW | DPT_HVACMode |
| 5 | State | On/Off | 1 bit | CRT | DPT_Switch |
| 6 | Comfort setpoint | Value | 2 bytes | CW | DPT_Value_Temp |
| 7 | Temperature value | Value | 2 bytes | CW | DPT_Value_Temp |
| 9 | Mode Status | Mode | 1 byte | CRT | DPT_HVACMode |
| 10 | Current setpoint | Value | 2 bytes | CRT | DPT_Value_Temp |

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## 4.9 SHUTTER/BLIND FUNCTIONS

A shutter channel can be configured to use the shutter or the blind function. There is a specific set of parameters for each function.

The channel can be blocked from the KNX bus using the “Block” communication object. When a channel is blocked, the output stays in the last state it was before being blocked.

**Measuring the travelling times**
For the purpose of positioning blinds and shutters or for adjusting the opening angle of venting louvers, the actuator needs accurate information about the maximum travelling time.
Switch on the mains supply.

- If not yet done, move the blind/shutter into the upper end position (open venting louver completely).
  The upper limit-stop position is reached (venting louver opened).
- Start the measuring time and move the blind/shutter by manual control into the lower end position (close the venting louver completely).
- Stop the time measurement when the lower limit (when the completely closed) position is reached.
- Enter the measured value in the ETS parameter “Duration to close”
- Repeat the same procedure from the lower limit to the upper limit position to measure the “Duration to open” parameter.

**Measuring the slat moving time (only for blinds)**
In the case of blinds with slats, the slat moving time is part of the overall travelling time of the blind. The slat moving time is the time required for a movement between the slat positions "closed – 100 %" and "open – 0 %". In order to compute the opening angle of the slats, the actuator needs an information about the slat moving time.
The slats must be completely closed (as in case of downward travel of the blind).
Switch on the mains supply.

- Start the measuring time and open the slats completely by manual control (as in case of upward travel of the blind).
- Take the measuring time when the completely open position is reached.
- Enter the measured value in the ETS parameter “Duration to open slats”.

**Determining and configuring short-time and long-time operation**
The short-time operation (Step) permits adjusting the slat tilting angle of a blind or the 'slit opening width' of a shutter. In most cases, short-time operation is activated by pressing a Venetian blind pushbutton sensor permitting manual intervention in the blind controller. When the actuator receives a short-time command while the blind, shutter, awning or louver is in motion, the travel movement is stopped immediately by the switching / blind actuator. The long-time operation (Move) is determined by the movement time of the connected Venetian blind, roller shutter/awning or louver and must therefore not be preset separately. The movement time must be measured 'manually' and entered into the ETS parameters.
To ensure that the shutter or blind has definitely reached its end position at the end of long-time operation, the actuator can extend the long-time movement by a certain percentage of the parameterized travelling time for all full upward or downward movements. In upward movement the drive motors are generally not so fast due to the weight of the curtains or to external physical influences (e.g. temperature, wind, etc.). Thus, it is ensured that the upper end position is always reached even in case of uninterrupted long time travel movements.

**Calculating the slat position (only with blinds)**

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In the "blinds" operating mode, the switching / blind actuator always calculates the slat position so that the opening angle and thus the 'amount of light admitted' into the room by the blind can be adjusted. A new position approach by a Venetian blind will always be followed by a positioning movement of the slats. Thus, the slat positions last selected will be tracked or readjusted to a new value if a position change has taken place. In case of single-motor Venetian blind systems without a working position, the slats will be readjusted directly by a change of the Venetian blind height. For this reason, an adjustment of the slat position will always have an influence on the position of the Venetian blind itself.

### 4.9.1 SHUTTER

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Minimum ON duration<br>Minimum OFF duration | ▪ No delay<br>▪ 100ms to 5 min. | Minimum duration the channel must remain in ON or OFF state before the next switching is allowed.<br>In case of switching before the delay is elapsed, the switching action is delayed by the remaining time. |
| Reverse delay | ▪ No delay<br>▪ 100ms to 5 min. | Defines the pause time between two movements in reverse direction. |
| Duration to open<br>Duration to close | ▪ 0 to 255s | Total duration for the upward (open) and downward (close) movement. |
| Number of steps | ▪ 2 to 64 | Number of steps to perform a complete movement from close to open position using a step telegram or using a pulsed dimming command. |
| Reaction on repeated command while moving | ▪ **Continue moving (default)**<br>▪ Stop | Behavior when a move up/down command is received in the same direction while it is already moving. |
| Reaction on reversed command while moving | ▪ **Reverse direction (default)**<br>▪ Stop | Behavior when a move up/down command is received in the opposite direction while it is already moving. |
| Motor startup delay | ▪ 0 to 255 (x 100ms) | Delay added to the operating duration to compensate the motor startup delay. |
| Additional time at full up/down tilting/position | ▪ **10 % (default)**<br>▪ 0-100% | Delay added to the operating duration when arriving at the upper or lower limit to make sure the end position is fully reached. |
| Multiple speed motor | ▪ **No (default)**<br>▪ Yes | Select “Yes” when using a motor that has a low speed at startup to allow precise step/slat adjustment. |
| Slow speed ratio (%) | ▪ **50 (default)**<br>▪ 0-100% | When multiple speed motor is selected, the slow speed ratio is the slow sleep percentage compared to the motor nominal speed. |
| Slow speed duration | ▪ 0 to 255 (x 100ms) | When multiple speed motor is selected, the slow speed duration before the motor switch to |

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| | | nominal speed. |
| Reaction to safety alarms | ▪ **No reaction (default)**<br>▪ Alarm 1 only<br>▪ Alarm 2 only<br>▪ Alarm 3 only<br>▪ On alarm 1 and alarm 2<br>▪ On alarm 2 and alarm 3<br>▪ On alarm 1, 2 and alarm 3 | Three general shutter/blind safety alarms can be used on the system, the reaction to the safety alarms is defined in the general settings of the system. For each channel it is possible to select if the reaction is applicable. The alarm 3 is the highest priority and its defined action will overwrite the lowest priority alarms. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Shutter up/down | Up/Down | 1 bit | CW | DPT_UpDown |
| 4 | Shutter step/stop | Step/Stop | 1 bit | CW | DPT_Step |
| 5 | Shutter stop | Stop | 1 bit | CW | DPT_Trigger |
| 6 | Shutter direction status | Up/Down | 1 bit | CRT | DPT_UpDown |
| 7 | Shutter absolute position | Percentage | 1 byte | CW | DPT_Scaling |
| 9 | Shutter position status | Percentage | 1 byte | CRT | DPT_Scaling |
| 12 | Shutter/slat dimming | Dim | 4 bits | CW | DPT_Control_Blinds |
| 13 | Shutter movement status up | On/Off | 1 bit | CRT | DPT_Switch |
| 14 | Shutter movement status | On/Off | 1 bit | CRT | DPT_Switch |

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### 4.9.2 BLIND

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Minimum ON duration<br>Minimum OFF duration | ▪ No delay<br>▪ 100ms to 5 min. | Minimum duration the channel must remain in ON or OFF state before the next switching is allowed.<br>In case of switching before the delay is elapsed, the switching action is delayed by the remaining time. |
| Reverse delay | ▪ No delay<br>▪ 100ms to 5 min. | Defines the pause time between two movements in reverse direction. |
| Duration to open<br>Duration to close | ▪ 0 to 255s | Total duration for the upward (open) and downward (close) movement. |
| Number of steps | ▪ 2 to 64 | Number of steps to perform a complete movement of the slats using a slat step telegram or using a pulsed dimming command. |
| Reaction on repeated command while moving | ▪ **Continue moving (default)**<br>▪ Stop | Behavior when a move up/down command is received in the same direction while it is already moving. |
| Reaction on reversed command while moving | ▪ **Reverse direction (default)**<br>▪ Stop | Behavior when a move up/down command is received in the opposite direction while it is already moving. |
| Motor startup delay | ▪ 0 to 255 (x 100ms) | Delay added to the operating duration to compensate the motor startup delay. |
| Additional time at full up/down position | ▪ **10 % (default)**<br>▪ 0-100% | Delay added to the operating duration when arriving at the upper or lower limit to make sure the end position is fully reached. |
| Multiple speed motor | ▪ **No (default)**<br>▪ Yes | Select “Yes” when using a motor that has a low speed at startup to allow precise step/slat adjustment. |
| Slow speed ratio (%) | ▪ **50 (default)**<br>▪ 0-100% | When multiple speed motor is selected, the slow speed ratio is the slow sleep percentage compared to the motor nominal speed. |
| Slow speed duration | ▪ 0 to 255 (x 100ms) | When multiple speed motor is selected, the slow speed duration before the motor switch to nominal speed. |
| Reaction at slat ends positions in step/dimming | ▪ **Stop (default)**<br>▪ Continue | Behavior when the slats arrive at the end positions. |
| Duration to open slats | ▪ 0 to 255 (x 100ms) | Total duration to open the slats |
| Slat position after a full down movement | ▪ **100% (default)**<br>▪ 0-100% | Automatically adjust slat position when reaching the down limit position. |
| Reaction to safety alarms | ▪ **No reaction (default)**<br>▪ Alarm 1 only<br>▪ Alarm 2 only<br>▪ Alarm 3 only | Three general shutter/blind safety alarms can be used on the system, the reaction to the safety alarms is defined in the general settings of the system. For each channel it is possible to select |

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|---|---|---|
| | ▪ On alarm 1 and alarm 2<br>▪ On alarm 2 and alarm 3<br>▪ On alarm 1, 2 and alarm 3 | if the reaction is applicable. The alarm 3 is the highest priority and its defined action will overwrite the lowest priority alarms. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Shutter up/down | Up/Down | 1 bit | CW | DPT_UpDown |
| 4 | Shutter step/stop | Step/Stop | 1 bit | CW | DPT_Step |
| 5 | Shutter stop | Stop | 1 bit | CW | DPT_Trigger |
| 6 | Shutter direction status | Up/Down | 1 bit | CRT | DPT_UpDown |
| 7 | Shutter absolute position | Percentage | 1 byte | CW | DPT_Scaling |
| 8 | Slat absolute position | Percentage | 1 byte | CW | DPT_Scaling |
| 9 | Shutter position status | Percentage | 1 byte | CRT | DPT_Scaling |
| 10 | Slat position status | Percentage | 1 byte | CRT | DPT_Scaling |
| 12 | Shutter/slat dimming | Dim | 4 bits | CW | DPT_Control_Blinds |
| 13 | Shutter movement status up | On/Off | 1 bit | CRT | DPT_Switch |
| 14 | Shutter movement status down | On/Off | 1 bit | CRT | DPT_Switch |

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## 4.10 PHASE DIMMER

In case of a phase dimming module (Dimming actuator extension), for each group of 2 channels, it is possible to use them individually for dimming functions or to group them together to control a higher load.

| CHANNEL USE |
|---|
| Single channel dimmer |
| Combined channels dimmer |

Features

- Blocking function can be set by a group object for each channel to prevent operating the channel from the bus.
- Dimming relative and absolute objects.
- Timing functions (switch-on delay, switch-off delay, staircase duration).
- Minimum and maximum output can be adjustable.
- Switch on/off speed and dimming speed adjustable.
- Dimming mode (leading/trailing edge) and dimming curve selectable.
- Staircase function with an optional pre-warning function. Option to extend the staircase duration and to allow manual switch off during the staircase delay.
- Up to 4 internal scenes configurable per output.
- Day/Night operation mode with selected behavior when switching on and switching off for each mode.

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Switch ON delay<br>Switch OFF delay | ▪ No delay<br>▪ 250ms to 60 min. | The ON or OFF delay causes a delayed switch of the channel. At sending a new switch signal to the channel, first the adjusted delay time expires and afterwards the channel will be switched. |
| Minimum light | ▪ **1% (default)**<br>▪ 0 to 100% | Adjust the minimum output percentage. In case a setpoint value lower than this value is received the output is switched off. |
| Maximum light | ▪ **100% (default)**<br>0 to 100% | Adjust the maximum output percentage. |
| Switch ON/OFF speed | ▪ **1s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% during switching on or off. |
| Dimming speed | ▪ **5s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% while dimming. |
| Mode | ▪ **Trailing edge (default)** | Type of phase dimming depending on the |

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|---|---|---|
| | ▪ Leading edge | driven load. |
| Dimming curve | ▪ **Linear (default)**<br>▪ Logarithmic<br>▪ Gamma 1<br>▪ Gamma 2<br>▪ Gamma 3<br>▪ Gamma 4<br>▪ Gamma 5<br>▪ Dali<br>▪ LED | Dimming curve depending on the driven load. |
| Behavior on ON telegram (Day) | ▪ **Fixed value (default)**<br>▪ Last value<br>▪ No reaction | Define the output value when the channel is switched ON during day or if day/night switch is disabled. |
| Switch ON value (day) | ▪ **100% (default)**<br>▪ 0-100% | Fixed value after switched ON during day or if day/night switch is disabled. |
| Day/Night switch | ▪ **Disabled (default)**<br>▪ Enabled | Enable or disable the use of the day/night mode. |
| Behavior on ON telegram (Night) | ▪ **Fixed value (default)**<br>▪ Last value<br>▪ No reaction | Define the output value when the channel is switched ON during night if day/night switch is enabled. |
| Switch ON value (Night) | ▪ **50% (default)**<br>▪ 0-100% | Fixed value after switched ON during night if day/night switch is enabled. |
| Behavior on OFF telegram (Night) | ▪ **Fixed value (default)**<br>▪ No reaction | Define the output value when the channel is switched OFF during night if day/night switch is enabled. |
| Switch OFF value (Night) | ▪ **00% (default)**<br>▪ 0-100% | Fixed value after switched OFF during night if day/night switch is enabled. |

In case the staircase light function is enabled the following additional parameters are available:

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Staircase duration | ▪ 1s to 12h | Total duration of the staircase lighting. The channel is automatically switched OFF after this delay. |
| Extend staircase duration | ▪ Disabled<br>▪ **Enabled (default)** | When enabled, the staircase duration is extended each time a ON telegram is received on the staircase object. |
| Manual switching OFF | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, the channel is switched OFF when receiving a OFF telegram on the staircase object. |
| Prewarning time | ▪ **No warning (default)**<br>▪ 5s to 5 min. | A prewarning can be set before the end of the staircase delay. The channel is switched OFF for 1s and switched ON again until the end of the staircase duration. Prewarning time is the time before the end of the staircase duration. |

Communication Objects

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| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Switch On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 4 | Staircase | On/Off | 1 bit | CW | DPT_Start |
| 5 | State On/Off | On/Off | 1 bit | CRT | DPT_Switch |
| 6 | Dimming relative | Dim | 4 bits | CW | DPT_Control_Dimming |
| 7 | Dimming absolute | Percent | 1 byte | CW | DPT_Scaling |
| 8 | State dimming value | Percent | 1 byte | CRT | DPT_Scaling |
| 9 | Night (1) / Day (0) Switch | Night/Day | 1 bit | CW | DPT_Switch |

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### 4.11 ANALOG OUTPUT

Features

- The analog output value is received as a percentage from the bus and is applied to the analog output.
- Blocking function can be set by a group object for each channel to prevent operating the channel from the bus.
- Minimum and maximum output can be adjustable.
- Output change speed adjustable.
- Up to 4 internal scenes configurable per output.
- Output status feedback.

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Switch ON delay<br>Switch OFF delay | ▪ No delay<br>▪ 250ms to 60 min. | The ON or OFF delay causes a delayed switch of the channel. At sending a new switch signal to the channel, first the adjusted delay time expires and afterwards the channel will be switched. |
| Minimum output | ▪ **0% (default)**<br>▪ 0 to 100% | Adjust the minimum output percentage. In case a setpoint value lower than this value is received the output is switched off. |
| Maximum output | ▪ **100% (default)**<br>0 to 100% | Adjust the maximum output percentage. |
| Output change duration | ▪ **1s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100%. |
| Send output status value | ▪ **Enabled (default)**<br>▪ Disabled | When enabled the output value is sent to a status group object. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 7 | Analog Control value | Percent | 1 byte | CW | DPT_Scaling |
| 8 | Analog Output value | Percent | 1 byte | CRT | DPT_Scaling |

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### 4.12 DIMMER

Features

- Blocking function can be set by a group object for each channel to prevent operating the channel from the bus.
- Dimming relative and absolute objects.
- Timing functions (switch-on delay, switch-off delay, staircase duration).
- Minimum and maximum output can be adjustable.
- Switch on/off speed and dimming speed adjustable.
- Staircase function with an optional pre-warning function. Option to extend the staircase duration and to allow manual switch off during the staircase delay.
- Up to 4 internal scenes configurable per output.
- Day/Night operation mode with selected behavior when switching on and switching off for each mode.

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Switch ON delay<br>Switch OFF delay | ▪ No delay<br>▪ 250ms to 60 min. | The ON or OFF delay causes a delayed switch of the channel. At sending a new switch signal to the channel, first the adjusted delay time expires and afterwards the channel will be switched. |
| Minimum light | ▪ **1% (default)**<br>▪ 0 to 100% | Adjust the minimum output percentage. In case a setpoint value lower than this value is received the output is switched off. |
| Maximum light | ▪ **100% (default)**<br>0 to 100% | Adjust the maximum output percentage. |
| Switch ON/OFF speed | ▪ **1s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% during switching on or off. |
| Dimming speed | ▪ **5s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% while dimming. |
| Dimming curve | ▪ **Linear (default)**<br>▪ Logarithmic<br>▪ Gamma 1<br>▪ Gamma 2<br>▪ Gamma 3<br>▪ Gamma 4<br>▪ Gamma 5<br>▪ Dali | Dimming curve depending on the driven load. |
| Behavior on ON telegram (Day) | ▪ **Fixed value (default)**<br>▪ Last value<br>▪ No reaction | Define the output value when the channel is switched ON during day or if day/night switch is disabled. |
| Switch ON value (day) | ▪ **100% (default)**<br>▪ 0-100% | Fixed value after switched ON during day or if day/night switch is disabled. |
| Day/Night switch | ▪ **Disabled (default)** | Enable or disable the use of the day/night |

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|---|---|---|
| | ▪ Enabled | mode. |
| Behavior on ON telegram (Night) | ▪ **Fixed value (default)**<br>▪ Last value<br>▪ No reaction | Define the output value when the channel is switched ON during night if day/night switch is enabled. |
| Switch ON value (Night) | ▪ **50% (default)**<br>▪ 0-100% | Fixed value after switched ON during night if day/night switch is enabled. |
| Behavior on OFF telegram (Night) | ▪ **Fixed value (default)**<br>▪ No reaction | Define the output value when the channel is switched OFF during night if day/night switch is enabled. |
| Switch OFF value (Night) | ▪ **0% (default)**<br>▪ 0-100% | Fixed value after switched OFF during night if day/night switch is enabled. |

In case the staircase light function is enabled the following additional parameters are available:

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Staircase duration | ▪ 1s to 12h | Total duration of the staircase lighting. The channel is automatically switched OFF after this delay. |
| Extend staircase duration | ▪ Disabled<br>▪ **Enabled (default)** | When enabled, the staircase duration is extended each time a ON telegram is received on the staircase object. |
| Manual switching OFF | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, the channel is switched OFF when receiving a OFF telegram on the staircase object. |
| Prewarning time | ▪ **No warning (default)**<br>▪ 5s to 5 min. | A prewarning can be set before the end of the staircase delay. The channel is switched OFF for 1s and switched ON again until the end of the staircase duration. Prewarning time is the time before the end of the staircase duration. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Switch On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 4 | Staircase | On/Off | 1 bit | CW | DPT_Start |
| 5 | State On/Off | On/Off | 1 bit | CRT | DPT_Switch |
| 6 | Dimming relative | Dim | 4 bits | CW | DPT_Control_Dimming |
| 7 | Dimming absolute | Percent | 1 byte | CW | DPT_Scaling |
| 8 | State dimming value | Percent | 1 byte | CRT | DPT_Scaling |
| 9 | Night (1) / Day (0) Switch | Night/Day | 1 bit | CW | DPT_Switch |

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### 4.13 RGB(W) DIMMER

Features

- Blocking function can be set by a group object for each channel to prevent operating the channel from the bus.
- HSV and RGB Color setting and feedback.
- HSV Dimming relative and absolute objects.
- Timing functions (switch-on delay, switch-off delay, staircase duration).
- Switch on/off speed and dimming speed adjustable.
- Staircase function. Option to extend the staircase duration and to allow manual switch off during the staircase delay.
- Up to 4 internal scenes configurable per output.
- Day/Night operation mode with selected behavior when switching on and switching off for each mode.

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Switch ON delay | ▪ No delay<br>▪ 250ms to 60 min. | The ON or OFF delay causes a delayed switch of the channel. At sending a new switch signal to the channel, first the adjusted delay time expires and afterwards the channel will be switched. |
| Switch ON/OFF speed | ▪ **1s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% during switching on or off. |
| Dimming speed | ▪ **5s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% while dimming. |
| Dimming curve | ▪ **Linear (default)**<br>▪ Logarithmic<br>▪ Gamma 1<br>▪ Gamma 2<br>▪ Gamma 3<br>▪ Gamma 4<br>▪ Gamma 5<br>▪ Dali | Dimming curve depending on the driven load. |
| Behavior on ON telegram (Day) | ▪ **Fixed value (default)**<br>▪ Last value<br>▪ No reaction | Define the output value when the channel is switched ON during day or if day/night switch is disabled. |
| Switch ON value (day) | ▪ **#FFFFFF (default)**<br>▪ #000000-#FFFFFF | Fixed value after switched ON during day or if day/night switch is disabled. |
| Day/Night switch | ▪ **Disabled (default)**<br>▪ Enabled | Enable or disable the use of the day/night mode. |
| Behavior on ON telegram (Night) | ▪ **Fixed value (default)**<br>▪ Last value<br>▪ No reaction | Define the output value when the channel is switched ON during night if day/night switch is enabled. |

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|---|---|---|
| Switch ON value (Night) | ▪ **#FFFFFF (default)**<br>▪ #000000-#FFFFFF | Fixed value after switched ON during night if day/night switch is enabled. |
| Behavior on OFF telegram (Night) | ▪ **Fixed value (default)**<br>▪ No reaction | Define the output value when the channel is switched OFF during night if day/night switch is enabled. |
| Switch OFF value (Night) | ▪ **#000000 (default)**<br>▪ #000000-#FFFFFF | Fixed value after switched OFF during night if day/night switch is enabled. |

In case the staircase light function is enabled the following additional parameters are available:

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Staircase duration | ▪ 1s to 12h | Total duration of the staircase lighting. The channel is automatically switched OFF after this delay. |
| Extend staircase duration | ▪ Disabled<br>▪ **Enabled (default)** | When enabled, the staircase duration is extended each time a ON telegram is received on the staircase object. |
| Manual switching OFF | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, the channel is switched OFF when receiving a OFF telegram on the staircase object. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Switch On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 4 | Staircase | On/Off | 1 bit | CW | DPT_Start |
| 5 | State On/Off | On/Off | 1 bit | CRT | DPT_Switch |
| 6 | HSV Hue (H) - Dim relative | Dim | 4 bits | CW | DPT_Control_Dimming |
| 7 | HSV Hue (H) - Dim absolute | Angle | 1 byte | CW | DPT_Angle |
| 8 | HSV Hue (H) – State Dimming value | Angle | 1 byte | CRT | DPT_Angle |
| 9 | Night (1) / Day (0) Switch | Night/Day | 1 bit | CW | DPT_Switch |
| 11 | RGB Color setting | Percent | 3 bytes | CW | Colour_RGB |
| 12 | RGB Color value | Percent | 3 bytes | CRT | Colour_RGB |
| 16 | HSV Saturation (S) - Dim relative | Dim | 4 bits | CW | DPT_Control_Dimming |
| 17 | HSV Saturation (S) - Dim absolute | Percent | 1 byte | CW | DPT_Scaling |
| 18 | HSV Saturation (S) - State Dimming value | Percent | 1 byte | CRT | DPT_Scaling |
| 19 | HSV Color setting | Percent | 3 bytes | CW | Colour_RGB |
| 20 | HSV Color value | Percent | 3 bytes | CRT | Colour_RGB |

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|---|---|---|---|---|---|
| 24 | HSV Brightness (V) - Dim relative | Dim | 4 bits | CW | DPT_Control_Dimming |
| 25 | HSV Brightness (V) - Dim absolute | Percent | 1 byte | CW | DPT_Scaling |
| 26 | HSV Brightness (V) - State Dimming value | Percent | 1 byte | CRT | DPT_Scaling |

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### 4.14 TUNABLE WHITE (TW) DIMMER

Features

- Blocking function can be set by a group object for each channel to prevent operating the channel from the bus.
- Dimming from warm white (0%) to cold white (100%).
- Temperature and brightness dimming relative and absolute objects.
- Timing functions (switch-on delay, switch-off delay, staircase duration).
- Switch on/off speed and dimming speed adjustable.
- Staircase function. Option to extend the staircase duration and to allow manual switch off during the staircase delay.
- Up to 4 internal scenes configurable per output.
- Day/Night operation mode with selected behavior when switching on and switching off for each mode.

Parameters

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Scene control:<br>Scene 1<br>Scene 2<br>Scene 3<br>Scene 4 | ▪ **0 (default)**<br>▪ 1 to 64 | When set to 0 the channel will ignore corresponding scene. When set to another value, the channel will respond to this scene number. Channel state can be store using the scene group object for further recall. |
| Switch ON delay | ▪ No delay<br>▪ 250ms to 60 min. | The ON or OFF delay causes a delayed switch of the channel. At sending a new switch signal to the channel, first the adjusted delay time expires and afterwards the channel will be switched. |
| Switch ON/OFF speed | ▪ **1s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% during switching on or off. |
| Dimming speed | ▪ **5s (default)**<br>▪ 0 to 60s | Duration to go from 0 to 100% while dimming. |
| Dimming curve | ▪ **Linear (default)**<br>▪ Logarithmic<br>▪ Gamma 1<br>▪ Gamma 2<br>▪ Gamma 3<br>▪ Gamma 4<br>▪ Gamma 5<br>▪ Dali | Dimming curve depending on the driven load. |
| Behavior on ON telegram (Day) | ▪ **Fixed value (default)**<br>▪ Last value<br>▪ No reaction | Define the output value when the channel is switched ON during day or if day/night switch is disabled. |
| Switch ON temperature (day) | ▪ **40% (default)**<br>▪ 0-100% | Fixed value after switched ON during day or if day/night switch is disabled. |
| Switch ON brightness (day) | ▪ **80% (default)**<br>▪ 0-100% | Fixed value after switched ON during day or if day/night switch is disabled. |
| Day/Night switch | ▪ **Disabled (default)**<br>▪ Enabled | Enable or disable the use of the day/night mode. |
| Behavior on ON telegram (Night) | ▪ **Fixed value (default)**<br>▪ Last value | Define the output value when the channel is switched ON during night if day/night |

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| | ▪ No reaction | switch is enabled. |
| Switch ON temperature (Night) | ▪ **30% (default)**<br>▪ 0-100% | Fixed value after switched ON during night if day/night switch is enabled. |
| Switch ON brightness (Night) | ▪ **40% (default)**<br>▪ 0-100% | Fixed value after switched ON during night if day/night switch is enabled. |
| Behavior on OFF telegram (Night) | ▪ **Fixed value (default)**<br>▪ No reaction | Define the output value when the channel is switched OFF during night if day/night switch is enabled. |
| Switch OFF temperature (Night) | ▪ **30% (default)**<br>▪ 0-100% | Fixed value after switched OFF during night if day/night switch is enabled. |
| Switch OFF brightness (Night) | ▪ **0% (default)**<br>▪ 0-100% | Fixed value after switched OFF during night if day/night switch is enabled. |

In case the staircase light function is enabled the following additional parameters are available:

| PARAMETER | VALUES | DESCRIPTION |
|---|---|---|
| Staircase duration | ▪ 1s to 12h | Total duration of the staircase lighting. The channel is automatically switched OFF after this delay. |
| Extend staircase duration | ▪ Disabled<br>▪ **Enabled (default)** | When enabled, the staircase duration is extended each time a ON telegram is received on the staircase object. |
| Manual switching OFF | ▪ **Disabled (default)**<br>▪ Enabled | When enabled, the channel is switched OFF when receiving a OFF telegram on the staircase object. |

Communication Objects

| NR | NAME | FUNCTION | SIZE | FLAGS | TYPE |
|---|---|---|---|---|---|
| 1 | Block | On/Off | 1 bit | CRW | DPT_Enable |
| 2 | Scene | Scene | 1 byte | CW | DPT_SceneControl |
| 3 | Switch On/Off | On/Off | 1 bit | CW | DPT_Switch |
| 4 | Staircase | On/Off | 1 bit | CW | DPT_Start |
| 5 | State On/Off | On/Off | 1 bit | CRT | DPT_Switch |
| 6 | Temperature - Dim relative | Dim | 4 bits | CW | DPT_Control_Dimming |
| 7 | Temperature - Dim absolute | Percent | 1 byte | CW | DPT_Scaling |
| 8 | Temperature - State Dimming value | Percent | 1 byte | CRT | DPT_Scaling |
| 9 | Night (1) / Day (0) Switch | Night/Day | 1 bit | CW | DPT_Switch |
| 16 | Brightness - Dim relative | Dim | 4 bits | CW | DPT_Control_Dimming |
| 17 | Brightness - Dim absolute | Percent | 1 byte | CW | DPT_Scaling |
| 18 | Brightness - State Dimming value | Percent | 1 byte | CRT | DPT_Scaling |

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## 4.15 LOGIC FUNCTIONS

The KNX logic module is a virtual extension module that is part of the ETS application of the master actuator. No additional physical device is need. Each logic module has 8 logic functions including logic gates, sequences, triggers, math operation and weekly calendar events.

- **Logic Gate** with 8 inputs, configurable output delay and inversion
- **Sequence** with 4 steps, configurable outputs delays and datatypes
- **Trigger** with inputs logic, delays and weekly calendar events
- **Math** operations with configurable objects type and delays

Refer to the KNX Logic Module manual for more details on each function.