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Application manual



KNX Secure hospitality system:

MIFARE® RFID card reader

MIFARE® RFID card holder

Outside door panel

EK-TO2-TP

EK-TI2-TP

EK-TD2-TP

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3.0	Modifications for the addition of the EK-TD2-TP model	20/10/2026	G. Schiochet	I. Panero
3.1	DPTs updated at the request of KNXA	16/11/2026	G. Schiochet	I. Panero

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1. Purpose of the document

This manual describes the application details for version A1.0 of the following devices with secure protocol:

- MIFARE®RFID card reader ekinex® EK-TO2-TP;
- MIFARE®RFID card holder ekinex® EK-TI2-TP;
- Outside door panel ekinex® EK-TD2-TP.

This document is intended for the system configurator as a description and reference guide for the device's functions and application programming. For mechanical and electrical details of the installation device, please refer to the device's technical data sheet.

This application manual and the application programmes for the ETS development environment are available for download at www.ekinex.com.

Document	File name (## = revision)	Version	Device revision	Last update
Technical datasheet	STEKTO2TI2TP_EN.pdf STEKTD2TP_EN.pdf	1.0 and later	A1.0	16/11/2026
Application manual	MAEKTX2TP_EN.pdf	1.0 and later		
Application software	APEKTX2TP##.knxprod	0.1 and later		

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2. Product description

The Ekinex® EK-TO2-TP and EK-TI2-TP KNX access control devices with RFID technology enable presence detection in hospitality environments. Both products can manage guest cards for the accommodation facility, based on system codes, bookings and check-in/check-out periods, as well as service cards based on time slots and master keys. The EK-TO2-TP card reader with backlit display allows the card to be read by positioning it in front of the reader, at a maximum distance of 20 mm, and grants access following validation of the card based on the configured authorisations. The EK-TI2-TP card holder is designed to register presence by inserting the transponder card into a slot at the top of the unit.

They also feature a KNX bus communication module, are powered by SELV voltage via the KNX bus, and require an auxiliary power supply of 12–24 Vac or 12–32 Vdc.

The ekinex® EK-TD2-TP KNX Secure device is an outside-door panel designed for installation outside guest rooms in hospitality facilities, which informs guests and staff of the room's status. The backlit front panel features LED symbols indicating guest requests, such as DND (Do Not Disturb) and MUR (Make-up Room), and a capacitive button that can be configured as a doorbell. It does not read access cards and does not control the lock. It is designed to work with smart locks, which manage door opening, and completes the range alongside the EK-TO2-TP card reader and the EK-TI2-TP card holder, with which it shares the same design, enclosures and plates. The KNX bus communication module, featuring KNX Secure, also provides SELV power supply: it does not require an auxiliary power supply.

The devices have an IP20 protection rating and are therefore suitable for use in dry indoor environments, mounted in a flush-mounted box. They are installed in a 2- or 3-module flush-mounted wall box, are available in white or black, and are compatible with the mechanisms and finishes of all ekinex® ranges featuring a 60 x 60 mm cut-out

During operation, the module receives communication telegrams from the KNX bus sent by another device (e.g. a manual control point, a sensor, a timer, etc.). These telegrams cause the outputs to be activated or deactivated and the dimming percentage to be adjusted, through the application of a series of utility functions defined according to the programming.



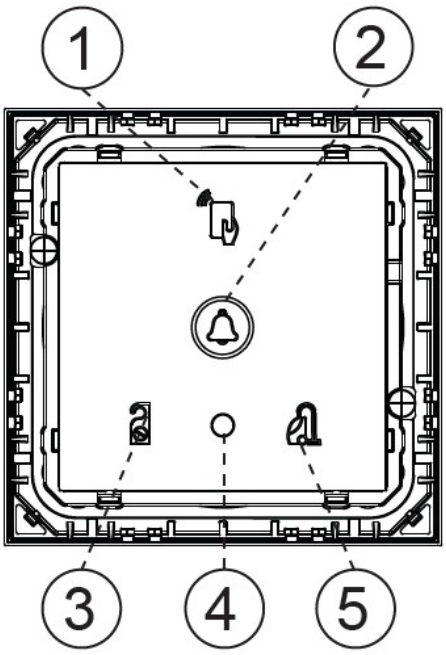
For further details and connection diagrams, please refer to the technical data sheets STEKTO2TI2TP_EN.pdf or STEKTD2TP_EN.pdf, available at www.ekinex.com.

3. Switching, display and connection elements

All devices are equipped with a terminal for connecting to the KNX bus line.
The card reader and the card holder are also equipped with a terminal for an auxiliary power supply and for connecting inputs/outputs.

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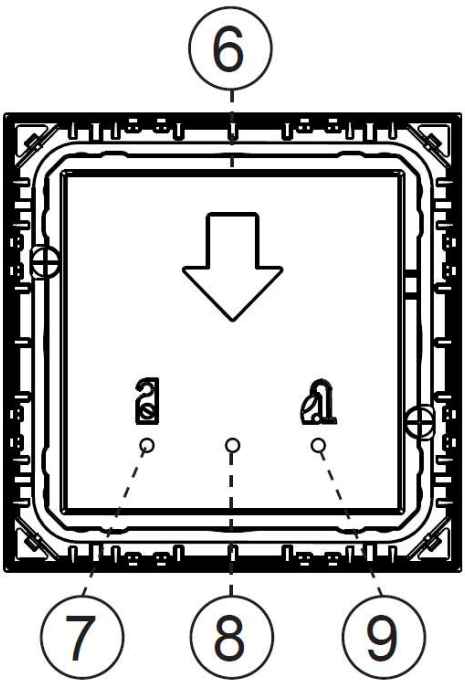
3.1 Layout of EK-TO2-TP front elements



1. RFID sensor (non-backlit symbol)
2. Button/doorbell LED
3. DND button/LED
4. RGB LED for general functions
5. MUR button/LED

Figure 1 - EK-TO2-TP switching and display elements

3.2 Layout of EK-TI2-TP front elements

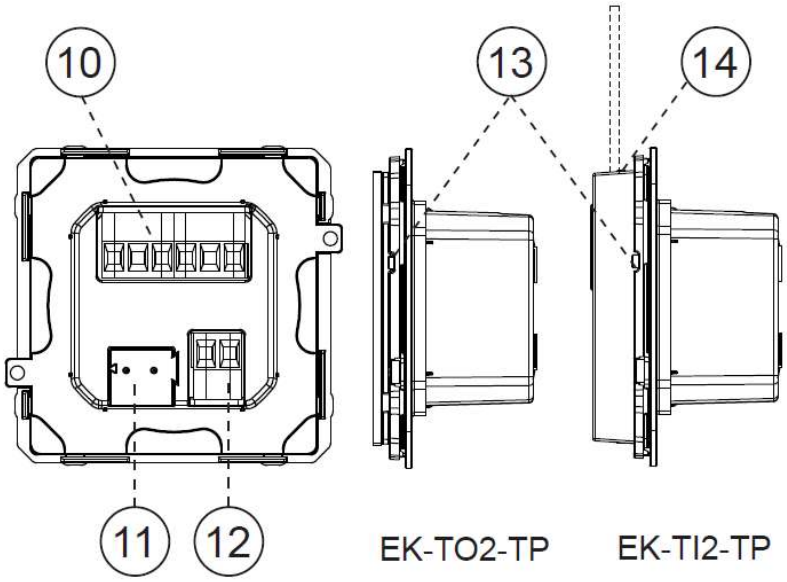


6. Card slot
7. DND LED indicator
8. General LED indicator
9. MUR LED indicator

Figure 2 - EK-TI2-TP display and connection elements

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3.3 Layout of rear and side elements for EK-TO2-TP and EK-TI2-TP

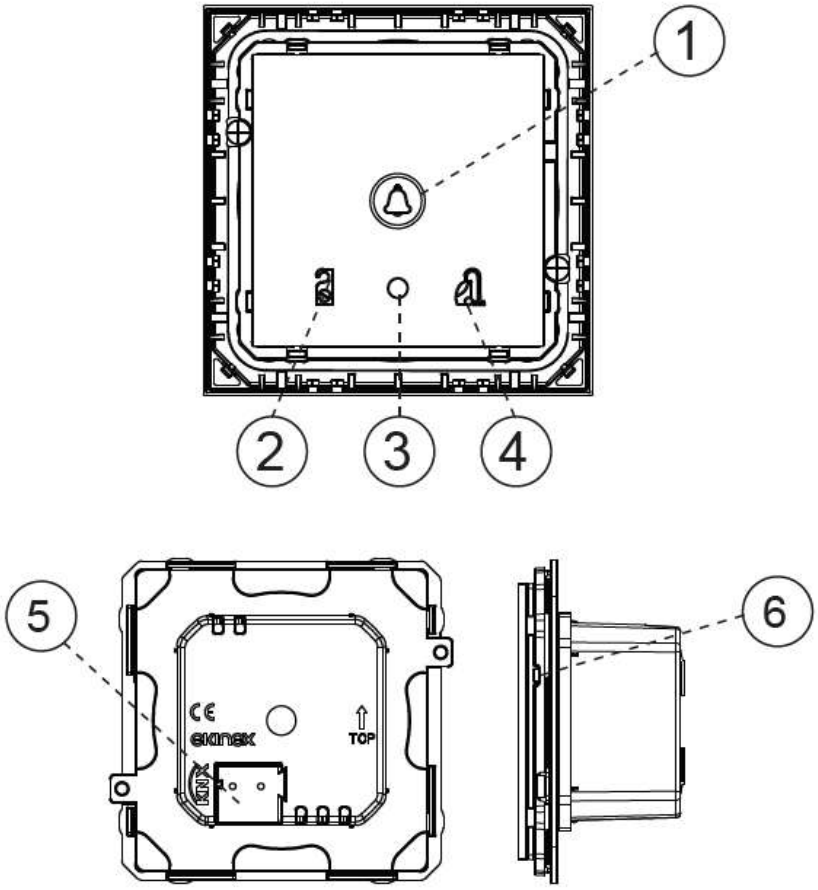


10. Relay output and digital input terminal
11. KNX bus terminal
12. Auxiliary power supply input
13. KNX programming button
14. Card slot

Figure 3 - Elements on the side and rear of the devices

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3.4 Layout of EK-TD2-TP front elements



1. Doorbell button/LED
2. Red LED for DND indication
3. RGB LEDs for general-purpose applications
4. Green LED for MUR indication
5. KNX bus terminal
6. KNX programming button

Figure 4 - EK-TD2-TP switching and display elements

4. Configuration

The functionality of the devices is determined by the settings configured via software. These activities must be carried out in accordance with the building automation system design drawn up by a qualified professional.

To configure each device, you will need the ETS5 development tool (or later versions) and the dedicated application program **APEKTX2TP##.knxprod**; the latter can be downloaded from the Ekinnex website www.ekinex.com.

The application programme is the same for both models and allows you to access, within the ETS environment, the selection of the device type (EK-TO2-TP, EK-TI2-TP or EK-TD2-TP) and the configuration of all the device's operating parameters. The application must be loaded into ETS (alternatively, the entire ekinex®product database can be loaded in a single operation), after which all instances of the device type in question can be added to the project currently being defined.

The configurable parameters for the device will be described in detail in the following sections.

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The configuration can be, and generally will be, defined entirely in *offline* mode; the transfer of the set configuration to the device will then take place during the programming phase, described in the following section.

Product code	ETS application software (## = revision)	Communication objects (Max. no.)	Group addresses (Max. no.)
EK-TO2-TP	APEKTX2TP##.knxprod	284	32768
EK-TI2-TP		278	32768
EK-TD2-TP		194	32768

The configuration and programming of KNX devices require specific knowledge; to acquire this knowledge, it is recommended that you attend the relevant training courses at a centre certified by the KNX Consortium.

For further information, visit www.knx.org.

In this manual, any reference to KNX communication objects is often indicated with the acronym CO ("Communication Object").

5. Programming and commissioning

Once the device configuration has been defined within the ETS project in accordance with the user's requirements, the following steps must be carried out to perform the programming:

- connect the device electrically, as described in the technical data sheet or instruction manual, to the KNX bus in the final installation or in a test system set up specifically for programming. The system must in any case include an interface device for the PC on which the KNX environment is installed;
- Apply power supply to the bus
- activate programming mode on the device: briefly pressing and releasing the programming button sets the device to programming mode. In this mode, the RGB LEDs are set to red and a fade effect occurs between the LED Color and black, and the device is waiting for the ETS application to be downloaded;
- From the ETS environment, start the programming (which, in the case of initial configuration, must include the physical address to be assigned to the device).

Once the program has finished downloading, the device automatically returns to operational mode; the programming LED should be off. The device is now programmed and ready for operation within the system.

5.1 Secure commissioning

Access control devices comply with the KNX security standard. This means that the device can be used safely.

Every KNX Secure device comes with a certificate, printed on a non-removable label affixed to the device and required for initial commissioning. This certificate must be kept in a secure place after installation to prevent unauthorised access to the factory default setup key (FDSK).

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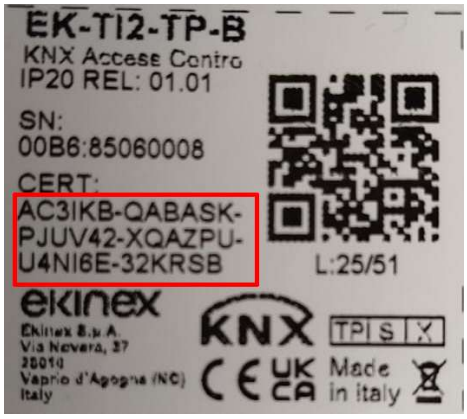


Figure 5 – Label with certificate

The device certificate provides the following information:

- Certificate code, both as a QR code and as a character string;
- The corresponding serial number.

A commissioning key is required when configuring a KNX Secure device for the first download. This key is generated in ETS prior to the first download, based on the certificate code and the serial number.
Furthermore, it is essential to assign a project password as soon as a KNX Secure device is imported into a project. This will protect the project from unauthorised access.

Note: the password must be kept in a safe place. Without it, access to the project is not possible; not even the KNX Association or the device manufacturer will be able to access it.

Without the project password, it will not be possible to import the commissioning key.

Furthermore, without the FDSK code, it will no longer be possible to use the device in KNX Secure mode after a reset.

You can enable secure commissioning from ETS, as indicated by the drop-down menu in the ETS Properties panel, highlighted in Figure 6 .



Figure 6 - Secure commissioning

During the initial configuration of the device, ETS will prompt you to enter the device certificate. This is also available as a QR code, which can be scanned using a QR scanner or entered manually.

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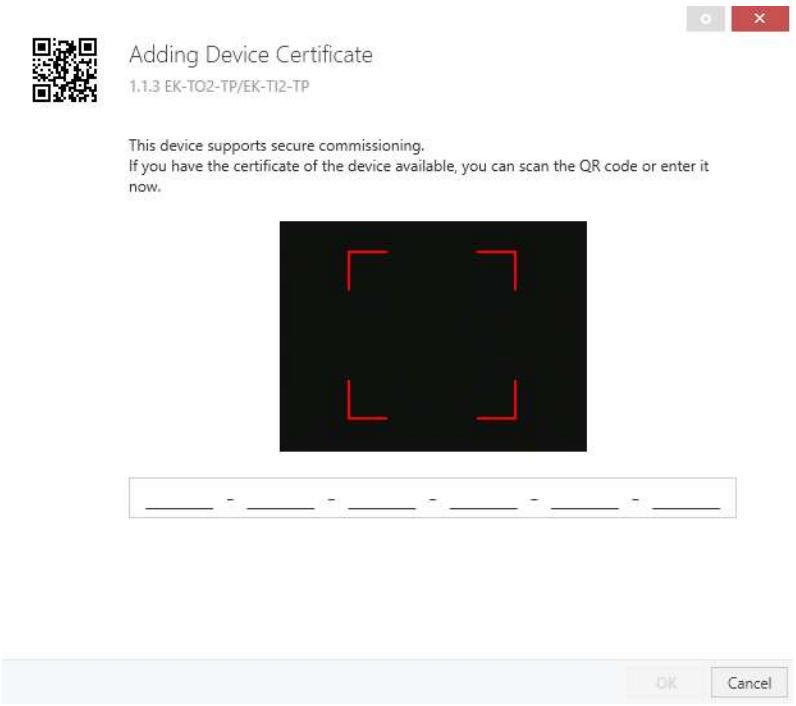


Figure 7 - Window for adding the device certificate

The device certificate is required only once, during the initial encryption and authentication process between ETS and the KNX Data Secure device. Once the certificate has been read, ETS extracts its key components: the serial number and the factory default configuration key (FDSK), as shown in Figure 8.

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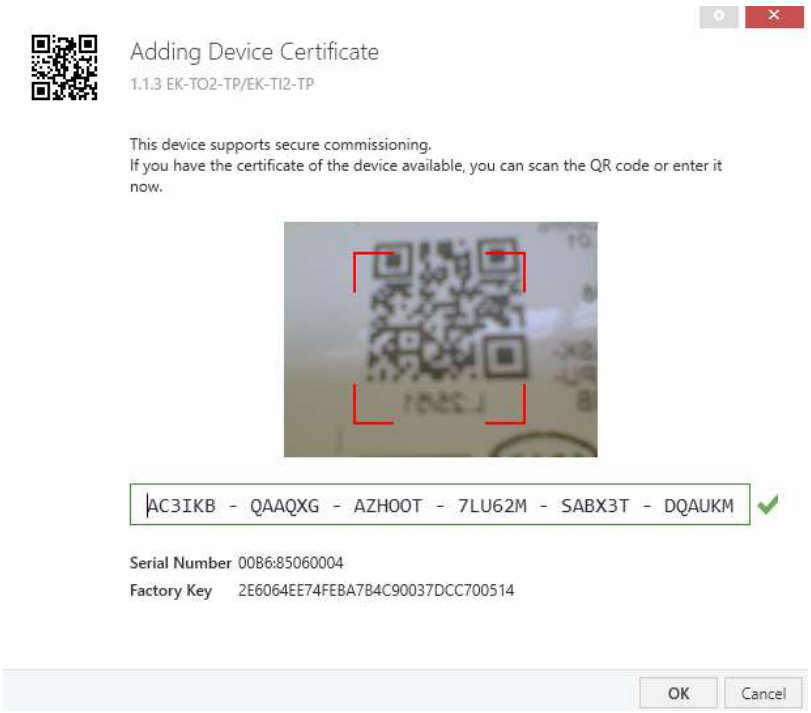


Figure 8 - Adding a certificate in ETS

ETS then generates and assigns a Toolkey to the device, which replaces the original certificate for runtime authentication and the commissioning process. Only after this step can the device be configured as a KNX Secure device in ETS.

This simplifies the configuration process, ensuring that every KNX Secure device is integrated securely and correctly into the project.

The certificate will only be required again if the device has been reset to factory settings (for example, if the device is to be used in a different ETS project).

5.2 Offline certificate entry in ETS

You can scan or manually enter all KNX device certificates into ETS in a single step, even without a direct connection to the devices.

During initial commissioning, ETS automatically assigns each certificate to the correct device using the serial number, which is included in both the device's readable product data and its certificate.

This operation is carried out via the "Security" tab on the "Main View" page of the ETS project.

- For ETS5, click on the project as shown inFigure 9 below and then on "Add" in the Security -> Device Certificates section.

Certificates can also be added to the device selected in the project, as shown in Figure 14 .

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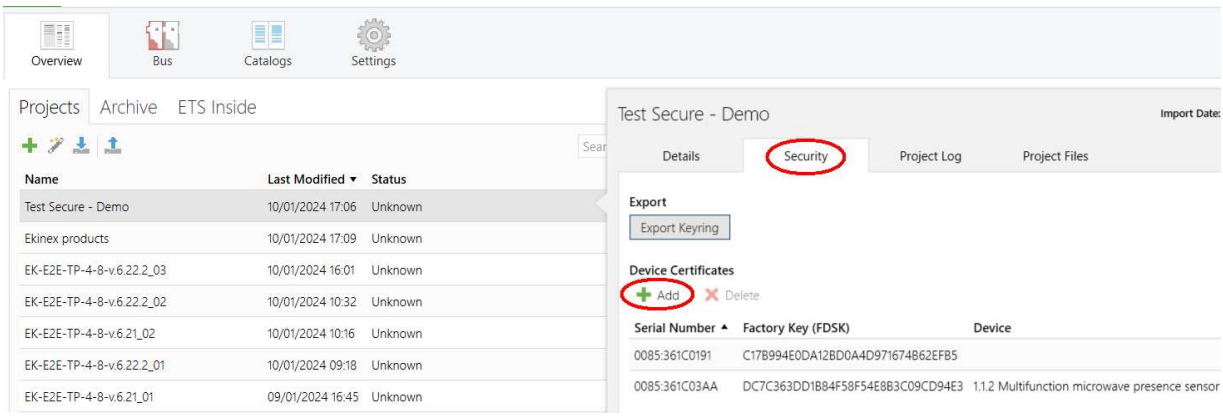


Figure 9 - Adding a certificate from ETS5

- For ETS6, again from the “Main View” page, select a project in the “Local Projects” section and click on “Details”

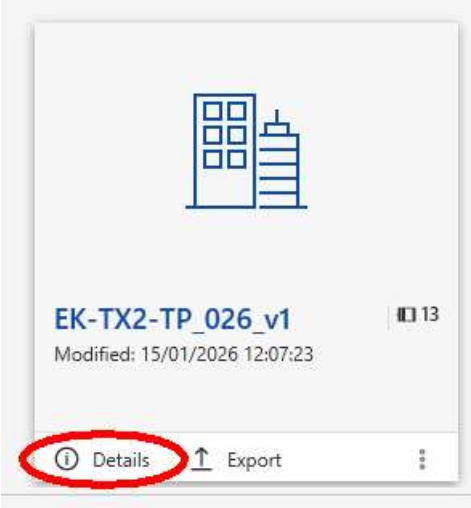


Figure 10 - ETS6 – Details

By clicking on the “Security” tab in an ETS project, you can view all device serial numbers and FDSK keys, both of which form part of the device certificate. This section also allows you to add new device certificates, simplifying the management and updating of the KNX Secure configuration directly from the ETS interface.

To add a certificate, click on “Add certificate” in the “Security” tab.

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Figure 11 - ETS6 - Security view in ETS project information

As soon as it is confirmed that a device will be part of the project, its certificate can be imported into ETS, even before the device is created in the software, installed on-site or delivered to the site. This proactive step helps to simplify the commissioning process and ensures that all necessary security credentials are already in place at the time of device integration.

Also on the Security tab, you can view the details of all Secure devices included in the project:

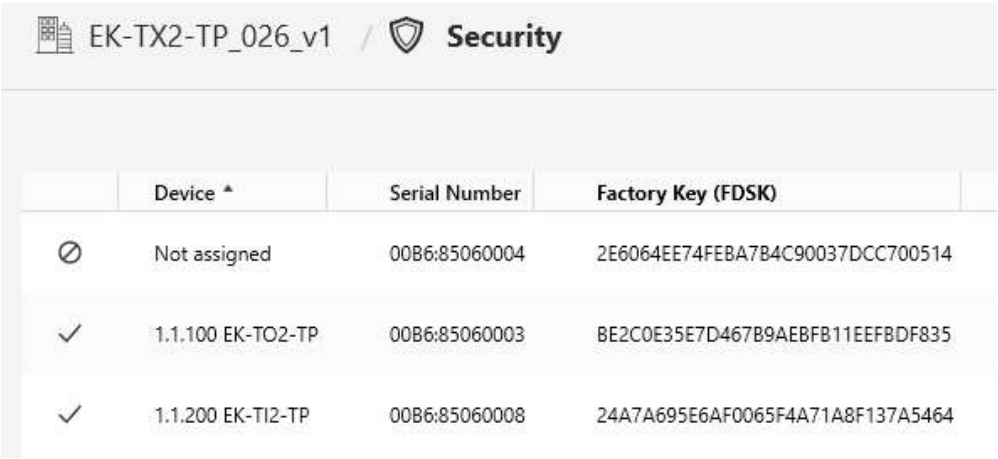


Figure 12 - Overview of device certificates

This procedure is suitable for easily accessible devices where the individual KNX address can be set simply by pressing the programming button.

5.3 Online commissioning via device certificates

Alternatively, you can select a specific device within ETS and manually link it to the appropriate certificate. This allows ETS to identify the device and start commissioning based on its serial number. This method is particularly useful when physical access to the device is limited, as it eliminates the need to press the programming button during configuration.

A common situation when commissioning hard-to-reach KNX devices is difficulty accessing the programming button. In such cases, assigning the individual device address via the serial number of the device certificate is a practical and efficient solution that eliminates the need to interact directly with the device.

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If the certificate can be assigned to a device, programming can be carried out using the serial number without using the programming button.

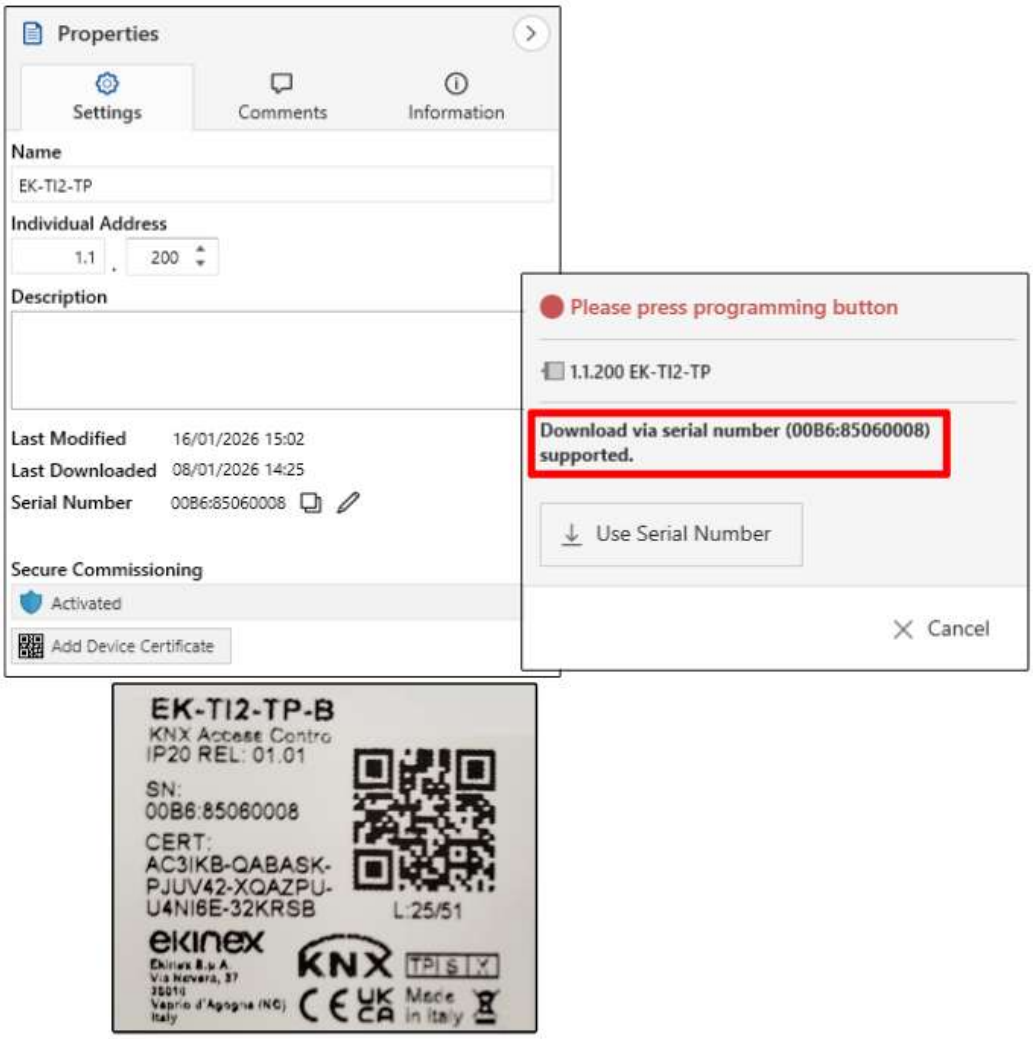


Figure 13 - Downloading in ETS via serial number

The ETS pane on the right, under ‘Properties’, indicates whether a certificate has been assigned to the device. The device is registered as a KNX product and is assigned a unique KNX address. Furthermore, the pane shows whether the device currently supports KNX Data Secure based on its configuration.

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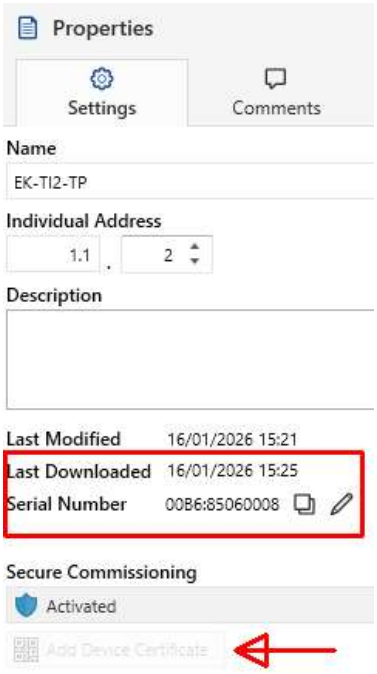
		
No certificate has been assigned to the device yet (no serial number is displayed)	A certificate has been assigned to the device (the serial number is displayed)	The device has been commissioned with the certificate (the "Add Device Certificate" button is disabled).

Figure 14 – Assigning the certificate from the “Properties” window

If the “Secure Commissioning” option is set to “Disabled”, all group addresses linked to the device will switch to unencrypted (plain) communication.

Note: Changing this setting triggers a general reset. All security keys will be deleted and the device must be put back into service completely. Please note that this process may result in longer download times.

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5.4 Device reset

To reset the device, power it via the KNX bus and press and hold the programming button for at least 10 seconds; then:

- For EK-TO2-TP and EK-TD2-TP, when the DND and MUR LEDs remain lit steadily, whilst the doorbell and general RGB LEDs flash rapidly in red, this indicates that the reset has been performed;
- For EK-TI2-TP, when the DND and MUR indicator LEDs remain lit steadily, whilst the general indicator LED flashes rapidly in red, this indicates that the reset has been performed.

At this point, you must re-address and reconfigure the device using ETS.



Warning! Resetting restores the device to its factory default settings. The addressing and parameter values set during configuration will be lost.

5.5 Test mode

Pressing and holding the programming button for approximately 5 seconds (then releasing it) sets the device to Test mode. In this mode:

- For all devices, the “Button/Doorbell” LED turns white; when pressed, it turns red.
- For the EK-TO2-TP and EK-TI2-TP models:
    - The MUR and DND LEDs flash once and then reflect the status of the digital inputs—the DND LED corresponds to input 1, and the MUR LED corresponds to input 2.
    - The “Generic” LED turns white whenever a card is detected and turns off when the card is no longer detected.
    - The relay outputs mirror the state of the input.

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6. Description of main functions and features

The features common to all device models are as follows:

- Control of LEDs via ETS objects
- KNX Secure protocol
- Test mode for checking LED operation
- Logical, arithmetic and comparison functions

The specific features for each model are listed below.

6.1 Features of the EK-TO2-TP card reader and EK-TI2-TP card holder

The main features of the access control devices are listed below:

- 30 Vdc power supply from the KNX bus, typical current draw from the bus 15 mA, max 25 mA
- Auxiliary power supply 12–24 Vac or 12–32 Vdc, current draw 3 mA @24V standby, 20 mA relays switched, 3 mA @12V standby, 32 mA relays switched
- Antenna with MIFARE 13.56 MHz RFID technology; maximum distance for card detection from the front panel: 20 mm
- Guest management for the accommodation facility based on booking and check-in/out times; service user management based on time slots and master key function
- Presence detection via bus and communication to the system supervision unit via KNX bus
- Transmission of statuses and scenarios on the KNX bus based on the validation of guest or service cards
- 2 outputs with monostable relays, programmable based on card validation or as actuators activated by KNX telegrams: OUT1 for electric lock control (in the case of the reader), room load control (for card holder) or general use; OUT2 for courtesy light or general use
- Output relay specifications: maximum current (for resistive load): 5A 250Vac/30Vdc; maximum switching current: 5A; maximum power 1250VA/150W
- 2 NO digital inputs for potential-free contacts, for connecting a traditional push-button (with switching, dimming or roller shutter/curtain function) or a signal contact (e.g. window opening)
- Test mode for checking relay operation

<u>EK-TO2-TP (external reader)</u>

The main function of the device is to read an RFID badge and subsequently open a gate, if the badge is deemed authorised.

Also included are:

- A display with RFID reader (non-backlit);
- backlit symbols:
    - DND (Do Not Disturb, red LED);
    - MUR (Make Up Room, green LED);

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  - RGB LED for general functions;
  - doorbell button with white LED.
- “Virtual presence” function

EK-TI2-TP (card holder)

The main function of the card holder is to enable the electrical loads in the room where it is installed, provided a badge is inserted into it.

Its key features are:

- LED for DND (Do Not Disturb, red LED) indication, RGB LED for general functions, MUR (Make Up Room, green LED);
- configurable card removal delay, for managing courtesy lighting.

6.2 Features of the EK-TD2-TP outside door panel

The main features of the EK-TD2-TP device are listed below:

- 30 Vdc power supply from the KNX bus; typical current draw from the bus: 10 mA; maximum: 22 mA
- Transmission of 1-bit and 1-byte commands, as well as welcome and farewell scenes triggered by user movement, via the KNX bus; these can be configured at guest level
- Receipt of a transit event from the KNX bus, in a 1-bit or 14-byte object (at card level), sent by an ekinex® card reader, by Delégo or by a third-party system
- “Virtual presence” function
- Backlit display with LED symbols: DND (Do Not Disturb, red LED), MUR (Make Up Room, green LED), RGB LED for general functions, doorbell button with RGB LED

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7. Start-up procedure

Upon connection to the bus, which also serves as the power supply for the logic, the device enters a fully operational state after a brief period (of the order of tens of milliseconds) required for reinitialisation. It is possible to set a longer delay to prevent bus traffic overload during the system start-up phase.

An unprogrammed device performs no activity on the bus; however, the outputs can be individually activated in manual mode (see below) via the membrane keypad on the front panel.

In the event of a power failure on the bus (voltage below 19 V for 1 s or more), the device switches off; before the power supply becomes insufficient, the status at the time of shutdown is stored internally.

When power is restored, the device resumes operation by restoring the state stored at shutdown, except for those parameters for which a different behaviour has been configured.

7.1 Test mode

A long press of the programming button for approximately 5 seconds puts the device in Test mode.

7.1.1 Test mode for card reader and card holder

In this mode, the MUR and DND LEDs flash for 10 seconds and then reflect the state of the digital inputs (DND → Input 1, MUR → Input 2). For the EK-TO2-TP card reader, the “Doorbell” LED turns yellow, and it turns red when the touch display is pressed.

The “Generic” LED is off; it toggles between this state and green whenever a card is detected.

The relay outputs change state every second.

Pressing and holding the programming button for approximately 5 seconds exits Test mode.

7.1.2 Test mode for outside door panel

In this mode, the “Doorbell” LED turns white, and when the touchscreen is pressed, it lights up red.

Pressing and holding the programming button for approximately 5 seconds exits Test mode.

7.2 Checking consistency between the device and the ETS application

Within the ETS application, you can select the device version: reader, card holder, or outside door panel.

If the device detects an inconsistency between the hardware and the ETS application (for example, because the wrong ETS application has been downloaded), the device signals this problem by rapidly flashing the LEDs and disables all access control functions.

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7.3 Summary of LED behaviour for general modes

The following table illustrates the LED behaviour for the main generic operating modes of the devices.

Mode	General LED	Doorbell LED (EK-TO2-TP and EK-TD-TP only)	DND LED	MUR LED
Programming	Red - slow fade	Red - slow fade	Off	Off
Test	Green - Toggle card reading	Yellow - Button not pressed Red - Button pressed	Red – flashing rapidly for 10 seconds On if input 1 is active	Red – flashing rapidly for 10 seconds On if input 2 is active
Application Reset	Red – rapid flashing	Red – rapid flashing	On	On
Technical alarm / Inconsistency between device and ETS application	Red – rapid flashing	Red – rapid flashing	Rapid flashing	Off

Table 1 - LED behaviour according to operating mode

8. Operation of the application software

The software performs the following tasks:

- Update internal status variables based on telegrams on the KNX bus;
- Implement functions relating to timing and other built-in features to determine the status of the physical outputs;
- Activate the physical outputs based on the status of the logic outputs;
- Respond to requests on the bus relating to communication objects.

8.1 Status variables (Communication objects)

The status of the device, and specifically of its interface elements (outputs), is based on status variables that are automatically defined by the application programme. When a group address is assigned to a status variable, it effectively becomes a KNX communication object; as such, it assumes the usual characteristics of communication objects, including, for example, the ability to use flags to determine how a change to the object affects its transmission on the bus.

8.2 General configurations

The device's general settings allow you to set the product type (reader, card holder or outside door panel), the LED brightness level (with a fixed value or adjustable via the KNX bus) and other functions:

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- **Ring button** (EK-TO2-TP and EK-TD2-TP only): acts as a virtual doorbell button, allowing you to set its behaviour and the LED Color in response to press (On) and release (Off) events. It is also possible to configure an LED switch-off delay.
- **Virtual presence** (EK-TO2-TP and EK-TD2-TP only): to enable virtual presence management. For a description of this mode, please refer to the section 8.2.3 .
- **Authentication** (EK-TO2-TP and EK-TI2-TP only): allows you to select the type of card authentication, which can be:
    - For EK-TO2-TP, **distributed** (*White-list)* if card authentication takes place directly in the device, which checks whether the card is on a list of authorised badges, or **centralised**, if card authentication takes place in central software (and not in the reader itself);
    - For EK-TI2-TP, **disabled** (all cards are considered valid) or **distributed** (*white-list)*.

For a more comprehensive discussion of this topic, please refer to the section 8.10 .

- **Date time format** (EK-TO2-TP and EK-TI2-TP only): for setting the device's date and time
- **Heartbeat**: the device sends a "keep-alive" signal using one of the following strategies:
    - Periodic: an On, Off or On/Off value is sent spontaneously (alternating, or "Toggle") via a specific group object at regular intervals, with a frequency set by the "period" parameter;
    - On request: a response is sent in reply to a query on the relevant group object
- **Demo mode** (EK-TO2-TP and EK-TI2-TP only): useful for demonstrating the device's operation even in the absence of access management software. In this mode:
    - Any card is considered valid;
    - The DND and MUR indicator LEDs are switched on at start-up
- **Intensity value LED from bus**: determines whether or not the brightness of the LEDs can be adjusted via a bus telegram.
- **Night mode**: allows you to set a specific brightness level for night-time, which is activated upon receipt of an On value on the relevant group object.
- **Enable logic module**: to enable the logic module and its various functions (logical, comparison and arithmetic operations).

8.2.1 Demo mode (EK-TO2-TP and EK-TI2-TP only)

Demo mode can be activated via the ETS application. If Demo mode is active, the DND and MUR LEDs are lit when the board is powered up and can be controlled via their respective COs.

Every card read is considered valid; therefore, no supervisor or valid card list (*White-list)* is required, and the "Doorbell" LED flashes green with every read. At least one output must be configured as a "lock" if you also wish to simulate the opening of the door.

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8.2.2 Ring button (EK-TO2-TP and EK-TD2-TP only)

This is a capacitive button on the front of the device, marked with a doorbell symbol. Its operation can be enabled or disabled via the ETS application. Furthermore, it is dynamically enabled or disabled depending on whether DND mode is active or not.

8.2.3 Virtual presence (EK-TO2-TP and EK-TD2-TP only)

The virtual presence function is available only for the EK-TO2-TP reader and the EK-TD2-TP outside door panel. It can be enabled at a general level. Subsequently, only if it has been enabled at a general level, can it also be enabled for each card level (guest, administrator, etc.).

This function allows the presence of the card holder to be simulated, so the reader device can perform a series of actions depending on whether the card is inserted or removed. To define the various actions, you can set:

- a virtual presence telegram, which notifies whether the room is occupied or not;
- general parameters, namely
    - a sensor activity timeout, which allows you to set the time elapsed after which, in the absence of activity, ‘goodbye’ COs are sent;
    - a “room occupancy maintenance” CO, which locks the room status if it is already occupied;
- a door sensor, which detects entry into and exit from the room, with the respective timeouts;
- a motion sensor, which identifies users present in the room at a given moment; this sensor is used to indicate that the user has entered or left the room;
- a bus activity sensor, which works alongside the presence sensor to determine whether users are present, by monitoring activity on the bus.

Some use cases for the virtual presence function are illustrated below.

8.2.3.1 User outside the room

Assuming the card is on *the White-list* and that the day, time and level allow for correct authentication, here are some typical scenarios:

1) Card swiped on the reader and door sensor open: the reader sends a Welcome message to the bus and sets the room occupancy status to ON.
2) Card swiped on the reader, door sensor open, waiting for the door opening timeout to expire: the reader sends a ‘Welcome’ message to the bus and sets the room occupancy status to ON; then, when the timeout expires, it sends a ‘Goodbye’ message and sets the room occupancy status to OFF.
3) Card swiped on the reader, door sensor open, then door closes before the timeout expires: the reader sends the Welcome message to the bus and sets the room occupancy status to ON; then, when the door closes, it sends the Goodbye message and sets the occupancy status to OFF.

   This is a typical scenario, for example, involving a courier who delivers a parcel and then leaves, without therefore occupying the room permanently.
4) Card swiped on the reader, door sensor open, then door closes and motion sensor command set to ON: the reader sends a ‘Welcome’ message over the bus and sets the room occupancy status to ON. As the room is now occupied, no ‘Goodbye’ message is sent.

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8.2.3.2 User inside the room

In this case too, it is assumed that the card is on *the White-list* and that the day, time and floor permit correct authentication. Furthermore, at least one user is inside the room, so:

- The card has been successfully authenticated;
- The door open and door close commands have been sent in sequence; the room occupancy status is therefore set to ON;
- The motion sensor command is ON.

Here are some scenarios:

1) The 'room occupied' maintenance command (enable) is sent, followed by the door open command and then the door close command; finally, the motion sensor command is set to OFF.

   In this case, the room occupancy status remains ON (maintain), because there may be another occupant in the room.

   If, at this point, the command to maintain the room as occupied (disable) is sent, the room occupancy status changes to OFF after the timeout and, finally, after the last general timeout, the 'Goodbye' message is sent.

2) The door-open command is sent, followed by the door-close command; finally, the motion sensor = OFF command is sent: after the door-open command, if the motion sensor is OFF, the system waits for the timeout and only then does the room occupancy status switch to OFF; after the final general timeout, the 'Goodbye' message is sent.

   If, on the other hand, the motion sensor is still ON, the room occupancy status remains ON.

3) The motion sensor = OFF command is sent, followed by the door open command and then the door close command: once the time equal to the sum of sensor timeouts + OFF delay after detection has elapsed, the reader sets the room occupancy status to OFF. After the general sensor activity timeout, it also sends the Goodbye messages.

4) The door open command is sent, followed by the door close command; subsequently, the motion sensor = OFF command and the bus activity sensor (enable) command are sent: in this case, the room occupancy status remains ON (maintained), because activity is detected on the bus regardless of the motion sensor.

   If, at this point, the "disable" command is sent to the bus activity sensor, followed by the door open and close commands, the room occupancy status changes to OFF after the timeout; finally, once the last general timeout has also expired, the Goodbye message is sent.

8.2.4 Transit information

Transit data can be in two different formats: 4 Bytes or 14 Bytes.

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8.2.4.1 4-Byte transit data

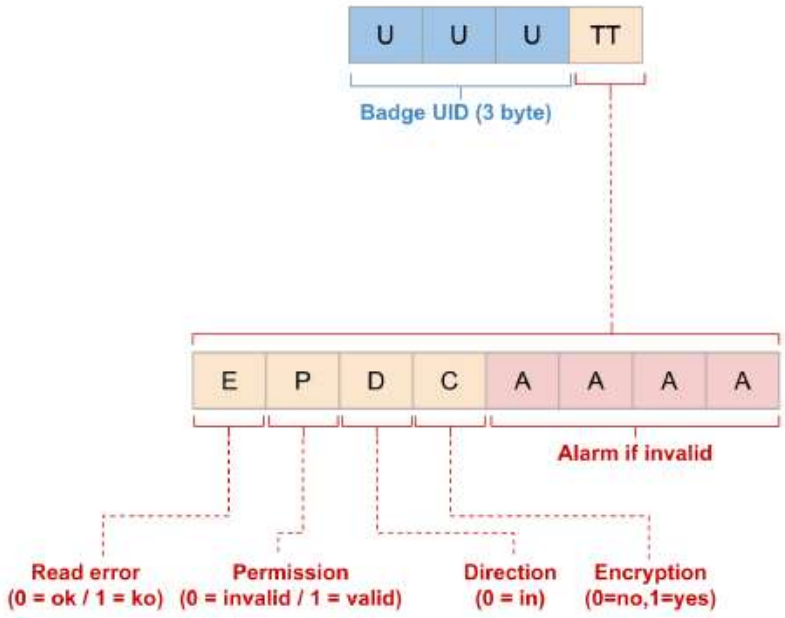


Figure 15 - 4-Byte transit information

8.2.4.2 14-Byte transit data (centralised authentication)

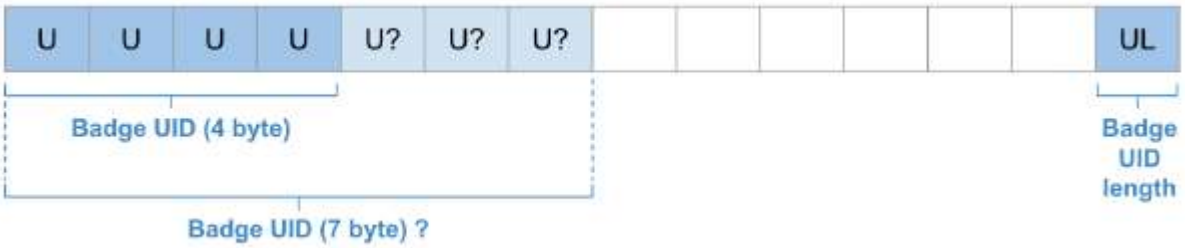


Figure 16 - 14-Byte transit information (for centralised authentication)

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8.2.4.3 14-Byte transit data (distributed authentication or White-list)

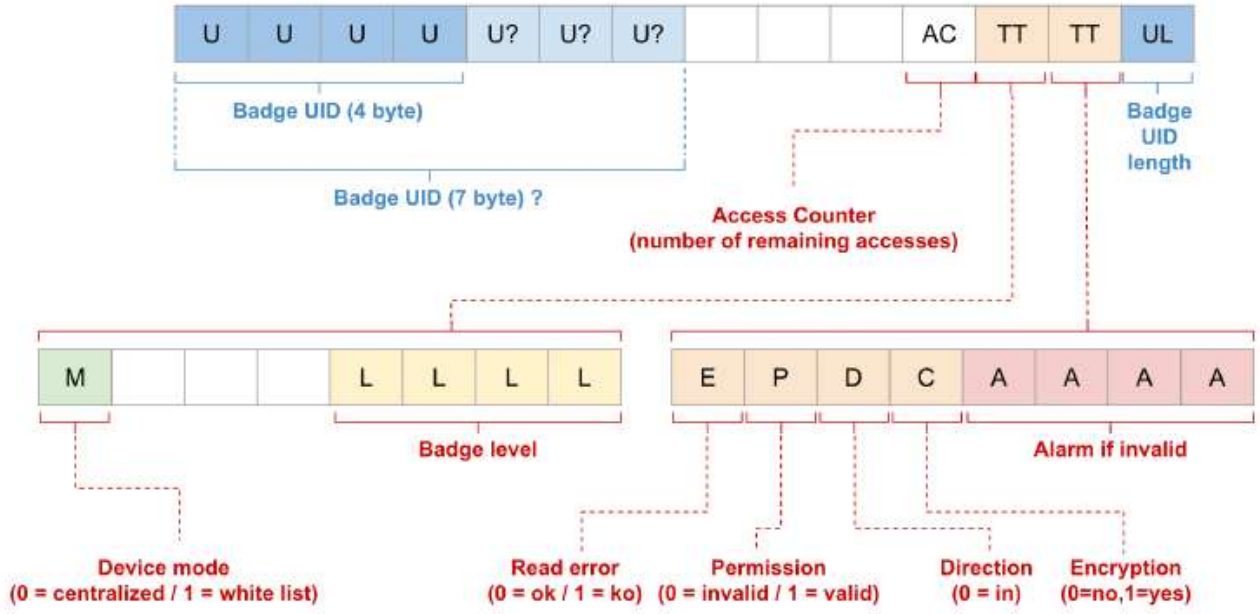


Figure 17 - 14-Byte transit information (for distributed authentication or *White-list*)

8.3 Output management (EK-TO2-TP and EK-TI2-TP only)

Output management allows you to set the control mode for the corresponding output relay.

The available outputs can be controlled either independently or in pairs, i.e. as a single channel to perform valve, roller shutter or blind functions: the features available for these two modes will be explained in the following chapters.

In independent or single mode, each output can be configured in different ways for the EK-TO2-TP reader device or the EK-TI2-TP card holder. Each output operates independently and has its own parameters and communication objects:

- Lock (for the reader) or load (for the card holder). The relay is activated upon successful card authentication (in the case of the reader) or upon detection of a card (in the case of the card holder);
- Enabled: the relay can be controlled via a specific group object, like a standard actuator;
- Disabled: the relay cannot be controlled.

In 3-way valve / shutter / Venetian blind mode, the two outputs are grouped under the same channel for a shared function.

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8.3.1 Output functions in independent mode

If an independent output is configured as a lock or a load, a connected lock will open or the load will switch on following successful card authentication. The status of the corresponding KNX object on the bus is also updated.

If an independent output is configured as “enabled”, the relay is driven according to the timing set by the ETS application upon receipt of the control CO: a single communication object per output, “On/Off Command”, is sufficient to switch the output directly based on the value received via a KNX telegram.

If an output is not disabled, it is possible to configure whether or not to send the status feedback telegram, according to the settings configured in the ETS application

Furthermore, output 2 can be configured as “copy from output 1”, so that the behaviour of both outputs is identical by configuring the parameters for output 1 alone.

The switch-on or switch-off delay sets a waiting time between the command to change the state of an output and the actual switching. A separate delay time can be set for each transition during activation and deactivation; these times are indicated in the following figure as Ton and Toff respectively.

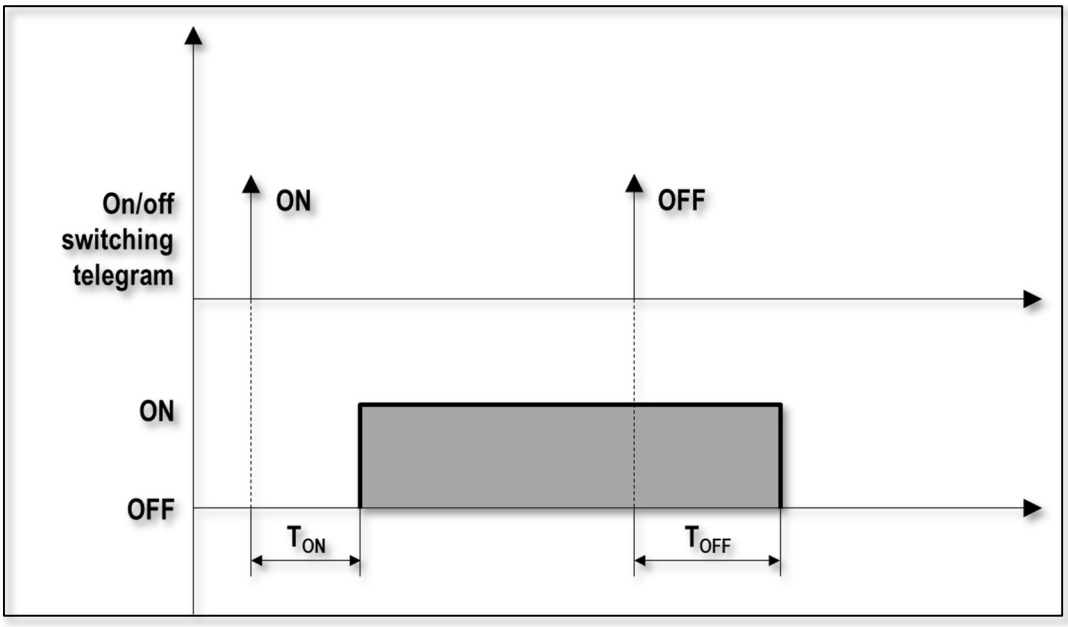


Figure 18 - Output switching delays

By configuring the device parameters, it is possible to activate certain more advanced functions, most of which affect the switching of the outputs.

These functions are as follows:

- Relay operation (output inversion): allows the closed (physical) contact position to be associated with the logical “On” state and vice versa;
- Bus ON behaviour: defines the value of the outputs when the KNX bus is powered;
- Status feedback telegram: automatically transmits status information upon switching;
- Transmission cycle time, i.e. the frequency at which the status object is sent.
- Delay after bus recovery: defines how long it takes for the device to become operational after the bus on command;

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- Valve function: to enable or disable it;
- Power-up delay: to set a delay before the output switches to the on state;
- Power-off delay: to set a delay before the output switches to the off state;
- Staircase lighting function: manages a retriggerable and resettable timer on the output.
- Operation lock and forced operation functions: these functions allow you to inhibit the operation of the output or force its value in various ways.
- Scenario function: allows you to recall or set a default value for the output in association with scenario codes.
- Energy/operating time counter: allows for an approximate calculation of energy consumed by accumulating the operating time of an output.

The functional blocks described are illustrated in the following figure, which is particularly important for understanding which functions take priority over others:

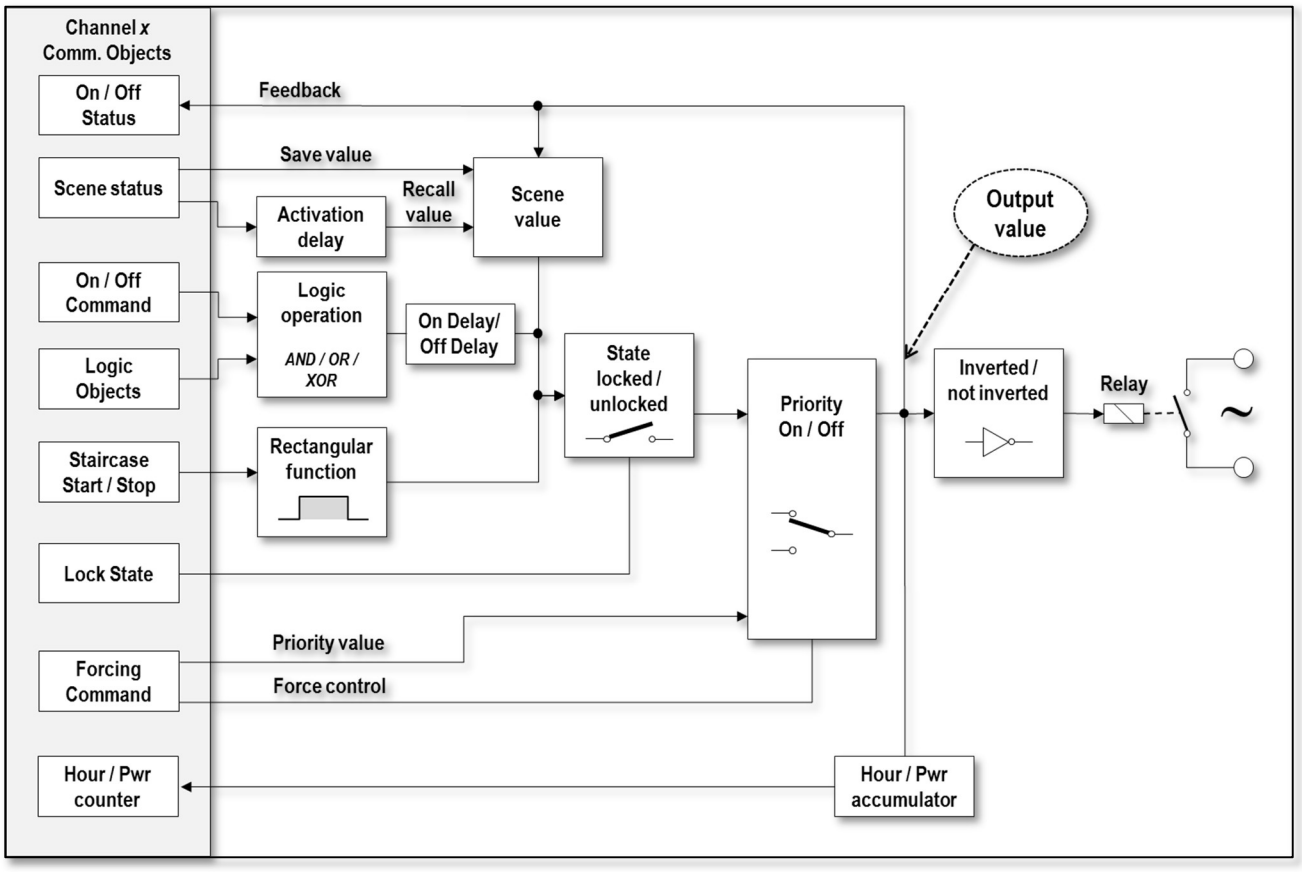


Figure 19 - Functional block diagram – independent mode

8.3.1.1 Output inversion (relay operation type)

This function allows the state of the output's physical contact to be inverted relative to the value of the logic output.

Note: regardless of this setting, in the rest of the manual, "On" and "Off" will always refer to the state of the logic output, not to the state of the relay output contact.

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8.3.1.2 Status feedback telegrams

When status feedback is enabled, a communication object corresponding to the output status is made available for reading by other devices on the bus. This object reports the actual status of the logic output, which is likely to differ from that set by the command as it includes the effect of any other functions currently active.

When this communication object is defined, it is automatically transmitted with every change of state, so that events can be generated with every actual change in the output.

Status feedback telegrams are not, however, transmitted if the outputs are activated manually.

8.3.1.3 Power-on / power-off delay

It is possible to set delays between the command to change the state of an output and the actual switching. A separate delay time can be set for each transition during activation and deactivation (or, in electrical engineering terminology, during *energisation* and *de-energisation*); these times are indicated in the following figure as Ton and Toff respectively.

These delays apply to switching via direct command and/or logic objects, but not to switching caused by other functions (e.g. staircase lighting or a scene).

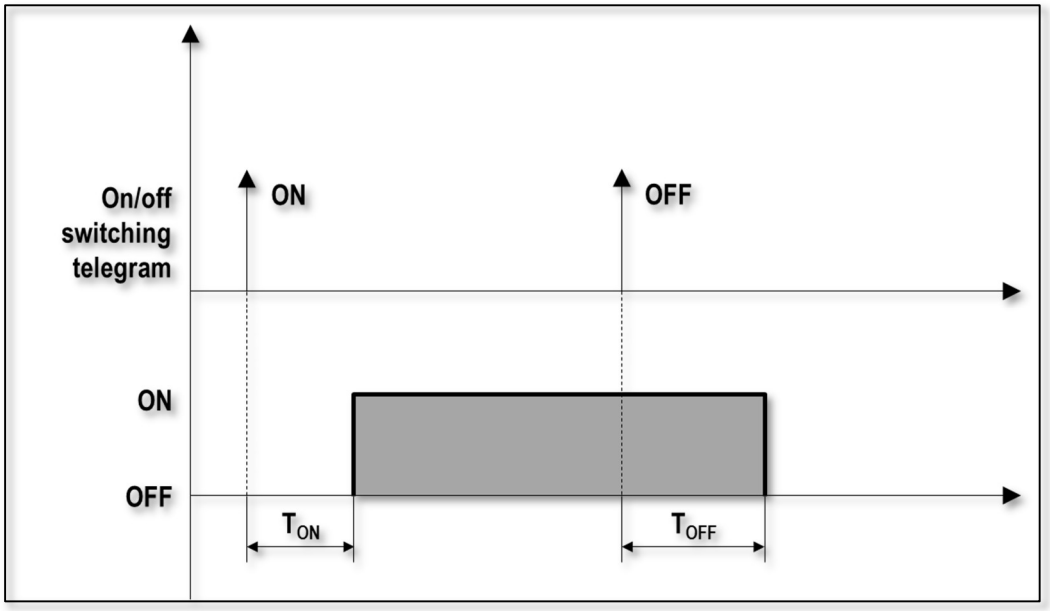


Figure 20 - Switching delays

8.3.1.4 Staircase lighting function

The purpose of this function is to allow simple and flexible management of the timing of stairwell lighting or similar loads. The specific requirements are as follows:

- The light is activated by a “Start” command (e.g. via a button or a presence sensor), and must normally remain on for a programmed base time;
- It must be possible to activate a “Stop” command (*manual switch-off*), again via a button or other event, which allows the light to be switched off before the programmed time has elapsed (e.g. when a sensor detects that the person passing through has left the building);

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- It must be possible for another “Start” command, received during the timer cycle, to restart the time count from the beginning (*retrigger*);
- An additional function, known as “pre-warning”, can cause the light to switch off temporarily a certain time before the timer expires to warn of the imminent end; both of these times (duration of the interruption and time remaining) are adjustable.

- The pre-warning time must be shorter than the staircase lighting time ($T_{P-W} < T_S$) and the interruption time must be shorter than the pre-warning time ($T_I < T_{P-W}$).
- The set on/off delay times have no effect on the staircase lighting function.
- A timing sequence in progress will be terminated by a device reset (loss and restoration of bus voltage or reprogramming via ETS) or by the use of any function that affects the output (e.g. direct command, forced command, logic function, scene recall), even if the on/off value of the output is not changed by the function used.
- In the event of forced termination of the timing sequence, the output value remains that which was active at the time of termination; this also applies if termination occurs during the warning period.

The following figures illustrate how the *manual switch-off* function works:

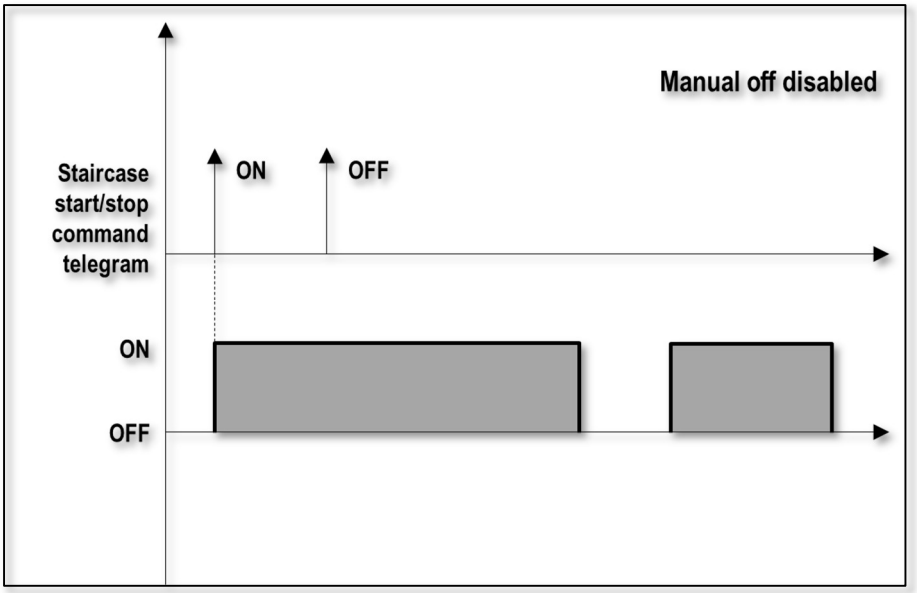


Figure 21 - Manual switch-off function disabled

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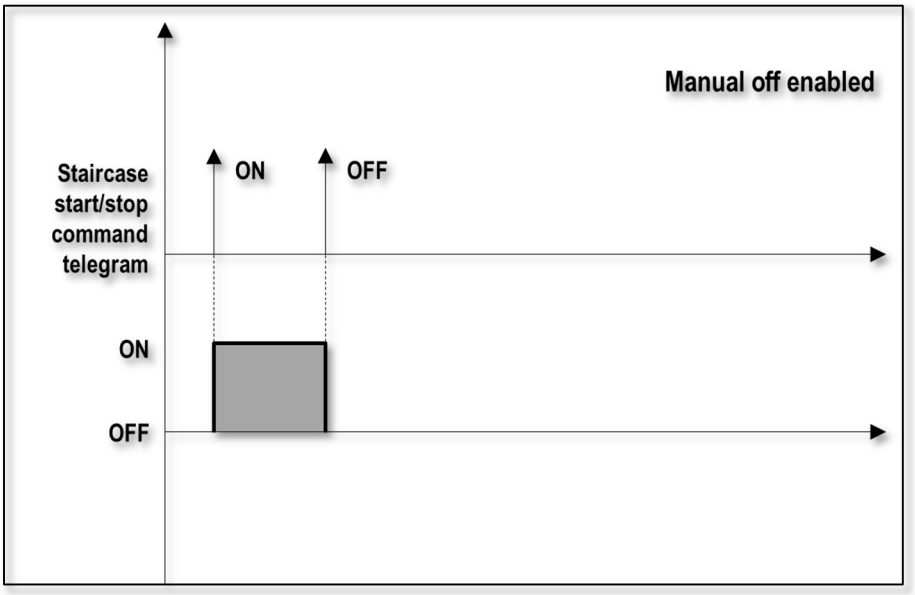


Figure 22 - Manual switch-off function enabled

The following figures illustrate how the *retrigger* function works:

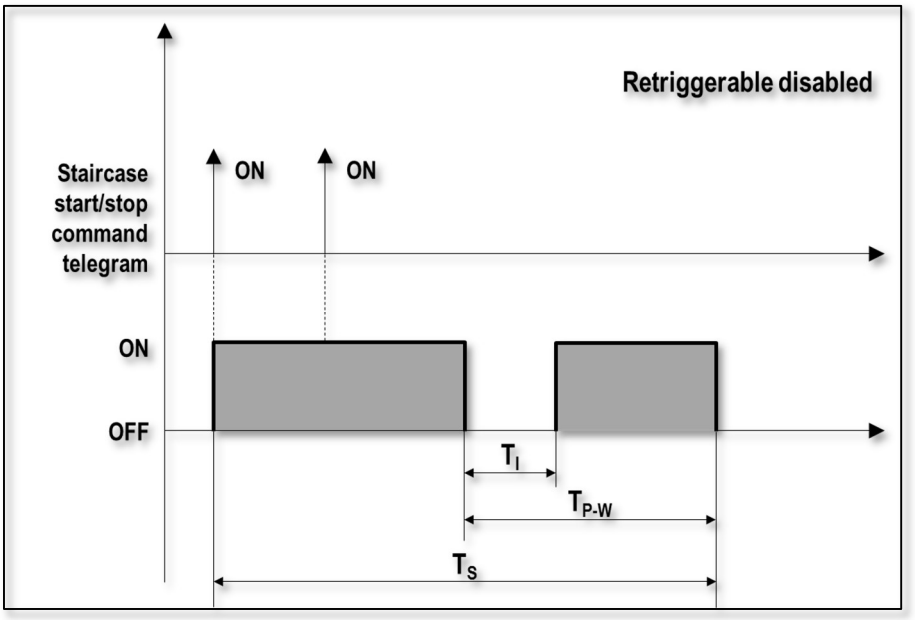


Figure 23 - Retrigger function disabled

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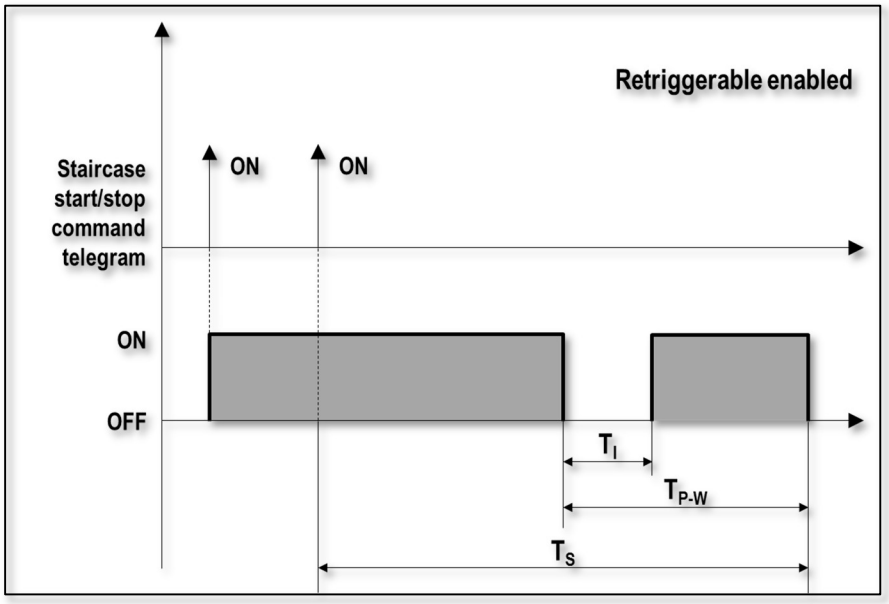


Figure 24 - Retrigger function enabled

The following figures illustrate how the *Pre-warning* function works:

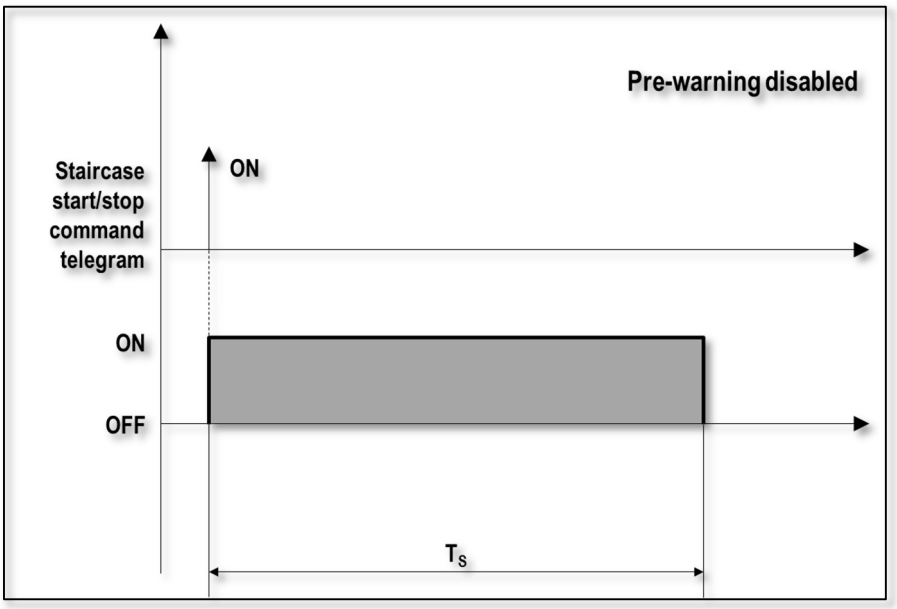


Figure 25 – Pre-warning function (disabled)

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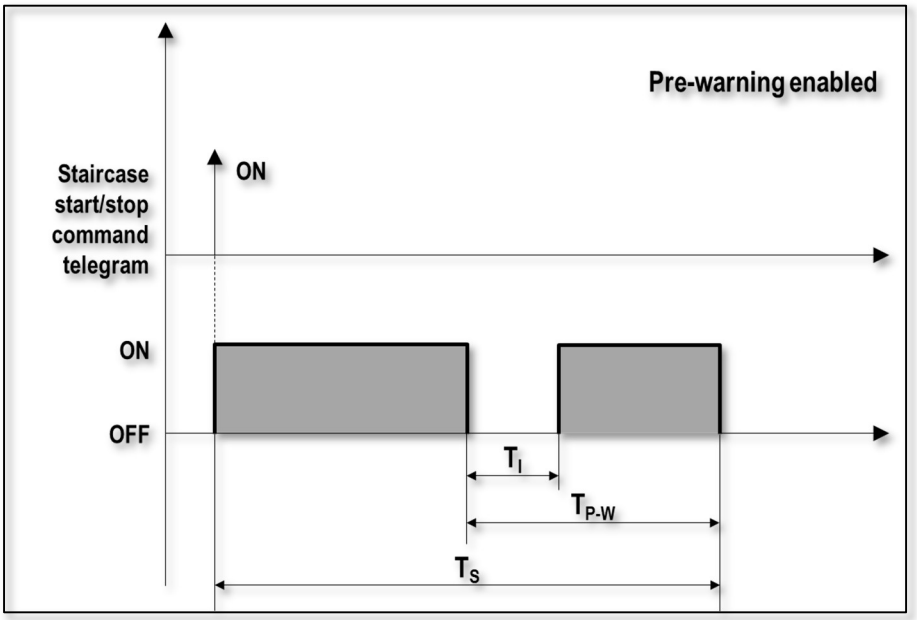


Figure 26 – Pre-warning function (enabled)

8.3.1.5 Valve function

Each output has a *Valve function,* which allows the output to be configured to operate as a 3-way valve with PWM control. The configurable parameters are:

- Valve position after timeout;
- Valve command timeout: once this time has elapsed without any operation being performed, the valve positions itself according to the setting in the previous parameter;
- PWM cycle time (min): this is the period during which the output is held at the ON value for a duration proportional to the value of the control variable
- Minimum valve (control) value (%): allows the PWM cycle to be adapted for use with electrothermal actuators having very long opening times. For control variable values lower than the set value, the NC actuator remains de-energised, whilst the NO actuator remains energised;
- Maximum valve (control) value (%): allows the PWM cycle to be adapted for use with electrothermal actuators having very long opening times. For control variable values higher than the set value, the NC actuator remains energised, whilst the NO actuator remains de-energised.

Note: the minimum and maximum control values are not taken into account if the valve position after timeout is set below or above these values.

8.3.1.6 Lock function

If the lock function is enabled, the activation of a channel can be inhibited via the bus by writing a value to a communication object. The object has the KNX data point type “enable”; it is important to note that the meaning

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of this value when set to On is *"enable* lock", not to be confused with either *"enable lock* function" or *"enable output*".

Furthermore, via a parameter, the meaning of the value can be inverted, so that a value "enable = On" is interpreted as *"disable lock*".

A locked output ignores direct switching commands for the duration of the lock, maintaining (unless other functions intervene) the value in effect at the time the lock was entered. It is possible to assign the output state to a specific value both upon entry into lock and upon release from lock; it is also possible to specify whether the lock state should persist or be reset upon power restoration following a bus voltage loss.

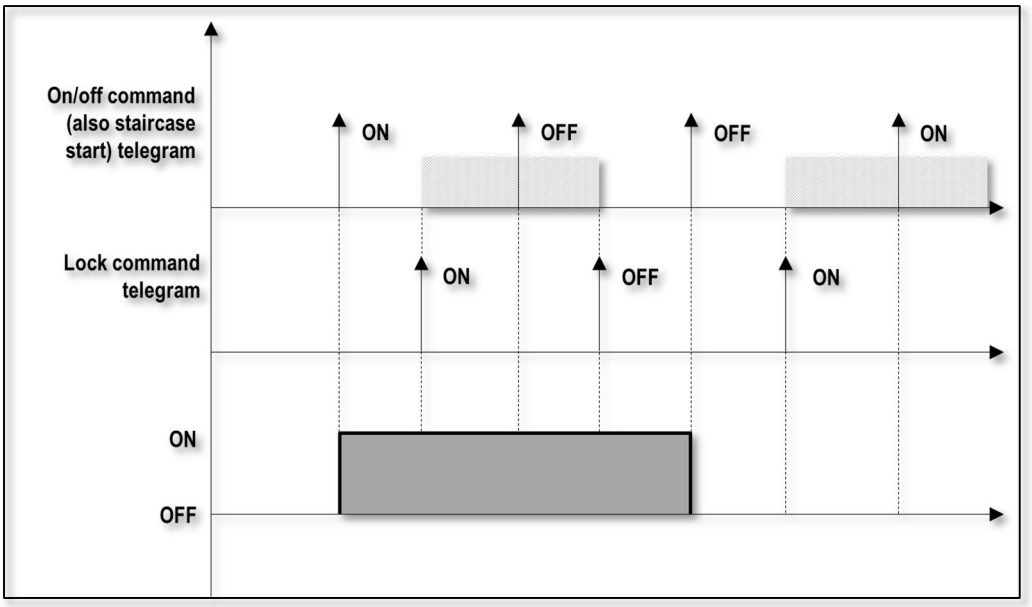


Figure 27 - Lock function

8.3.1.7 Forcing function

The forcing function is very similar to normal direct control of the output, but with the particularity of having priority both over the value set in the "normal" manner and over the value determined by any other function (i.e. logic functions, staircase lighting timers, etc.)

In addition to forcing a desired value, it is possible to set the value that the output must assume both when the forcing is released and when power is restored following a loss of voltage on the bus, should a forcing have been active at the time of the interruption.

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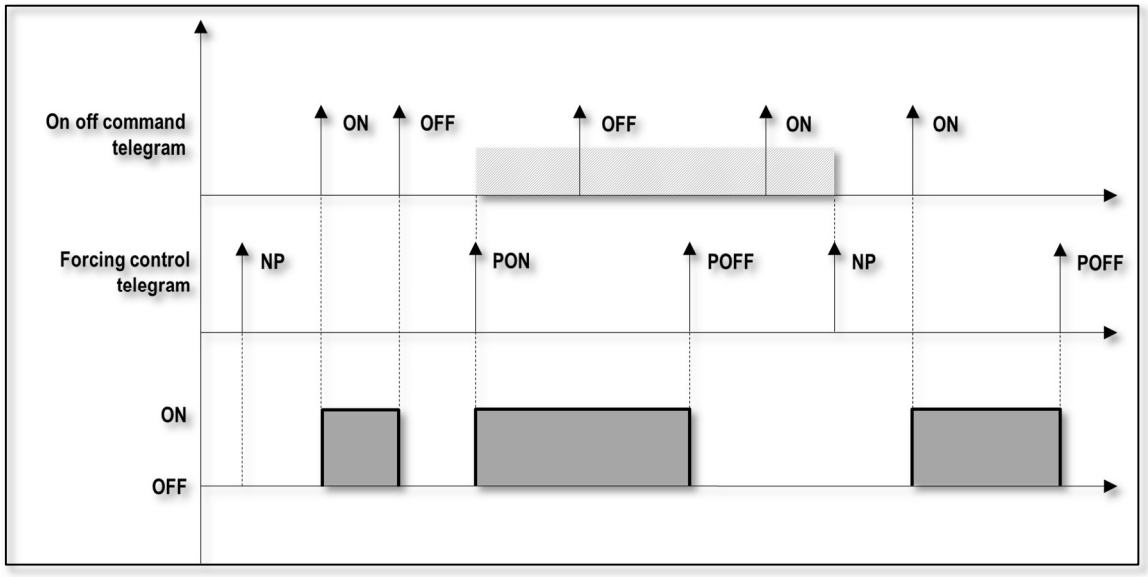


Figure 28 - Forcing function

The lock command takes precedence over the forcing function; this means that an output in a locked state cannot be controlled via the forcing commands.

The KNX forcing command code is a 2-bit value; the *priority* bit determines whether the output is to be overridden, in which case the *value* bit will be assigned to the output itself.

In the figure above, *NP* means that the *priority* bit has a value of 0 (No priority), whilst the codes *PON* and *POFF* indicate output values of 1 and 0 respectively with *priority* = 1.

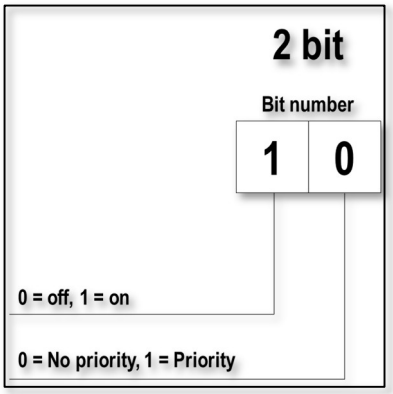


Figure 29 - Forcing command bits

8.3.1.8 Scene Management

Each output can be associated with up to 8 scenario codes; when a scenario with one of these codes is called up by a control device, the output will assume the configured value. It is possible to define an additional delay for the actual activation (or deactivation) of the output relative to the moment the scenario is called up.

The value to be assigned to the output for the scenario can be defined either as fixed (selected during configuration) or reprogrammable via the bus using a *"save scenario"* command.

If the latter option is enabled, when the device receives a save command for a scenario code associated with the output, the current value of the output itself will be stored in association with that scenario. This value will be the one recalled during subsequent activations of the scenario.

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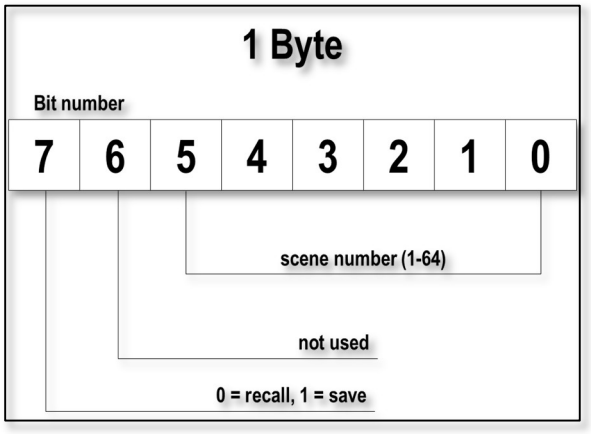


Figure 30 - Scene command codes (save / recall)

8.3.1.9 Operating energy/time counter

Each output can be associated with a counter that accumulates the time the output is in the active (On) state. In terms of communication objects, the counter has the KNX format of an “hour counter”, and is therefore additionally equipped with both an associated reset command and a full-scale alarm (“overflow”); both of these commands consist of further communication objects.

Along with the hour counter, a KNX object of the “energy counter (Wh)” type is created, which also has a communication object with a reset command. A specific parameter allows you to define a conventional value for electrical power in W associated with the load.

Although this is not an actual electrical power measurement, but simply the definition of a proportionality factor between operating time and estimated conventional consumption, this function nevertheless provides a useful rough indication for monitoring consumption, particularly in the case of resistive or fixed-power loads such as lights and many other residential or office appliances.

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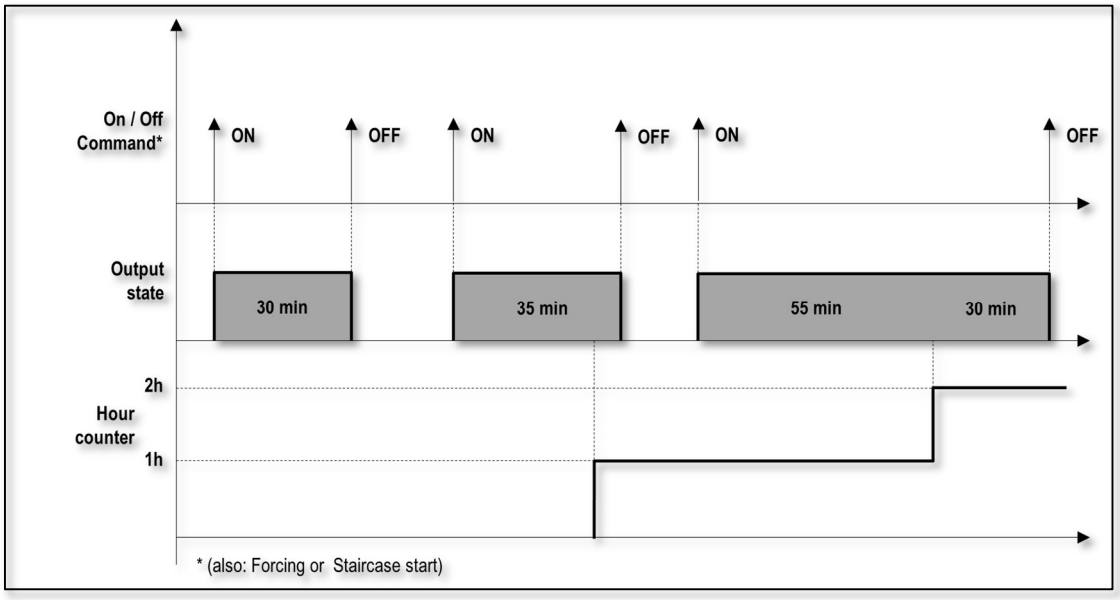


Figure 31 - Operating time and energy meter

8.3.1.10 Output values at bus on in independent mode

As already mentioned, the status of the outputs following certain significant events can be assigned to a value specified during configuration.

The values available for outputs used as independent outputs are:

- On
- Off
- no change
- previous value / state[1]

The difference between “no change” and “previous value/state” is as follows:

- “no change” refers to the state prior to the event itself (e.g. for the “Behaviour at bus on” event, if the output was “off” before the bus was restored, it remains “off” after restoration);
- “previous state” refers to the state prior to the condition terminated by the event (e.g. for the “Behaviour after bus recovery” event of the forcing function, if the output was “off” before the forcing was activated, it remains “off” after the bus failure and recovery, regardless of the forcing).

For further details, refer to the section describing the device settings.

[1] This option is not available for the “Bus on behaviour” event.

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8.3.2 Output functionality in coupled mode

In coupled mode, the output channel can drive three categories of actuators: these are grouped under the names *3-way valve, Shutters and Venetian Blinds.*

All these categories have a similar operating mode, namely moving a mechanical device from one end-of-travel point to another; this can occur in steps, over a full stroke, and possibly with the option to stop the movement at intermediate points. The actuators listed can be viewed, disregarding minor details, as progressively more complex versions of the same basic mechanism; in any case, they are all characterised by two control lines associated with the two directions.

In addition to their main distinctive features, these categories of actuators also share common characteristics, such as lock function, forcing function, meteo alarms and scenario management. Several of these features are entirely analogous to those seen for independent outputs; in such cases, please refer to the relevant sections of the previous paragraph for a description.

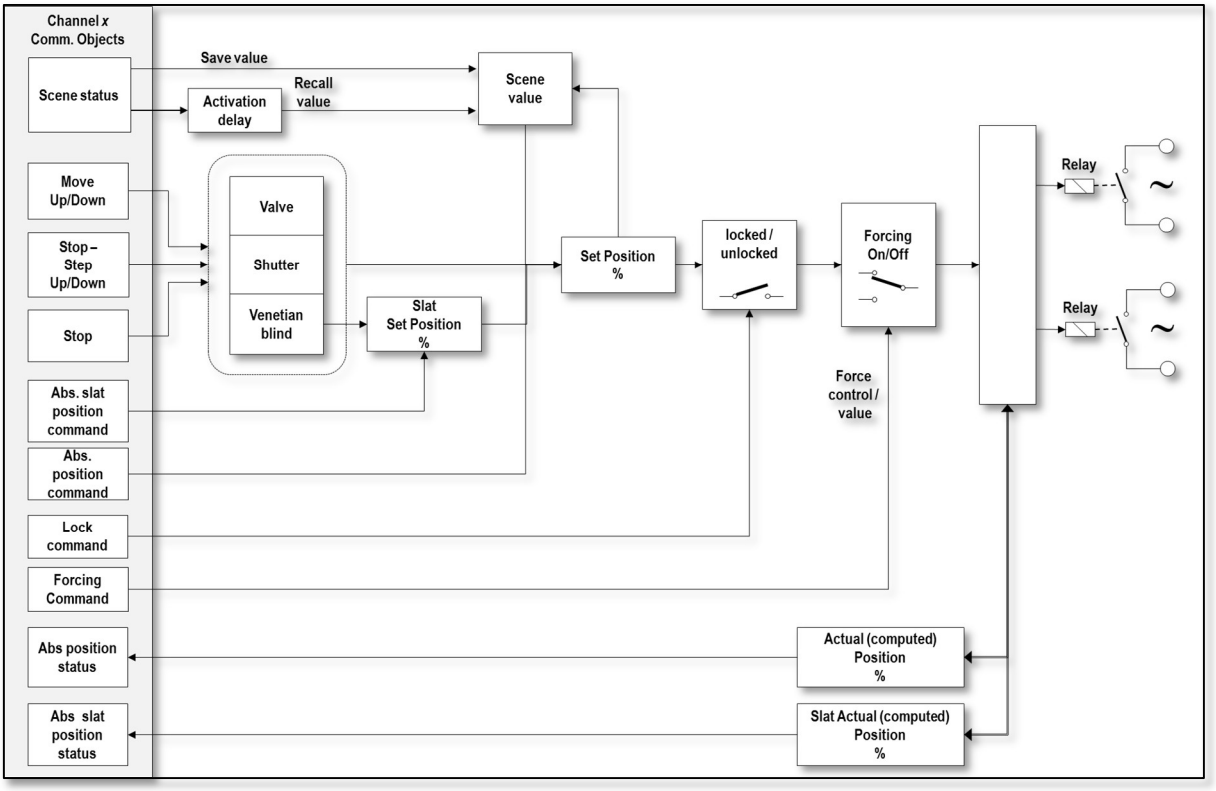


Figure 32 - Functional block diagram – coupled mode

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8.3.2.1 Overview of coupled output control

Coupled-output control is based on three main telegrams, each of which consists of a 1-bit value and can therefore carry two different commands:

Command	Control
Movement Up (open) / Down (close) (only for shutters/ venetian blinds)	When the command is received, the actuator begins to move in the specified direction until it reaches the limit switch.
Dedicated stop	When the telegram is received, the actuator stops any movement and remains in its current position
Stop–Step Up / Down (only for shutters/ venetian blinds)	This command causes a pulsed movement, i.e. in steps. It actually serves two different purposes: • if the actuator is at rest, it behaves similarly to the movement command. Upon receipt, the actuator moves in the specified direction, but only by one step (i.e. a predefined length determined by timing); • if the actuator is in motion, it stops at the current position.

Table 2 - Coupled output control

In most real-world systems, and as defined by KNX standards, the difference between “Movement” and “Step” (apart from the latter’s additional stop function) is merely the duration of the movement: in principle, a “Movement” command is simply a “Step” command whose duration is guaranteed to be sufficiently long to allow the actuator to reach the limit switch in any case.

Viewed from another perspective, the same timing that defines the length of a step in the case of a step command, in the case of a full movement acts as a *timeout* that deactivates the output when it is no longer necessary to drive it (obviously, these intervals are defined by different parameters). In any case, it should be noted that actuators must always be fitted with electrical limit switches to prevent overloads caused by forcing the drive at the extremes of the stroke.

In cases where a movement must be performed to ensure the end of travel is reached, to better characterise the open and close time intervals, it is possible to enable an “extra time” mode, which allows two distinct time intervals to be set:

- Time over full scale when moving up/opening (for the ascent/opening movement);
- Time over full scale when moving down/closing (for the descent/closing movement).

These intervals are to be understood as two additional optional time periods, in addition to the opening/closing times.

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Warning:

Ensure that the motorised system is equipped with adequate limit switches; otherwise, this option could impair operation.

As there is no mechanical *feedback* available to determine the actuator's position, this is determined by timing the movements: given the exact duration of the stroke between the two extremes, a movement expressed as a percentage of the total stroke will correspond, with excellent approximation, to the same percentage of the total stroke time. The device maintains an internal position counter which is resynchronised whenever the actuator is known to reach one of the end positions (following a full-stroke command).

For the timing described above – to be used for controlling the output contacts – to be correct, the total travel time must be measured and set via a parameter.

The above is a basic, general description: actual actuators may not have the same control capabilities (e.g. they may not be able to stop at positions other than the two end positions) or may have additional options and features. These will be explained below in the specific description of the actuator categories.

8.3.2.2 Valve control

Valve control can be configured for 2-way or 3-way actuators.

A 2-way actuator has two control lines, each of which moves the valve to one of the end positions; the movement may not be instantaneous, but no intermediate rest positions are possible.

A 3-way actuator works in much the same way, except that the stroke is gradual (and normally slower); consequently, if both control lines are deactivated whilst the actuator is moving, it will stop in the position it has reached at that moment.

The operating mode of the 3-way actuator is similar to that of a roller shutter (or damper), except that it does not provide an On/Off type open/close command but only an absolute position command. As this operation is described in the next paragraph, only the control for the 2-way actuator is described below.

This control provides the three basic commands already illustrated in the section 8.3.2.1 ; however, the "Stop / Step" command is implemented as required by the KNX specifications, but has no effect as progressive movements are not possible. The "Stop" command also has no real effect on the movement (it merely deactivates both output lines immediately).

The standard method of controlling a 2-way valve therefore requires the use of only the "Movement" command, with one or the other direction specified, to move the valve to its two possible positions.

An additional communication object allows the actuator's movement status to be queried (i.e. it indicates whether the valve is moving or at rest).

8.3.2.3 Shutter control

The shutter control applies exactly in the same way to the valve with a 2-way actuator (independent outputs).

The standard way to control a channel configured as a shutter is therefore as follows:

- send the "Movement" command with the desired direction to set the shutter in motion;

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- allow the shutter to reach its end position (the output will be deactivated once a *timeout* has elapsed) or send a “Stop” or “Stop-Step” command once the shutter has reached the desired position.

To make better use of the intermediate positioning options, the control offers additional ways to specify the actuator’s position:

- the “absolute position” (expressed as a percentage) can be specified; a status feedback value for the current position and a “position reached” telegram are available;
- a “dimmer” type control can be enabled, as shown in the figure below. Please refer to the section describing the parameters for further details.

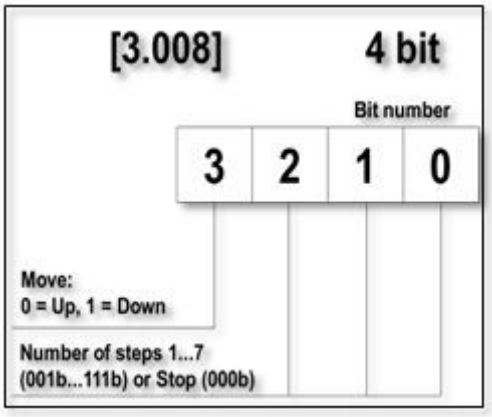


Figure 33 – Shutter control with dimming

As already mentioned, the total travel time must be specified via a parameter; for this purpose, there are two parameters, one for the upward direction and the other for the downward direction. The times are likely to differ in the two cases for mechanical reasons (e.g. heavy roller shutters).

The time to be specified is the actual and precise travel time from one end to the other, which will be used for timing calculations. In cases where a movement must be performed to ensure the end of travel is reached, the full-scale times can be adjusted.

Another parameter that must be defined is the reversal time, i.e. the pause that must elapse between two movement commands in different directions sent in succession. The aim is to allow the shutter to stop and reverse its movement correctly without excessive strain on the mechanical components.

8.3.2.4 Venetian blind control

Venetian blinds differ from shutters in that they have slats, the control of which requires certain additional parameters.

In terms of available commands and parameters, venetian blinds differ from shutters as follows:

- the basic movement of the slats is defined by 3 parameters:
  - Number of slat steps;
  - Opening time of the slat step;
  - Closing time of the slat step.

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A step movement refers to the slats (not to the up/down movement); there is a specific parameter to define the time associated with *the* step (*slat step opening/closing time*), i.e. the activation time of the outputs that causes the movement corresponding to the desired step; this period is repeated a number of times specified by *the number of slat steps* parameter;

- an additional set of communication objects is available for setting and reading the absolute position of the slats, as well as a 'position reached' object;
- a dimmer-type control object can also be enabled for the slats.

For the up/down movement, there are two separate parameters to configure the total travel time. Another internal position counter is also maintained to ensure the best possible positioning performance in this case as well.

In the case of the Venetian blind, an additional parameter called "Restore slat orientation after movement" allows you to choose whether, following an up or down stroke, you wish to restore the same slat angle or position them at the base angle of 0%.

Note: Restoring the slat orientation after movement is not considered in the case of Meteo Alarms.

As with shutters, it is also possible to enable an "extra-time" (full scale) for Venetian blinds, using the same method described in the previous paragraphs.

Standard Venetian blind actuators control both the up/down movement and the slat angle using the same two control lines; to allow the movements to be separated, these are used as described below. Note that this is a description of a basic mechanism (albeit a realistic one) for illustrative purposes; actual actuators may achieve the same functionality using different or more sophisticated mechanical solutions, whilst retaining the same control mechanism.

Let us initially assume that the blind is in the fully closed position (slats included). By activating the opening control line, the motor begins to move the slats to the open position; when they have reached their end of travel, the motor's continued action pulls the blind panel upwards.

If we now imagine stopping the blind halfway through its movement, we end up with a partially open panel and fully open slats; naturally, we could resume the upward movement until it is fully open. However, if we now activate the closing command line, the slats will begin to close first; the panel will not start to move until the slats are fully closed and, in turn, pull the panel downwards.

If the activation time of the closing command line had been short, i.e. not long enough for the slats to reach the fully closed position, we would have ended up with a situation where the panel remained in the same position, but with a different slat opening setting. Furthermore, in this condition, by alternating the activation of the two control lines, the slats can be moved to any intermediate position provided they do not exceed their end-of-travel limit (in which case the panel will begin to move upwards or downwards).

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The following figure illustrates how the blind reacts to a sequence of commands:

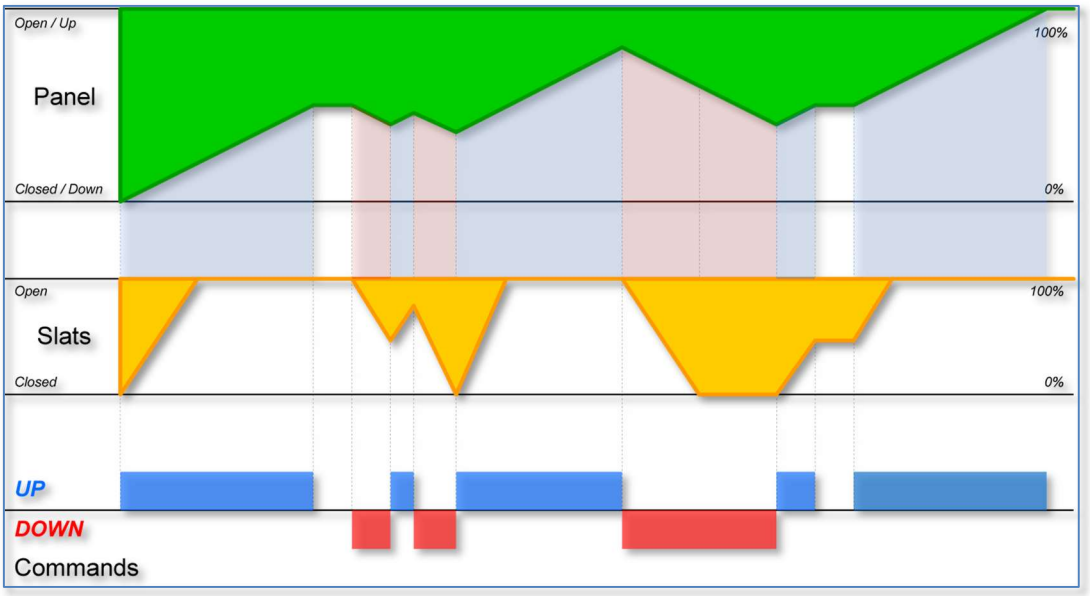


Figure 34 - Venetian blind control diagram

As is evident from the description above, the slats cannot be moved independently of the blind panel; in other words, short control pulses change the orientation of the slats but simultaneously raise or lower the blind by a short distance. To compensate for this effect and achieve a movement of the slats that does not affect the position of the panel (except temporarily), a 'recovery' movement is performed, similar to the backlash compensation mechanism used in the mechanical components of machines.

The mechanism works as illustrated below. Suppose we wish to lower (close) the slats from an initial position of 50% to a position of 70%. Activating the closing control signal for the desired distance would lower the panel by a length L1. The overall movement is therefore corrected as shown in the second part of the figure (shown for clarity starting from the initial position).

The up command is initially activated until the slats are fully open (0%; length L2), and then the movement continues for the additional length L1 to be compensated. At this point, the down command is activated for the time required for the slats to move from 0% to the desired position (70%). The final result is as expected.

All lengths (and the corresponding movement times) are calculated by the device based on the values specified for the full stroke, for both the panel and the slats; both these values must be configured, as accurately as possible, for the specific motorised actuator in use. The compensation mechanism described is managed automatically and therefore requires no intervention or parameterisation by the user or the configuration technician.

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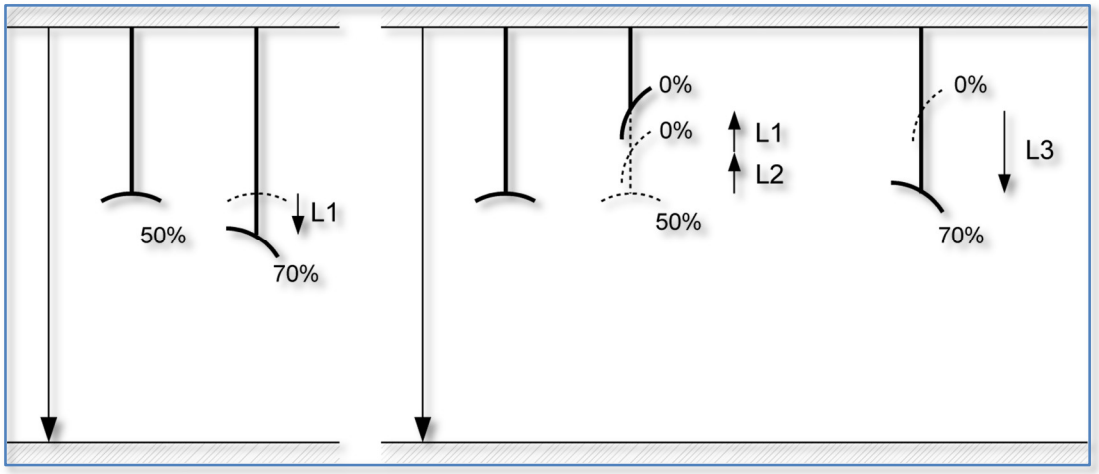


Figure 35 - Movement compensation for slats

Finally, it is possible to enable a parameter to reset the position of the slats, or to leave it unchanged after repositioning, at the end of an upward or downward movement.

Example of use:

- A command is sent to move the blind Down 100% (closed);
- With the blind closed, set the slats to 50%;
- A command is sent to move the blind Up (opening): at this point, the slats are positioned at 0% and the blind rises.

When the blind stops:

- if 'Restore slat position' = Yes, then the slats return to 50%;
- if Restore slat position = No, then the slats remain at 0%.

The following table summarises the communication objects present for the roller shutter or Venetian blind modes, for the output channel.

Mode	Output
Venetian blind	[1.007] Stop – Step Up/Down [1.008] Move Up/Down command [1.017] Dedicated Stop command
Shutters	[1.008] Move Up/Down command [1.017] Dedicated Stop

Table 3 - Communication object for the output configured as venetian blind or shutter

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8.3.2.5 Lock function

The lock function is similar to that for independent outputs; the only significant difference lies in the wider range of values for the actuator position compared to simple binary outputs. Specifically, the possible values include the two end-of-travel positions, an arbitrary programmed position, or the position the actuator held prior to locking, as well as stopping any movement currently in progress.

For further details, please refer to the configuration description section.

8.3.2.6 Forcing function

The forcing function is similar to that for independent outputs; the considerations made above regarding the lock function apply.

8.3.2.7 Scenario management

Scenario management is entirely analogous to the case of independent outputs; the same considerations made above regarding the hold function apply here.

The values that can be assigned to the outputs are specified in terms of damper position; specifically, these include the two end positions of the stroke, a specified intermediate position, or the stop (activating the scenario only interrupts any movements currently in progress).

8.3.2.8 Meteo Alarms

Meteo alarms allow you to define pre-programmed settings in the event of specific weather conditions detected by a weather sensor unit connected to the KNX bus (which must be purchased and installed separately).

Three types of meteo alarms can be managed independently, specifically for wind, frost and rain. The designation is in fact merely descriptive, as these three alarms are perfectly equivalent and could even be used for different types of events.

It is possible to define a specific behaviour for the actuator upon receipt of each of these alarms: movement to the fully closed/lowered position, to the fully open/raised position, or no action. A different behaviour can be associated with the cessation of the alarm (all the previous options, plus a return to the state prior to the alarm).

If more than one alarm is triggered, only the actions corresponding to the first alarm received are executed.

KNX alarms include an optional monitoring function (*heartbeat*), which checks at regular intervals for the receipt of the alarm telegram (whether the alarm is active or not), sent by an external source (e.g. a weather station). The purpose of this function is twofold: on the one hand, it reduces the likelihood that an alarm condition will go undetected in the event of a lost telegram; on the other hand, it confirms that the source is communicating and that no alarm is active if this is the case (alarm telegrams must be transmitted by the source with an ‘alarm inactive’ status).

For each of the three available alarms, a separate timeout can be defined for the *heartbeat* function. When the source sends an alarm telegram (active or inactive), the timeout countdown begins simultaneously. If no alarm information telegram is received within the time interval configured for the timeout, it is assumed that the alarm is active and the actuator is controlled accordingly. In practice, the alarm condition is a logical OR between the “active alarm” condition and the expiry of the timeout.

The *heartbeat* function can, of course, be disabled; note, however, that if it is enabled, the device generating the alarms must be configured to support periodic transmission at intervals compatible with the value chosen for the timeout.

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8.3.2.9 Output restore values in coupled mode

As already mentioned, the state of the outputs following certain significant events (see section 8.3.1.10) can be assigned to a value specified during configuration.

The values available for outputs used in coupled mode are:

- None (remains unchanged)
- Up / Open
- Down / Close
- Move to position

For further details, please refer to the section describing the device settings.

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8.4 Input management (EK-TO2-TP and EK-TI2-TP only)

When an input contact closes, the device sends the telegram (or sequence) associated with it during programming to the KNX bus. This is analogous to pressing a button and can be managed using “on-off” events (where “on” refers to pressing and “off” to releasing) or “long/short press” events (for which a duration value is defined to distinguish between “long” and “short”).

In both cases, a different action can be assigned to each of the two available events, acting on a different variable (in some cases, even more than one; see below for further details).

In the most common case, for example, one input might send an “ON” status telegram for a light point, whilst the adjacent one might send the “OFF” status telegram. Other examples of typical applications include increasing and decreasing the brightness of a lamp controlled by a dimmer unit, or the up/down commands for a roller shutter or motorised blind, and so on.

8.4.1 Types of input

The status of the inputs is determined by the status of the connected physical contacts.

The closure of an input contact can be associated with various effects on a status variable.

Each type of analogue or digital contact on the device can be configured in two ways, so that it can be interfaced with both NO (normally open) and NC (normally closed) contacts

From a logical point of view, these modes alter the interpretation of the ‘active’ and ‘inactive’ states of an input as follows:

- In NO mode, an open connection between the two input terminals (open contact) corresponds to the input’s inactive state, and a closed connection corresponds to the active state; this is obviously the most intuitive mode;
- In NC mode, an open connection between the two input terminals (open contact) corresponds to the active state of the input, whilst a closed connection corresponds to the inactive state.

The two modes are therefore named according to the type of contact that is intended to be connected.

8.4.2 Input events

The device recognises two types of input events (or rather, pairs of events): *“closed/open contact*” and *“short/long press*”.

The first type of event is a simple logical value: “Open” is in this case synonymous with “inactive”, whilst “Closed” is synonymous with “active”.

> *It is essential to note that the terms “OPEN” and “CLOSED”, being common terms used to indicate the states of an input, are to be interpreted from a logical point of view, and must not be confused with the state of the associated physical contact as described in relation to the NO and NC input modes.*
>
> *For example, an NO contact in the active position is electrically and logically “closed”, whilst an NC contact in the active position is electrically “open” but logically “closed”.*

The second type of event that can be detected on an input is “short/long press”. The term “press” refers to user-activated buttons, but the mechanism can obviously be applied to contacts on other devices.

The distinction is as follows:

- if an input remains active for a period shorter than a definable duration, the “short press” event is generated upon release;

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- if the input remains active for longer than the defined duration, the “long press” event is generated when the duration expires. After this point, the input may remain active for any length of time, and no further events will be generated either during the remainder of the activation or upon release (the next event can only be generated following a subsequent activation).

Refer to the timing diagrams in the following figures for an illustration of the differences between the various events; note that in these diagrams, the closing/opening of the electrical contacts at the terminals is shown as the trigger.

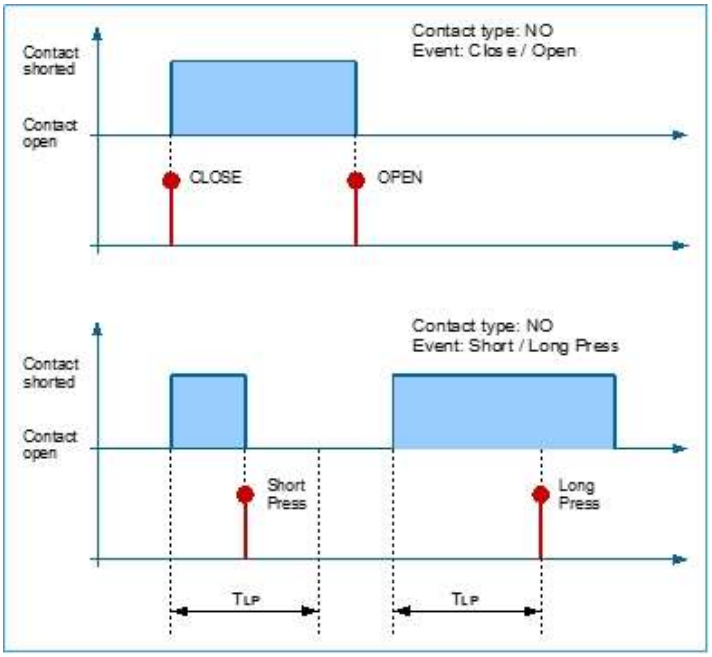


Figure 36 - Timing diagram for NO (Normally Open) mode

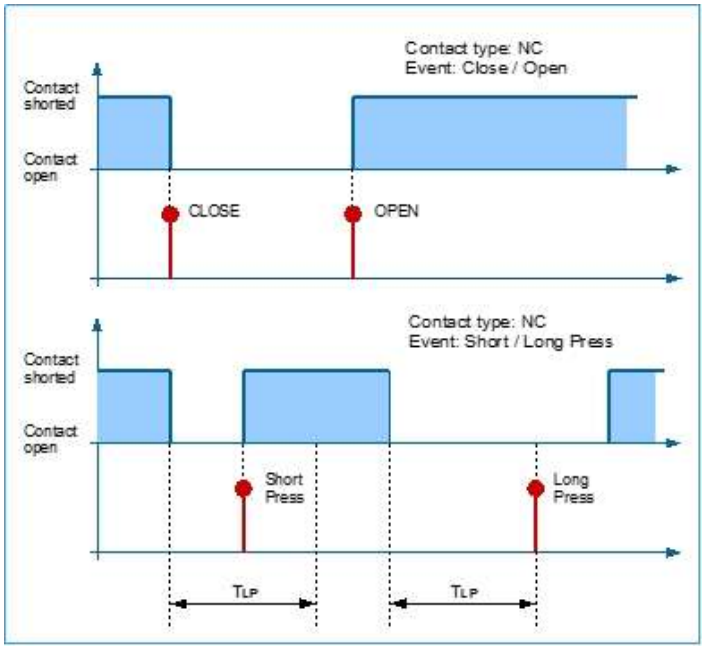


Figure 37 - Timing diagrams for NC (Normally Closed) mode

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8.4.3 Input management

The inputs described can be considered and used as independent; given the physical structure of the device and the nature of the functions it most commonly performs, the inputs can also be coupled:

- In *independent or single* mode, each input operates independently and has its own parameters and communication objects.
- In *couple* mode, two inputs are grouped under the same channel for a common function; consequently, these inputs operate on shared communication objects.

Below is a description of the various functions that can be assigned to the inputs; the *'independent' or 'single'* and *'coupled'* modes have similar functions but differ in terms of configuration, and will therefore be described separately.

Note: in the remainder of this document, as within the application programme, the term 'Channel' will be used to refer to a pair of inputs, for the sake of clarity.

For single (independent) inputs, the term 'inputs' will be used generically.

8.4.3.1 Independent or single input

Each independent input can be configured as normally open (NO) or normally closed (NC).

In addition, an **On/Off Status** communication object is available to send status feedback to the bus. The cycle time for transmitting the object is configurable.

Each independent input can be configured for one of the following functions:

1. Switching

An event (contact closed/open or short/long press) triggers the transmission of a configurable value or sequence of values over the bus. These values can be logical or numerical, with different data types.

A sequence can consist of up to 8 communication objects, each of a different type and value.

Configurable delays can be inserted between the values in the sequence.

2. Dimming

This mode is used in conjunction with KNX dimmer actuators to control lighting fixtures.

The function is activated only by short or long presses.

When pressed shortly, the device sends on/off commands to the dimmer;

When the button is held down, the dimming level is adjusted – either increased or decreased – until the button is released

3. Shutters or Venetian blinds

This mode is used in conjunction with KNX dimming actuators to control motorised roller shutters, blinds or similar devices.

These actuators have functions for opening and closing the shutters; two types of movement can be selected: continuous or step-by-step.

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Following input events, the device sends the appropriate telegrams to the actuator. The configuration parameters are as follows:

- if toggle mode is enabled, the direction of movement is reversed each time a specific input is activated; if it is disabled, the direction is fixed and can be set to “Up/Open” or “Down/Close”;
- If Venetian blind mode is enabled, the device sends an “all up/all down” command when the button is held down, and a “step” command when the button is pressed shortly; if, however, it is disabled, the command for a long press remains the same, but a “stop” command is sent when the button is pressed shortly.

4. Scenario

This mode is used in conjunction with KNX units that support the scene function.

This feature allows you to save and recall a scenario-based communication object; specifically, the device sends a “save” or “recall scenario” command to the actuators in response to a short or long press.

The configuration options are as follows:

- Activate the selected scene with a short press, and save the current configuration as the selected scene with a long press;
- Activate two different scenarios in a toggle mode with a short press.

5. Shift register

Closing the input contact triggers a count, which can be configured in terms of start/stop position, maximum and minimum values, increment/decrement step size and reset.

8.4.3.2 Coupled inputs

A pair of independent inputs can correspond to a coupled input, which can be configured for one of the following functions (only the differences from the independent mode are highlighted):

1. Switching

The pair’s two inputs, which can be configured as normally open (NO) or normally closed (NC), are connected to the same communication object; unlike in single-mode operation, however, the object can only be of the 1-bit (on-off) type, thus constituting a conventional switch.

The user can choose which of the two inputs to assign to the On or Off function.

2. Dimming

The dimming function uses short/long press events on the inputs to activate. The user can configure which of the two inputs corresponds to the “increase” or “decrease” action.

When the input configured as “increase” is shortly pressed, the device sends a “turn on” command; conversely, the “decrease” input sends a “turn off” command.

When the switch is held down, the dimming level increases or decreases until the switch is released.

3. Shutters or Venetian blinds

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The two coupled inputs are assigned opposite, configurable movement directions, i.e. A opens/moves up and B closes/moves down, or vice versa.

It is possible to set the “blind” mode, which works exactly as for independent inputs.

The Scenario function is not available in coupled input mode.

8.4.3.3 Dimmer functionality

The “dimmer” function is an application profile for devices covered by the KNX specifications. These specifications define basic requirements relating to interface mechanisms, in addition to which certain aspects concerning operating modes specific to the device (whether a control device or an actuator) must be considered.

“Dimmer” control is essentially based on a 4-bit communication object whose data has the format shown in the figure:

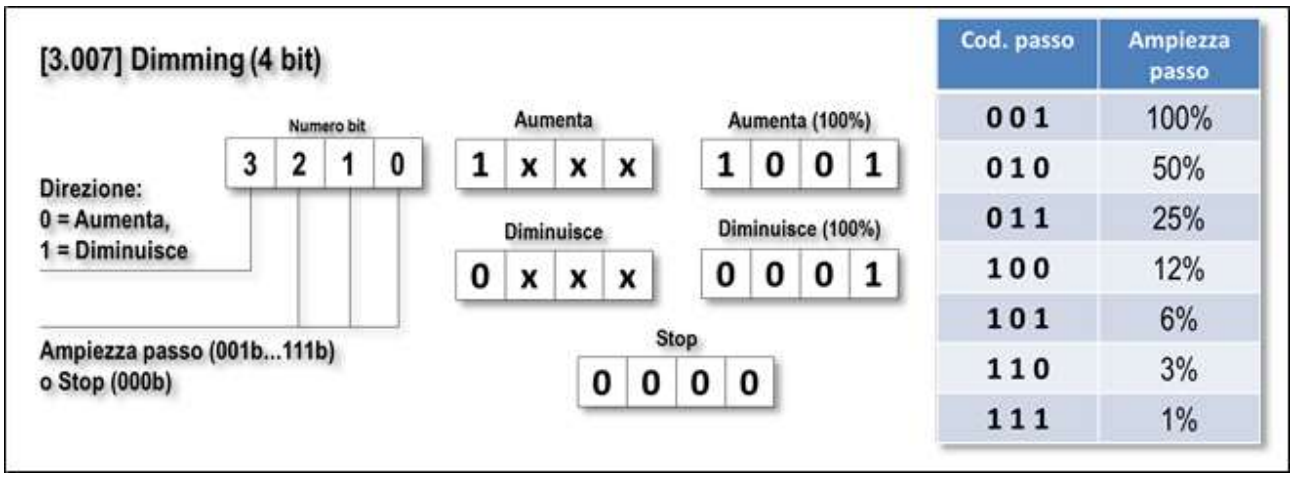


Figure 38 - “Dimmer” communication object

The transmission of telegrams containing data in this format instructs the actuator to increase or decrease the output value by an amount equal to the specified step size, or to halt a change currently in progress.

The increase or decrease in the intensity value by the actuator is not instantaneous but gradual; consequently, an increase/decrease command with an interval equal to the maximum possible range has the effect of initiating the change in intensity in the indicated direction, which will continue until the maximum (or minimum) value is reached. This change can then be stopped, once the desired intensity value has been reached, by sending a “Stop” command.

It is usually possible, and desirable, to be able to switch the load on or off instantly (i.e. to set its intensity instantly to 0% or 100%). To achieve this, a command based on another object, of the “On/Off” type, is used; this is simply the same object used for normal load switching, which is usually present even in the absence of a dimming mechanism.

The control device – in our case, the input unit – will define the operations to generate a sequence of these commands in the correct order and with the appropriate timing to achieve the desired control effect.

The defined operations and their associated commands are as follows:

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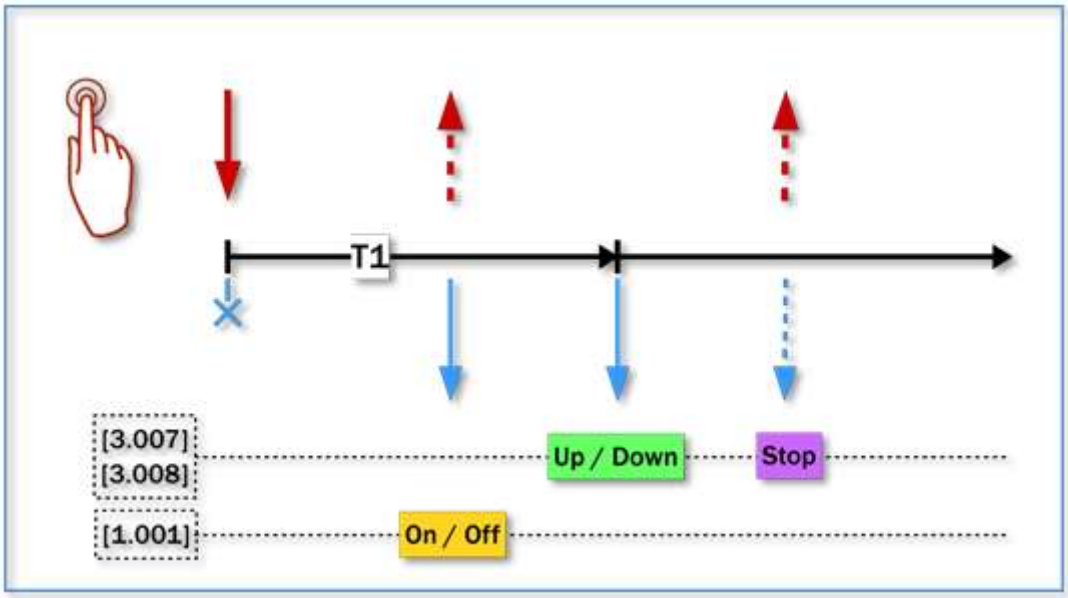


Figure 39 - Dimmer command sequence

- Short contact: instantaneous switch on / off (toggle on / off on a switch object);
- Long press: increase / decrease value until 100% / 0%;
- Release: stop increase / decrease.

Note that the same mechanism can be applied to control shutters or Venetian blinds (where 'maximum/minimum intensity' should be replaced with 'open/close'). For this purpose, there is data type (DPT) 3.008, which has the same structure and values as those just described; to control a shutter in the same way as above, it is therefore possible to connect a type 3.007 communication object on the control side to a type 3.008 object on the actuator side (provided the latter supports this). In this case, obviously, the "On / Off" object, which allows instant switching on / off, is not used.

8.4.3.4 Shutter/blind functionality

The "shutters/blinds" functionality is a set of application profiles for devices covered by the KNX specifications. As with the dimmer function, these specifications define basic requirements relating to interface mechanisms, in addition to which aspects concerning the specific operating modes of the device (control device or actuator) must be considered.

In the case of shutters, the actuator moves a mechanical component gradually from one end position to another, with the option to stop at intermediate points; control is via two lines which, when activated (one at a time), move the actuator in the corresponding direction.

The Venetion blind is essentially a shutter which, in addition to the up/down movement, is also fitted with slats that are opened or closed in the same way as the shutter (gradual movement between the two extremes). The distinctive feature is that normally the movement of the slats and the up/down movement are controlled by the same two lines, so the activation of the electromechanical device must follow specific sequences. For further

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details, please refer to the actuator documentation; here it is sufficient to note that, on the control side, the control sequences can be considered independent of these aspects.

The basic control for a shutter or Venetian blind is essentially based on a set of three communication objects (all 1-bit in size):

- [1.008] Move Up/Down
- [1.007] Stop-step Up/Down – for venetian blind only
- [1.017] Dedicated Stop

The effect of the commands associated with these objects is as follows:

- Upon reception, the “Move” command initiates the shutter’s movement in the specified direction.
- The “Step/Stop” command has two functions: if the shutter is stationary, it takes a step in the indicated direction (the duration is set in the actuator); otherwise, it stops the current movement and does nothing else.
- The “Stop” command only stops the current movement.

Other types of control objects (such as “dimmer”, absolute position, etc.) are also normally available, but they fall outside the scope of basic control via buttons covered in this manual; for further details, please refer to the actuator manuals or the KNX specifications.

In the simplest version, on the control side:

- for controlling a shutter, at least the “Move” and “Stop” objects are required (and present);
- for controlling a venetian blind, on the other hand, at least the “Move” and “Step/Stop” objects are required (and present).

For information, on the actuator side – whether for a shutter or a Venetian blind – the presence of the “Move” and “Step/Stop” objects must be guaranteed, whilst the “Stop” object is optional (but almost always present).

As regards the operations to be performed on the control device – in our case, the input unit – to generate a sequence of these commands in the correct order and with the appropriate timing, there are numerous possible variations.

In the case of ekinex® input devices, two modes are available – labelled “Shutter” and “Venetian blind” depending on their typical application – illustrated in the following figure.

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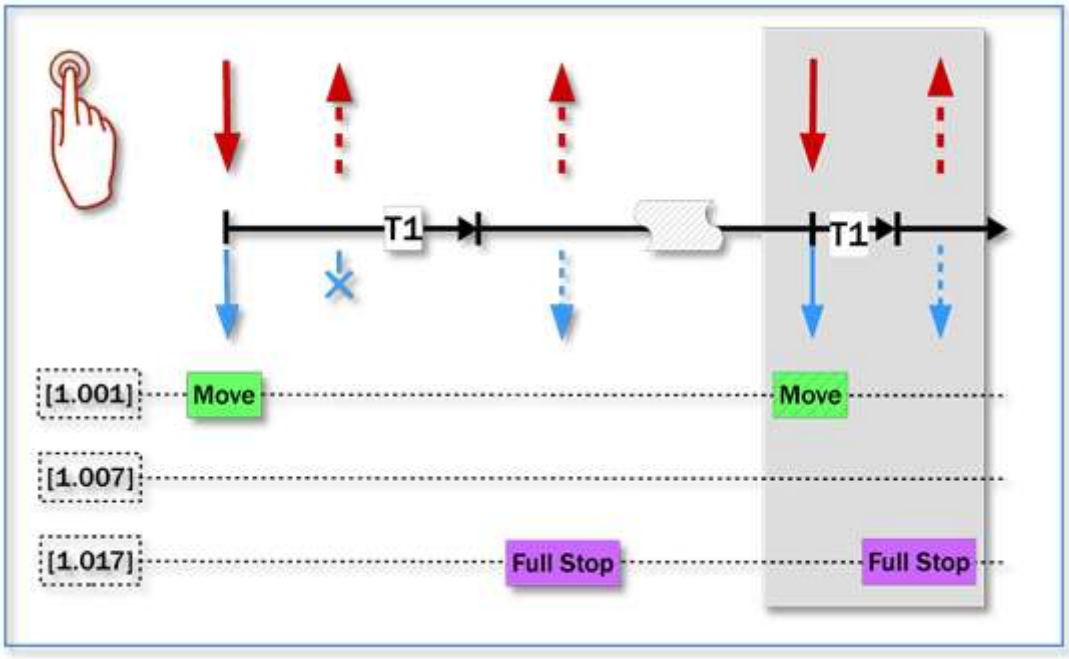


Figure 40 - Command sequence in “Shutter” mode

In “Shutter” mode, when an input contact is closed, the shutter begins to move in the corresponding direction (which can be in either direction if the input is in independent mode and configured as a toggle).

If the contact is released quickly, the shutter will continue its movement until it is fully closed or open; however, it is possible to stop it by holding the contact closed for a longer period.

If, on the other hand, the contact is held closed for a prolonged period, the shutter stops when the contact is released – which will occur at the desired intermediate position.

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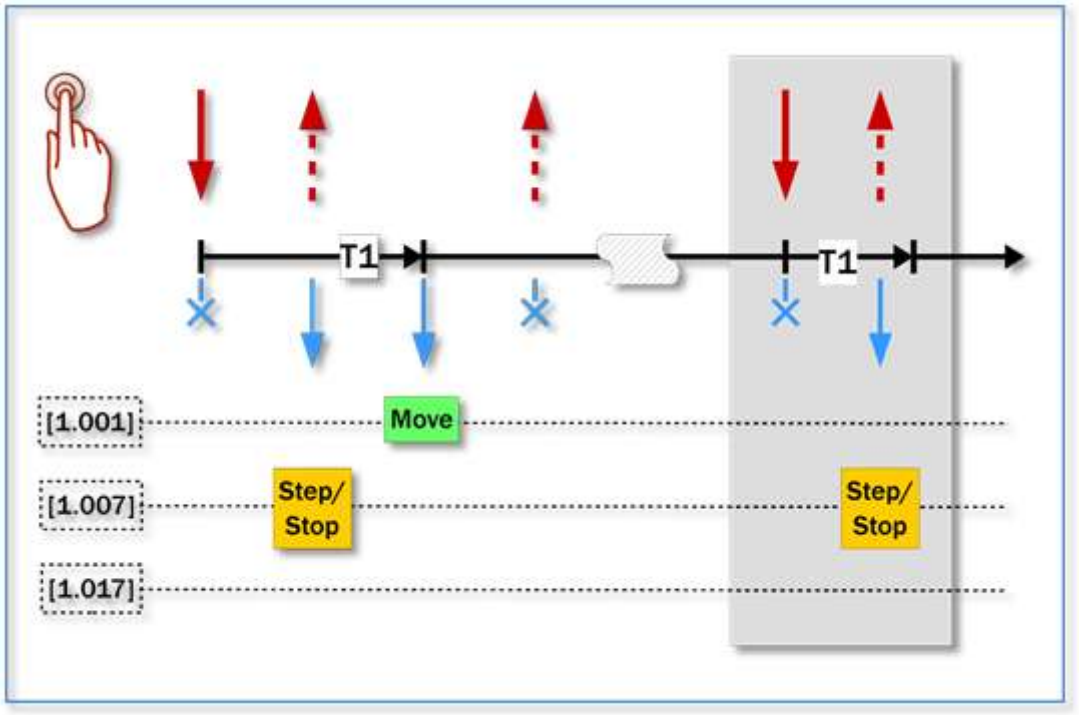


Figure 41 - Command sequence in “Venetian” mode

In “Venetian” mode, when an input is briefly closed (upon release), the shutter performs a single movement; this operation is normally – i.e. if the actuator is actually configured for a Venetian blind – used to adjust the slats.

By keeping the input closed for longer, once the threshold time is reached, a “Move” command is sent, which will move the shutter to the fully closed or fully open position. If you wish to stop it at an intermediate point, simply briefly close the input.

The following table summarises the communication objects present for the roller shutter or Venetian blind modes, for the input channel.

Mode	Input
Venetian blind	[1.007] Stop – Step Up/Down [1.008] Move Up/Down command
Shutters	[1.008] Move Up/Down command [1.017] Dedicated Stop

Table 4 - Communication object for the input configured as venetian blind or shutter

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8.5 Card levels configuration

Card levels are access levels via card, depending on the user's role: Guest, Service, Maintenance, Security, Administrator.

Note: The EK-TD2-TP outside door panel supports only the Guest access level.

For each card level, it is possible to configure the sending of welcome and farewell commands, in the following data formats:

- 1 bit;
- 1 byte (signed or unsigned);
- scenarios;
- HVAC (Auto, Comfort, Standby, Economy, Building Protection);
- Temperature setpoint.

In the case of centralised management, the only level available is the guest level.

If virtual presence is enabled for the desired card level, the welcome message is sent when the door is detected as open; otherwise (virtual presence not enabled), the welcome message is sent following successful card validation.

The goodbye commands are visible if the device is configured as a card holder or if the device is configured as a reader or as a outside door panel and virtual presence is enabled.

For the reader and holder devices, along with card levels, you can set the maximum number of time slots, which can be configured via the Delégo software.

The maximum number of time slots can be configured as follows:

- None;
- Time schedule 1, which may also span multiple days, for example as follows:

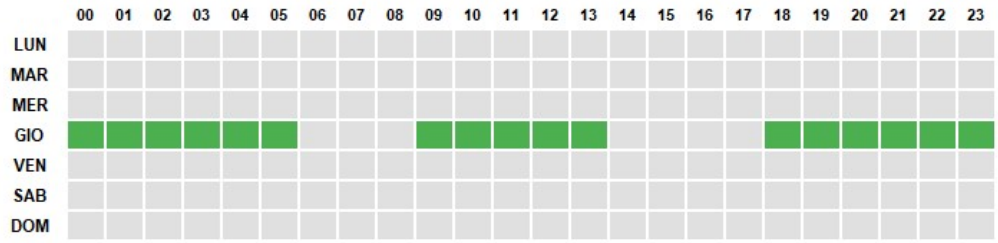


Figure 42 - single time schedule (example 1)

Or the same, but spread over several days, for example:

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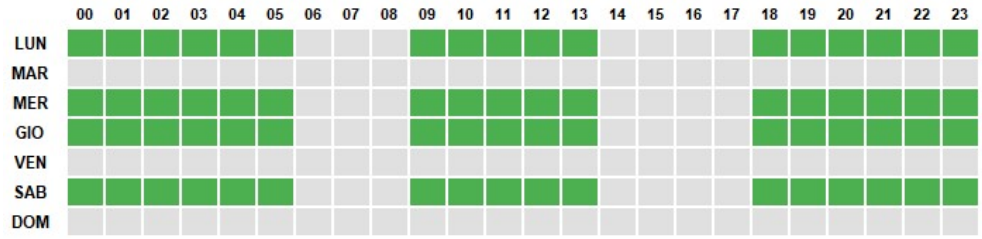


Figure 43 - single time schedule (example 2)

- Time schedule 2, over two days, for example

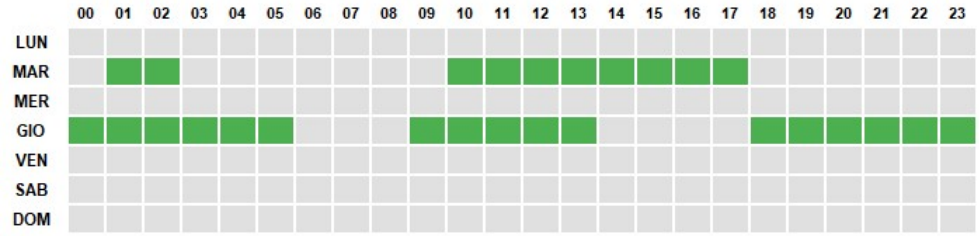


Figure 44 - Time schedule 2 (example 1)

Or

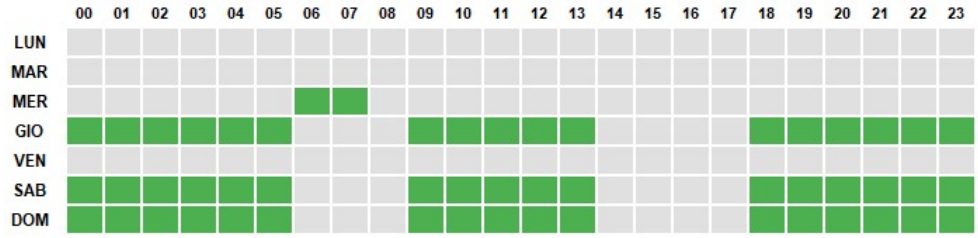


Figure 45 - Time schedule 2 (example 2)

- Time schedule 3, over three days, for example as follows

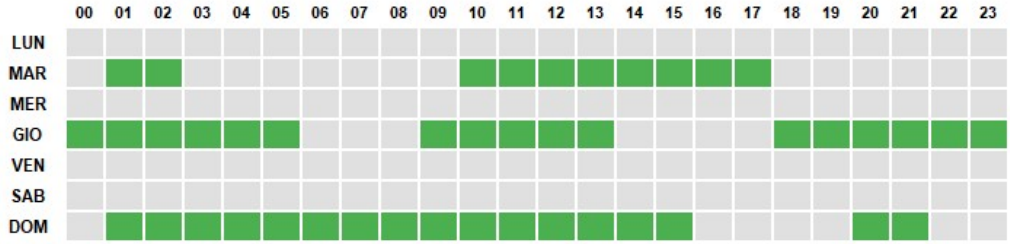


Figure 46 – Time schedule 3

- Daily, if there are more than three time slots, up to 7 (different for each day of the week). For example

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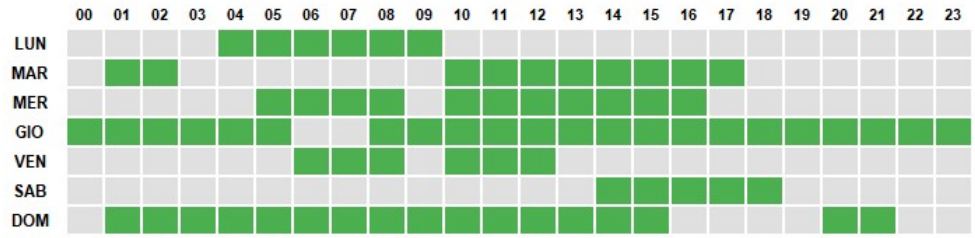


Figure 47 - Daily time schedule

From the ETS library, it is possible to enable support for cards with a 7-Byte UID.

8.6 Presence configuration (EK-TI2-TP only)

If the EK-TI2-TP card holder detects the presence of a card, it sends the “card presence status” communication object to the bus with a value of 1; when the card is removed from the holder, it sends the “card presence status” communication object with a value of 0 after a configurable timeout.

When a card is placed in the slot, in addition to the “card presence status” object, the 4-Byte and 14-Byte “transit data” objects are sent, as is the case in Reader mode.

From the ETS library, you can link card presence detection to the generic LED, thereby selecting the Colors to be displayed when a card is present and when it is not. In this mode, the LED is configured as a “normally open” contact

You can enable authentication via *White-list* to check the validity of the inserted card ID; there are two scenarios:

- *White-list* not enabled: any card is considered valid (and attendance is activated);
- *White-list* enabled: only cards on the list activate presence.

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8.7 Logic module

This module allows the device to be configured to perform logical, comparison or arithmetic operations on communication objects.

A description of the operations for each block is provided below.

8.7.1 Logic functions

The device can condition the state of the outputs by applying a simple logic block.

The direct command can be applied to the input of a block with a logical operation selectable from:

- *OR;*
- *AND;*
- *XOR (Exclusive OR);* the output is ON if the number of inputs set to ON is odd.
- *NOR (Negated OR);*
- *NAND (Negated AND);*
- *XNOR;* the output is ON if the number of inputs at ON is even.
- *IDN (identity operator);* always returns the ON value.

Up to other 8 objects can be provided as inputs to the same block, which are connected to communication objects accessible via bus to other external devices. Each of these objects can be individually applied, if desired, a negation operator that inverts its value.

The input objects are logically combined as in following picture:

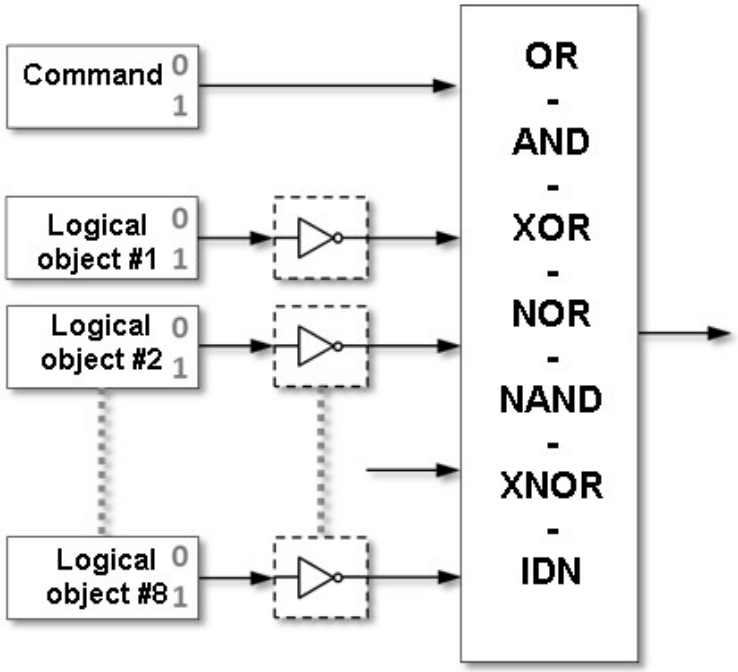


Figure 48 - Logical combination function

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It should be noted that, in this description, the terms 'input' and 'output' refer solely to the logic block; for the purposes of the device's operation, the actual 'inputs' are provided by the communication objects, so the possible activation of inverters must also be taken into account.

This structure also allows for the implementation of logical combinations of moderate complexity; furthermore, greater programmability would have added excessive complexity and would therefore have been beyond the scope of achieving a user-friendly structure.

The following images illustrate the basic logical functions, assuming that the output command and a logical input object are used:

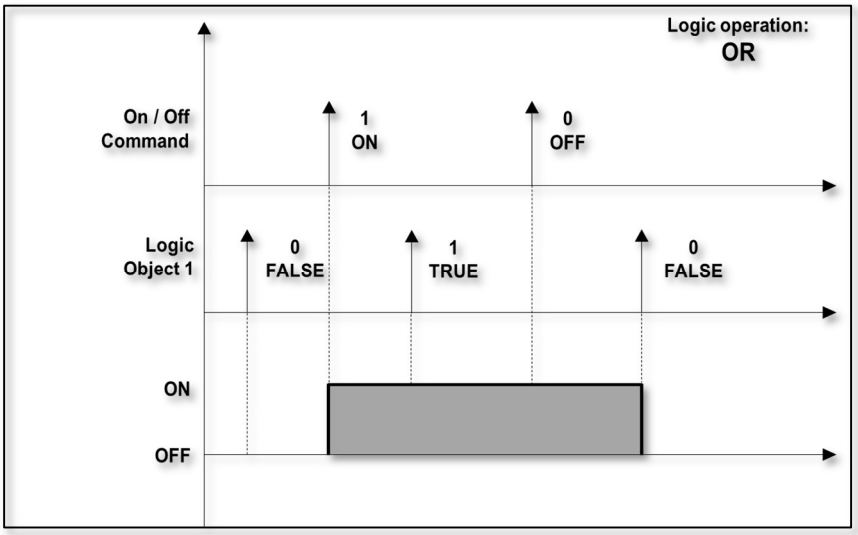


Figure 49 - OR logical function

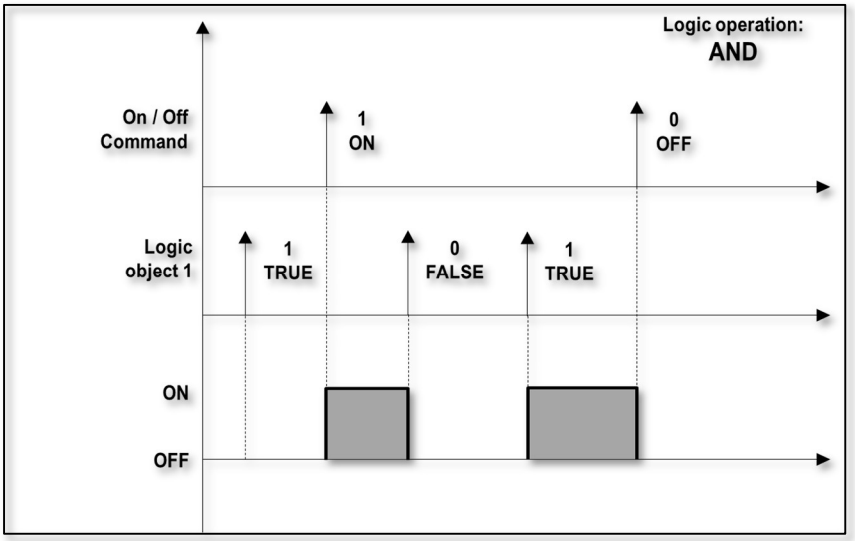


Figure 50 - AND logical function

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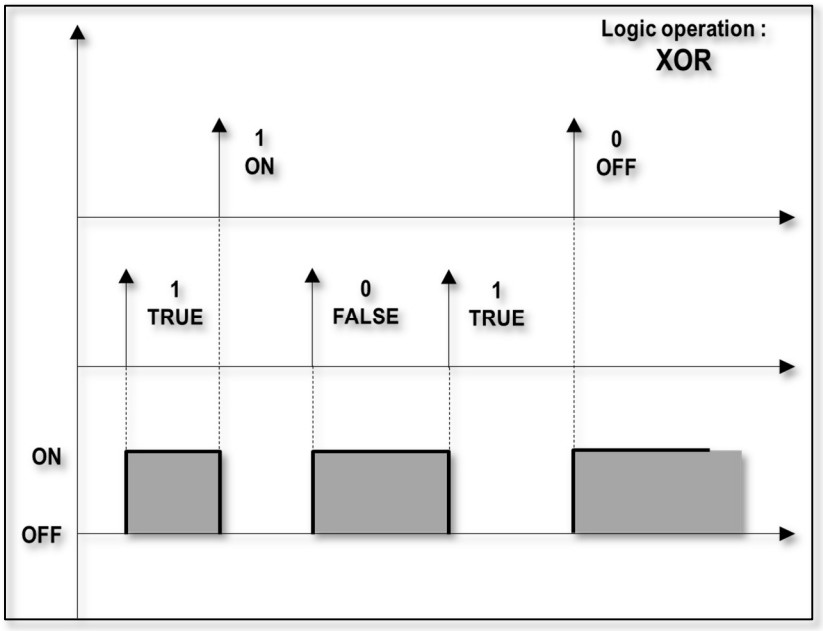


Figure 51 - XOR logical function

8.7.2 Comparison functions

Up to 8 comparison functions are available, allowing two objects with assigned data types to be compared. The result of the operation can be True or False.

The comparison objects can be:

- Communication objects, with the following data types:
  - 1 bit;
  - 2 bits;
  - 1-byte percentage;
  - 1-Byte signed
  - 1-Byte unsigned
  - 2-Byte signed;
  - 2-Byte unsigned;
  - 2-Byte floating;
- Numeric value (only for the second comparison object), expressed as 2-Byte floating point, in the range [-671088,…,670597].

The available comparison operations are:

- Equality;
- Diversity;

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- Minor;
- Greater than;
- Less than or equal to;
- Greater than or equal to.

It is also possible to assign a hysteresis value, expressed as a percentage, for the comparison. This means that the comparison operation is true or false, subject to the assigned hysteresis: for example, the equality comparison between the numerical values 100 and 90, with a hysteresis of 15%, returns the value “True”, because this hysteresis assigns to the value 90 all values between 90±15% = [76.5 ÷ 103.5] and 100.

Note: the hysteresis applies to the second comparison object.

Note: due to limitations imposed by the KNX protocol, for the 2-Byte floating-point data type, values greater than 670100 or less than -670100 are not considered valid. Consequently, the results of operations performed on them are unreliable.

8.7.3 Arithmetic functions

Up to 8 arithmetic functions are available to perform mathematical or statistical operations on a maximum of 8 objects received as input.

The result of the operation is made available in a specific object.

These functions are:

- Minimum
- Maximum
- Average
- Sum
- Difference
- Multiplication
- Division

The available data types, both for individual arithmetic operands and for the result, are as follows:

- 1-bit value
- 2-bit value
- 4-bit value
- 1-Byte percentage

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- 1-Byte signed
- 1 Byte unsigned
- 2-Byte signed
- 2-Byte unsigned
- 2-Byte floating value
- 4-Byte signed
- 4-Byte unsigned
- 4-Byte floating value

Note: the division operation uses only 2 input objects (dividend and divisor)

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8.8 Alarm configuration (for EK-TO2-TP and EK-TI2-TP only)

As regards device-level alarm/fault indicators, the following alarms are available:

- **Relay power supply alarm**: this is always available and allows a communication object to be sent over the bus if a loss of auxiliary power to the output or lock relay is detected.

  In the event of a power supply alarm, the general-purpose LED flashes red at a frequency of 4 Hz.

For the alarms defined below, it is also possible to enable an object to be sent over the bus for signalling.

- **Invalid card alarm**: this is always available for the EK-TO2-TP reader device, whilst for the EK-TI2-TP card holder it is only available if authentication is enabled as a White-list. This alarm indicates if the card is not on the White-list.

  In distributed mode (*White-list*), in addition to the power failure alarm, it is possible to enable or disable alarms related to card reading. The available alarms are:

- **Invalid time alarm**, if the card is included in *the White-list* but the current time does not fall within any time slot;
- **Invalid weekday alarm**, if the card is on *the White-list*, the current time falls within a time slot, but the day of the week is incorrect;
- **Invalid card level alarm**, if the card is on *the White-list,* the time slot and day of the week are correct, but the user role (Guest, Service, Maintenance, Security or Administrator) does not match that stored on *the White-list*;
- **Access counter alarm**: if the card is on *the White-list*, an access limit has been set and this limit has been exceeded.

For all types of alarm, except the relay power supply alarm, certain parameters can be configured:

- Enabling LED feedback;
- Selection of LED Color;
- LED flashing duration;
- Alarm reset following authentication with a valid card, after a preset timeout or via a bus command.

For the EK-TO2-TP reader device only, all alarms except the relay power supply alarm can be reset by swiping a valid card, following the expiry of a timeout, or via the bus, using a communication object.

8.9 LED management

The device features the following LEDs:

- **Ringbell LED** (EK-TO2-TP and EK-TD2-TP only); as explained in the par. 8.2 , the Color can be set (either via a drop-down menu with a Color list or via an RGB Color picker) for the On and Off states independently. Furthermore, the switch-off delay is also configurable.

  When a card is read, the LED flashes in a Color configurable via ETS (green by default) if access is granted, and in red if denied.

- **Generic LED**; this is an RGB signal LED, whose behaviour (Color and flashing) is defined by the value of a communication object. For this object, it is possible to define the data type and up to 10 value thresholds, distinguished by Color and flashing pattern.

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- **DND** (Do Not Disturb) **LED**, for setting the Do Not Disturb message. The Color is steady red and only the switch-off delay can be set.
- **MUR** (room cleaning) **LED**, to indicate the status of the cleaning function (active/inactive). In this case, the Color is steady green and only the switch-off delay can be set.

8.9.1 RGB LED indicators

For both the doorbell LED (where present) and the generic LED, two alternative modes are available for setting the LED Color.

1. Color list

Setting “Color choice = Color list” brings up a drop-down menu with a number of predefined Color shades for selection, as shown inFigure 52 .

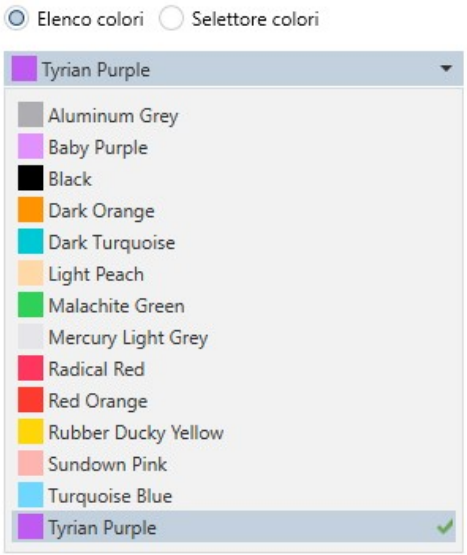


Figure 52 - Color list

2. Color picker

By setting “Color choice = Color picker” and clicking on the symbol  , the Color palette opens:

See the examples inFigure 53 andFigure 54 .

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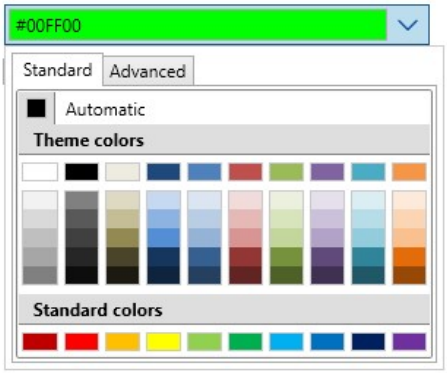


Figure 53 - Standard Color picker

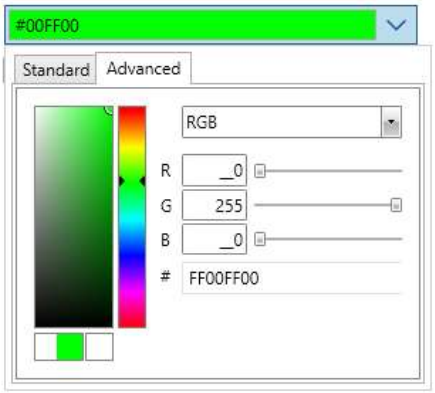


Figure 54 - Advanced Color picker

A Color reference is available at the following link:

https://www.rapidtables.com/web/color/html-color-codes.html

8.9.2 Individual parameters Generic LED

The behaviour of the generic LED can be configured as a state via the bus using thresholds. Up to 10 different events can be associated with the LED's state (Color and flashing).

The type of data to be monitored can be defined as follows:

- 1-bit boolean;
- 2-bit enumerator;
- 1-Byte signed;
- 1-Byte unsigned;
- 2-Byte signed;
- 2-Byte unsigned;
- 2-Byte floating point (float).

In the case of 1-bit and 2-bit variables, the Color will change when the value corresponds to one of the possible values (On/Off or 4 values respectively). In the case of Byte variables, the Color selection will be

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determined by thresholds; this means that when the value received from the bus falls between two thresholds, it will assume the set Color.

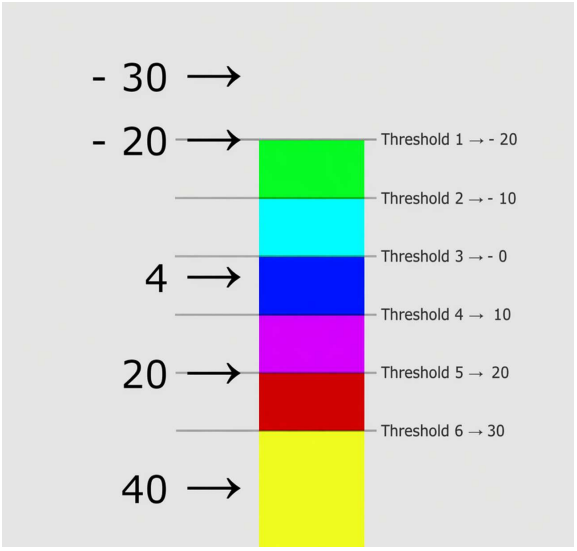


Figure 55 - Example of bus value operation with thresholds for a generic LED

Referring to the diagram inFigure 55 , the Color of the generic LED will vary according to the command value as follows. In the example, we assume a 1-Byte signed data type (i.e. in the range -128…+127) and 6 thresholds, set at -20, -10, 0, 10, 20 and 30 respectively:

- With value = -30, as no threshold covers this value, the LED will be off;
- With value = -20, as threshold 1 is set to -20, the LED will be green;
- At value = 4, threshold 3 is triggered, setting the Color to blue, so the LED will light up blue;
- With a value of 20, threshold 5 takes effect, setting the Color to red, so the LED will light up red;
- At a value of 40, threshold 6 comes into play, which starts at 30 and ends at 127; therefore, the LED Color will be that specified by this threshold (in the example, yellow).

8.9.3 LED configuration for EK-TO2-TP reader and EK-TD2-TP outside door panel

The ETS application must manage 2 fixed-color LEDs (DND, MUR) and two RGB LEDs.

The following table describes the possible configurations:

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Function	Type	Configuration
Generic LED	RGB	• **Bus threshold**: this allows up to 10 different events to be associated with the LED status (Color and flashing). • **24V alarm**: In the event of a 24V power supply alarm, the LED flashes red at a frequency of 4 Hz • **Card read status feedback**: In the event of presence detection.
Button	RGB	**Contact closed**: standard management (the user can choose 2 Colors for the OFF and ON states). When the capacitive button is activated, the LED changes Color. **Card status feedback (for EK-TO2-TP reader only)**: When a card is read, the LED may display different Colors and/or flashing patterns depending on the configuration in ETS E.g.: • Valid card: green + flashing • Invalid card: red + flashing Different Colors can be assigned to different error types, for example: • Time error: steady yellow • Type error: steady orange
DND	Steady red	**Contact closed**: the corresponding CO value determines whether the LED is on or off.
MUR	Steady green	**Contact closed**: the corresponding CO value determines whether the LED is on or off.

Table 5 - LED configuration for EK-TO2-TP and EK-TD2-TP

8.9.4 LED configuration for EK-TI2-TP card holder

The ETS application must manage 2 fixed-Color LEDs (DND, MUR) and two RGB LEDs.

The following table describes the possible configurations:

Function	Type	Configuration
Generic LED	RGB	• **Bus threshold**: this allows up to 10 different events to be associated with the LED status (Color and flashing). • **Contact closed**: the corresponding CO value determines whether the LED is switched on or off. If management via *White-list* is enabled, it may signal an invalid card alarm • **24V alarm**: In the event of a 24V power supply alarm, the LED flashes red at a frequency of 4 Hz • **Card alarm**: if *White-list* management is enabled, the LED displays the configured alarm Color
Button	RGB	**Not present**
DND	Steady Red	**Contact closed**: the corresponding CO value determines whether the LED is on or off.
MUR	Steady Green	**Contact closed**: the corresponding CO value determines whether the LED is on or off.

Table 6 - LED configuration for EK-TI2-TP

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8.10 Authentication strategies (for EK-TO2-TP and EK-TI2-TP only)

The device provides two different strategies for validating RFID cards presented by the user. These strategies differ depending on whether the device is a reader or a card holder.

8.10.1 Strategies for EK-TO2-TP

The reader device's strategies can be of two types:

- **Distributed *(white-list)***: the card is authenticated directly within the device, which checks whether it is present in a list of authorised badges (*white-list*, stored in the device's memory).
  The device manages the addition and removal of a card from *the white list* and also checks compliance with any time-based access restrictions (day of the week and/or time).
  Only cards on the list trigger a presence event. Upon successful verification, the gate is opened (in the case of a reader) or room loads are enabled (in the case of a card holder) according to the ETS application settings.

  In this mode, the card access counter is also managed, with access limited by the number of entries. When adding a card to *the white list*, the supervisor can limit access for that card to a specified number of times; with each access, the application logic decrements this number, invalidating access if the limit is reached and sending the remaining number of accesses with each transmission of the extended transit communication object sent over the bus.

  Furthermore, the device sends a request for the date and time values to the bus cyclically every 10 seconds. Upon receiving each value, the device synchronises with the new time. Synchronisation is required at start-up; therefore, the device will send a synchronisation request to the supervisor.

- **Centralised**: Card authentication takes place in central software (and not in the reader itself) which, upon receiving the "transit" information, sends the device (which has read the card) a status telegram (access granted or denied); upon receiving this (if authorised), the gate opens (in the case of the reader) according to the ETS application settings.

8.10.2 Strategies for EK-TI2-TP

There are two types of strategies for the card holder device:

- **Distributed *(white-list)***: defined as in the previous paragraph. The only difference compared to the reader is that, following successful verification of the inserted card, the room's loads are enabled, based on the settings defined by the ETS application.
- **Disabled**: any card is considered valid.

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9. Application software for ETS

This section of the manual lists all the parameters that can be configured via ETS and describes the relevant communication objects.



The parameter values shown in bold are the *default* values.

The description of the parameters is divided into the following sections:

- **About**: general information about the ETS application;
- **General**: general device parameters (device type selection, LED brightness, etc.);
- **Outputs**: general output parameters (for EK-TO2-TP and EK-TI2-TP only);
- **Inputs**: parameters relating to the inputs (for EK-TO2-TP and EK-TI2-TP only);
- **LED**: parameters for configuring the LEDs;
- **Alarms**: parameters relating to power supply alarms and incorrect card authentication (for EK-TO2-TP and EK-TI2-TP only);
- **Card levels**: parameters defining card user levels and the commands to be executed following authentication;
- **Logic functions**: for defining boolean functions;
- **Comparison functions**: parameters for defining comparison functions between objects and/or numerical values;
- **Arithmetic functions**: parameters for defining arithmetic operations.

The device parameters are divided into general parameters and specific parameters, grouped into tabs. In Figure 56 , the tree structure of the application program, including its main tabs, is shown for the version with the most extensive feature set.

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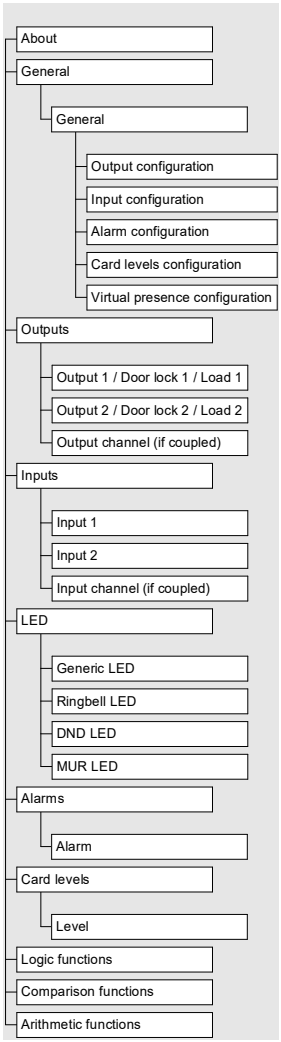


Figure 56 - ETS application parameter structure

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9.1 About

The ***About*** tab is for information purposes only and does not contain any parameters to be set. The information displayed is:

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Application software for ETS5 and ETS6
Version 1.00 (or later)
EK-TX2-TP

EKINEX S.p.A.
Via Novara, 37
I-28010 Vaprio d'Agogna (NO) Italy
www.ekinex.com
info@ekinex.com

9.2 General

This tab allows you to set the following parameters:

- Product type
- Doorbell button (EK-TO2-TP and EK-TD2-TP only)
- Virtual presence (EK-TO2-TP and EK-TD2-TP only)
- Authentication (EK-TO2-TP and EK-TI2-TP only)
- Date and time format (EK-TO2-TP and EK-TI2-TP only)
- Heartbeat
- Heartbeat value
- Heartbeat interval
- Demo mode
- LED intensity value from the bus
- LED intensity value
- Night mode
- Night brightness
- Enable logic module
- Number of logic functions
- Number of comparison functions
- Number of arithmetic functions

9.2.1.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Product type	-	--- EK-TO2-TP (card reader) EK-TI2-TP (card holder) EK-TD2-TP (door panel)

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Parameter name	*Conditions*	*Values*
	Allows you to select the type of device: card reader, card holder or outside door panel.	
Ring button	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (door panel)	Disabled **Enabled**
	Enables or disables the doorbell button function and its associated status object. Sends a telegram on the bus via the appropriate group object when pressed. The button is only active if DND mode is disabled.	
Virtual presence	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (door panel)	
	Enables virtual presence management.	
Authentication	Product type = EK-TO2-TP (card reader)	**Distributed (White-List)** Centralised
	Allows you to select the desired authentication type.	
Authentication	Product type = EK-TI2-TP (card holder)	**White-list** Disabled
	Allows you to choose whether or not to enable authentication (distributed type only).	
Date and time format	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list)	**Date/time (DPT 19.001)** Separated date and time (DPT 11.001 10.001)
	Allows you to choose the date-time format (single or double DataPoint)	
Heartbeat	Product type = any	**Disabled** Periodic Request
	Sets the function for the device to send a "keep-alive" signal on the bus.	
Value	Heartbeat = periodic	**On** Off Toggle
	Type of signal sent by the heartbeat function (On, Off, or On/Off alternately).	
Period	Heartbeat = periodic	**00:01:00 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Interval for cyclic transmission of the heartbeat signal.	
Demo mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder)	**Disabled** Enabled
	Enables or disables the Demo function for validating RFID cards.	
LED intensity value from bus	Product type = any	**No** Yes
	Allows you to select the LED brightness with a fixed value set via ETS or configurable via the bus. If the selection is "no", a fixed LED brightness value can be specified manually via the sub-parameter "LED brightness value".	
LED intensity value	LED intensity value from bus = No	0 … 100 [**50**]
	Sets the fixed value via ETS for the LED brightness.	
Night mode	Product type = any	**Disabled** Enabled
	Enables the night mode function.	
Brightness night	Night mode = enabled	0 … 100 [**50**]
	Allows you to select the brightness of the LEDs when the night mode is active.	

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Parameter name	*Conditions*	*Values*
Enable logic module	-	**disabled** enabled
	Enables or disables the section for logic functions.	
Number of logic functions	Enable logic module = enabled	0…8
	Set the number of logic functions to enable.	
Number of comparison functions	Enable logic module = enabled	0…8
	Set the number of comparison functions to enable.	
Number of arithmetic functions	Enable logic module = enabled	0…8
	Set the number of arithmetic functions to enable.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
Heartbeat command	Heartbeat = request or periodic	1 bit	C-W--	[1.001] Switch	2
Heartbeat	Heartbeat = request or periodic	1 bit	CR-T-	[1.001] Switch	3
Card transit data	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder)	4 Bytes	CR-T-	[15,000] entrance access	4
Card extended transit data	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder)	14 Bytes	CR-T-	[16,000] Character String (ASCII)	5
Valid access	Product type = EK-TD2-TP (door panel)	1 bit	C-W--	[1.002] Boolean	7
Date-time	Authentication = distributed (White-list) Date and time format = Date/Time [DPT 19.001]	8 Bytes	C-WTU	[19.001] Date time	8
Date	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = distributed (White-list) Date and time format = Separated date and time [DPT 11.001 10.001]	3 Bytes	C-WTU	[11.001] Date	8

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
Time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = distributed (White-list) Date and time format = Separated date and time [DPT 11.001 10.001]	3 Bytes	C-WTU	[10.001] Time of day	9
White-list	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = distributed (White-list)	14 Bytes	C-W--	[16,000] Character String (ASCII)	11
Device status info	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder)	14 Bytes	CR-T-	[16,000] Character String (ASCII)	12
DND LED command (Do not disturb)	Product type = any	1 bit	C-W--	[1.003] Enable	13
MUR LED command (Make up room)	Product type = any	1 bit	C-W--	[1.003] Enable	14
DND LED status (Do not disturb)	Product type = any	1 bit	CR-T-	[1.003] Enable	15
MUR LED status (Make up room)	Product type = any	1 bit	CR-T-	[1.003] Enable	16
LED brightness command	Product type = any LED intensity value from bus = No	1 Byte	C-W--	[5.001] percentage	17
Access granted	Product type = EK-TO2-TP (card reader) Authentication = centralised	1 bit	C-W--	[1.005] Alarm	19
Access denied	Product type = EK-TO2-TP (card reader) Authentication = centralised	1 bit	C-W--	[1.005] Alarm	20
Technical alarm command	Product type = any	1 bit	C-W--	[1.005] Alarm	21
Night mode LED enable command	Product type = any Night mode = enabled	1 bit	C-W--	[1.003] Enable	33
Night mode LED brightness value command	Product type = any Night mode = enabled	1 Byte	C-W--	[5.001] Percentage (0…100%)	34

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Object name	Conditions	Dim.	Flags	DPT	No. of objects
Doorbell button status	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (door panel)	1 bit	CR-T-	[1.001] Switch	35
Card presence status	Product type = EK-TI2-TP (card holder)	1 bit	CR-T-	[1.002] Boolean	36
Generic LED – Command *[type]*	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (door panel) or EK-TI2-TP (card holder) and Presence LED = No	*depending on the configuration* (**1-bit**)	C-W--	*depending on configuration* (**[1.001] switch**)	132
	For the values of the [type] parameter, see Table 11.				

9.3 Output configuration (for EK-TO2-TP and EK-TI2-TP only)

The *Output Configuration* tab is located under the *General* menu and allows you to set the parameters for managing the output contacts.

If the output channel is configured as “independent or single”, then the tab contains the following parameters:

- Output 1
- Output 2

If, on the other hand, it is configured as “3-way valve / shutter / Venetian blind”, then it contains the parameter

- Use

9.3.1.1 Parameters

Parameter name	Conditions	Values
Output 1	Product type = EK-TO2-TP (card reader) Output channel = independent or single	Disabled Enabled **Lock**
	Allows you to select the function of Output 1; in the case of the EK-TO2-TP reader, this determines whether the output channel is configured as independent or single.	
Output 1	Product type = EK-TI2-TP (card holder) Output channel = independent or single	Disabled Enabled **Load**
	Allows you to select the function of Output 1 for the EK-TI2-TP card holder, depending on whether the output channel is configured as independent or single.	
Output 2	Product type = EK-TO2-TP (card reader) Output channel = independent or single	Disabled **Enabled** Copy from output 1 Lock
	Allows you to select the function of Output 2; in the case of the EK-TO2-TP reader, this applies if the output channel is configured as independent or single.	

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Parameter name	*Conditions*	*Values*
Output 2	Product type = EK-TI2-TP (card holder) Output channel = independent or single	Disabled **Enabled** Copy from output 1 Load
	Allows you to select the function of Output 2, in the case of the EK-TI2-TP card holder, depending on whether the output channel is configured as independent or single.	
Use	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind	**Valve** Shutter Venetian blind
	Allows you to select the use of the coupled output channel, if configured as 3-way valve / shutter / Venetian blind.	

9.3.2 Output n

The *Output n (n=1,2)* tab is located within the *Outputs* tab, if the output channel is configured as independent or single; at least one of the outputs must be configured as **enabled** in the *Output Configuration* tab.

It contains the following parameters:

- Relay operation
- Behaviour at bus on
- Status feedback telegram
- Transmission cycle time
- Delay after bus recovery
- Valve function
- ON delay time
- OFF delay time
- Staircase function
- Lock function
- Forcing operation
- Scenes function
- Operating energy/time counter

9.3.2.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Relay operation	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	**Not inverted** Inverted
	Determines whether the relay should be operated normally or inverted.	

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Parameter name	*Conditions*	*Values*
Behaviour at bus on	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	Off On **No change**
	Defines the behaviour of the output when the bus is restored.	
Status feedback telegram	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	Disabled **Enabled**
	Enables or disables transmission of the status of the corresponding output to the relevant group object.	
Transmission cycle time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Status feedback telegram = enabled	**00:00:00 hh:mm:ss** [range 00:00:00 … 04:39:37]
	If the status feedback telegram is enabled, it allows you to set up periodic transmission; the value 0 implies no periodic transmission. *The value 00:00:00 indicates that transmission does not occur periodically, but only when the status changes.*	
Delay after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	00:00:00.00…04:39:37.21 hh:mm:ss.ff (**3 s**)
	Time, starting from bus reset, after which status feedback telegrams may begin to be transmitted. *The delay has no effect on the behaviour of the outputs, but only affects the transmission of the telegrams. The outputs can therefore be activated during the delay time.* *Telegram transmission is not delayed but inhibited; therefore, no status feedback is generated for any switching operations that occur during the delay time.*	
Valve function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	**disabled** enabled
	Enables the valve function on the independent output.	
Valve position after timeout	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Valve function = enabled	0…100% (**50%**)
	Indicates the valve position, as a percentage of the stroke, when there is no command update and the timeout is reached.	
Valve command timeout	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Valve function = enabled	hh:mm:ss:ff **00:01:00:00** [other values in the range 00:00:00…04:39:37:21]
	Sets the timeout after which the valve is no longer controlled, unless other commands are received.	
PWM cycle time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Valve function = enabled	hh:mm:ss **00:01:00** [other values in the range 00:01:00…04:39:37]

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Parameter name	*Conditions*	*Values*
	Allows you to set the period during which the output is held at the ON value for a time proportional to the value of the control variable.	
Minimum valve value	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Valve function = enabled	**0 %** [other values in the range 0 %…30 %]
	Allows the PWM cycle to be adapted for use with electrothermal actuators with very long opening times. For control variable values lower than the set value, the NC actuator remains unpowered, the NO actuator remains powered. *The set value does not affect the valve position after a timeout.*	
Maximum valve value	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Valve function = enabled	**100 %** [other values in the range 70%…100%]
	Allows the PWM cycle to be adapted for use with electrothermal actuators with very long opening times. For control variable values higher than the set value, the NC actuator remains energised; the NO actuator remains de-energised. *The set value does not affect the valve position after timeout.*	
ON delay time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Valve function = disabled	**00:00:00.00 hh:mm:ss.ff** [range 00:00:00.00 … 04:39:37.21]
	Sets the activation delay, if any, relative to the receipt of the command from the bus.	
OFF delay time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2) Valve function = disabled	**00:00:02.00 hh:mm:ss.ff** [range 00:00:00.00 … 04:39:37.21]
	Sets the delay, if any, before deactivation, relative to the receipt of the command from the bus.	
Staircase function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	**disabled** enabled
	Enables or disables the staircase lighting function. For further details and descriptions of the parameters, see the relevant section (par. 8.3.1.4)	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	**disabled** enabled
	Enables or disables the ability to lock the input via a remote command. For further details and descriptions of the parameters, see the relevant section (par. 8.3.1.6).	
Forcing operation	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	**disabled** enabled
	Enables or disables the ability to force the input, i.e. the ability to force a value on the output with priority over other functions. *For further details and descriptions of the parameters, see the relevant section (par. 8.3.1.7).*	

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Parameter name	*Conditions*	*Values*
Scenes function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	**disabled** enabled
	Enables or disables the Scenarios function. *For further details and descriptions of the parameters, see the relevant section (par. 8.3.1.8).*	
Operating energy/time counter	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output n = enabled (n=1,2)	**disabled** enabled
	Enables or disables the Hour Meter/Energy function. *For further details and descriptions of the parameters, see the relevant section (par. 8.3.1.9)*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output 1 – On/Off command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output 1 = enabled Status feedback telegram = enabled	1 bit	CRWTU	[1.001] Switch	150
Output 1 – On/Off status	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output 1 = enabled Status feedback telegram = enabled	1 bit	CR-T-	[1.001] Switch	153
Output 2 – On/Off command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output 2 = enabled Status feedback telegram = enabled	1 bit	CRWTU	[1.001] Switch	154
Output 2 – On/Off status	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output 1 = enabled Status feedback telegram = enabled	1 bit	CR-T-	[1.001] Switch	157

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output x – Valve continuous command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Valve function = enabled	8-bit unsigned	C-W--	[5.001] percentage (0…100%)	151, 155
	This group object is the direct command for setting output 1 or 2 when the valve function has been enabled.				

9.3.2.2 Lock function

These parameters are located under the *Output 1 or 2* tab.

The lock function allows you to disable the operation of a specific channel's output.
For a comprehensive explanation of the lock function, refer to the section 8.3.1.6.

Parameter name	*Conditions*	*Values*
Lock function – Lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Lock function = enabled	**Not inverted** / inverted
	Allows the lock function signal to be inverted (on = lock enabled / off = lock disabled, or vice versa). *x = 1,2.*	
Lock function – After bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Lock function = enabled	unlock lock **no change**
	Allows you to set the lock status upon bus reset. • *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus is switched off, it remains locked after the bus is switched on.* x = 1,2.	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Lock function = enabled	Off On **No change**
	Allows you to set the output status when the block is activated. x = 1,2.	
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Lock function = enabled	Off On **no change** previous updated value

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Parameter name	Conditions	Values
	Allows you to set the output status when the lock is disabled. x = 1,2.	

Object name	Conditions	Dimensions	Flags	DPT	No. of Comm. Objects
Output *x* – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Lock function = enabled	1 bit	C-W--	[1.003] enable	158, 159.
	Inhibits switching commands for the output when an "enable" telegram is received and unlocks them when a "disable" telegram is received. *x = 1,2.*				

9.3.2.3 Forced function

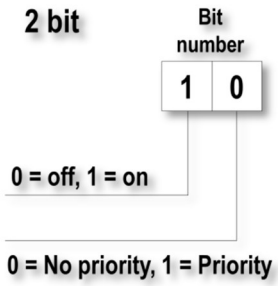
These parameters are located under the *Output 1 or 2* tab.

The forcing function allows a value to be forced on the output of a specific channel, taking precedence over other functions.

For a comprehensive explanation of the forcing function, refer to the section 8.3.1.7 .

Parameter name	Conditions	Values
Forced function – Behaviour end forced control	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Forcing function = enabled	On Off **No change** Previous
	Defines the state the output must assume when the forced operation is released. *x=1,2.*	
Forced function – Behaviour after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Forcing function = enabled	Not forced Forced On Forced Off Previous **No change**
	Defines the state the output must assume after the bus voltage is restored. *Note that what is indicated is the state of the output, not of the forcing; the latter, if active when the bus voltage dropped, is restored.* *x = 1,2.*	

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output *x* – Forcing command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel n = independent or single Output x = enabled Forced function = enabled	2 bits	C-W--	[2.001] switch control	160, 161.
	This allows you to force the state of an output. *The value consists of 2 bits: the first indicates the priority status (i.e. it indicates that forcing is active if "Priority" = On) and the second indicates the value to be forced (which is ignored if forcing is not active).*  				

9.3.2.4 Staircase (lighting) function

These parameters are located under the *Output 1 or 2* tab.

For a comprehensive explanation of the staircase lighting function, please refer to the section 8.3.1.4

Parameter name	*Conditions*	*Values*
Staircase function – Staircase lighting time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Staircase function = enabled	hh:mm:ss (**00:00:30**) [range 00:00:03…04:39:37]
	Duration of the output delay period. This is the time indicated in the figure as "Ts" in the section 8.3.1.4 describing the function. x=1,2.	
Staircase function – Manual off	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Staircase function = enabled	Enabled / **Disabled**
	When enabled, this allows the timer to be stopped with an "Off" command. *The command can be sent at any time, including during the pre-warning period.* *x=1,2.*	

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Parameter name	*Conditions*	*Values*
Staircase function – Retriggerable	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Staircase function = enabled	Enabled / **Disabled**
	When enabled, this allows the timer to restart with an "On" command. *The command can be sent at any time, including during the pre-warning period.* *x=1,2.*	
Staircase function – Pre-warning	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel n = independent or single Output x = enabled Staircase function = enabled	enabled / **disabled**
	Enables the pre-warning function. *For further details, see the section 8.3.1.4 describing the function.* *x=1,2.*	
Staircase function – Pre-warning time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Staircase function = enabled Pre-warning = enabled	hh:mm:ss (**00:00:10**) [range 00:00:02…04:39:37]
	Specifies how long before the expiry time the output must be briefly interrupted for signalling. *The specified interval includes the duration of the interruption.* *This is the time indicated in the figure as "Tp-w" in the 8.3.1.4 section of the feature description.* *x=1,2.).*	
Staircase function – Interruption time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Staircase function = enabled Pre-warning = enabled	ss.fff (**00.250**) [range 00.250…01.000]
	Specifies the duration of the interruption in ms. *This is the time indicated in the figure as "T_i" in the section 8.3.1.4 describing the functionality.* *x=1,2.*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output *x* – Staircase lighting start-stop command	Product type = any Output channel = independent or single Output x = enabled Staircase function = enabled	1 bit	C-W--	[1.010] start/stop	162, 163.
	Writing an "On" value activates the output and starts the timer. Once the set time has elapsed, the output is automatically deactivated. *If "Manual Off" is enabled, writing an "Off" value stops the timer.* *If "Retriggerable" is enabled, writing a new "On" value restarts the timer.* *x=1,2.*				

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9.3.2.5 Scenes function

These parameters are located under the *Output 1 or 2* tab.

For a comprehensive explanation of the scenario function, refer to the section 8.3.1.8 .

Parameter name	*Conditions*	*Values*
Scenes function – learning mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Scenes function = enabled	Enabled / **Disabled**
	When disabled, "save scene" commands are simply ignored and only the values assigned in the configuration are used for the scenarios. *x=1,2.*	
Scenario k	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Scenes function = enabled	Enabled / **Disabled**
	Enables or disables a new scene code to be associated with the output. *x=1,2. k=1,…,8.*	
Scene k – Scene number	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Scenes function = enabled Scene k = enabled	1…64 (**1**)
	Scene number to be associated with the output. The channel will respond (among others) to scenario commands relating to the set channel. *x=1,2. k=1,…,8.*	
Scene k – activation delay	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Scenes function = enabled Scene k = enabled	**00:00:00.0** hh:mm:ss.f [range 00:00.00.0 … 04:39:37.2]
	Waiting delay between a "call scene" command and the corresponding output switching. *The maximum value is 04:39:37.2.* *x=1,2. k=1,…,8.*	
Scene k – output behaviour	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Scenes function = enabled Scene k = enabled	Off **On**
	Value to be assigned to the output for the selected scene. This is an initialisation value which may remain fixed or, if learning mode is enabled, be overwritten by a "save scene" command. *x=1,2. k=1,…,8.*	

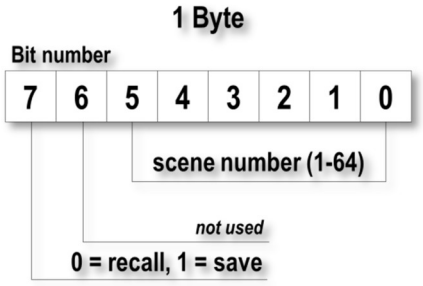
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- A new “recall scene” command restarts the activation delay.
- If a new “recall scene” command is received during the activation delay, the value of the new command overwrites the previous one, which is then lost.
- If learning mode is enabled, the activation delay has no effect on saving, which always takes place immediately.
- If the same scene number is assigned multiple times to the same output (with different parameters), the entry at the lowest position will be considered upon recall. Subsequent entries relating to the same scene number will be ignored.
- The scene function has lower priority than the forcing or lock function.

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output *x* – Scene number	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Scenes function = enabled	1 Byte	C-W--	[17.001] Scene number [18.001] scene control	164, 165.

x=1,2. k=1,…,8.

Allows you to retrieve the value associated with a scene or to store the current output value by associating it with the specified scene.



9.3.2.6 Energy counter function

These parameters are located under the *Output 1 or 2* tab.

For a comprehensive description of the operating time/energy counter function, refer to the section 8.3.1.9 .

Parameter name	*Conditions*	*Values*
Output load [W]	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	**50** [W] [range 0…5000]

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Parameter name	*Conditions*	*Values*
	Defines the nominal power to be considered when calculating the total energy consumption for the load connected to the output. *The total energy consumed [Wh] is calculated as the product of this value [W] multiplied by the total operating hours [h].* *x=1.2.*	
Energy/time cyclic sending	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	hh:mm:ss (**00:00:00**) [range 00:00:00…04:39:37]
	Defines the interval for periodic retransmission of totaliser values (for both time and energy). *A value of zero (00:00:00) disables periodic transmission.* *x=1,2.*	

During reprogramming via ETS or in the event of a loss of bus voltage, even if the output is in the “On” position, the counter is stopped.

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output *x* – Energy meter (Wh)	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	4-Byte signed value	CR-T-	[13.010] active energy [Wh]	166, 172.
	Current value of the total energy consumed by the load. *x=1.2.*				
Output *x* – Energy counter reset command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	1 bit	C-W--	[1.015] reset	167, 173.
	Resets the energy totaliser value. *x=1,2.*				
Output *x* – Operating hours counter	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	2-Byte unsigned value	CR-T-	[12.102] counter timehrs (h)	168, 174.
	Current value of the output operating time counter, expressed in hours. *x=1,2.*				

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output *x* – Operating seconds counter	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	4-Byte signed value	CR-T-	[13.100] time lag [s]	169, 177.
	Current value of the output operating time counter, expressed in seconds. *x=1.2.*				
Output *x* – Hours counter reset	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	1 bit	C-W--	[1.015] reset	170, 175.
	Resets the value of the output operating time totaliser. *x=1,2.*				
Output *x* – Hours counter overflow	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = independent or single Output x = enabled Operating energy/time counter = enabled	1 bit	CR-T-	[1.005] alarm	171, 176.
	Alarm triggered when the output operating time totaliser reaches the limit value of 65535 hours. *x=1,2.*				

9.3.3 Load n (only for EK-TI2-TP card holder)

The *Load n (n=1,2)* tab is located within the *Outputs* tab and is available only for the EK-TI2-TP card holder; if the output channel is configured as independent or single, at least one of the outputs must be configured as **a load** in the *Output Configuration* tab.

It contains the following parameters:

- Relay operation
- Status feedback telegram
- Transmission cycle time

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9.3.3.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Relay operation	Product type = EK-TI2-TP (card holder) Output n = load	**Not inverted** Inverted
	Determines whether the relay should be operated normally or in reverse.	
Status feedback telegram	Product type = EK-TI2-TP (card reader) Output n = load	Disabled **Enabled**
	Enables or disables the transmission of the status of the corresponding output to the relevant group object.	
Transmission cycle time	Product type = EK-TI2-TP (card holder) Output n = load Status feedback telegram = enabled	**00:00:00 hh:mm:ss** [range 00:00:00 … 04:39:37]
	If the status feedback telegram is enabled, it allows you to set up cyclic transmission; the value 0 means that transmission only occurs if the value itself changes.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output 1 – Load status	Product type = EK-TI2-TP (card holder) Output 1 = load	1 bit	CR-T-	[1.001] Switch	152
Output 2 – Load status	Product type = EK-TI2-TP (card holder) Output 2 = load	1 bit	CR-T-	[1.001] Switch	156

9.3.4 Lock n (only for EK-TO2-TP reader)

The *Lock n (n=1,2)* tab is located within the *Outputs* tab and is available only for the EK-TO2-TP card reader, provided the output channel is configured as independent or single. At least one of the outputs must be configured as a **lock** in the *Output Configuration* tab.

It contains the same parameters as the *Output n* tab, namely:

- Relay operation
- ON delay time
- OFF delay time
- Status feedback telegram
- Transmission cycle time

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9.3.4.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Relay operation	Product type = EK-TO2-TP (card reader) Output n = lock	**Not inverted** Inverted
	Determines whether the relay should be operated normally or in reverse.	
ON delay time	Product type = EK-TO2-TP (card reader) Output n = lock	**00:00:00.00 hh:mm:ss:ff** [range 00:00:00.00 … 04:39:37:21]
	Sets the activation delay, if any, relative to the receipt of the command from the bus.	
OFF delay time	Product type = EK-TO2-TP (card reader) Output n = lock	**00:00:02.00 hh:mm:ss:ff** [range 00:00:00.00 … 04:39:37:21]
	Sets the delay, if any, between deactivation and the receipt of the command from the bus.	
Status feedback telegram	Product type = EK-TO2-TP (card reader) Output n = lock	Disabled **Enabled**
	Enables or disables the transmission of the status of the corresponding output to the designated group object.	
Transmission cycle time	Product type = EK-TO2-TP (card reader) Output n = lock Status feedback telegram = enabled	**00:00:00 hh:mm:ss** [range 00:00:00 … 04:39:37]
	If the status feedback telegram is enabled, this allows you to set up a cyclic transmission; a value of 0 means no periodic transmission.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output 1 – Lock status	Product type = EK-TO2-TP (card reader) Output 1 = lock	1 bit	CR-T-	[1.003] Enable	152
Output 2 – Lock status	Product type = EK-TO2-TP (card reader) Output 2 = lock	1 bit	CR-T-	[1.003] Enable	156

9.3.5 Output channel (coupled outputs)

The *Output Channel* tab is located within the *Outputs* tab and is only available if, in the *Output Configuration* tab, the output channel has been configured as **a 3-way valve / shutter / Venetian blind.**

In this configuration, the outputs are coupled, as described in the section 8.3.1.

The parameters are:

- Relay operation
- Status feedback telegram
- Reversion pause time
- Open time
- Close time

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- Position control with dimmer
- Number of slat steps (only if Use = Venetian blind)
- Time of the slat step (only if Use = Venetian blind)
- Opening time of the slat step (only if Use = Venetian blind)
- Closing time of the slat step (only if Use = Venetian blind)
- Slat control with dimmer (only if Use = Venetian blind)
- Restore slat orientation after movement (only if Use = Venetian blind)
- Enable extra time
- Time over full scale when moving up / opening
- Time over full scale in descent / closing
- Behaviour at bus on
- Delay after bus recovery
- Lock function
- Forcing operation
- Scenes function
- Meteo alarms (only if Use = Venetian blind or shutter)

9.3.5.1 Main parameters

Parameter name	***Conditions***	***Values***
Relay operation	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	**Not inverted** Inverted
Status feedback telegram	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	Disabled **Enabled**
Reversal pause time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	hh:mm:ss.fff **(00:00:00.300)** [range 00:00:00.000 … 04:39:37.215]
	Minimum pause time between contact activations when switching between one output and the other coupled output	

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Parameter name	*Conditions*	*Values*
Open time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	hh:mm:ss (**00:00:15**) [range 00:00:00 … 04:39:37]
	Time taken by the motorised actuator to cover the full travel between the two end positions, in the opening direction. *It is important that this time is indicated with particular precision, as positioning accuracy depends essentially on this value.*	
Close time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	hh:mm:ss (**00:00:15**) [range 00:00:00 … 04:39:37]
	Time taken by the motorised actuator to cover the full travel between the two end positions, in the closing direction. *It is important that this time is indicated with particular precision, as positioning accuracy depends on this value to a significant extent.*	
Position control with dimmer	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	**no** / yes
	If this option is selected, a communication object similar to the standard one for dimmers is made available for the control of Shutters / venetian blinds. *This object can be used alternatively (and simultaneously) with the other control mechanisms.*	

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Parameter name	*Conditions*	*Values*
Enable extra time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	Disabled **Enabled**
	Enable or disable the additional times for reaching the end of the stroke.	
Time over full scale when moving up / opening	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all Enable extra time = enabled	0…60 s **(3 s)**
	Allows you to set the additional time required to reach the full travel limit during the upstroke / opening.	
Time over full scale in descent / closing	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all Enable extra time = enabled	0–60 s **(3 s)**
	Allows you to set the additional time required to reach the end of the stroke during descent/closing.	
Number of slat steps	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	1…64 **5**
	Number of steps required for the motorised actuator to move the slats between the two extremes of their travel.	
Time of the slat step	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	00:00:00.000…04:39:37.215 hh:mm:ss.fff (**100 ms**)
	Activation time of the outputs corresponding to the complete rotation of the slats during opening or closing.	
Opening time of the slat step	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	00:00:00.000…04:39:37.215 hh:mm:ss.fff (**100 ms**)
	Activation time of the outputs corresponding to the desired basic amplitude step for opening the slats.	
Closing time of the slat step	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	00:00:00.000…04:39:37.215 hh:mm:ss.fff (**100 ms**)
	Activation time of the outputs corresponding to the desired basic amplitude step for closing the slats.	

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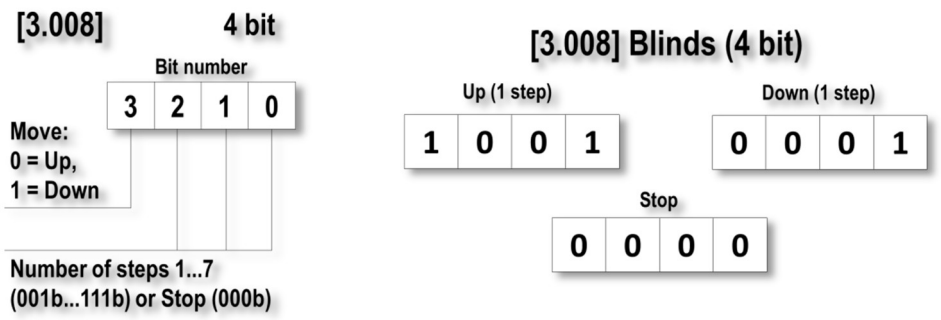
Parameter name	*Conditions*	*Values*
Slats control with dimmer	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	**no** / yes
	If this option is selected, a communication object similar to the standard one for dimmers is made available for slat movement. *This object can be used alternatively (and simultaneously) with the other control mechanisms.*	
Restore slat orientation after movement	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	**no** / yes
	If this option is selected, after an up, down or absolute position command, the slats return to their previous position. If it is not selected, they remain in the position they assumed during the movement. *Restoring the slat orientation after movement is not considered in the case of Meteo Alarms.*	
Behaviour at bus on	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	**No change** Up / Open down / close moves to position
	Defines the output value upon bus recovery.	
Delay after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	00:00:00.00…04:39:37.21 hh:mm:ss.ff (**3 s**)
	Time, starting from bus reset, after which status feedback telegrams may begin to be transmitted. *The delay has no effect on the behaviour of the outputs, but only affects the transmission of telegrams. The outputs can therefore be activated during the delay time.* *Telegram transmission is not delayed but inhibited; therefore, no status feedback is generated for any switching operations that occur during the delay time.*	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	enabled / **disabled**
	Enables or disables the lock function, i.e. the ability to prevent the output from being changed via a bus command. *For further details and a description of the parameters, see the relevant section 8.3.2.5*	
Forcing operation	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	Enabled / **Disabled**
	Enables or disables the forced operation function, i.e. the ability to force a value on the output with priority over other functions. *For further details and a description of the parameters, see the relevant section 8.3.2.6 .*	

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Parameter name	*Conditions*	*Values*
Scenes function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	enabled / **disabled**
	Enables or disables the Scenarios function. *For further details and a description of the parameters, see the relevant section 8.3.2.7*	
Meteo alarms	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind or Shutter	Enabled / **Disabled**
	Enables or disables the meteo alarm management function. *For further details and a description of the parameters, see the relevant section 8.3.2.8 .*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output channel - Up/down command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Shutter or venetian blind	1 bit	C-W--	[1.008] up/down	136
	Command object for continuous movement: if received, initiates movement in the specified direction.				
Output channel - Stop-step up/down command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Shutter or venetian blind	1 bit	C-W--	[1.007] step	137
	Command object for step-by-step movement: if received (and no movement is in progress), it initiates a movement of a preset duration in the specified direction. If the actuator is already in motion, however, it stops the current movement.				
Output channel - Dedicated stop command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	1 bit	C-W--	[1.017] trigger	138
	Upon reception, interrupts the current movement.				
Output channel - Info move	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	1 bit	CR-T-	[1.011] state	139
	Returns information on the current direction of movement.				

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output channel - Valid current abs position	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	1 bit	CR-T-	[1.002] Boolean	140
	Indicates that the actuator has reached the requested absolute position. It is transmitted following absolute positioning commands.				
Output channel - Dimmer blind position command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind Position control via dimmer = yes	4-bit	C-W--	[3.008] blind control	141
	Allows the actuator to be controlled via a communication object of the same type as those used for dimmers. 				
Output channel - Dimmer valve position command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = 3-way valve Position control via dimmer = yes	4-bit	C-W--	[3.008] blind control	141
	Allows the 3-way valve position to be controlled via a communication object of the same type as those used for dimmers. *See the parameter "Output channel – Blind position control (via dimmer)" for details.*				
Output channel - Dimmer shutter position command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Shutter Position control via dimmer = yes	4-bit	C-W--	[3.008] blind control	141

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Object name	Conditions	Dim.	Flags	DPT	No. of Comm. Objects
	Allows control of the Shutter position via a communication object of the same type as those used for dimmers. *See the parameter "Output channel – Blind position control (via dimmer)" for details.*				
Output channel – Abs [valve / shutter / blind] position command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	1 Byte	C-W--	[5.001] percentage (0..100%)	142
	Sets the absolute position to be reached and starts movement in the appropriate direction. *In the case of venetian blinds, the absolute position referred to is that of the slat.*				
Output channel - Abs [valve / shutter / blind] position status	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all	1 Byte	CR-T-	[5.001] percentage (0..100%)	143
	Returns the current absolute position of the actuator. *The absolute position is calculated based on the sequence of requested movements and is realigned whenever the actuator reaches a limit switch.* *In the case of venetian blinds, the absolute position referred to is that of the slat.*				
Output channel - Dimmer slats command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind Slats control with dimmer = yes	4-bit	C-W--	[3.008] blind control	144
	Allows the slats to be controlled via a communication object of the same type as those used for dimmers. *See the parameter "Output channel – Venetian blind position control (via dimmer)" for details.*				
Output channel - Abs slats position command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	1 Byte	C-W--	[5.001] percentage (0–100%)	145
	Set the absolute position to be reached by the slats and start the movement in the appropriate direction.				
Output channel - Abs slats position status	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = Venetian blind	1 Byte	CR-T-	[5.001] percentage (0..100%)	146
	Returns the current absolute position of the lamellae. *The absolute position is calculated based on the sequence of requested movements and is realigned whenever the lamellae reach the end of their travel; this occurs when the uninterrupted duration of movement in one direction is at least equal to the full travel time specified as a parameter.*				

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Object name	Conditions	Dim.	Flags	DPT	No. of Comm. Objects
Output channel - Direction status output x	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Status feedback telegram = enabled Usage = all	1 bit	CR-T-	[1.001] switch	153, 157.
	Sent on every change in the output status. x=1,2.				

9.3.5.2 Lock function

Parameter name	Conditions	Values
Lock function – lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all Lock function = enabled	**Not inverted** / inverted
	Allows the lock function signal to be inverted (on = lock enabled / off = lock disabled, or vice versa).	
Lock function – After bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all Lock function = enabled	unlock lock **no change**
	Allows you to set the lock status upon bus reset.	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all Lock function = enabled	**no change** Up / Open Down / Close Stop Move to position
	Allows you to set the output status when the lock is activated.	
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Shutter / Venetian blind Use = all Lock function = enabled	**no change** Up / Open Down / Close Stop Move to position Previous Updated value
	Allows you to set the output status when the block is deactivated. *For the meaning of the "previous" option, see the details in section 8.3.1.10 .* ***Previous** is the value that the output had at the time the block was activated.* ***Updated value** behaves as follows:* *1) If, during the lock, the user makes an up or down movement, when the lock is released, the Shutter/blind/valve moves to the full-open or full-closed position, depending on the direction set during*	

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Parameter name	Conditions	Values
	the lock; *2) If, during the lock, the user sends an absolute position command, for example 50%, when the lock is removed, the actuator moves exactly to that percentage value.*	

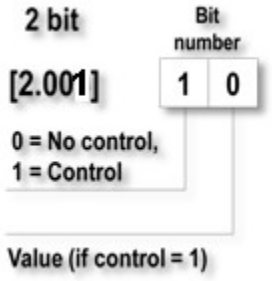
Object name	Conditions	Dimensions	Flags	DPT	No. of Comm. Objects
Output channel - Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Venetian blind / Shutter Use = all Lock function = enabled	1 bit	C-W--	[1.003] enable	158
	If set to "On", it inhibits switching of the channel outputs; if set to "Off", it allows normal operation.				

9.3.5.3 Forced function

Parameter name	Conditions	Values
Forcing function – Behaviour at the end of the forcing	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Venetian blind / Shutter Use = all Forcing function = enabled	**No change** Up / Open Down / Close Stop Move to position Previous
	Defines the state the output must assume when the forcing is released.	
Forcing function – Behaviour after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / blind / Shutter Use = all Forcing function = enabled	Not forced Forced up / open Forced down / closed Previous **No change**
	Defines the state the output must assume after the bus voltage is restored. *Note that what is indicated is the state of the output, not the forcing; the latter, if active when the bus voltage dropped, is restored.*	

Object name	Conditions	Dim.	Flags	DPT	No. of Comm. Objects
Output channel – Forcing command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Venetian blind / Shutter Use = all Forcing function = enabled	2 bits	C-W--	[2.001] switch control	160

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Object name	Conditions	Dim.	Flags	DPT	No. of Comm. Objects
	Allows the state of the output channel to be forced. The command is of the "direction control" type, with which movement can be forced in one direction (output activation for up / open), in the other (down / close), or the forcing released. 				

9.3.5.4 Scenes function

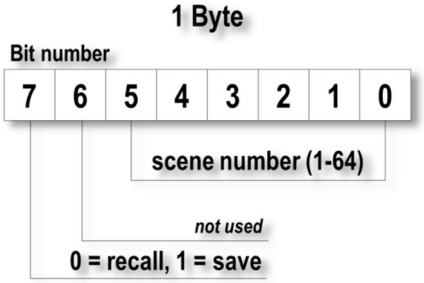
Parameter name	Conditions	Values
Scenes function - Learning mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / blind / Shutter Use = all Scenes function = enabled	Enabled / **Disabled**
	When disabled, the "save scenario" commands are simply ignored and only the values assigned in the configuration are used for the scenarios.	
Scenes function - Scenario *k*	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / blind / Shutter Use = all Scenes function = enabled	enabled / **disabled**
	Enables or disables a new scenario code to be associated with the output. *k=1,…,8.*	
Scenes function - Scene *k* – Scene number	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Venetian blind / Shutter Use = all Scenes function = enabled	1…64 (**1**)
	Scenario number to be associated with the output. The channel will respond (among others) to scenario commands relating to the set channel. *k=1,…,8.*	

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Parameter name	*Conditions*	*Values*
Scenes function - Scene k – Activation delay	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / blind / Shutter Use = all Scenes function = enabled Scene *k* = enabled	hh:mm:ss.f (**00:00:00.0**) [range 00:00:00.0…04:39:37.2]
	Waiting delay between a "call scenario" command and the corresponding output switching. *The maximum value is 04:39:37.2.* *k=1,…,8.*	
Scenes function - Scene k – Output behaviour	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / blind / Shutter Use = all Scenes function = enabled Scene k = enabled	stop **fully open** fully closed move to position
	Value to be assigned to the output for the scenario in question *This is an initialisation value that may remain fixed or, if learning mode is enabled, be overwritten by a "save scenario" command.* *k=1,…,8.*	
Scenes function - Scene *k* – Position	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / blind / Shutter Use = all Scenes function = enabled Scene *k* = enabled Output behaviour = moves to position	**0** [0…100%]
	Absolute position that the actuator must reach for the scenario in question. *This is an initialisation value that may remain fixed or, if learning mode is enabled, be overwritten by a "save scenario" command.* *k=1,…,8.*	
Scenes function - Scene *k* – Slats position	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / venetian blind / Shutter Use = Venetian blind Scene k = enabled Output behaviour = moves to position	*(***0** [0…100%]
	Absolute position to be assigned to the slats for the scenario in question. *This is an initialisation value that may remain fixed or, if learning mode is enabled, be overwritten by a "save scenario" command.* *k=1,…,8.*	

- A new "recall scenario" command restarts the activation delay.
- If a new "recall scenario" command is received during the activation delay, the value of the new command overrides the previous one, which is then lost.
- If learning mode is enabled, the activation delay has no effect on saving, which always takes place immediately.
- If the same scene number is assigned multiple times to the same output (with different parameters), the entry at the lowest position will be considered upon recall. Subsequent entries relating to the same scene number will be ignored.
- The scene function has lower priority than the forcing or lock function.

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Item name	*Condition*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Output channel - Scene number	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Venetian blind / Shutter Use = all Scene function = enabled Scene k = enabled	1 Byte	C-W--	[17.001] scene number [18.001] scene control	164
	k=1,…,8. *Allows you to recall the setting associated with the specified scene number, or to save the current status associated with the selected scene.*  				

9.3.5.5 Meteo alarms

Parameter name	*Conditions*	*Values*
Meteo alarms – Reaction to [wind / frost / rain]	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Use = Shutter or venetian blind Meteo alarms = enabled	**none** up / open down / close
	Defines the movement that the actuator must perform when the corresponding alarm is triggered.	
Meteo alarms – [wind / frost / rain] timeout	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / venetian blind / Shutter Use = Shutter or venetian blind Meteo alarms = enabled	hh:mm:ss (**00:10:00**) [range 00:00:00…04:39:37]
	Defines the timeout interval for the monitoring function (heartbeat). *If a timeout is set, "Alarm not active" telegrams must be sent regularly by the source at intervals shorter than the specified timeout to confirm that alarm communication is taking place regularly. If no "Alarm not active" telegram is received for longer than the timeout period, the alarm condition is triggered.* *A value of zero (0) disables the monitoring function.*	

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Meteo alarms – Action at the end of the alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / venetian blind / Shutter Use = Shutter or venetian blind Meteo alarms = enabled	**none** up / open down / close previous
	Defines the movement the actuator must perform when all alarms cease.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Output channel – Wind alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Venetian blind / Shutter Use = Shutter or Venetian blind Meteo alarms = enabled	1 bit	C-W--	[1.005] alarm	147.
	Enables the reception of meteo alarms. If reception is enabled, the alarm will be activated by sending an "alarm active" command, and will be deactivated by sending an "alarm cancel" command. *If the Heartbeat alarm function is used (see section 8.3.2.8), the "cancel alarm" command must be sent regularly at intervals shorter than the maximum programmed timeout.*				
Output channel – Frost alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Use = Shutter or venetian blind Meteo alarms = enabled	1 bit	C-W--	[1.005] alarm	148.
	See previous parameter.				
Output channel – Rain alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Output channel = 3-way valve / Venetian blind / Shutter Use = Shutter or Venetian blind Meteo alarms = enabled	1 bit	C-W--	[1.005] alarm	149
	See previous parameter.				

9.4 Input configuration (for EK-TO2-TP and EK-TI2-TP only)

The *Input Configuration* tab is located under the *General* menu and allows you to set the parameters for managing the inputs. Each input channel can be configured **independently or single**, or **coupled**.

If configured as "independent or single", the parameters are:

- Input 1
  - Type
- Input 2
  - Type

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If configured as “coupled”, the only parameter is:

- Type

9.4.1 Input type

9.4.1.1 Parameters and communication objects

Parameter name	*Conditions*	*Values*
Input channel	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder)	disabled **independent or single** coupled
	Set the operating mode for the inputs associated with the input channel.	
Input x	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single	Disabled / **digital input**
	x=1,2. *Enables or disables an input channel as a digital input.*	
Type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input	**switching** Dimming Shutters or Venetian blinds Scene Shift register
	x=1,2. *Sets the function associated with the input channel.* *Further parameters for the selected function appear in the individual channel/input configuration (see following sections).*	

9.4.2 Independent or single - switching

9.4.2.1 Parameters and communication objects

Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	**NO (normally open)** NC (normally closed)
	x=1,2. *Allows you to choose whether, in the rest state, the input contacts are open (NO) or closed (NC).*	

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Parameter name	*Conditions*	*Values*
Number of communication objects	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	1…8 (**1**)
	x=1,2. *Number of communication objects to be associated with the button event.*	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	**disabled** enabled
	x=1,2. *Enables or disables the lock function.*	
Lock function – Invert lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Lock function = enabled	**Not inverted** inverted
	x=1,2. *Allows an "enable lock" code of a command to be interpreted as "disable lock" and vice versa.*	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Lock function = enabled	**No** yes
	x=1,2. • *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Lock function = enabled	**none** as closed or short press as open or long press
	x=1,2. *Defines the operation to be performed upon lock entry. The choice is between the operations associated with the two possible events: closing (or short press, depending on the configuration) or opening (or long press).*	

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Parameter name	*Conditions*	*Values*
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Lock function = enabled	**none** as closed or short press as open or long press
	x=1,2. *Defines the operation to be performed upon unlocking. The choice is between the operations associated with the two possible events: closing (or short press, depending on the configuration) or opening (or long press).*	
Number of communication objects	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	1…8 (**1**)
	x=1,2. *Number of communication objects to be associated with the contact closure event.*	
Event	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	**Activation / release** Short / long press
	x=1,2. *Type of event to be used as a trigger for an action.*	
Long press time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Event = short press / long press	hh:mm:ss.fff (**00:00:00.800**) [range 00:00:00.215 04:39:37.215]
	x=1,2. *Minimum pressure hold time to distinguish between short and long press.*	
Object *n* – communication object dimension	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	**1 bit value** 2 bits value 1 Byte unsigned value 1 Byte scaling value 1 Byte signed value 2 Byte unsigned value 2 Byte signed value 2 Byte floating value
	x=1,2. *Defines the type and size of individual communication objects.*	
Object *n* – Send delay	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	hh:mm:ss.ff (**00:00:00.00**)

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Parameter name	*Conditions*	*Values*
	x=1,2. *Delay between the event and the transmission of the value on the bus.* *By defining an individual delay for each object, it is possible to form a defined sequence of telegrams to be associated with the event.* *n = 1,…,8.*	
Object *n* – Send cyclically	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Number of communication objects ≥ 1	**none** off / value 1 on / value 2 Both off and on / both values
	x=1,2. *Defines which values, if any, must be transmitted periodically if they are in the active state.* *Cyclic transmission is only available if the number of communication objects to be associated is 1.* *n = 1,…,8.*	
Object *n* – Cyclic transmission interval	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Number of communication objects ≥ 1 Cyclic transmission ≠ none	hh:mm:ss (**00:02:00**) [range 00:00:10 … 04:39:37]
	x=1,2. *Interval between periodic retransmissions.* *n = 1,…,8.*	
Object *n* – Reaction to activation *or* Reaction to short press	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching O.C. size = 1 bit	none on off **toggle**
	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching O.C. size = 2 bits	none Disable enable off / up **enable on / down** enable off / up ↔ disable enable on / down ↔ disable enable off / up ↔ enable on / down
	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching oc size = *all Byte values*	**none** send value 1 send value 2 send value 1 ↔ send value 2
	x=1,2. *Value change triggered by a Closed or Short Press event (depending on the event configuration).* *n = 1,…,8.*	

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Parameter name	*Conditions*	*Values*
Object *n* – Reaction to release *or* Reaction to long press	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching oc size = 1 bit	**none** on off toggle
	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching O.C. size = 2 bits	none Disable enable off / up **enable on / down** enable off / up ↔ disable enable on / down ↔ disable enable off / up ↔ enable on / down
	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching oc size = *all Byte values*	**none** send value 1 send value 2 send value 1 ↔ send value 2
	x=1,2. *Value change triggered by an Open or Long Press event (depending on the event configuration).* *n = 1,…,8.*	
Object *n* – Value 1	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching o.c. range = *all Byte values*	0…100 (1 Byte scaling) 0...255 (1 Byte unsigned) -128...127 (1 Byte signed) 0...65535 (2 Byte unsigned) -32768... 32767 (2 Byte signed) -671088.64...670760.96 (2 Byte floating point)
	x=1,2. *First value configured for event association.* *n = 1,…,8.*	
Object *n* – Value 2	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching oc size = *all Byte values*	*as for value 1*
	x=1,2. *Second value configured for event association.* *n = 1,…,8.*	

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Input *x* – Switching status *[type]*, object *no.*	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching	*depending on configuration* (**1-bit**)	C-WTU	*depending on configuration* (**[1.001] switch**)	368, 369, 370, 371, 372, 373, 374, 375. 376, 377, 378, 379, 380, 381, 382, 383.
	x=1,2. *Up to 8 objects can be defined to be associated with the same event (n = 1,…,8).* *The CO numbers listed refer to the first of these 8 objects (for each of the inputs); the CO numbers for subsequent objects are sequential. To obtain the CO number for the nth object, simply add (n-1) to the numbers given.* *E.g.: the COs associated with input 1 have numbers starting from 368. The number of the 5th CO associated with that input will therefore be 368 + (5-1) = 372.* ***The types and sizes of individual objects can be configured as described below.***				
Input *x* – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = switching Lock function = enabled	1 bit	C-W-U	[1.003] enable	356, 362.
	x=1,2.				

The data dimensions and *Data Point Types* are as follows:

Dimension	*DPT*
1 bit	[1.001] switch
2 bits	[2.*] 1-bit control
1 Byte unsigned value	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-Byte
1 Byte scaling value	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-Byte
1 Byte signed value	[6.*] 8-bit signed value
2 Bytes unsigned value	[7.*] 2-Byte unsigned value
2 Bytes signed value	[8.*] 2-Byte signed value
2 Bytes floating-point value	[9.*] 2-Byte floating-point value

Table 7 - Sizes and data types for communication objects

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Note on the 2-Byte floating-point value range

When the data is of the *2-Byte floating-point* type, the value range is between -273…670760.96, rather than between -671088.64…670760.96. The reason is that by default it is treated as a temperature range in °C, so the lower limit is absolute zero.

To obtain negative values < -273, open the *Properties* menu of the communication object from the Group Objects tab and manually modify the DPT, selecting the most suitable one from those available for the 7.* 2-Byte unsigned value group, as shown in Figure 57 :

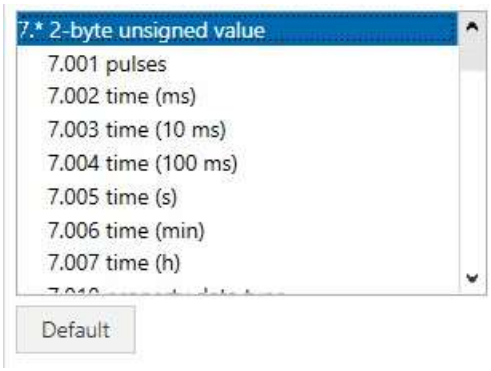


Figure 57 - DPT for group 7.* 2-Byte floating point

9.4.3 Independent or single - dimming

9.4.3.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming	**NO (normally open)** NC (normally closed)
	x=1,2. *Allows you to choose whether, in the idle state, the input contacts are open (NO) or closed (NC).*	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming	**enable** disable
	x=1,2. *Enable or disable the lock function.*	
Long press time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming	hh:mm:ss.fff (**00:00:03.000**) [range 00:00:00.215 04:39:37.215]

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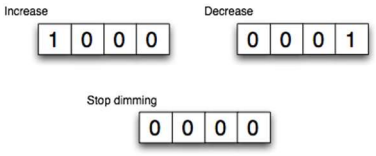
Parameter name	*Conditions*	*Values*
	x=1,2. *Minimum pressure hold time to distinguish between short and long presses.*	
Toggle mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming	**enabled** / disabled
	x=1,2. *When enabled, a short press toggles the on/off state of the associated communication object; otherwise, a short press results in a fixed state between the two.*	
Reactrion to long press	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Toggle mode = enabled	**less bright** brighter dimmer ↔ brighter
	x=1,2. *Defines the function to be assigned to a long press.* *If* Toggle mode *is enabled, the Toggle function is already assigned to a short press.*	
Short / long action	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Toggle mode = disabled	**off / dimmer** on / brighter off / dimmer ↔ brighter on / dimmer ↔ brighter
	x=1,2. *Defines the function to be assigned to short and long presses.*	
Cyclic sending	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming	**none** off / value 1 on / value 2 both off and on / both values
	x=1,2. *Defines which values, if any, must be transmitted periodically if they are in the active state.*	
Cyclic sending interval	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Cyclic transmission ≠ none	hh:mm:ss (**00:02:00**) [range 00:00:10 … 04:39:37]
	x=1,2. *Interval between periodic retransmissions.*	

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Parameter name	*Conditions*	*Values*
Lock function – Inverts lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Lock function = enabled	**Not inverted** / inverted
	x=1,2. *Allows an "enable lock" command code to be interpreted as "disable lock" and vice versa.*	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Lock function = enabled	**no** / yes
	x=1,2. • *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Lock function = enabled	**none** off on toggle
	x=1,2. *Defines the state to be set for the communication object upon block entry.*	
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Lock function = enabled	**none** off on as previous
	x=1,2. *Defines the state to be set for the communication object upon unlocking.*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Input *x* – Switch command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming	1 bit	C-WTU	[1.001] switch	357, 363.

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Object name	Conditions	Dim.	Flags	DPT	No. of Comm. Objects
	x=1,2. *Sends an on/off command to a dimmer actuator.* *The command is sent following a brief contact closure event.* *The value sent can be a fixed value or alternate between the two possible values with each activation.*				
Input x – Dimming up / down / stop command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming	3 bits	C--T-	[3.*] 3-bit controlled	358, 364.
	x=1,2. *Sends a brightness change command (increase or decrease) to a dimmer actuator.* *Three values are used, corresponding to the start-up, start-down and stop commands.*  *The increase/decrease commands are sent following a long closure; the stop command following the opening of the contact.* *The value sent upon activation can be a fixed value or alternate between the two possible values (increase/decrease) with each activation.*				
Input *x* – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = dimming Lock function = enabled	1 bit	C-W--	[1.003] enable	356, 362.
	x=1,2.				

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9.4.4 Independent or single - shutters or venetian blinds

9.4.4.1 Parameters and communication objects

Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutter or Venetian blind	**NO (normally open)** NC (normally closed)
	x=1,2. *Allows you to choose whether, in the idle state, the input contacts are open (NO) or closed (NC).*	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutter or Venetian blind	**enable** enable
	x=1,2. *Enable or disable the lock function.*	
Long press time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutter or Venetian blind	hh:mm:ss.fff (**00:00:00.800**) [range 00:00:00.215 04:39:37.215]
	x=1,2. *Minimum pressure hold time to distinguish between short and long pressure.*	
Toggle mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutter or Venetian blind	**Disabled** Enabled
	x=1,2. *When enabled, a short press reverses the movement direction; otherwise, a short press is associated with a fixed value between the two.*	
Up/down action	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutter or Venetian blind Toggle mode = disabled	**Up / Open** Down / Close
	x=1,2. *Defines the direction of movement associated with the contact closing.*	
Venetian blind mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind	**Disabled** Enabled

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Parameter name	*Conditions*	*Values*
	x=1,2. *If Venetian blind mode is enabled, the device sends 'full movement' commands following a prolonged closure of the contact, and 'step' commands upon brief closure;* *if disabled, it still sends "full movement" commands upon prolonged closure, but "stop" commands upon brief closure.*	
Lock function – Invert lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind Lock function = enabled	**not inverted** / inverted
	x=1,2. *Allows an "enable lock" command code to be interpreted as "disable lock" and vice versa.*	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind Lock function = enabled	**no** / yes
	x=1,2. • *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind Lock function = enabled	**none** Up Down
	x=1,2. *Defines the action to be performed upon entry into the block.*	
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind Lock function = enabled	**none** Up Down
	x=1,2. *Defines the action to be performed upon unlocking.*	

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Input x - Dedicated stop command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind Venetian blind mode = disabled	1 bit	C- -T-	[1.017] trigger	357, 363.
	x=1,2. *Immediately stops any movement of the shutter. The object is sent to a short close if 'Venetian' mode is disabled, or at the end of a long contact if 'Venetian' mode is enabled.*				
Input x - Stop / step up / down command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blinds Venetian blind mode = enabled	1 bit	C--T-	[1.007] step	357, 363.
	x=1,2. *Moves the shutter to the fully open or fully closed position.* *The object is sent at the end of a long closing cycle.*				
Input x - Move up / down command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind	1 bit	C—T-	[1.008] up/down	359, 365.
	x=1,2. *Opens or closes the shutter in stages.* *The object is sent to the momentary contact.*				
Input x - Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shutters or Venetian blind Lock function = enabled	1 bit	C-W--	[1.003] enable	356, 362.
	x=1,2.				

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9.4.5 Independent or single – scenes

9.4.5.1 Communication parameters and objects

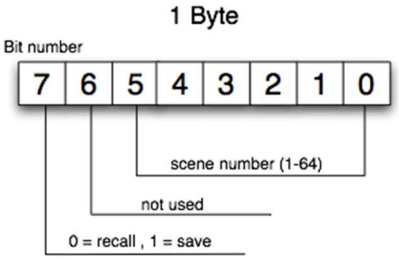
Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene	**NO (normally open)** NC (normally closed)
	x=1,2. *Allows you to choose whether, in the rest state, the input contacts are open (NO) or closed (NC).*	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene	**enable** enable
	x=1,2. *Enables or disables the lock function.*	
First scene number	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene	1…64 (**1**)
	x=1,2. *Number of the main scenario to be assigned to the input.* *It is referred to as "first" as a second alternative scenario number may be defined.*	
Learning mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene	**Disabled** Enabled
	x=1,2. *If enabled, this allows the current configuration to be saved with the assigned scenario number by pressing and holding the button.*	
Long press time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene Learning mode = enabled	hh:mm:ss.fff (**00:00:00.800**) [range 00:00:00.215 04:39:37.215]
	x=1,2. *Minimum pressure hold time to distinguish between short and long pressure.*	

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Parameter name	*Conditions*	*Values*
Scene activation	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene Learning mode = disabled	**Send first scene only** Toggle between 2 scenes
	x=1,2. *Allows you to use the input contact to switch between two different scenarios.*	
Second scene number	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene Learning mode = disabled Scene activation = Toggle between 2 scenarios	1…64 (**1**)
	x=1,2. *Number of selectable alternative scenarios.*	
Lock function – Inverts lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene Lock function = enabled	**Not inverted** / inverted
	x=1,2. *Allows an "enable block" code for a command to be interpreted as "disable block" and vice versa.*	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene Lock function = enabled	**no** / yes
	x=1,2. • *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene Lock function = enabled	**none** send first scene send second scene (*)
	x=1,2. *Defines the action to be performed upon block entry.* *(*) available only if Scene activation = Toggle between 2 scene is selected.*	

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Parameter name	*Conditions*	*Values*
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene Lock function = enabled	**none** send first scene send second scenario (*)
	x=1,2. *Defines the action to be performed upon unlocking.* *(*) available only if Scene activation = Toggle between 2 scene is selected.*	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Input *x* – Scene number	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scene	1 Byte	C--T-	[17.*] Scene number [18.*] Scene control	360, 366.
	x=1,2. *Saves or recalls a scene.* *The lowest 6 bits in the code Byte represent the scenario number, whilst the highest bit is the operation code (store or retrieve).*  				
Input *x* – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = scenario Lock function = enabled	1 bit	C-W--	[1.003] enable	356, 362.
	x=1,2.				

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9.4.6 Independent or single - shift register

9.4.6.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	**NO (normally open)** NC (normally closed)
	x=1,2. *Allows you to choose whether, in the idle state, the input contacts are open (NO) or closed (NC).*	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	**enable** enable
	x=1,2. *Enables or disables the lock function.*	
Shift register maximum value	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	0…255 (**0**)
	x=1,2. *Maximum value for the counter.*	
Shift register minimum value	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	0…255 (**0**)
	x=1,2. *Minimum value for the counter.*	
Shift register step value	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	-128…127 (**0**)
	x=1,2. *Counter increment/decrement step.*	
Shift register direction	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	**From lowest to highest value** From highest value to lowest value

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Parameter name	*Conditions*	*Values*
	x=1,2. *Allows you to select the direction of increment/decrement for the counter register.*	
Shift register reset enable	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	**Disabled** Enabled
	x=1,2. *Enable or disable register reset.* *If enabled, a long press of the input resets the counter.*	
Long press time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register Shift register reset enable = enabled	hh:mm:ss.fff (**00:00:00.800**) [range 00:00:00.215 04:39:37.215]
	Minimum contact closure hold time to distinguish between short and long presses.	
Lock function – Invert lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register Lock function = enabled	**Not inverted** / inverted
	x=1,2. *Allows a command's "enable block" code to be interpreted as "disable block" and vice versa.*	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register Lock function = enabled	**no** / yes
	x=1,2. • *If Block after bus recovery = yes, after a bus off/on the input is always blocked, regardless of its state before the bus off;* • *if Block after bus recovery = no, then if it is blocked before the bus off, it remains blocked after the bus on.*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Input x – Shift register	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register	1 byte	CR-T-	[5.010] counter pulses (0.255)	361, 367.
	x=1,2.				

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Input *x* – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = independent or single Input x = digital input Type = shift register Lock function = enabled	1 bit	C-W-U	[1.003] enable	356, 362.
	x=1,2.				

9.4.7 Coupled: switching

9.4.7.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching	**NO (normally open)** NC (normally closed)
	Allows you to choose whether, in the rest state, the input contacts are open (NO) or closed (NC).	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching	**enable** enable
	Enables or disables the lock function.	
1 and 2 use	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching	**Odd on, Even off** Odd off, Even on
	Allows the functionality of the odd input and the even input to be reversed.	
Send cyclically	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching	None **off / value 1** on / value 2 both off and on / both values
	Defines which values, if any, are to be transmitted periodically if they are in the active state.	
Cyclic sending interval	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching Send cyclically ≠ none	hh:mm:ss (**00:02:00**) [range 00:00:10 … 04:39:37]
	Interval between periodic retransmissions.	

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Parameter name	*Conditions*	*Values*
Lock function – Invert lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching Lock function = enabled	**Not inverted** / inverted
	Allows an "enable lock" code in a command to be interpreted as "disable lock" and vice versa.	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching Lock function = enabled	**no** / yes
	• *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching Lock function = enabled	**none** off on toggle
	Defines the operation to be performed upon lock entry. The choice is between the operations associated with the two possible events: closing (or momentary contact, depending on the configuration) or opening (or sustained contact).	
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching Lock function = enabled	**none** off on as previous
	Defines the operation to be performed upon unlocking. The choice is between the operations associated with the two possible events: closing (or momentary contact, depending on the configuration) or opening (or sustained contact).	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Input channel – Switch command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = switching	1-bit	C-WTU	[1.001] switch	361
Input channel *x* – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel x = coupled Type = switching Lock function = enabled	1 bit	C-W-U	[1.003] enable	356

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9.4.8 Coupled: dimming

9.4.8.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming	**NO (normally open)** NC (normally closed)
	Allows you to choose whether, in the off state, the input contacts are open (NO) or closed (NC).	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming	**enable** enable
	Enables or disables the lock function.	
Send cyclically	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming	none **off / value 1** on / value 2 off and on / both values
	Defines which values, if any, must be transmitted periodically if they are in the active state.	
Cyclic sending interval	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming Send cyclically ≠ none	hh:mm:ss (**00:02:00**) [range 00:00:10 … 04:39:37]
	Interval between periodic retransmissions.	
Long press time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming	hh:mm:ss.fff **(00:00:08.000)** [range 00:00:00.215 04:39:37.215]
	Minimum pressure hold time to distinguish between short and long pressure (contact closure).	
1 and 2 use	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming	**Input odd increases, even decreases** Input odd decreases, even increases
	Allows the functionality of the odd input and the even input to be reversed.	
Lock function – Invert lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming Lock function = enabled	**not inverted** / inverted
	Allows an "enable lock" command code to be interpreted as "disable lock" and vice versa.	

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Parameter name	*Conditions*	*Values*
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming Lock function = enabled	**no** / yes
	• *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming Lock function = enabled	**none** off on toggle
	Defines the operation to be performed upon lock entry. The choice is between the operations associated with the two possible events: closing (or momentary contact, depending on the configuration) or opening (or sustained contact).	
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming Lock function = enabled	**none** off on as previous
	Defines the operation to be performed upon unlocking. The choice is between the operations associated with the two possible events: closing (or momentary contact, depending on the configuration) or opening (or sustained contact).	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Input channel - Switch command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming	1 bit	C-WTU	[1.001] switch	357
	See notes for independent input.				
Input channel – Dimming up / down / stop command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel x = coupled Type = dimming	4-bit	C--T-	[3.*] 3-bit controlled	358
	See notes for independent input.				
Input channel – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = dimming Lock function = enabled	1 bit	C-W-U	[1.003] enable	356 .

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9.4.9 Coupled: shutters or venetian blinds

9.4.9.1 Parameters and communication objects

Parameter name	*Conditions*	*Values*
Contact type	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds	**NO (normally open)** NC (normally closed)
	Allows you to choose whether, in the idle state, the input contacts are open (NO) or closed (NC).	
Lock function	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds	**enable** enable
	Enable or disable the lock function.	
Long press time	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds	hh:mm:ss.fff **(00:00:08.000)** [range 00:00:00.215 04:39:37.215]
1 and 2 use	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds	**Odd up, Even down** Odd down, Even up
	Allows you to reverse the functionality of the odd input and the even input.	
Venetian blind mode	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds	**Disabled** Enabled
	If Venetian blind mode is enabled, the device sends "full movement" commands when the button is held down, and "step" commands when the button is pressed shortly; if disabled, it still sends "full movement" commands when the button is held down, but "stop" commands when the button is pressed shortly.	
Lock function – Inverts lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds Lock function = enabled	**not inverted** / inverted
	Allows an "activate lock" command code to be interpreted as "deactivate lock" and vice versa.	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds Lock function = enabled	**no** / yes

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Parameter name	*Conditions*	*Values*
	• *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	
Lock function – Behaviour at locking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or venetian blinds Lock function = enabled	**none** up down
	Defines the operation to be performed upon entry into lock mode. The choice is between the operations associated with the two possible events: closing (or momentary contact, depending on the configuration) or opening (or sustained contact).	
Lock function – Behaviour at unlocking	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds Lock function = enabled	**none** up down
	Defines the operation to be performed upon unlocking. The choice is between the operations associated with the two possible events: closing (or momentary contact, depending on the configuration) or opening (or sustained contact).	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Input channel – Dedicated stop command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds Venetian blind mode = disabled	1 bit	C—T-	[1.017] trigger	360
	See notes for independent input.				
Input channel – Stop-step up / down command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds Venetian blind mode = enabled	1 bit	C--T-	[1.007] step	360
	See notes for independent input.				
Input channel – Move Up/down command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds	1 bit	C—T-	[1.008] up/down	359
	See notes for independent input.				

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Input channel – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input channel = coupled Type = shutters or Venetian blinds Lock function = enabled	1 bit	C-W-U	[1.003] enable	356.

9.4.10 Lock function

When the lock function is enabled, a behaviour can be defined for each input to be executed when a lock or unlock command is received.

Details are provided in the following sections; a summary of the various options is given in the Table 8.

Function type	*Behaviour on lock*	*Behaviour on release*
Switching	**none** off on toggle	**none** off on as before
Dimming	**none** off on toggle	**none** off on as before
Shutters or Venetian blinds	**none** up down	**none** up descent
scenario	**none** send first scene send second scene	
Shift register	NA	

Table 8 - Lock function behaviours

9.4.10.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Lock function	-	Enabled / **Disabled**
	Enables or disables the ability to lock an input via remote command (bus telegram).	

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Parameter name	*Conditions*	*Values*
Lock function – Invert lock device signal	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input x = enabled Type = any Lock function = enabled	**Not inverted** / inverted
	x=1,2. *Allows an "enable lock" code for a command to be interpreted as "disable lock" and vice versa.*	
Lock function – Lock after bus recovery	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input x = enabled Type = any Lock function = enabled	**no** / yes
	x=1,2. • *If Lock after bus recovery = yes, after a bus off/on the input is always locked, regardless of its state before the bus off;* • *if Lock after bus recovery = no, then if it is locked before the bus off, it remains locked after the bus on.*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Input *x* – Lock command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Input *x* = enabled Lock function = enabled	1 bit	C-W--	[1.003] enable	356
	x=1,2.				

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9.5 Alarm Configuration (for EK-TO2-TP and EK-TI2-TP only)

The *Alarm Configuration* tab is located under the *General* menu and allows you to set the alarm for relay power failure. It contains the following parameters, depending on the selected product and the type of authentication:

- Invalid card alarm
- Invalid time alarm
- Invalid day of the week alarm
- Invalid card level alarm
- Access counter alarm
- Relay power supply alarm

9.5.1.1 Communication parameters and objects

Parameter name	***Conditions***	***Values***
Invalid card alarm	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list	disabled **enabled**
	If enabled, the alarm configuration is made available in the Alarms tab and triggers when a specific card ID is not present in the White-list.	
Invalid time alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) and Authentication = White-list	disabled **enabled**
	If enabled, the alarm settings will appear in the Alarms tab and will alert you when the access time configured for a specific card is invalid.	
Invalid weekday alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) and Authentication = White-list	disabled **Enabled**
	If enabled, the alarm configuration is made available in the Alarms tab and triggers when a specific card ID has an invalid day of the week.	
Invalid card level alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) and Authentication = White-list	disabled **Enabled**
	If enabled, the alarm configuration is made available in the Alarms tab and signals when a specific card ID has an invalid level.	
Access counter alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) and Authentication = White-list	disabled **Enabled**
	If enabled, the alarm configuration is made available in the Alarms tab and triggers when a specific card ID has exceeded the configured number of accesses.	
Relay power supply alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder)	disabled **enabled**
	Allows you to enable or disable the bus signal indicating a loss of auxiliary power.	

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9.5.2 Invalid card alarm

The “Invalid card” alarm card contains the following parameters:

- Enable feedback LED (only for EK-TO2-TP reader)
- Color choice (only for EK-TO2-TP reader)
- Color (only for EK-TO2-TP reader)
- Flashing period (EK-TO2-TP reader only)
- Alarm reset after (EK-TO2-TP reader only)
- Timeout (EK-TO2-TP reader only)
- Enable alarm object
- Telegram value

9.5.2.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Enable feedback LED	Product type = EK-TO2-TP (card reader) Invalid card alarm = enabled	No **Yes**
	If enabled, the alarm is indicated by the LED on the button. *Available only for the EK-TO2-TP product.*	
Color choice	Product type = EK-TO2-TP (card reader) Invalid card alarm = enabled	Color list **Color picker**
	Allows you to set the selected LED Color for the alarm signal. *For reference, see section 8.9.1 .*	
Color	Product type = EK-TO2-TP (card reader) Invalid card alarm = enabled Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the Color of the LED used to indicate the alarm from a list in the drop-down menu.	
Color	Product type = EK-TO2-TP (card reader) Invalid card alarm = enabled Color choice = Color picker	**#FF0000** (range #000000, …, #FFFFFF)
	Allows you to select the LED Color for the alarm signal from the RGB selector (Standard or Advanced).	
Flashing period	Product type = EK-TO2-TP (card reader) Invalid card alarm = enabled	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
	Allows you to configure the LED flashing interval for the alarm signal.	
Alarm reset after	Product type = EK-TO2-TP (card reader) Invalid card alarm = enabled	Valid card From bus **Timeout or valid card**
	Allows you to set the visual reset of the alarm, i.e. the end of the alarm notification via LED. *As documented in section 8.8 , it is possible to configure the alarm reset following authentication with a valid card, after a preset timeout, or via a bus command.*	

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Parameter name	*Conditions*	*Values*
Timeout	Product type = EK-TO2-TP (card reader) Invalid card alarm = enabled Alarm reset after = Timeout or valid card	**00:00:05 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the alarm reset timeout.	
Enable alarm object	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid card alarm = enabled	**No** Yes
	Allows you to enable or disable the transmission of the CO signal on the bus in the event of an alarm.	
Telegram value	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid card alarm = enabled Enable alarm object = Yes	Inverted **Not inverted**
	Allows you to choose whether the telegram value is inverted.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Command reset invalid card alarm	Product type = EK-TO2-TP (card reader), Authentication = White-list Invalid card alarm = enabled Alarm reset after = from bus	1 bit	C-W--	[1.015] Reset	23
	Alarm reset is only available for the EK-TO2-TP reader.				
Invalid card alarm	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid card alarm = enabled Enable alarm object = Yes	1 bit	CR-T-	[1.005] Alarm	123

9.5.3 Invalid time alarm

The “Invalid time” alarm tab contains the following parameters:

- Enable feedback LED (only for EK-TO2-TP reader)
- Color choice (EK-TO2-TP reader only)
- Color (EK-TO2-TP reader only)
- Flashing period (EK-TO2-TP reader only)
- Alarm reset after (EK-TO2-TP reader only)
- Timeout (EK-TO2-TP reader only)

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- Enable alarm object
- Telegram value

9.5.3.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Enable feedback LED	Product type = EK-TO2-TP (card reader) Invalid time alarm = enabled	No **Yes**
	If enabled, the presence of the alarm is indicated by the LED button. *Available only for the EK-TO2-TP product.*	
Color choice	Product type = EK-TO2-TP (card reader) Invalid time alarm = enabled	Color list **Color picker**
	Allows you to set the selected LED Color for the alarm signal. *For reference, see section 8.9.1 .*	
Color	Product type = EK-TO2-TP (card reader) Invalid time alarm = enabled Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the Color of the LED used to indicate the alarm from a list in the drop-down menu.	
Color	Product type = EK-TO2-TP (card reader) Invalid time alarm = enabled Color choice = Color picker	**#FF0000** (range #000000, …, #FFFFFF)
	Allows you to select the LED Color for the alarm signal from the RGB selector (Standard or Advanced).	
Flashing period	Product type = EK-TO2-TP (card reader) Invalid time alarm = enabled	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
	Allows you to configure the LED flashing interval for the alarm signal.	
Alarm reset after	Product type = EK-TO2-TP (card reader) Invalid time alarm = enabled	Valid card From bus **Timeout or valid card**
	Allows you to set the visual reset of the alarm, i.e. the end of the alarm notification via LED. *As documented in section 8.8 , it is possible to configure the alarm reset following authentication with a valid card, after a preset timeout, or via a bus command.*	
Timeout	Product type = EK-TO2-TP (card reader) Invalid time alarm = enabled Alarm reset after = Timeout or valid card	**00:00:05 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the alarm reset timeout.	
Enable alarm object	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid time alarm = enabled	**No** Yes
	Allows you to enable or disable the transmission of the CO signal on the bus in the event of an alarm.	

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Parameter name	*Conditions*	*Values*
Telegram value	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid time alarm = enabled Enable alarm object = Yes	Inverted **Not inverted**
	Allows you to choose whether the telegram value is inverted.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
Command reset invalid time alarm reset	Product type = EK-TO2-TP (card reader), Authentication = White-list Invalid time alarm = enabled Alarm reset after = from bus	1 bit	C-W--	[1.015] Reset	25
	Alarm reset is only available for the EK-TO2-TP reader.				
Invalid time alarm	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid time alarm = enabled Enable alarm object = Yes	1 bit	CR-T-	[1.005] Alarm	125

9.5.4 Invalid day of the week alarm

The “Invalid day of the week” alarm tab contains the following parameters:

- Enable LED feedback (EK-TO2-TP reader only)
- Color choice (EK-TO2-TP reader only)
- Color (EK-TO2-TP reader only)
- Flashing period (EK-TO2-TP reader only)
- Alarm reset after (EK-TO2-TP reader only)
- Timeout (EK-TO2-TP reader only)
- Enable alarm object
- Telegram value

9.5.4.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Enable feedback LED	Product type = EK-TO2-TP (card reader) Invalid weekday alarm = enabled	No **Yes**

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Parameter name	*Conditions*	*Values*
	If enabled, the presence of the alarm is indicated on the LED button. *Available only for the EK-TO2-TP product.*	
Color choice	Product type = EK-TO2-TP (card reader) Invalid weekday alarm = enabled	Color list **Color picker**
	Allows you to set the selected LED Color for the alarm signal. *For reference, see section 8.9.1 .*	
Color	Product type = EK-TO2-TP (card reader) Invalid weekday alarm = enabled Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the LED Color for the alarm signal from a list in the drop-down menu.	
Color	Product type = EK-TO2-TP (card reader) Invalid weekday alarm = enabled Color choice = Color picker	**#FF0000** (range #000000, …, #FFFFFF)
	Allows you to select the LED Color for the alarm signal from the RGB selector (Standard or Advanced).	
Flashing period	Product type = EK-TO2-TP (card reader) Invalid weekday alarm = enabled	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
	Allows you to configure the LED flashing interval for the alarm signal.	
Alarm reset after	Product type = EK-TO2-TP (card reader) Invalid weekday alarm = enabled	Valid card From bus **Timeout or valid card**
	Allows you to set the visual reset of the alarm, i.e. the end of the alarm notification via LED. *As described in section 8.8 , it is possible to configure the alarm to reset following authentication with a valid card, after a preset timeout, or via a bus command.*	
Timeout	Product type = EK-TO2-TP (card reader) Invalid weekday alarm = enabled Alarm reset after = Timeout or valid card	**00:00:05 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the alarm reset timeout.	
Enable alarm object	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid weekday alarm = enabled	**No** Yes
	Allows you to enable or disable the transmission of the CO signal on the bus in the event of an alarm.	

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Parameter name	*Conditions*	*Values*
Telegram value	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid weekday alarm = enabled Enable alarm object = Yes	Inverted **Not inverted**
	Allows you to choose whether the telegram value is inverted.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
Command reset invalid weekday alarm	Product type = EK-TO2-TP (card reader) Authentication = White-list Invalid weekday alarm = enabled Alarm reset after = from bus	1 bit	C-W--	[1.015] Reset	26
	Alarm reset is only available for the EK-TO2-TP reader.				
Invalid weekday alarm	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid weekday alarm = enabled Enable alarm object = Yes	1 bit	CR-T-	[1.005] Alarm	126

9.5.5 Invalid card level alarm

The “Invalid card level” alarm card contains the following parameters:

- Enable feedback LED (only for EK-TO2-TP reader)
- Color choice (EK-TO2-TP reader only)
- Color (EK-TO2-TP reader only)
- Flashing period (EK-TO2-TP reader only)
- Alarm reset after (only for EK-TO2-TP reader)
- Timeout (EK-TO2-TP reader only)
- Enable alarm object
- Telegram value

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9.5.5.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Enable feedback LED	Product type = EK-TO2-TP (card reader) Invalid card level alarm = enabled	No **Yes**
	If enabled, the presence of the alarm is indicated by the LED on the button. *Available only for the EK-TO2-TP product.*	
Color choice	Product type = EK-TO2-TP (card reader) Invalid card level alarm = enabled	Color list **Color picker**
	Allows you to set the selected LED Color for the alarm signal. *For reference, see section 8.9.1 .*	
Color	Product type = EK-TO2-TP (card reader) Invalid card level alarm = enabled Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the LED Color for the alarm signal from a list in the drop-down menu.	
Color	Product type = EK-TO2-TP (card reader) Invalid card level alarm = enabled Color choice = Color picker	**#FF0000** (range #000000, …, #FFFFFF)
	Allows you to select the LED Color for the alarm signal from the RGB selector (Standard or Advanced).	
Flashing period	Product type = EK-TO2-TP (card reader) Invalid card level alarm = enabled	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
	Allows you to configure the LED flashing interval for the alarm signal.	
Alarm reset after	Product type = EK-TO2-TP (card reader) Invalid card level alarm = enabled	Valid card From bus **Timeout or valid card**
	Allows you to set the visual reset of the alarm, i.e. the end of the alarm notification via LED. *As documented in section 8.8 , it is possible to configure the alarm reset following authentication with a valid card, after a preset timeout, or via a bus command.*	
Timeout	Product type = EK-TO2-TP (card reader) Invalid card level alarm = enabled Alarm reset after = Timeout or valid card	**00:00:05 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the alarm reset timeout.	
Enable alarm object	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid card level alarm = enabled	**No** Yes
	Allows you to enable or disable the transmission of the CO signal on the bus in the event of an alarm.	

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Parameter name	*Conditions*	*Values*
Telegram value	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid card level alarm = enabled Enable alarm object = Yes	Inverted **Not inverted**
	Allows you to choose whether the telegram value is inverted.	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
Command reset invalid type card alarm	Product type = EK-TO2-TP (card holder) Authentication = White-list Invalid card level alarm = enabled Alarm reset after = from bus	1 bit	C-W--	[1.015] Reset	27
	Alarm reset is only available for the EK-TO2-TP reader.				
Invalid card level alarm	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Invalid card level alarm = enabled Enable alarm object = Yes	1 bit	CR-T-	[1.005] Alarm	127

9.5.6 Access counter alarm

The “Access Counter” alarm tab contains the following parameters:

- Enable feedback LED (only for EK-TO2-TP reader)
- Color choice (only for EK-TO2-TP reader)
- Color (EK-TO2-TP reader only)
- Flashing period (only for EK-TO2-TP reader)
- Alarm reset after (only for EK-TO2-TP reader)
- Timeout (EK-TO2-TP reader only)
- Enable alarm object
- Telegram value

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9.5.6.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Enable feedback LED	Product type = EK-TO2-TP (card reader) Access counter alarm = enabled	No **Yes**
	If enabled, the presence of the alarm is indicated by the LED on the button. *Available only for the EK-TO2-TP product.*	
Color choice	Product type = EK-TO2-TP (card reader) Access counter alarm = enabled	Color list **Color picker**
	Allows you to set the selected LED Color for the alarm signal. *For reference, see section 8.9.1 .*	
Color	Product type = EK-TO2-TP (card reader) Access counter alarm = enabled Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the Color of the LED for the alarm signal from a list in the drop-down menu.	
Color	Product type = EK-TO2-TP (card reader) Access counter alarm = enabled Color choice = Color picker	**#FF0000** (range #000000, …, #FFFFFF)
	Allows you to select the LED Color for the alarm signal from the RGB selector (Standard or Advanced).	
Flashing period	Product type = EK-TO2-TP (card reader) Access counter alarm = enabled	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
	Allows you to configure the LED flashing interval for the alarm signal.	
Alarm reset after	Product type = EK-TO2-TP (card reader) Access counter alarm = enabled	Valid card From bus **Timeout or valid card**
	Allows you to set the visual reset of the alarm, i.e. the end of the alarm notification via LED. *As documented in section 8.8 , it is possible to configure the alarm reset following authentication with a valid card, after a preset timeout, or via a bus command.*	
Timeout	Product type = EK-TO2-TP (card reader) Access counter alarm = enabled Alarm reset after = Timeout or valid card	**00:00:05 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the alarm reset timeout.	
Enable alarm object	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Entry counter alarm = enabled	**No** Yes
	Allows you to enable or disable the transmission of the CO signal via the bus in the event of an alarm.	

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Parameter name	Conditions	Values
Telegram value	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Access counter alarm = enabled Enable alarm object = Yes	Inverted **Not inverted**
	Allows you to choose whether the telegram value is inverted.	

Object name	Conditions	Dim.	Flags	DPT	No. of objects
Command reset access counter alarm	Product type = EK-TO2-TP (card holder), Authentication = White-list Access counter alarm = enabled Alarm reset after = via bus	1 bit	C-W--	[1.015] Reset	28
	Alarm reset is only available for the EK-TO2-TP reader.				
Expired access counter alarm	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Access counter alarm = enabled Enable alarm object = Yes	1 bit	CR-T-	[1.005] Alarm	128

9.5.7 Relay power supply alarm

The “Access Counter” alarm tab contains the following parameters:

- Enable alarm object
- Telegram value

9.5.7.1 Communication parameters and objects

Parameter name	Conditions	Values
Enable alarm object	Product type = EK-TO2-TP (card reader) EK-TI2-TP (card holder) Relay power supply alarm = enabled	No **Yes**
	Allows you to enable or disable the transmission of the CO signal to the bus in the event of an alarm.	
Telegram value	Product type = EK-TO2-TP (card reader), or Product type = EK-TI2-TP (card holder) and Authentication = White-list Access counter alarm = enabled Enable alarm object = Yes	Inverted **Not inverted**
	Allows you to choose whether the telegram value is inverted.	

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Object name	Conditions	Size	Flags	DPT	No. of Comm. Objects
Relay power supply alarm	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Relay power supply alarm = enabled Enable alarm object = Yes	1 bit	CR-T-	[1.005] Alarm	129

9.6 Card levels configuration

The *Card levels configuration* tab is located under the *General* menu and allows you to set access levels for specific users.

It contains the following parameters, depending on the type of authentication:

- Guest (the only one provided for EK-TD2-TP)
- Service
- Maintenance
- Security
- Administrator
- Maximum number of time slots
- Support for cards with 7-Byte UID

Note: For the EK-TI2-TP card holder, if authentication is disabled, only guest mode is available. Similarly, for the EK-TO2-TP reader, if authentication is centralised.

For the EK-TD2-TP outside door panel, only the guest level is available.

9.6.1.1 Communication parameters and objects

Parameter name	Conditions	Values
Guest	Product type = any	Disabled **Enabled**
	If enabled, the Guest level parameter configuration is made available in the Card Levels tab.	
Service	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list)	**Disabled** Enabled
	If enabled, the configuration of Service level parameters is made available in the Card Levels tab.	

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Parameter name	*Conditions*	*Values*
Maintenance	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list)	**Disabled** Enabled
	If enabled, the configuration of Maintenance level parameters is made available in the Card Levels tab.	
Security	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list)	**Disabled** Enabled
	If enabled, the configuration of Security level parameters is made available in the Card Levels tab.	
Administrator	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list)	**Disabled** Enabled
	If enabled, the configuration of Administrator-level parameters is made available in the Card Levels tab.	
Maximum number of time slots	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list)	None Time schedule 1 Time schedule 2 Time schedule 3 **Daily**
	Allows you to choose the number of time slots to manage. The "Daily" option allows you to configure up to 7 independent time slots.	
Support for cards with 7-Byte UID	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list)	**disabled** Enabled
	If enabled, this allows cards with 7-Byte UIDs to be managed; otherwise, cards with 4-Byte UIDs are supported.	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Guest Level – Card activation command	Product type = any Guest = enabled	1 bit	C-W--	[1.003] enable	45
Service Level – Card activation command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list) Service = enabled	1 bit	C-W--	[1.003] enable	56
Maintenance Level – Card activation command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list) Maintenance = enabled	1 bit	C-W--	[1.003] enable	67

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Security Level – Card activation command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list) Security = enabled	1 bit	C-W--	[1.003] enable	89
Administrator Level – Card activation command	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = Distributed (White-list) Administrator = enabled	1 bit	C-W--	[1.003] enable	111

9.6.2 Card levels

The card level tabs “Guest Level”, “Service Level”, “Maintenance Level”, “Security Level” and “Administrator Level” contain the following parameters:

- Enabling after download
- Enable virtual presence (only for EK-TO2-TP reader)
- Enable 1-bit commands
- Enable welcome
- Command value
- Enable goodbye
- Command value
- Enable 1-Byte commands
- Data format
- Enable welcome
- Command value
- Enable goodbye
- Command value
- Enable scene commands
- Enable welcome
- Command value
- Enable goodbye
- Command value
- Enable HVAC commands
- Enable welcome

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- Scene value
- Enable goodbye
- Scene value
- Enable temperature setpoint controls
- Enable welcome
- Command value
- Enable goodbye
- Command value

9.6.2.1 Communication parameters and objects

Parameter name	***Conditions***	***Values***
Enabling after download	Product type = any	Disabled **Enabled**
	Allows you to specify whether the corresponding level is enabled after download, or conversely must be enabled at runtime with the corresponding CO.	
Enable virtual presence	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	No **Yes**
	If the virtual presence feature is enabled at the general level, this option allows you to enable management for the corresponding card level.	
Enable 1-bit commands	Product type = any	**No** Yes
	Allows you to enable the sending of welcome or farewell commands (only under the specified conditions).	
Enable welcome	Product type = any	**No** Yes
	Enable sending of 1-bit welcome command.	
Command value	Product type = any Enable welcome = Yes	Inverted **Not inverted**
	Allows you to choose whether the command value is inverted.	
Enable goodbye	Product type = EK-TO2-TP (reader) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder)	**No** Yes
	Enable 1-bit goodbye command transmission.	
Command value	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Enable goodbye = Yes	Inverted **Not inverted**
	Allows you to choose whether the command value is inverted.	

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Parameter name	*Conditions*	*Values*
Enable 1-Byte commands	Product type = any	**No** Yes
	Allows you to enable the sending of welcome or farewell commands (only under the specified conditions).	
Data format	Product type = any	**1 signed Byte (DPT 6.010)** 1 unsigned Byte (DPT 5.010)
	Allows you to choose the format of the 1-Byte command (signed or unsigned).	
Enable welcome	Product type = any	**No** Yes
	Enables sending of 1-Byte welcome command (signed or unsigned).	
Command value	Product type = any Enable welcome = Yes	**0** 1-Byte signed: range -128…+127 1-Byte unsigned: range 0…255
	Allows you to select the command value.	
Enable goodbye	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder)	**No** Yes
	Enable sending of 1-Byte goodbye command (signed or unsigned).	
Command value	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Enable goodbye = Yes	**0** 1-Byte signed: range -128…+127 1-Byte unsigned: range 0…255
	Allows you to select the command value.	
Enable scene commands	Product type = any	**No** Yes
	Allows you to enable the sending of welcome or farewell scenarios (only under the specified conditions).	
Enable welcome	Product type = any	**No** Yes
	Enable sending of welcome scenario.	
Scene value	Product type = any Enable welcome = Yes	**1** 1…64
	Allows you to select the command value.	
Enable goodbye	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder)	**No** Yes
	Enable send goodbye scenario.	

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Parameter name	*Conditions*	*Values*
Scene value	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Enable goodbye = Yes	**1** 1…64
	Allows you to select the command value.	
Enable HVAC commands	Product type = any	**No** Yes
	Allows you to enable the sending of the welcome or farewell HVAC command (only under the specified conditions).	
Enable welcome	Product type = any	**No** Yes
	Enable sending of welcome HVAC command.	
Command value	Product type = any Enable welcome = Yes	Auto Comfort **Standby** Economy Building protection
	Allows you to select the command value.	
Enable goodbye	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder)	**No** Yes
	Enable sending of the HVAC goodbye command.	
Command value	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Enable goodbye = Yes	Auto Comfort **Standby** Economy Building protection
	Allows you to select the control value.	
Enable temperature setpoint commands	Product type = any	**No** Yes
	Allows you to enable the sending of the welcome or farewell temperature setpoint (only under the specified conditions).	
Enable welcome	Product type = any	**No** Yes
	Enable sending of welcome temperature setpoint.	
Command value	Product type = any Enable welcome = Yes	**18** -10 … +30 °C
	Allows you to select the command value.	

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Parameter name	*Conditions*	*Values*
Enable goodbye	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder)	**No** Yes
	Enable sending of goodbye temperature setpoint	
Command value	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Enable goodbye = Yes	**18** -10 … +30 °C
	Allows you to select the control value.	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Guest level – Welcome (1 bit)	Product type = any Guest = enabled Guest Level -> Enable 1-bit commands = Yes Enable welcome = Yes	1 bit	CR-T-	[1.006] Binary value	46
Guest level – Goodbye (1 bit)	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Guest = enabled Guest Level -> Enable 1-bit commands = Yes Enable goodbye = Yes	1 bit	CR-T-	[1.006] Binary value	47
Guest level – Welcome (1 Byte signed)	Product type = any Guest = enabled Guest level -> Enable 1-Byte commands = Yes Data format = 1-Byte signed [DPT 6.010] Enable welcome = Yes	1-Byte signed	CR-T-	[6.010] Counter pulses (-128, 127)	48

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Guest level – Welcome (1 Byte unsigned)	Product type = any Guest = enabled Guest Level -> Enable 1-Byte commands = Yes Data format = 1-Byte unsigned [DPT 5.010] Enable welcome = Yes	1-Byte unsigned	CR-T-	[5.010] Counter pulses (0, 255)	48
Guest level – Goodbye (1 Byte signed)	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Guest = enabled Guest Level -> Enable 1-Byte commands = Yes Data format = 1-Byte signed [DPT 6.010] Enable goodbye = Yes	1-Byte signed	CR-T-	[6.010] Counter pulses (-128, 127)	49
Guest Level – Goodbye (1 Byte unsigned)	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Guest = enabled Guest Level -> Enable 1-Byte commands = Yes Data format = 1-Byte unsigned [DPT 5.010] Enable goodbye = Yes	1-Byte unsigned	CR-T-	[5.010] Counter pulses (0, 255)	49
Guest Level – Welcome (Scene)	Product type = any Guest = enabled Guest Level -> Enable scene commands = Yes Enable welcome = Yes	1 Byte	CR-T-	[17.001] Scene number	50

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Guest Level – Goodbye (Scene)	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Guest = enabled Guest Level -> Enable scene commands = Yes Enable goodbye = Yes	1 Byte	CR-T-	[1.001] Scene number	51
Guest Level – Welcome (HVAC command)	Product type = any Guest = enabled Guest Level -> Enable HVAC controls = Yes Enable welcome = Yes	1 Byte	CR-T-	[20.102] HVAC mode	52
Guest Level – Goodbye (HVAC command)	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual Presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Guest = enabled Guest Level -> Enable HVAC controls = Yes Enable goodbye = Yes	1 Byte	CR-T-	[20.102] HVAC mode	53
Guest Level – Welcome (Temperature setpoint)	Product type = any Guest = enabled Guest Level -> Enable Temperature Setpoint = Yes Enable welcome = Yes	2 Bytes	CR-T-	[9.001] Temperature (°C)	54
Guest Level – Goodbye (Temperature setpoint)	Product type = EK-TO2-TP (card reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Guest = enabled Guest Level -> Enable Temperature Setpoint = Yes Enable goodbye = Yes	2 Bytes	CR-T-	[9.001] Temperature (°C)	55

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
[Role] Level – Welcome (1 bit)	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled Level *[Role]* -> Enable 1-bit commands = Yes Enable welcome = Yes	1 bit	CR-T-	[1.006] Binary value	57, 68, 90, 112.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Goodbye (1 bit)	Product type = EK-TO2-TP (card reader) Authentication = White-list General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* level -> Enable 1-bit commands = Yes Enable goodbye = Yes	1 bit	CR-T-	[1.006] Binary value	58, 69, 91, 113.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Welcome (1 Byte signed)	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* Level -> Enable 1-Byte commands = Yes Data format = 1-Byte signed [DPT 6.010] Enable welcome = Yes	1-Byte signed	CR-T-	[6.010] Counter pulses (-128, 127)	59, 70, 92, 114.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Welcome (1 Byte unsigned)	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* level -> Enable 1-Byte commands = Yes Data format = 1-Byte unsigned [DPT 5.010] Enable welcome = Yes	1 unsigned Byte	CR-T-	[5.010] Counter pulses (0, 255)	59, 70, 92, 114.
	[Role] = Service, Maintenance, Security, Administrator.				

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
[Role] Level – Goodbye (1 Byte signed)	Product type = EK-TO2-TP (reader) Authentication = White-list General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* level -> Enable 1-Byte commands = Yes Data format = 1-Byte signed [DPT 6.010] Enable goodbye = Yes	1-Byte signed	CR-T-	[6.010] Counter pulses (-128, 127)	60, 71, 93, 115.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Goodbye (1 Byte unsigned)	Product type = EK-TO2-TP (reader) Authentication = White-list General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* level -> Enable 1-Byte commands = Yes Data format = 1-Byte unsigned [DPT 5.010] Enable goodbye = Yes	1-Byte unsigned	CR-T-	[5.010] Counter pulses (0, 255)	60, 71, 93, 115.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Welcome (Scene)	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* Level -> Enable scene commands = Yes Enable welcome = Yes	1 Byte	CR-T-	[17.001] Scene number	61, 72, 94, 116.
	[Role] = Service, Maintenance, Security, Administrator.				

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
[Role] Level – Goodbye (Scene)	Product type = EK-TO2-TP (reader) Authentication = White-list General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Authentication = White-list Card level settings -> *[Role]* = enabled *[Role]* level -> Enable scene commands = Yes Enable goodbye = Yes	1 Byte	CR-T-	[1.001] Scene number	62, 73, 95, 117.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Welcome (HVAC command)	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* Level -> Enable HVAC commands = Yes Enable welcome = Yes	1 Byte	CR-T-	[20.102] HVAC mode	63, 74, 96, 118.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Goodbye (HVAC command)	Product type = EK-TO2-TP (reader) Authentication = White-list General -> Virtual Presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Authentication = White-list Card Level Configuration -> *[Role]* = enabled *[Role]* level -> Enable HVAC commands = Yes Enable goodbye = Yes	1 Byte	CR-T-	[20.102] HVAC mode	64, 75, 97, 119.
	[Role] = Service, Maintenance, Security, Administrator.				
[Role] Level – Welcome (Temperature setpoint)	Product type = EK-TO2-TP (card reader) or EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled *[Role]* Level -> Enable Temperature Setpoint = Yes Enable welcome = Yes	2 Bytes	CR-T-	[9.001] Temperature (°C)	65, 76, 98, 120.
	[Role] = Service, Maintenance, Security, Administrator.				

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Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
[Role] Level – Goodbye (Temperature setpoint)	Product type = EK-TO2-TP (reader) Authentication = White-list General -> Virtual presence = enabled Enable virtual presence = Yes or Product type = EK-TI2-TP (card holder) Authentication = White-list Card level configuration -> *[Role]* = enabled Level *[Role]* -> Enable temperature setpoint = Yes Enable Goodbye = Yes	2 Bytes	CR-T-	[9.001] Temperature (°C)	66, 77, 99, 121.
	[Role] = Service, Maintenance, Security, Administrator.				

9.7 Presence Configuration (EK-TI2-TP card holder only)

The Presence Configuration tab is located under the *General* menu and is only available if the selected device is the EK-TI2-TP card holder. It allows you to set the parameters for managing the card inserted into the card holder and contains the following parameters:

- Shutdown delay time
- Presence LED

9.7.1.1 Communication parameters and objects

Parameter name	*Conditions*	*Values*
Shutdown delay time	Product type = EK-TI2-TP (card holder)	**00:00:03.00 hh:mm:ss.ff** [range 00:00:00.00 … 04:39:37.21]
	Allows you to set the time, after the card has been removed from the slot, at which the value 0 is sent to the outputs configured as "load". *If the value 00:00:00.00 is set, no delay is applied between the card being removed from the slot and the value being sent to the bus.*	
Presence LED	Product type = EK-TI2-TP (card holder)	**No** Yes
	If enabled, the generic LED cannot be controlled independently, as it indicates whether a card is present in the slot.	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of objects*
Generic LED – *[type]* command	Product type = EK-TI2-TP (card holder) Presence LED = No	*depending on configuration* (**1-bit**)	C-W--	*depending on configuration* (**[1.001] switch**)	132
	For the values of the [type] parameter, see the Table 11.				

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9.8 Virtual presence configuration (EK-TO2-TP and EK-TD2-TP only)

The *Virtual presence configuration* tab is located under the *General* menu and is only available if the selected device is the EK-TO2-TP reader and if virtual presence has been enabled via the *General* menu.

For further details on this topic, please refer to section 8.2.3 .

The form contains the following details:

Virtual presence telegram

- Telegram value
- Transmission cycle time

General parameters

- Sensor activity timeout
- Enable room occupancy maintenance

Door sensor

- Contact type
- Door opening timeout
- Door closing timeout

Motion sensor

- Contact type
- Detection timeout
- OFF delay after detection

Bus activity sensor

- Enabling

9.8.1.1 Communication parameters and objects

Parameter name	***Conditions***	***Values***
Virtual presence telegram – Telegram value	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	Inverted **Not inverted**
	Allows you to choose whether the value of the virtual presence telegram is inverted.	
Virtual presence telegram - Transmission cycle time	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	**00:00:00 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the cyclic transmission time on the bus. *00:00:00 means no cyclic transmission.*	
General parameters – Sensor activity timeout	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	**00:30:00 hh:mm:ss** [range 00:00:00 … 04:39:37]

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Parameter name	*Conditions*	*Values*
	Allows you to set the elapsed time after which, in the absence of activity, 'goodbye' COs are sent	
General parameters – Enable room occupancy maintenance	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	No **Yes**
	Allows you to enable the CO that locks the room status if the room is already occupied.	
Door sensor – contact type	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	NO (normally open) **NC (normally closed)**
	Allows you to choose whether the sensor is NO or NC type.	
Door sensor – door opening timeout	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	**00:00:30 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the door opening timeout after the badge has been read.	
Door sensor – door closing timeout	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	**00:00:30 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the door closing timeout after the door has been opened.	
Motion sensor – Contact type	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	NO (normally open) **NC (normally closed)**
	Allows you to choose whether the sensor is NO or NC type.	
Motion sensor – Detection timeout	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	**00:01:00 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the motion detection timeout.	
Motion sensor – OFF delay after detection	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	**00:00:10 hh:mm:ss** [range 00:00:00 … 04:39:37]
	Allows you to set the sensor delay before returning to OFF after a detection.	
Bus activity sensor - Enabling	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled	Disabled **Enabled**
	Allows you to enable or disable activity monitoring on the bus.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*No. of Comm. Objects*
Virtual presence – Room occupancy status	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual Presence = enabled	1 bit	CR-T-	[1.018] Occupancy	384

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Object name	*Conditions*	*Size*	*Flags*	*DPT*	*No. of Comm. Objects*
Virtual presence – Door sensor	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual Presence = enabled	1 bit	C-W--	[1.001] Switch	385
Virtual presence – Motion sensor	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual Presence = enabled	1 bit	C-W--	[1.001] Switch	387
Virtual presence – Bus activity sensor	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual presence = enabled Bus activity sensor: enabling = Enabled	1 bit	C-W--	[1.001] Switch	389
Virtual presence – Room occupancy hold command	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) General -> Virtual Presence = enabled Enable room occupancy maintenance = Yes	1 bit	C-W--	[1.003] enable	395

9.9 LED

The LED card allows you to configure up to 4 different LEDs:

- Generic LED
- Ringbell LED (only for the EK-TO2-TP reader and the EK-TD2-TP outside door panel)
- DND (Do Not Disturb) LED
- MUR (Make Up Room) LED

9.9.1 Generic LED

The *Generic LED* Tab is located inside the LED Tab and is available for all device models.

As regards the EK-TI2-TP card holder, this feature is only available if the following option has been selected in the *General* tab → *Presence Configuration:*

Presence LED = No.

The *Generic LED* Tab contains the following parameters:

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- Threshold type
- Number of thresholds (for 1- and 2-Byte threshold type only)

Depending on the type of data selected for the threshold, the following sub-parameters are available:

- Threshold bit 1 – OFF (for threshold type = 1-bit or 2-bit)
- Threshold bit 1 – ON (for threshold type = 1-bit or 2-bit)
- Threshold bit 2 – OFF (for threshold type = 2-bit)
- Threshold bit 2 – ON (for threshold type = 2-bit)
- Threshold n (n=1,…,10) for all other threshold types.

For each threshold, the sub-parameters are:

- Color choice
- Color
- Flashing period

And for 1- or 2-Byte thresholds, there is also the parameter

- Value

9.9.1.1 Communication parameters and objects

Parameter name	***Conditions***	***Values***
Threshold type	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) or Product type = EK-TI2-TP (card holder) and General -> Presence configuration -> Presence indication on generic LED = No	**1 bit** 2 bit 1 Byte signed 1 Byte unsigned 2 Byte signed 2 Byte unsigned 2 Byte floating
	Sets the data type for the threshold.	
Threshold bit 1 – OFF – Color choice	Threshold type = 1 bit, or 2 bit	Color list **Color picker**
Threshold bit 1 – OFF – Color	Threshold type = 1 bit, or 2 bits Color choice = Color list	**Black** (other Colors available)
Threshold bit 1 – OFF – Color	Threshold type = 1 bit, or 2 bit Color choice = Color picker	**#000000** (range #000000, …, #FFFFFF)

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Parameter name	*Conditions*	*Values*
Threshold bit 1 – OFF – Blinking period	Threshold type = 1 bit, or 2 bit	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
Threshold bit 1 – ON – Color choice	Threshold type = 1 bit, or 2 bit	Color list **Color picker**
Threshold bit 1 – ON – Color	Threshold type = 1 bit or 2 bit Color choice = Color list	**Black** (other colors available)
Threshold bit 1 – ON – Color	Threshold type = 1 bit, or 2 bit	**#0000FF** (range #000000, …, #FFFFFF)
Threshold bit 1 – ON – Blinking period	Threshold type = 1 bit, or 2 bit	**None** 0.25 s ON, 0.25 s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
Threshold bit 2 – OFF – Color choice	Threshold type = 2 bit	Color list **Color picker**
Threshold bit 2 – OFF – Color	Threshold type = 2 bit Color choice = Color list	**Black** (other Colors available)
Threshold bit 2 – OFF – Color	Threshold type = 2-bit Color choice = Color picker	**#000000** (range #000000, …, #FFFFFF)

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Parameter name	*Conditions*	*Values*
Threshold bit 2 – OFF – Blinking period	Threshold type = 2 bits	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
Threshold bit 2 – ON – Color choice	Threshold type = 2 bit	Color list **Color picker**
Threshold bit 2 – ON – Color	Threshold type = 2 bit Color choice = Color list	**Black** (other colors available)
Threshold bit 2 – ON – Color	Threshold type = 2 bit Color choice = Color picker	**#00FF00** (range #000000, …, #FFFFFF)
Threshold bit 2 – ON – Bliking period	Threshold type = 2 bit	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
Threshold n (n=1,…,10) - value	Threshold type = 1 or 2 Bytes Number of thresholds = n	**0** 1 Byte signed: range -128…+127 1 Byte unsigned: range 0…255 2 Bytes signed: range -32768…+32767 2 Byte unsigned: range 0…65535 2 Byte floating: range -671088.64…670760.96
Threshold n (n=1,…,10) - Color choice	Threshold type = 1 or 2 Bytes Number of thresholds = n	Color list **Color picker**
Threshold n (n=1,…,10) - Color choice	Threshold type = 1 or 2 Bytes Number of thresholds = n Color choice = Color list	**Black** (other Colors available)
Threshold n (n=1,…,10) - Color	Threshold type = 1 or 2 Bytes Number of thresholds = n Color choice = Color picker	**#000000 (threshold 1)** **#0000FF (threshold 2)** **#AEAEB2 (thresholds 3,…,10)** (range #000000, …, #FFFFFF)

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Parameter name	*Conditions*	*Values*
Threshold n (n=1,…,10) – Blinking period	Threshold type = 1 or 2 Bytes Number of thresholds = n	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Generic LED – 1 bit command	Threshold type = 1 bit	1 bit	C-W--	[1.001] switch	132
Generic LED – 2 bit command	Threshold type = 2 bit	2 bit	C-W--	[2.001] switch control	132
Generic LED – 1 Byte signed command	Threshold type = 1 Byte signed	1 Byte signed	C-W--	[6.001] percentage (-128…127%)	132
Generic LED – 1 Byte unsigned command	Threshold type = 1 Byte unsigned	1 Byte unsigned	C-W--	[5.010] counter pulses (0…255)	132
Generic LED – 2 Byte signed command	Threshold type = 2 Byte signed	2 Byte signed	C-W--	[8.001] pulse difference	132
Generic LED – 2 Byte unsigned command	Threshold type = 2 Byte unsigned	2 Byte unsigned	C-W--	[7.001] pulses	132
Generic LED – 2 Byte floating command	Threshold type = 2 Byte floating	2 Byte floating point	C-W--	[9.002] temperature difference	132

9.9.2 Ringbell LED (EK-TO2-TP and EK-TD2-TP only)

The *Ringbell LED* board is located inside the LED board and is only available if the EK-TO2-TP card reader or the EK-TD2-TP outside door panel has been enabled.

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It contains the following parameters, which allow you to control the LED's behaviour when the button is pressed (ON) and released (OFF), or to indicate whether a card is valid:

- Color choice
- ON Color
- Color choice
- OFF Color
- Off delay
- Valid card – Color choice
- Valid card – Color
- Valid card – Off delay
- Valid card – Blinking period

9.9.2.1 Communication parameters and objects

Parameter name	***Conditions***	***Values***
Color choice	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel)	Color list **Color picker**
	Allows you to set the type of LED Color choice when the doorbell button is pressed (ON).	
ON Color	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the LED Color when the doorbell button is pressed (ON) from a list in the drop-down menu.	
ON Color	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) Color choice = Color picker	**#FFFFFF** (range #000000, …, #FFFFFF)
	Allows you to choose the LED Color when the doorbell button is pressed (ON), using the RGB selector (Standard or Advanced).	
Color choice	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel)	Color list **Color picker**
	Allows you to set the method for selecting the LED Color when the doorbell button is released (OFF).	
Color OFF	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the LED Color when the doorbell button is released (OFF) from a list in the drop-down menu.	
OFF Color	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) Color choice = Color picker	**#0000FF** (range #000000, …, #FFFFFF)

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Parameter name	*Conditions*	*Values*
	Allows you to select the LED Color when the doorbell button is released (OFF), via the RGB selector (Standard or Advanced).	
Off delay	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel)	**00:00:01.0 hh:mm:ss.f** [range 00:00:00.2 … 04:39:37.2]
	Allows you to set the delay before the LED switches to the Off Color.	
Valid card – Color choice	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel)	Color list **Color picker**
	This allows you to set the method for selecting the LED Color when a valid card is swiped.	
Valid card - Color	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) Color choice = Color list	**Aluminium Grey** (other Colors available)
	Allows you to select the LED Color when a valid card is swiped, from a list in the drop-down menu.	
Valid card - Color	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel) Color choice = Color picker	**#00FF00** (range #000000, …, #FFFFFF)
	Allows you to choose the LED Color when a valid card is swiped, via the RGB selector (Standard or Advanced).	
Off delay	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel)	**00:00:05 hh:mm:ss** [range 00:00:02 … 00:10:00]
	Allows you to set the delay after which the LED turns off, following the swiping of a valid card.	
Blinking period	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel)	**None** 0.25s ON, 0.25s OFF 0.25s ON, 0.75s OFF 0.50s ON, 0.50s OFF 0.75s ON, 0.25s OFF 0.50s ON, 1.50s OFF 1s ON, 1s OFF 1.50s ON, 0.50s OFF 1s ON, 3s OFF 2s ON, 2s OFF 3s ON, 1s OFF
	Allows you to configure the LED flashing duration when a valid card is read.	

Object name	*Conditions*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
Bell button status	Product type = EK-TO2-TP (reader) or EK-TD2-TP (outside door panel)	1 bit	CR-T-	[1.001] Switch	35

9.9.3 DND (Do Not Disturb) LED

The *DND (Do Not Disturb) LED* card is located inside the LED card and is available for all device models.

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It contains just one parameter:

- Off delay

9.9.3.1 Parameters and communication objects

Parameter name	*Conditions*	*Values*
Off delay	Product type = any	**00:00:00.0 hh:mm:ss.f** [range 00:00:00.0 … 04:39:37.2]
	Any delay in the LED switching off, following receipt of the command that disables the LED. *If the value 00:00:00.0 is set, no delay is applied between the reception of the command and the LED switching off*	

Item name	*Condition*	*Dimensions*	*Flags*	*DPT*	*No. of Comm. Objects*
DND (Do Not Disturb) LED command	Product type = any	1 bit	C-W--	[1.003] Enable	13
DND (Do Not Disturb) LED status	Product type = any	1 bit	CR-T-	[1.003] Enable	15

9.9.4 MUR LED (Room Cleaning)

The *LED MUR (Room Cleaning)* tab is located within the LED tab and is available for all device models.

It contains just one parameter:

- Off delay

9.9.4.1 Parameters and communication objects

Parameter name	*Conditions*	*Values*
Off delay	Product type = any	**00:00:00.0 hh:mm:ss.f** [range 00:00:00.0 … 04:39:37.2]
	Any delay in the LED switching off, following receipt of the command that disables the LED. *If the value 00:00:00.0 is set, no delay is applied between receiving the command and the LED switching off*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
MUR (Make Up Room) LED command	Product type = any	1 bit	C-W--	[1.003] Enable	14

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
MUR (Make Up Room) LED status	Product type = any	1 bit	CR-T-	[1.003] Enable	16

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9.10 Logic functions

For a comprehensive explanation of the logic function, please refer to the section 8.7.1 .

Communication objects for a specific logic function are only available if the Logic Module is enabled, the logic function is enabled and, finally, if at least one input has been enabled.

9.10.1.1 Main parameters

Parameter name	***Conditions***	***Values***
Logic function n	Number of logic functions ≠ 0	**disabled** Enabled
	Allows a specific logic function to be enabled. *n=1,…,8.*	
Logic operation type	Logic function n = enabled	**OR** AND XOR NOR NAND XNOR IDN
	Defines the logical operation to be performed on the inputs. *n=1,…,8.*	
Read delay after bus recovery	Logic function n = enabled	mm:ss.fff (**00:01.000**) [range 00.00.000 … 05.00.000]
	After bus recovery, the device waits for the specified time before evaluating the logic objects configured as inputs; for those for which no value has been received by the end of the time, a request is sent over the bus. *The maximum value is 05:00.000.* *n=1,…,8.*	
Logic object *x*	Logic function n = enabled	disabled / **enabled**
	Defines which of the available logical objects to use as inputs. *Logic objects configured as disabled are ignored and the corresponding communication objects are not generated.* *x= 1,…,8. n=1,…,8.*	
Logic object x – Logic object *x* negated	Logic function n = enabled Logic object x = enabled	**no** / yes
	Applies a logical negation to the value of the logical object. *x= 1,…,8. n=1,…,8.*	

The logical function is evaluated only if and when at least one of the input logical objects is updated.

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Logic function n - Logic object *x*	Logic function n = enabled Logil object x = enabled	1 bit	C-WTU	[1.001] switch	Function 1: 180,…,187 Function 2: 189,…,196 Function 3: 198,…,205 Function 4: 207,…,214 Function 5: 216,…,223 Function 6: 225,…,232 Function 7: 234,…,241 Function 8: 243,…,250
	x = 1,…,8. n = 1,…,8. *These are the objects relating to the inputs for each logic function.*				
Logic function n - Logic object status	Logic function n = enabled Logic object x = enabled	1 bit	CR-T-	[1.001] switch	188, 197, 206, 215, 224, 233, 242, 251.
	x = 1,…,8. n = 1,…,8. *These are the objects relating to the outputs for each logical function.*				

9.11 Comparison functions

For a comprehensive discussion of comparison functions, refer to the section 8.7.2

The status object for a specific comparison function is available only if the Logic Module is enabled and comparison function n (n=1,…,8) is enabled.

Furthermore, depending on the type of comparison set, new communication objects can be enabled, or internal objects or numerical values can be used.

9.11.1.1 Main parameters

Parameter name	***Conditions***	***Values***
Comparison function n	Number of comparison functions ≠ 0	**disabled** Enabled
	Allows a specific comparison function to be enabled. *n=1,…,8.*	
Comparison operation	Comparison function n = enabled	**=** != < > >= <=
	Defines the comparison operation to be performed. *n=1,…,8.*	
Hysteresis	Comparison function n = enabled	0… 15 % (**0**)
	Defines a hysteresis value to be used in the comparison between the two values. *n=1,…,8.*	

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Parameter name	*Conditions*	*Values*
DPT	Comparison function n = enabled	**1 bit (DPT 1.001)** 2 bits (DPT 2.001) 4 bits (DPT 3.008) 1 Byte scaling (DPT 5.001) 1 Byte signed (DPT 6.010) 1 Byte unsigned (DPT 5.010) 2 Byte signed (DPT 8.001) 2 Byte unsigned (DPT 7.001) 2 Byte float (DPT 9.002)
	Indicates the data type of comparison term 1 when set as a communication object. *n=1,…,8.*	
Comparison 2	Comparison function n = enabled	**Communication object** Numeric value
	Allows you to set whether the second comparison object is a communication object or a numerical value. *n=1,…,8.*	
DPT	Comparison function n = enabled Comparison 2 = communication object	**1 bit (DPT 1.001)** 2 bits (DPT 2.001) 4 bits (DPT 3.008) 1 Byte scaling (DPT 5.001) 1 Byte signed (DPT 6.010) 1 Byte unsigned (DPT 5.010) 2 Byte signed (DPT 8.001) 2 Byte unsigned (DPT 7.001) 2 Byte float (DPT 9.002)
	Indicates the data type of comparison term 2, when set as a communication object. *n=1,…,8.*	
Value	Comparison function n = enabled Comparison 2 = numerical value	**0** [-671088…670100]
	Expresses the value of comparison term 2, when set as a numerical value. *n=1,…,8.*	

Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of objects*
Comparison n - Object 1 *[Data type]*	Comparison function n = enabled Comparison 1 = communication object	Depending on configuration **1 bit**	C-W--	depending on configuration **([1.001] switch)**	252, 255, 258, 261, 264, 267, 270, 273.
	n=1,…,8. *The types and dimensions of individual objects can be configured as described below.*				
Comparison n - Object 2 *[Data type]*	Comparison function n = enabled Comparison 2 = communication object	Depending on the configuration **1 bit**	C-W--	depending on configuration **([1.001] switch)**	253, 256, 259, 262, 265, 268, 271, 274.
	n=1,…,8. *The types and dimensions of individual objects can be configured as described below.*				

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Object name	Conditions	Dim.	Flags	DPT	No. of objects
Comparison state *n*	Comparison function n = enabled	1 bit	CR-T-	[1.001] switch	254, 257, 260, 263, 266, 269, 272, 275.
	n=1,…,8. *Expresses the result of the comparison operation, as True or False.*				

The data dimensions and *Data Point Types* are as follows:

Dimension	DPT
1 bit	[1.001] 1-bit, switch
2 bit	[2.001] 1-bit controlled, switch control
4 bit	[3.008] blind control
1 Byte scaling	[5.001] 8-bit unsigned value, counter pulses
1 Byte signed	[6.010] 8-bit signed value, counter pulses
1 Byte unsigned	[5.010] 8-bit unsigned value, counter pulses
2 Byte signed	[8.001] 2-Byte signed value, pulse difference
2 Byte unsigned	[8.001] 2-Byte unsigned value, pulses
2 Byte float	[9.002] 2-Byte floating-point value, temperature difference

Table 9 - DPT comparison objects

9.12 Arithmetic functions

For a comprehensive discussion of arithmetic functions, refer to the section 8.7.3.

The status object for a specific arithmetic function is available only if the Logic Module is enabled and the arithmetic function n (n=1,…,8) is enabled.

Furthermore, depending on the type of operation set, new communication objects can be enabled, or internal objects or numerical values can be used.

9.12.1.1 Main parameters

Parameter name	Conditions	Values
Arithmetic function n	Number of arithmetic functions ≠ 0	**disabled** Enabled
	Allows a specific arithmetic function to be enabled. *n=1,…,8.*	

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Parameter name	*Conditions*	*Values*
Operation type	Arithmetic function n = enabled	**Minimum** Maximum Average Sum Difference Multiplication Division
	Defines the arithmetic operation to be performed. *n=1,…,8.*	
Read delay after bus recovery	Arithmetic function n = enabled	00:00:.000 … 05:00.000 (**00:01.000**)
	Defines a read delay for operands upon bus restart. *n=1,…,8.*	
DPT of the result	Arithmetic function n = enabled	**1 bit value (DPT 1.001)** 2 bit value (DPT 2.001) 4 bit value (DPT 3.008) 1 Byte scaling value (DPT 5.001) 1 Byte signed value (DPT 6.010) 1 Byte unsigned value (DPT 5.010) 2 Byte signed value (DPT 8.001) 2 Byte unsigned value (DPT 7.001) 2 Byte floating value (DPT 9.002) 4 Byte signed value (DPT 13.001) 4 Byte unsigned (DPT 12.001) 4 Byte floating value (DPT 14.056)
	Defines the data type for the result of the operation *n=1,…,8.*	
Arithmetic object x	Arithmetic function n = enabled	**Disabled** / enabled
	n=1,…,8. *x=1,…,8.* *Enables operand x.* *For the division operation, only arithmetic objects 1 and 2 can be enabled.*	
DPT	Arithmetic function n = enabled Arithmetic object x = enabled	**1 bit value (DPT 1.001)** 2 bit value (DPT 2.001) 4 bit value (DPT 3.008) 1 Byte scaling value (DPT 5.001) 1 Byte signed value (DPT 6.010) 1 Byte unsigned value (DPT 5.010) 2 Byte signed value (DPT 8.001) 2 Byte unsigned value (DPT 7.001) 2 Byte floating value (DPT 9.002) 4 Byte signed value (DPT 13.001) 4 Byte unsigned (DPT 12.001) 4 Byte floating value (DPT 14.056)
	n=1,…,8. *x=1,…,8.* *Defines the data type for the operand x.*	

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Object name	*Conditions*	*Dim.*	*Flags*	*DPT*	*No. of Comm. Objects*
Arithmetic function n - Object x value	Arithmetic function n = enabled Arithmetic object x = enabled	Depending on configuration **1 bit**	C-W--	depending on configuration **([1.001] switch)**	276, 277, 278, 279, 280, 281, 282, 283. 286, 287, 288, 289, 290, 291, 292, 293. 296, 297, 298, 299, 300, 301, 302, 303. 306, 307, 308, 309, 310, 311, 312, 313. 316, 317, 318, 319, 320, 321, 322, 323. 326, 327, 328, 329, 330, 331, 332, 333. 336, 337, 338, 339, 340, 341, 342, 343. 346, 347, 348, 349, 350, 351, 352, 353.
	n=1,…,8. *x=1,…,8.* *The types and dimensions of individual objects can be configured as described in the Table 10.*				
Arithmetic function n - Result	Arithmetic function n = enabled	Depending on the configuration **1 bit**	CR-T-	depending on configuration **([1.001] switch)**	284, 294, 304, 314, 324, 334, 344, 354.
	n=1,…,8. *x=1,…,8.* *The types and dimensions of individual objects can be configured as described below.*				
Arithmetic function n - Error	Arithmetic function n = enabled	1 bit	CR-T-	[1.001] alarm	285, 295, 305, 315, 325, 335, 345, 355.
	n=1,…,8. *Triggers an alarm if the operation resulted in an error.*				

The data dimensions and *Data Point Types* are as follows:

Dimension	*DPT*
1 bit	[1.001] 1-bit, switch
2 bit	[2.001] 1-bit controlled, switch control
4 bit	[3.008] blind control
1 Byte percentage	[5.001] 8-bit unsigned value, counter pulses
1 Byte signed	[6.010] 8-bit signed value, counter pulses
1 Byte unsigned	[5.010] 8-bit unsigned value, counter pulses
2 Byte signed	[8.001] 2-Byte signed value, pulse difference
2 Byte unsigned	[8.001] 2-Byte unsigned value, pulses
2 Byte floating	[9.002] 2-Byte floating-point value, temperature difference
4 Byte signed	[13.001] 4-Byte signed value, counter pulses (signed)

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Dimension	*DPT*
4 Byte unsigned	[12.001] 4-Byte unsigned value, counter pulses (unsigned)
4 Byte floating	[14.056] 4-Byte floating-point value, power (W)

Table 10 - DPT of the arithmetic objects

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10. Summary of KNX communication objects

Below is a list of KNX communication objects with the corresponding *Data Point Types* (DPT) defined by the application programme depending on the configurations made.

The order of the list is generally by object number.

Object name	Dimension	Flags	DPT	CO number(s)
Heartbeat command (*) (**) (***)	1 bit	C-W--	[1.1] DPT_Switch	2
Heartbeat (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	3
Card transit data (*) (**)	4 Bytes	CR-T-	[15.0] DPT_entrance access	4
Card extended transit data (*) (**)	14 Bytes	CR-T-	[16.0] DPT_Character String (ASCII)	5
Valid access (***)	1 bit	C-W--	[1.2] DPT_Boolean	7
Date-time (*) (**)	8 Bytes	C-WTU	[19.1] DPT_Date_time	8
Date (*) (**)	3 Bytes	C-WTU	[11.1] DPT_Date	8
Time (*) (**)	3 Bytes	C-WTU	[10.1] Time of day	9
White-list (*) (**)	14 Bytes	C-W--	[16.0] DPT_Character String (ASCII)	11
Device status info (*) (**)	14 Bytes	CR-T-	[16.0] DPT_Character String (ASCII)	12
DND LED command (Do not disturb) (*) (**) (***)	1 bit	C-W--	[1.3] DPT_Enable	13
MUR LED command (Make up room) (*) (**) (***)	1 bit	C-W--	[1.3] DPT_Enable	14
DND LED status (Do not disturb) (*) (**) (***)	1 bit	CR-T-	[1.3] DPT_Enable	15
MUR LED status (Make up room) (*) (**) (***)	1 bit	CR-T-	[1.3] DPT_Enable	16
LED brightness command (*) (**) (***)	1 Byte	C-W--	[5.001] DPT_Percentage	17
Access granted (*)	1 bit	C-W--	[1.5] DPT_Alarm	19
Access denied (*)	1 bit	C-W--	[1.5] DPT_Alarm	20
Technical alarm command (*) (**) (***)	1 bit	C-W--	[1.5] DPT_Alarm	21
Command reset invalid card alarm (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	23
Command reset invalid time alarm (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	25
Command reset invalid weekday alarm (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	26
Command reset invalid type card alarm (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	27
Command reset access counter alarm (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	28
Night mode LED enable command (*) (**) (***)	1 bit	C-W--	[1.3] DPT_Enable	33
Night mode LED brightness value command (*) (**) (***)	1 Byte	C-W--	[5.1] DPT_Percentage	34
Doorbell button status (*) (***)	1 bit	CR-T-	[1.1] DPT_Switch	35
Card presence status (**)	1 bit	CR-T-	[1.2] DPT_Boolean	36

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Object name	Dimension	Flags	DPT	CO number(s)
Guest level – Card activation command (*) (**) (***)	1 bit	C-W--	[1.3] DPT_Enable	45
Guest level – Welcome (1 bit) (*) (**) (***)	1 bit	CR-T-	[1.6] DPT_Binary_value	46
Guest level – Goodbye (1 bit) (*) (**) (***)	1 bit	CR-T-	[1.6] DPT_Binary_value	47
Guest level – Welcome (1 signed Byte) (*) (**) (***)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	48
Guest level – Welcome (1 unsigned Byte) (*) (**) (***)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	48
Guest level – Goodbye (1 unsigned Byte) (*) (**) (***)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	49
Guest level – Goodbye (1 signed Byte) (*) (**) (***)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	49
Guest level – Welcome (Scene) (*) (**) (***)	1 Byte	CR-T-	[17.1] DPT_scene_number	50
Guest level – Goodbye (Scene) (*) (**) (***)	1 Byte	CR-T-	[17.1] DPT_scene_number	51
Guest level – Welcome (HVAC command) (*) (**) (***)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	52
Guest level – Goodbye (HVAC command) (*) (**) (***)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	53
Guest level – Welcome (Temperature setpoint) (*) (**) (***)	2 Bytes	CR-T-	[9.1] DPT_temperature	54
Guest level – Goodbye (Temperature setpoint) (*) (**) (***)	2 Bytes	CR-T-	[9.1] DPT_temperature	55
Service level – Card activation command (*) (**)	1 bit	C-W--	[1.3] DPT_Enable	56
Service level – Welcome (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	57
Service level – Goodbye (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	58
Service level – Welcome (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	59
Service level – Welcome (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	59
Service level – Goodbye (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	60
Service level – Goodbye (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	60
Service level – Welcome (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	61
Service level – Goodbye (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	62
Service level – Welcome (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	63
Service level – Goodbye (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	64
Service level – Welcome (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	65
Service level – Goodbye (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	66
Maintenance level – Card activation command (*) (**)	1 bit	C-W--	[1.3] DPT_Enable	67
Maintenance level – Welcome (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	68
Maintenance level – Goodbye (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	69

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Object name	Dimension	Flags	DPT	CO number(s)
Maintenance level – Welcome (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	70
Maintenance level – Welcome (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	70
Maintenance level – Goodbye (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	71
Maintenance level – Goodbye (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	71
Maintenance level – Welcome (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	72
Maintenance level – Goodbye (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	73
Maintenance level – Welcome (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	74
Maintenance level – Goodbye (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	75
Maintenance level – Welcome (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	76
Maintenance level – Goodbye (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	77
Security level – Card activation command (*) (**)	1 bit	C-W--	[1.3] DPT_Enable	89
Security level – Welcome (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	90
Security level – Goodbye (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	91
Security level – Welcome (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	92
Security level – Welcome (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	92
Security level – Goodbye (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	93
Security level – Goodbye (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	93
Security level – Welcome (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	94
Security level – Goodbye (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	95
Security level – Welcome (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	96
Security level – Goodbye (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	97
Security level – Welcome (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	98
Security level – Goodbye (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	99
Administrator level – Card activation command (*) (**)	1 bit	C-W--	[1.3] DPT_Enable	111
Administrator level – Welcome (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	112
Administrator level – Goodbye (1 bit) (*) (**)	1 bit	CR-T-	[1.6] DPT_Binary_value	113
Administrator level – Welcome (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	114

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Object name	Dimension	Flags	DPT	CO number(s)
Administrator level – Welcome (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	114
Administrator level – Goodbye (1 unsigned Byte) (*) (**)	1 Byte	CR-T-	[5.010] DPT_counter_pulses (0…255)	115
Administrator level – Goodbye (1 signed Byte) (*) (**)	1 Byte	CR-T-	[6.010] DPT_counter_pulses (-128…127)	115
Administrator level – Welcome (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	116
Administrator level – Goodbye (Scene) (*) (**)	1 Byte	CR-T-	[17.1] DPT_scene_number	117
Administrator level – Welcome (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	118
Administrator level – Goodbye (HVAC command) (*) (**)	1 Byte	CR-T-	[20.102] DPT_HVAC_mode	119
Administrator level – Welcome (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	120
Administrator level – Goodbye (Temperature setpoint) (*) (**)	2 Bytes	CR-T-	[9.1] DPT_temperature	121
Invalid card alarm (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	123
Invalid time alarm (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	125
Invalid weekday alarm (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	126
Invalid card level alarm (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	127
Expired access counter alarm (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	128
Relay power supply alarm (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	129
Generic LED – *[type]* command (*) (**) (***)	*See Table 11*	C-W--	*See Table 11*	132
Output channel – Up/Down command (*) (**)	1 bit	C-W--	[1.008] DPT_up/down	136
Output channel – Stop-Step Up/Down command (*) (**)	1 bit	C-W--	[1.007] DPT_step	137
Output channel – Dedicated stop command (*) (**)	1 bit	C-W--	[1.017] DPT_trigger	138
Output channel – Info move (*) (**)	1 bit	CR-T-	[1.011] DPT_state	139
Output channel – Valid current abs position (*) (**)	1 bit	CR-T-	[1.002] DPT_boolean	140
Output channel – Dimmer blind position command (*) (**)	4 bit	C-W--	[3.008] DPT_blind control	141
Output channel – Dimmer valve position command (*) (**)	4 bit	C-W--	[3.008] DPT_blind control	141
Output channel – Dimmer shutter position command (*) (**)	4 bit	C-W--	[3.008] DPT_blind control	141
Output channel – Abs [valve / shutter / blind] position command (*) (**)	1 bit	C-W--	[5.001] DPT_percentage (0..100%)	142
Output channel – Abs [valve / shutter / blind] position status (*) (**)	1 bit	CR-T-	[5.001] DPT_percentage (0..100%)	143
Output channel – Dimmerr slats command (*) (**)	4 bit	C-W--	[3.008] DPT_blind control	144
Output channel – Abs slats position command (*) (**)	1 bit	C-W--	[5.001] DPT_percentage (0..100%)	145

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Object name	Dimension	Flags	DPT	CO number(s)
Output channel – Abs slats position status (*) (**)	1 bit	CR-T-	[5.001] DPT_percentage (0..100%)	146
Output channel – Wind alarm (*) (**)	1 bit	C-W--	[1.005] DPT_alarm	147
Output channel – Frost alarm (*) (**)	1 bit	C-W--	[1.005] DPT_alarm	148
Output channel – Rain alarm (*) (**)	1 bit	C-W--	[1.005] DPT_alarm	149
Output 1 – On/Off command (*) (**)	1 bit	CRWTU	[1.1] DPT_Switch	150
Output 1 – Valve continuous command (*) (**)	1 Byte	C-W--	[5.001] DPT_percentage (0..100%)	151
Output 1 – Load status (**)	1 bit	CR-T-	[1.1] DPT_Switch	152
Output 1 – Lock status (*)	1 bit	CR-T-	[1.3] DPT_Enable	152
Output 1 – On/Off status (*) (**)	1 bit	CR-T-	[1.1] DPT_Switch	153
Output channel – Direction status output 1 (*) (**)	1 bit	CR-T-	[1.1] DPT_Switch	153
Output 2 – On/Off command (*) (**)	1 bit	CRWTU	[1.1] DPT_Switch	154
Output 2 – Valve continuous command (*) (**)	1 Byte	C-W--	[5.001] DPT_percentage (0..100%)	155
Output 2 – Load status (**)	1 bit	CR-T-	[1.1] DPT_Switch	156
Output 2 – Lock status (*)	1 bit	CR-T-	[1.3] DPT_Enable	156
Output 2 – On/Off status (*) (**)	1 bit	CR-T-	[1.1] DPT_Switch	157
Output channel – Direction status output 2 (*) (**)	1 bit	CR-T-	[1.1] DPT_Switch	157
Output 1 – Lock command (*) (**)	1 bit	C-W--	[1.3] DPT_Enable	158
Output channel – Lock command (*) (**)	1 bit	C-W--	[1.3] DPT_Enable	158
Output 2 – Lock command (*) (**)	1 bit	C-W--	[1.3] DPT_Enable	159
Output 1 – Forcing command (*) (**)	2 bit	C-W--	[2.1] DPT_Switch_control	160
Output channel – Forcing command (*) (**)	2 bit	C-W--	[2.1] DPT_Switch_control	160
Output 2 – Forcing command (*) (**)	2 bit	C-W--	[2.1] DPT_Switch_control	161
Output 1 – Staircase light start/stop command (*) (**)	1 bit	C-W--	[1.010] DPT_Start_Stop	162
Output channel – Staircase light start/stop command (*) (**)	1 bit	C-W--	[1.010] DPT_Start_Stop	162
Output 2 – Staircase light start/stop command (*) (**)	1 bit	C-W--	[1.010] DPT_Start_Stop	163
Output 1 – Scenario number (*) (**)	1 Byte	C-W--	[17.001] DPT_Scene_number [18.001] DPT_Scene_control	164
Output channel – Scenario number (*) (**)	1 Byte	C-W--	[17.001] DPT_Scene_number [18.001] DPT_Scene_control	164
Output 2 – Scenario number (*) (**)	1 Byte	C-W--	[17.001] DPT_Scene_number [18.001] DPT_Scene_control	165
Output 1 – Energy counter (*) (**)	4 Bytes	CR-T-	[13.010] DPT_Active energy (Wh)	166
Output 1 – Energy counter reset command (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	167
Output 1 – Operating hours counter (*) (**)	2 Byte	CR-T-	[12.102] DPT_LongTimePeriod_Hrs	168
Output 1 – Operating seconds counter (*) (**)	4 Byte	CR-T-	[13.100] DPT_Time lag [s]	169

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Object name	Dimension	Flags	DPT	CO number(s)
Output 1 – Hours counter reset command (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	170
Output 1 – Hours counter overflow (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	171
Output 2 – Energy counter (*) (**)	4 Bytes	CR-T-	[13.010] DPT_Active energy (Wh)	172
Output 2 – Energy counter reset command (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	173
Output 2 – Operating hours counter (*) (**)	2 Byte	CR-T-	[12.102] DPT_LongTimePeriod_Hrs	174
Output 2 – Hours counter reset command (*) (**)	1 bit	C-W--	[1.015] DPT_Reset	175
Output 2 – Hours counter overflow (*) (**)	1 bit	CR-T-	[1.005] DPT_alarm	176
Output 2 – Operating seconds counter (*) (**)	4 Byte	CR-T-	[13.100] DPT_Time lag [s]	177
Logic function 1 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	180, 181, 182, 183, 184, 185, 186, 187
Logic function 1 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	188
Logic function 2 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	189, 190, 191, 192, 193, 194, 195, 196
Logic function 2 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	197
Logic function 3 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	198, 199, 200, 201, 202, 203, 204, 205
Logic function 3 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	206
Logic function 4 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	207, 208, 209, 210, 211, 212, 213, 214
Logic function 4 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	215
Logic function 5 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	216, 217, 218, 219, 220, 221, 222, 223
Logic function 5 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	224
Logic function 6 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	225, 226, 227, 228, 229, 230, 231, 232
Logic function 6 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	233
Logic function 7 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	234, 235, 236, 237, 238, 239, 240, 241
Logic function 7 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	242
Logic function 8 – Logic object x (*) (**) (***)	1 bit	C-WTU	[1.1] DPT_Switch	243, 244, 245, 246, 247, 248, 249, 250
Logic function 8 – Logic object status x (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	251
Comparison n – Object 1 *[Data type]* (*) (**) (***) (n=1,…,8)	*See Table 9*	C-W--	*See Table 9*	252, 255, 258, 261, 264, 267, 270, 273

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Object name	Dimension	Flags	DPT	CO number(s)
Comparison n – Object 2 *[Data type]* (*) (**) (***) (n=1,…,8)	*See Table 9*	C-W--	*See Table 9*	253, 256, 259, 262, 265, 268, 271, 274
Comparison state n (n=1,…,8) (*) (**) (***)	1 bit	CR-T-	[1.1] DPT_Switch	254, 257, 260, 263, 266, 269, 272, 275
Arithmetic function 1 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	276, 277, 278, 279, 280, 281, 282, 283
Arithmetic function 1 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	284
Arithmetic function 1 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	285
Arithmetic function 2 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	286, 287, 288, 289, 290, 291, 292, 293
Arithmetic function 2 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	294
Arithmetic function 2 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	295
Arithmetic function 3 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	296, 297, 298, 299, 300, 301, 302, 303
Arithmetic function 3 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	304
Arithmetic function 3 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	305
Arithmetic function 4 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	306, 307, 308, 309, 310, 311, 312, 313
Arithmetic function 4 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	314
Arithmetic function 4 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	315
Arithmetic function 5 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	316, 317, 318, 319, 320, 321, 322, 323
Arithmetic function 5 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	324
Arithmetic function 5 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	325
Arithmetic function 6 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	326, 327, 328, 329, 330, 331, 332, 333
Arithmetic function 6 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	334
Arithmetic function 6 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	335
Arithmetic function 7 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	336, 337, 338, 339, 340, 341, 342, 343
Arithmetic function 7 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	344
Arithmetic function 7 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	345
Arithmetic function 8 – Object x value (*) (**) (***)	*See Table 10*	C-W--	*See Table 10*	346, 347, 348, 349, 3590, 351, 352, 353
Arithmetic function 8 – Result (*) (**) (***)	*See Table 10*	CR-T-	*See Table 10*	354
Arithmetic function 8 – Error (*) (**) (***)	1 bit	CR-T-	[1.005] DPT_alarm	355
Input 1 – Lock command (*) (**)	1 bit	C-W-U	[1.3] DPT_Enable	356

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Object name	Dimension	Flags	DPT	CO number(s)
Input 1 – Switch command (*) (**)	1 bit	C-WTU	[1.1] DPT_Switch	357
Input channel – Switch command (*) (**)	1 bit	C-WTU	[1.1] DPT_Switch	357
Input 1 – Dedicated stop command (*) (**)	1 bit	C—T-	[1.017] DPT_trigger	357
Input 1 – Stop/Step Up/Down command (*) (**)	1 bit	C—T-	[1.007] DPT_Step	357
Input 1 – Dimming Up/Down/Stop command (*) (**)	4 bit	C—T-	[3.007] DPT_dimming_control	358
Input channel – Dimming Up/Down/Stop command (*) (**)	4 bit	C—T-	[3.007] DPT_dimming_control	358
Input 1 – Up/Down command (*) (**)	1 bit	C—T-	[1.008] DPT_up/down	359
Input channel – Move Up / Down command (*) (**)	1 bit	C—T-	[1.008] DPT_up/down	359
Input channel – Dedicated stop command (*) (**)	1 bit	C—T-	[1.017] DPT_trigger	360
Input channel – Stop-step up/down command (*) (**)	1 bit	C—T-	[1.007] DPT_Step	360
Input 1 – Scene number (*) (**)	1 Byte	C—T-	[17.001] DPT_Scene_number [18.001] DPT_Scene_control	360
Input channel – Switch command (*) (**)	1 bit	C-WTU	[1.1] DPT_Switch	361
Input 1 – Shift register (*) (**)	1 Byte	CR-T-	[5.010] DPT_Counter pulses (0...255)	361
Input 2 – Lock command (*) (**)	1 bit	C-W-U	[1.3] DPT_Enable	362
Input 2 – Switch command (*) (**)	1 bit	C-WTU	[1.1] DPT_Switch	363
Input 2 – Dedicated stop command (*) (**)	1 bit	C—T-	[1.017] DPT_trigger	363
Input 2 – Stop/Step Up/Down command (*) (**)	1 bit	C—T-	[1.007] DPT_Step	363
Input 2 – Dimming Up/Down/Stop command (*) (**)	4 bit	C—T-	[3.007] DPT_dimming_control	364
Input 2 – Up/Down command (*) (**)	1 bit	C—T-	[1.008] DPT_up/down	365
Input 2 – Scenario number (*) (**)	1 Byte	C—T-	[17.001] DPT_Scene_number [18.001] DPT_Scene_control	366
Input 2 – Shift register (*) (**)	1 Byte	CR-T-	[5.010] DPT_Counter pulses (0...255)	367
Input 1 – Switching status *[type]* object n (*) (**) (n=1,…,8)	*See Table 7*	CR-T-	*See Table 7*	368, 369, 370, 371, 372, 373, 374, 375
Input 2 – Switching status *[type]* object n (*) (**) (n=1,…,8)	*See Table 7*	CR-T-	*See Table 7*	376, 377, 378, 379, 380, 381, 382, 383
Virtual presence – Room occupancy status (*) (***)	1 bit	CR-T-	[1.018] DPT_Occupancy	384
Virtual presence – Door sensor (*) (***)	1 bit	C-W--	[1.1] DPT_Switch	385
Virtual presence – Motion sensor (*) (***)	1 bit	C-W--	[1.1] DPT_Switch	387
Virtual presence – Bus activity sensor (*) (***)	1 bit	C-W--	[1.1] DPT_Switch	389
Virtual presence – Room occupancy hold command (*) (***)	1 bit	C-W--	[1.3] DPT_Enable	395

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(*) Available for EK-TO2-TP reader
(**) Available for EK-TI2-TP card holder
(***) Available for EK-TD2-TP outside door panel

Size	*DPT*
1 bit value	[1.001] switch
2 bit value	[2.*] 1-bit controlled
1 value unsigned value	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-Byte
1 Byte signed value	[6.*] 8-bit signed value
2 Byte unsigned value	[7.*] 2-Byte unsigned value
2 Byte signed value	[8.*] 2-Byte signed value
2 Byte floating value	[9.*] 2-Byte float value

Table 11 - Dimensions and DPT for Generic LED Communication Objects

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11. Appendix

11.1 Warnings

- Installation, electrical connection, configuration and commissioning of the device must only be carried out by qualified personnel.
- Opening the device housing will immediately invalidate the warranty.

11.2 Return of defective devices

Devices with faults or defects may be returned for repair or replacement by following the procedure described below.

11.2.1 Devices purchased directly from ekinex®

You must first contact ekinex®technical support by sending an email to support@ekinex.com with the following information (mandatory):

- Exact model of the device
- Serial number (found on the label attached to the product)
- Date and/or details of the purchase document
- A precise and as detailed as possible description of the fault or problem

ekinex®technical support will contact the customer promptly, as appropriate, to investigate the issue further, suggest possible solutions or authorise the return of the device for repair or replacement.
Devices must be sent to the following address:

EKINEX S.p.A. - Via Novara, 37 - I-28010 Vaprio d'Agogna (NO) - Italy.

Any further instructions will be agreed with technical support during the support process.

11.2.2 Devices purchased through retailers

For assistance regarding devices purchased through retailers, please contact the retailers' technical support department.
Depending on the nature of the problem and any other factors, at the sole discretion of ekinex®and in agreement with the retailer, the customer may be advised to contact ekinex®directly following the same procedure as above.

11.3 Further information

This application manual is intended for installers, system integrators and system configurators.
For further information on the product, please contact the ekinex® technical support team at support@ekinex.com or visit the website www.ekinex.com.

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