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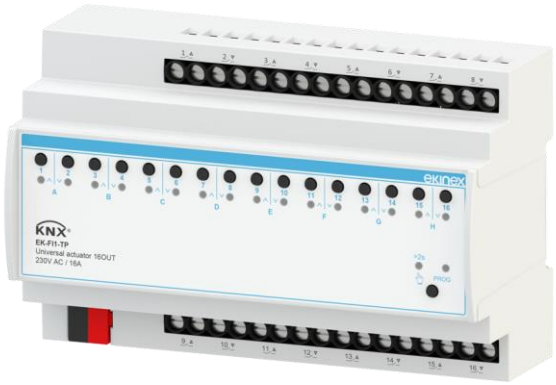
Application manual



KNX universal actuators ÆVO series

EK-FG1-TP 8 output / 4 channels

EK-FI1-TP 16 output / 8 channels

Contents

Release	Update	Date	Author	Revised by
1.0	First issue	03/02/2025	G. Schiochet	V. Cappelli
2.0	EK-FI1-TP device integration	24/04/2025	G. Schiochet	V. Cappelli
2.1	Added meteo alarms management	09/05/2025	G. Schiochet	V. Cappelli
2.2	Minor corrections for valve behavior	28/05/2025	G. Schiochet	V. Cappelli

1 Scope of the document

This manual describes the application details for version 1.0 of the ekinex® EK-FG1-TP universal actuator module with 8 outputs (4/8 channels) and the ekinex® EK-FI1-TP universal actuator module with 16 outputs (8/16 channels).

The document is intended for the system configurator as a description and reference guide for the device functionality and application programming. For mechanical and electrical details of the installation device, please refer to the data sheet of the device itself.

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

Item	*File name (## = release)*	*Version*	*Device rel.*	*Update*
Technical datasheet	STEKFG1TP_EN.pdf STEKFI1TP_EN.pdf	1.0 and later	1.0	05/2025
Application manual	MAEKFG1FI1TP_EN.pdf	1.0 and later		
Application program	APEKFG1TP##.knxprod APEKFI1TP##.knxprod	0.1 and later		

2 Product description

The ekinex® EK-FG1-TP 8-output actuator module (4/8 channels) is a modular DIN-rail device for internal panel mounting, which allows the independent switching of 4 or 8 electrical loads respectively; similarly, the ekinex® EK-FI1-TP 16-output actuator module (8/16 channels) is a modular DIN-rail device for internal panel mounting and allows the independent switching of 8 or 16 electrical loads respectively.The outputs consist of relay contacts.

The device is equipped with an integrated interface module to the KNX bus and is designed for mounting on a unified DIN rail inside electrical panels.

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 activation or deactivation of the outputs, through the application of a series of utility functions defined according to the programming.

It is also possible to manually operate the outputs using the membrane keys on the front of the unit; indicator LEDs allow checking the condition of the outputs.

The device draws its power exclusively from the KNX bus line with a SELV voltage of 30 Vdc. Therefore, no auxiliary power supply is required.

For further technical information, please also refer to the product datasheet STEKFG1TP_EN.pdf or STEKFI1TP_EN.pdf available on the ekinex website www.ekinex.com.

2.1 Technical data

2.1.1 Supply

- Power supply 21-30 Vdc via KNX bus
- Bus current draw at start-up: 54 mA @30 Vdc, 49 mA @21 Vdc
- Bus current draw in stand-by: 10 mA @30 Vdc, 13 mA @21 Vdc
- Bus current draw during relay movement: 32 mA @21-30 Vdc

2.1.2 Outputs

- EK-FG1-TP: 8 independent outputs, 4 combined in channels (depending on use)
- EK-FI1-TP: 16 independent outputs, 8 combined in channels (depending on use)
- Bistable relays with tungsten pre-contact
- Rated current (I_n) per output: AC 16(6) A @250 Vac (4000 VA); DC 7 A @30 Vdc (210 W)
- Maximum load per output: resistive 4000 W, inductive 1500 VA, LED lamps 90-230 Vac max. 400 W
- Maximum inrush current: 800 A / 200 µs, 165 A / 20 ms
- Maximum capacitive load: 200 µF

- Possibility of connecting different phases in adjacent outputs
- Total maximum current in device: 96 A
- Short-circuit protection: not present
- Overload protection: not present
- Connection method: screw terminal block (0.5 Nm torque max.)
- Cable cross-section: 4 mm² / 2 x 2,5 mm² (0,5 mm² min.)
- Outputs per common: 1

2.1.3 Environmental conditions

- Operating temperature: - 5 ... + 45°C
- Storage temperature: - 25 ... + 55°C
- Transport temperature: - 25 ... + 70°C
- Relative humidity: 95% not condensing)

2.1.4 Other characteristics

- Housing in plastic material
- Mounting on 35 mm rail (according to EN 60715)
- Protection degree IP20 (installed device)
- Overvoltage class III (according to EN 60664-1)
- Classification climatic 3K5 and mechanical 3M2 (according to EN 50491-2)
- Pollution degree 2 (according to IEC 60664-1)
- Mechanical lifetime (min. cycles): 3 000 000
- Electrical lifetime (min. cycles): 100000 @8A / 25000 @16 A (Vac)
- Dimensions (WxHxD): 71 x 90 x 63 mm (for EK-FG1-TP), 142 x 90 x 63 mm (for EK-FI1-TP)
- Weight: 277 g (for EK-FG1-TP), 505 g (for EK-FI1-TP)

3 Switching, display and connection elements

The device is equipped with:

- membrane buttons for manual activation of the outputs;
- a button to switch the device to programming mode (short press) or to switch between manual mode or control line of the outputs (long press > 2s);
- LED indicators for the status of the outputs and for the manual mode;
- LED indicator for the programming mode;
- screw terminal blocks for connecting the output loads;
- plug-in terminal block for connecting the KNX bus line.

The terminals of the outputs that can be used as coupled are located side by side on the upper or lower terminal block; the corresponding outputs are marked with letters from A to D (corresponding to the channels) and numbers from 1 to 8 for EK-FG1-TP, or with letters from A to H and numbers from 1 to 16 for EK-FI1-TP. The up/down arrows are intended to recall the typical function for roller shutters/blinds (raise/lower). Further details on this can be found in the following chapters.

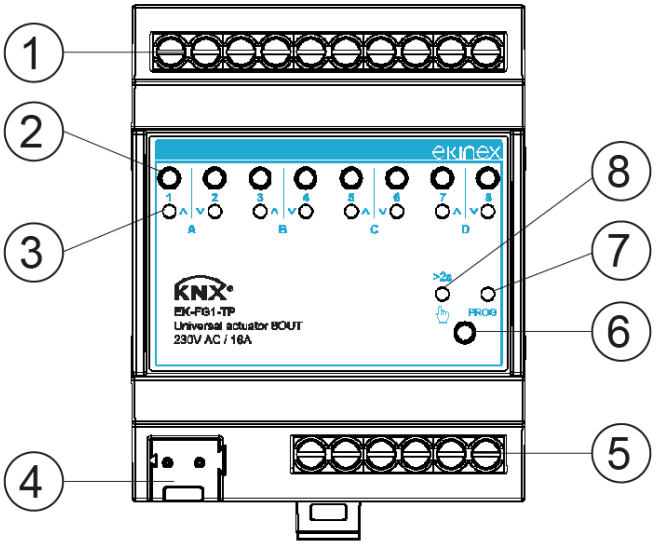


Figure 1 - Switching, display and connection elements for EK-FG1-TP

1. Connection terminals for outputs A-1 to C-5 2. Buttons for forced operation of the outputs 3. Green LEDs for indicating the status of the outputs 4. Connection terminal for KNX bus line	5. Connection terminals for outputs C-6 to D-8 6. Button for switching between forced and automatic operation of the outputs / KNX programming 7. Red LED for indicating KNX programming mode

	8. Green LED for indicating the operating mode (on = forced operation, off = automatic operation)

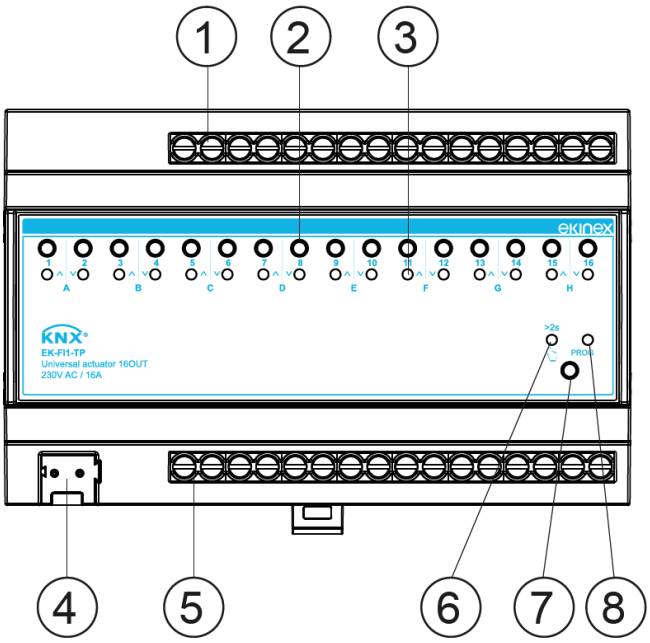


Figure 2 - Switching, display and connection elements for EK-FI1-TP

1. Connection terminals for outputs A-1 to D-8 2. Buttons for forced operation of the outputs 3. Green LEDs for indicating the status of the outputs 4. Connection terminal for KNX bus line	5. Connection terminals for outputs E-9 to H-16 6. Button for switching between forced and automatic operation of the outputs / KNX programming 7. Red LED for indicating KNX programming mode 8. Green LED for indicating the operating mode (on = forced operation, off = automatic operation)

4 Configuration

The functionality of the device on the settings done via software.

In order to configure the device, the ETS5 development tool (or later versions) and the dedicated application program for the device, called **APEKFG1TP##.knxprod** for EK-FG1-TP or **APEKFI1TP##.knxprod** for EK-FI1-TP, are required; the latter can be downloaded from the ekinex website www.ekinex.com.

The application program allows access, within the ETS environment, to the configuration of all the working parameters of the device. The program must be loaded into ETS (alternatively, it is possible to load the entire ekinex® product database in a single operation), after which all the device specimens of the considered type can be added to the project being defined.

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

The configuration can be, and generally will be, defined completely in off-line mode; the transfer of the set configuration to the device will then take place in the programming phase, described in the next paragraph.

Product code	No. of channels/ouputs	ETS application software (## = release)	Communication objects (max nr.)	Group adresses (max nr.)
EK-FG1-TP	4 / 8	APEKFG1TP##.knxprod	681	254
EK-FI1-TP	8 / 16	APEKFI1TP##.knxprod	871	254

Configuration and commissioning of KNX devices require specialized skills. To acquire these skills, you should attend training courses at a training center certified by KNX.

For further information: www.knx.org

5 Commissioning

After the device configuration has been defined within the ETS project according to the user requirements, to carry out programming it is necessary to carry out the following operations:

- electrically connect the device, as described in the technical data sheet, to the KNX bus in the final destination system or in a reduced system, composed specifically for programming. The system will in any case contain an interface device to the PC on which the KNX environment is installed;
- apply power to the bus;
- activate the programming mode on the device by pressing the appropriate button located on the front. The programming mode indicator LED must light up with a fixed light;
- from the ETS environment, start programming (which in the case of first configuration must include the physical address to be given to the device).

Once the program has been downloaded, the device automatically returns to operational mode; the programming LED must be off. The device is now programmed and ready for operation in the system.

5.1 Device reset

To reset the device, remove the connection to the bus network by removing the bus terminal from its seat. Keeping the programming button pressed, reinsert the bus terminal in its seat; after about 10 seconds, the programming LED flashes quickly. Release the programming button and extract the clamp again; the reset has been performed. At this point it is necessary to carry out the addressing and configuration of the device again using ETS.

Warning! The reset resets the device to the factory delivery state. The addressing and the value of the parameters set in the configuration phase are lost.

6 Function description

The device works as a controlled switch, which activates its outputs according to the commands received from the bus in the form of KNX telegrams.

In addition to direct activation, it also has auxiliary functions such as timing functions and logical combination of inputs. These functions are described in detail in the following paragraphs.

The logic outputs are of the binary (or digital) type, that is, they can only assume the two values “On” and “Off”; each output is equipped with a bistable relay.

6.1 Start-up

When the bus is connected, the device enters a fully active state after a short period (of the order of tens of ms) necessary for reinitialization. It is possible to define a longer additional delay to avoid overloading the bus during the system start-up phase.

At this point the device is ready for operation.

To operate, the device receives a telegram from the bus, sent by a KNX sensor or another KNX control device, which determines the opening or closing of one or more relays. Each output uses a bistable relay and can also be controlled either via the KNX bus or manually via buttons on the front of the device. There are also LEDs on the front that indicate the status of each output. The device requires only power from the KNX bus at 21-30Vdc.

6.1.1 Resetting outputs

In any mode, it is possible to define the behavior of the device following some relevant events. In particular, these events are:

- Bus On, i.e. the restoration of the KNX bus;
- downloading a new configuration from ETS.

Further events are then given by the cessation of particular functions, such as the block function or the forcing of the outputs.

For each of these events, the state of the outputs (or pairs of outputs) can be defined by configuration among a set of values depending on how each output is configured. These sets of values will be indicated later in the paragraphs describing the relative functions.

It should be noted that in all the cases listed above it is assumed that the voltage is present; otherwise, even if the internal state of the outputs is the expected one, the physical switching of the output relays cannot take place.

6.2 Manual operation

Manual operation is an alternative possibility to switching inputs via bus commands; this mode is intended for test or maintenance situations.

6.2.1 Output status when changing mode

When manual mode is activated, the status of the outputs is not altered. When manual mode is active, telegrams from the bus do not affect the physical outputs; the output contacts can only be switched via the membrane keys on the front.

Manual activation / deactivation of the outputs does not cause any status feedback telegram to be generated on the bus. The LEDs associated with the outputs will continue to indicate their status in any case.

Even when returning online from manual mode, the status of the outputs remains the one currently set.

From another point of view, the situation could be illustrated by saying that while remaining in manual mode, it is as if the internal variables were temporarily "disconnected" from the group addresses. When "reconnected" (exiting manual) their value remains unchanged until a new bus command alters it.

The same considerations made for bus commands apply to switching due to internal timing functions (for example, activation delays or stair light function): status changes due to internal functions have no effect as long as manual mode remains active.

6.2.2 Activating manual mode

If manual operation has been enabled by ETS, to switch to manual operation proceed as follows:

1) Press the manual mode button on the front of the device for at least 2 seconds. In normal operation, the LED is off; when the LED lights up green, the forced operation buttons are active, and manual mode is activated.

2) Press the keypad button corresponding to the channel to be activated (in the example: A-1). Repeated pressing toggles between On and Off.

3) When the need is over, deactivate manual mode by pressing the mode change button again for at least 2 seconds. When switching to normal mode, the indicator LED turns off.

Switching to manual mode via the front panel can be prevented in two ways, both configurable:

- by completely disabling the manual operation functionality from the ETS interface;
- by a bus command.

It should be noted that the bus command just mentioned prevents the mode change via the appropriate button, but does not allow the mode to be changed.

If manual mode is neither inhibited by configuration nor defined as bus controllable, another parameter can be used to set a timeout period (*Restore automatic mode*) after which, if the device is left in manual mode, it is returned to online mode. This prevents the device from being left in an uncontrollable state by mistake.

6.3 Online operation

All features described below assume the device has been correspondingly programmed by means of the ETS tool. A fully unprogrammed device causes no activity on the bus; it can be switched to manual mode and operated through the membrane keys on the front panel.

6.3.1 Software working cycle

The software working cycle can be described as follows:

- Handle incoming telegrams from the KNX bus to update internal state variables
- Implement timing functions and other inbuilt functions to determine effect on physical outputs;
- Drive output relays outputs according to output status
- Handle the key presses from the membrane key on the front.
- Respond to bus messages requesting feedback on the status of the outputs and of the device.

There are also special events on which it is possible to trigger additional features. These events are for instance the bus and power supply failure and recovery, and the download of a new configuration with ETS.

6.3.2 State variables (Communication objects)

The determination of the status of physical outputs is made basing on internal state variables. These state variables, once assigned a group address, are actually KNX communication objects, which allows other devices on the bus to exploit the features of the device.

State variables undergo the usual rules for communication objects, among which – for instance – the effect of flags to determine how the change of value affects the transmission of the objects.

6.3.3 Output independent mode and coupling

Outputs can be driven independently, or they can be coupled; the features available in both modes will be explained in detail in following chapters.

Due to the nature of the functions this device most frequently performs, the outputs can be grouped in pairs. In this case, each channel is made of a pair of outputs which are physically close on the terminal block.

In order to maintain a consistent naming, the outputs are numbered in the same way regardless whether the channel pairing is used or not.

Since the channels are identified by the letters A,B,C,D (for EK-FG1-TP) or A,B,C,D,E,F,G,H (for EK-FI1-TP) and the outputs with the numbers 1 to 8 (for EK-FG1-TP) or 1 to 16 (for EK-FI1-TP), the outputs are indicated as 1, 2 for channel A, 3, 4 for channel B and so on. For uniformity, the same naming is used even if the outputs are used as independent.

In order to specify channel pairings, each output can be configured in two modes: independent (or single) and coupled.

- In *independent or single mode*, each of the outputs operates independently and has its own parameters and communication objects. This is the mode described so far.
- In *3-way valve/Shutter/Venetian blind* mode, two outputs are grouped under the same channel for a common functionality; consequently, these inputs operate on shared communication objects. Each

output has the possibility of coupling only with the adjacent output, hence the coupling possibilities 1 2, 3 with 4 etc.

It is obviously possible to configure some outputs as independent and others as coupled, with the association constraints described above.

6.3.4 Output features in independent mode

In the simplest application, a single communication object per channel, “On/Off Command”, is sufficient, which switches the channel directly based on the value received via a KNX telegram.

By configuring the device parameters, it is possible to activate some more advanced functions, most of which have an effect on the switching of the outputs.

These functions are as follows:

- relay operation (output inversion): allows you to associate the closed (physical) contact position with the logical “On” state and vice versa;
- behavior with bus ON: defines the value of the outputs when the KNX bus is powered;
- status feedback telegram: automatically transmits the status information upon switching;
- behavior after download: defines the value of the outputs after downloading the ETS application;
- delay after bus recovery: defines the time within which the device is operational, after the bus on command;
- valve function: to enable or disable it;
- delay at power-on: to set a delay in the transition of the output to the on state;
- delay in switching off: to set a delay in switching the output to the off state;
- staircase light function: manages a restartable and resettable timer on the output;
- lock and forced operation functions: these functions allow you to inhibit the operation of the output or force its value in different ways;
- scenario function: allows you to recall or set a default value for the output in association with scenario codes;
- energy counter / operating time: allows an approximate count of the energy consumed by accumulating the activity time of an output.The most significant functional blocks for an output in independent operation are described in the following scheme.

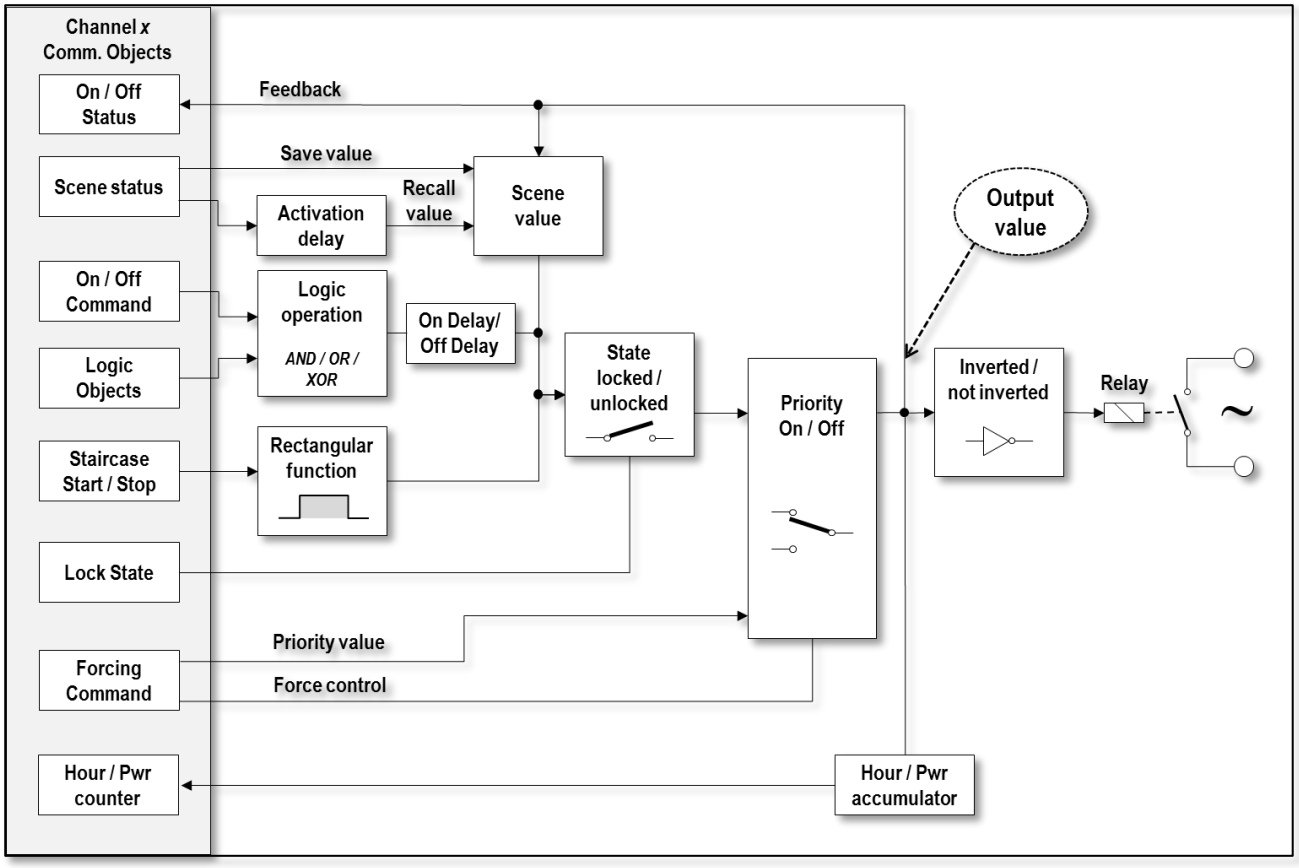


Figure 3 - Functional blocks – Independent mode (referred to a single output)

It must be noted that, as can be seen from the above diagram, the different features of the output channel can be activated and operated in parallel at the same time; the configurator has the responsibility of taking care that any interference between different functions does not produce unintended effects on the way device outputs are managed.

6.3.4.1 Relay operation

This feature inverts the status of the physical contact of a channel with respect to the exit status.
Note: regardless of the "inversion" parameter setting, the following sections will always take "on" and "off" to be a reference to the logical status of the output, not the status of the relay contact switch.

6.3.4.2 Status feedback telegram

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

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

Feedback telegrams are **not** transmitted, however, if the outputs are activated manually.

6.3.4.3 ON/OFF delay time

The actual change of state of an output can be set to take place after a configurable delay from the change of the value of the corresponding communication object; this applies both to the on-off and the off-on transitions, each with its individually configurable delay value (T_{on} and T_{off} respectively).

These delays apply to switching via direct command and/or logical objects, but not to those caused by other functions (e.g. staircase light or scene function).

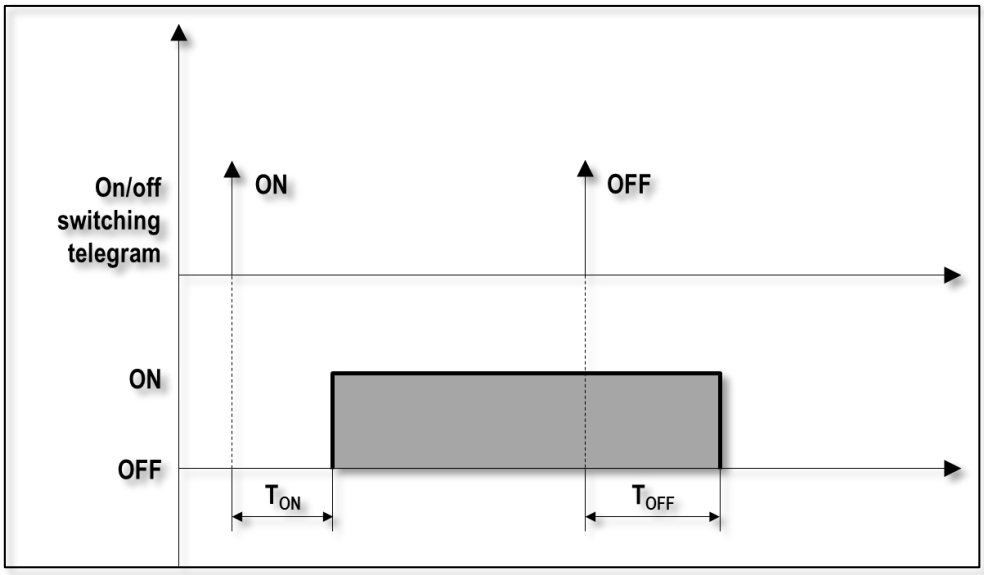


Figure 4 – ON/OFF Time delay

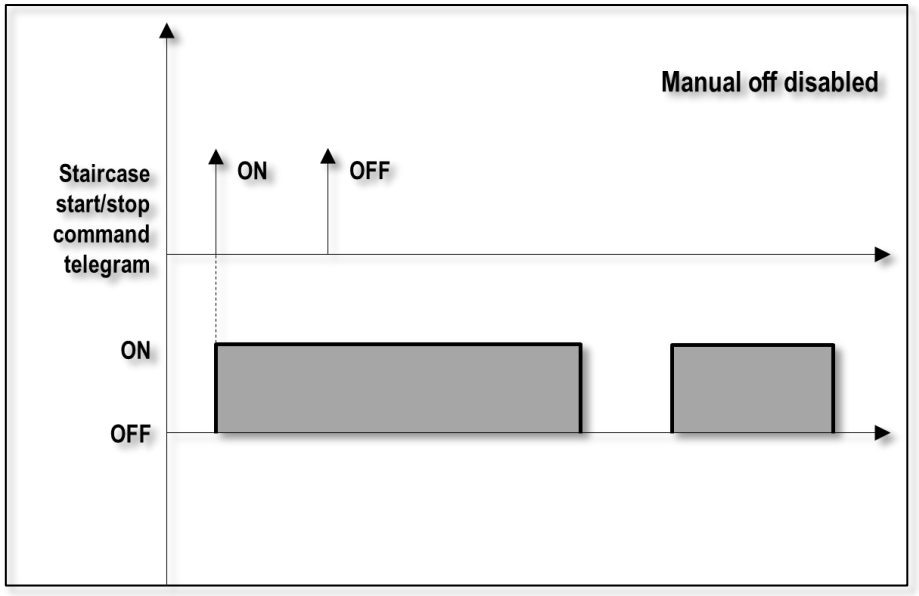
6.3.4.4 Staircase function

This function is intended to provide a simple and flexible way to manage the switching of staircase lights. These have following peculiar requirements:

- The light is activated by a “start” command (e.g. through a pushbutton or a presence sensor), and normally remain lit for a programmed time duration;
- There is a provision to enable a “stop” (Manual Off) command, again through a pushbutton or other events, that allows to switch the light off before the programmed time expires (e.g. because the person who triggered the presence sensor has surely left the building through an exit);
- There is a provision to allow another “start” command (Retriggering), received during activation, to restart the time duration counter;
- A further optional “pre-warning” function allows to briefly switch off the load a certain time before expiration (both times, i.e. pause duration and time before expiration, are configurable) in order to warn the user that the activation time is about to end.

- The warning time must be shorter than the staircase light time ($T_{P-W} < T_S$) and the interruption time must be shorter than the warning time ($T_I < T_{P-W}$).
- The set on / off delay times have no influence on the staircase light function.
- A running timing will be terminated by a reset of the device (bus voltage drop and recovery or reprogramming from ETS) or by using any function that influences 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, the value of the output remains the one active at the time of termination; this also applies if termination occurs during the warning time.

The following pictures show the *Manual Off* feature:



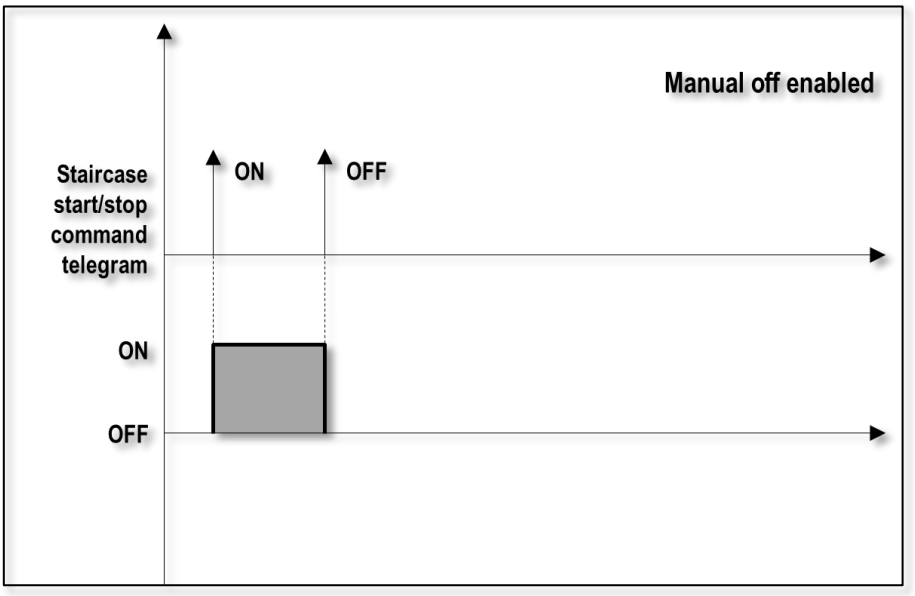
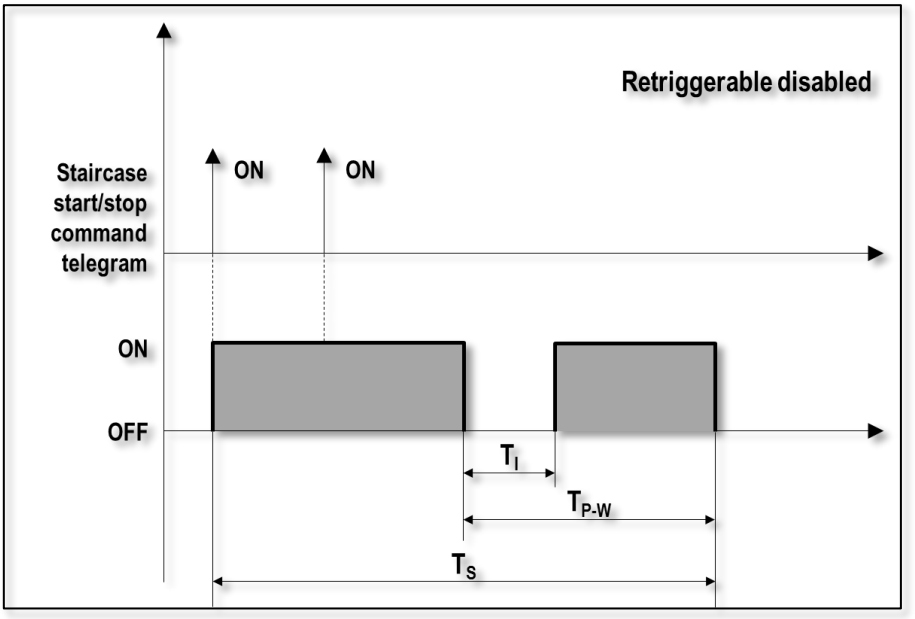


Figure 5 - Manual Off feature

Following pictures show the *Retrigger* feature:



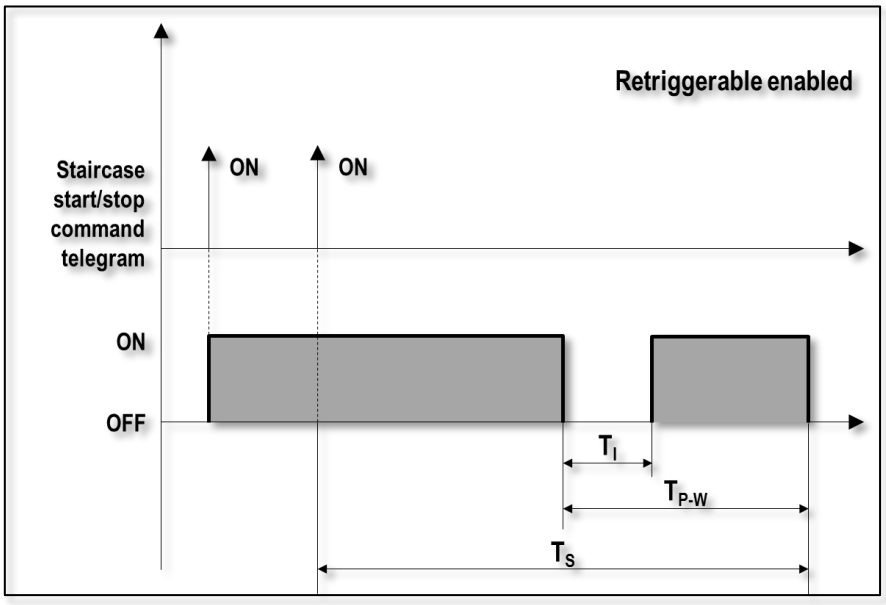
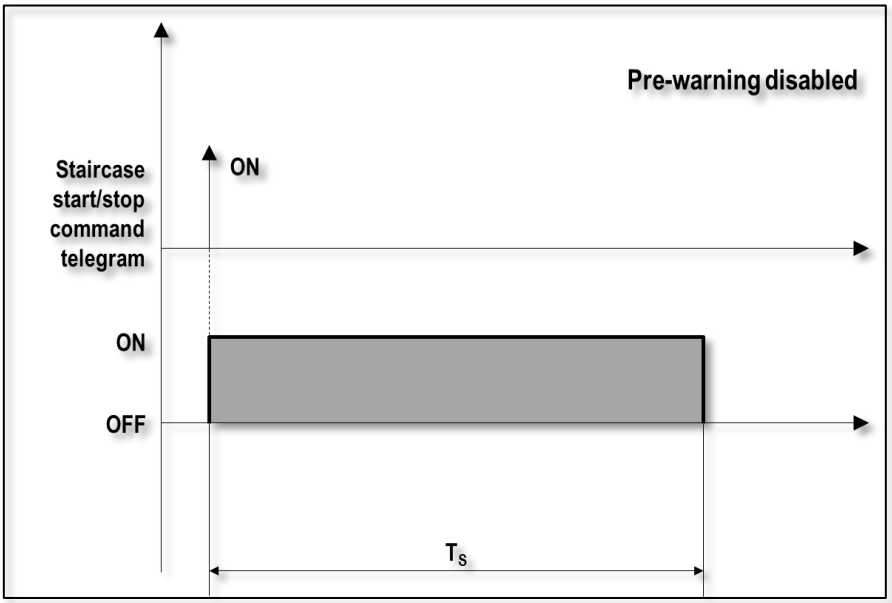


Figure 6 - Retrigger feature

Following pictures show the *Pre-warning* feature:



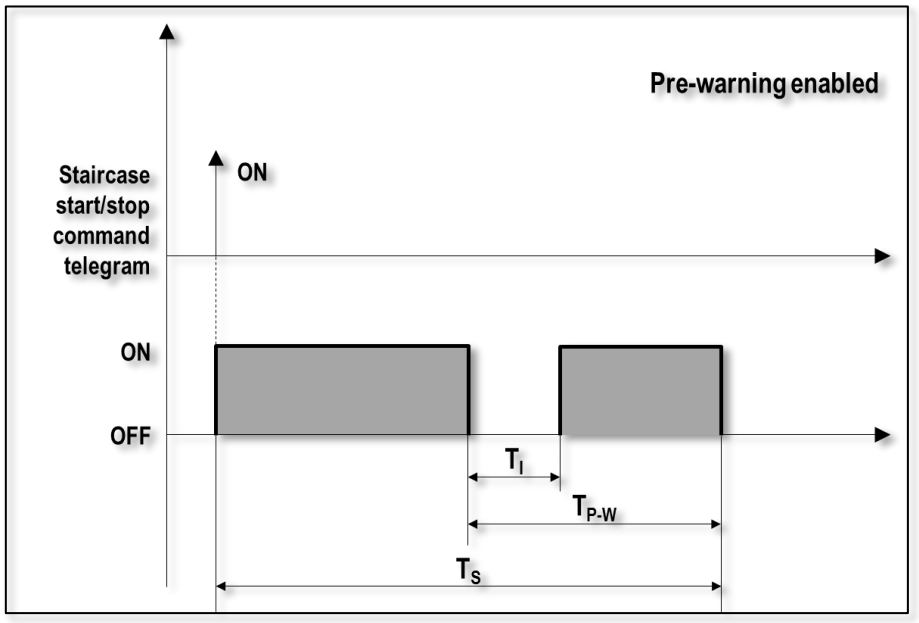


Figure 7 - Pre-warning feature

6.3.4.5 Valve function

Each output has a Valve Function (*Use valve*), which allows you to set the output to work as a 3-way valve with PWM regulation. The parameters that can be set are:

- Valve position after timeout;
- Valve command timeout: when this time expires, without any operation being carried out, the valve positions itself as set in the previous parameter;
- PWM cycle time (min): is the period in which the output is maintained at the ON value for a time proportional to the value of the control variable;
- Minimum (control) valve value (%): allows you to adapt the PWM cycle to use with electrothermal actuators with very long opening times. For values of the control variable lower than the set value, the NC actuator remains unpowered, the NO actuator remains unpowered;
- Maximum (control) valve value (%): allows you to adapt the PWM cycle to use with electrothermal actuators with very long opening times. For values of the control variable higher than the set value, the NC actuator remains powered, the NO actuator remains unpowered.

Note: The minimum and maximum (contro) valve values are not taken into account if you set the valve position after timeout below or above these values.

6.3.4.6 Lock function

If the locking feature is enabled, the operation of a channel can be inhibited by writing a value in a communication object. The value written is of the KNX type “enable”; please beware that the meaning of this value is “*activate lock*”, which is not to be confused either with “enable *locking function*” or with “enable output”. The meaning of the value can be optionally inverted through a configuration parameter (an “enable on” value can be interpreted as “lock off”).

A locked output ignores the switching commands that are received for the duration of the lock, thereby maintaining the status it has upon lock entry. The status of the output can be set to a particular value both when the lock is set and when it is released; it is also possible to determine whether the lock status should be maintained or changed on recovery after a bus power-off.

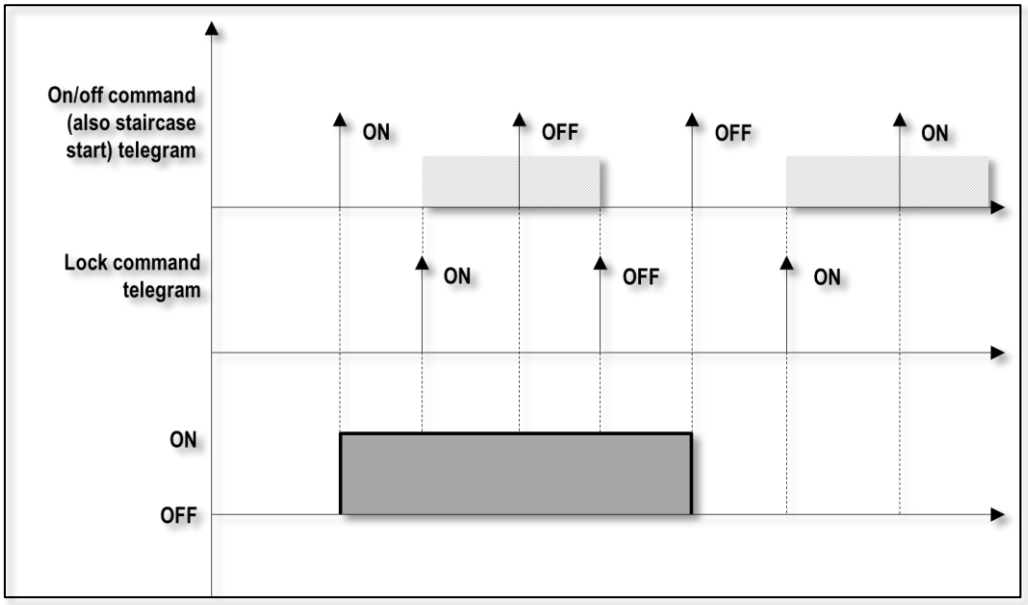


Figure 8- Lock function

6.3.4.7 Forcing function

The forced control is very similar to the basic direct command of the output value, but with the peculiarity that it overrides both the “regular” set value and every other value conditioning feature (i.e. logic function, staircase timing etc.).

It is possible to set what value the output should assume both when the output forcing is released and also on recovery after a bus power-off if forcing was previously in effect.

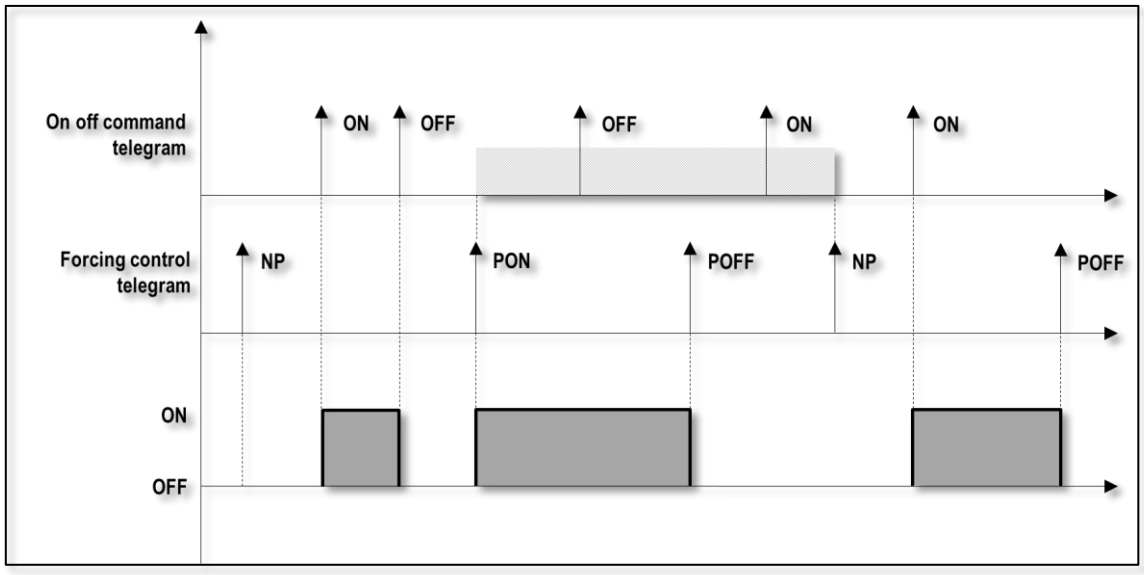


Figure 9 - Forcing function

The lock command has priority over the forcing function; this means that an output in the lock state cannot be controlled via the force commands.

The KNX command code for the “Force” operation is a 2 bit value; the *priority* bit determines whether the output value must be forced, in which case the *value* bit is assigned to the output.

In the figure above, NP means that the *priority* bit is 0 (No Priority), while the PON and POFF codes indicate the values with *priority* = 1 and *value* respectively 1 or 0.

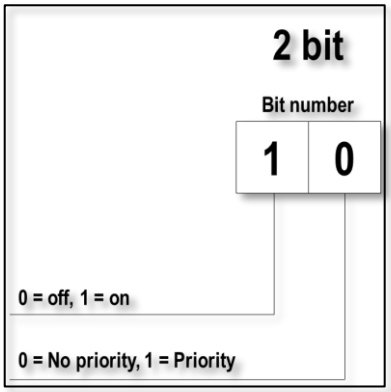


Figure 10 - Force command bits

6.3.4.8 Scene management

Each output can be linked to up to 8 scene codes; when one of these scene codes is recalled through a bus command originated by any controller device, the output will assume a preset value. An additional delay can be defined for the output activation (or deactivation) from the moment the scene code is recalled.

The output value for a scene can either be fixed or chosen in the configuration phase, or it can be defined as reprogrammable through a Scene Learning command.

If this latter option is enabled (for each single output), whenever a Scene Learning command is received on the bus for a specific scene code to which the output has an association, the device will store the current output status value for that scene. This value will then be recalled in subsequent scene activations.

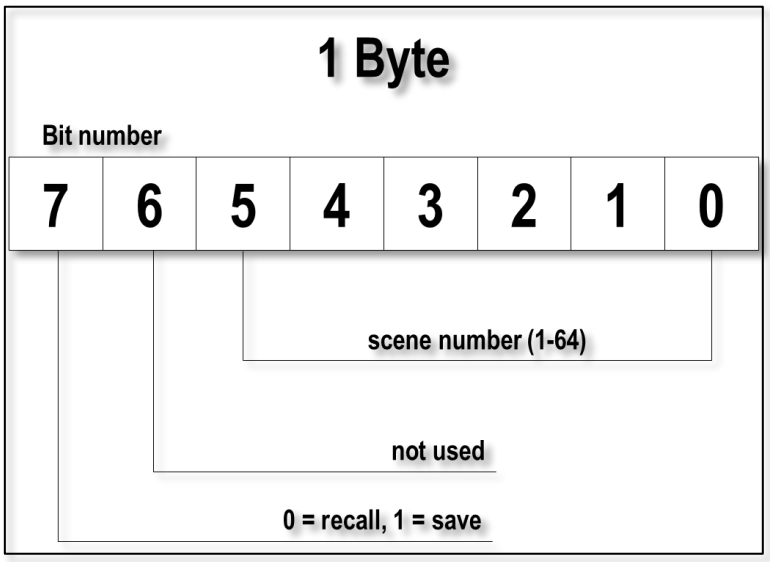


Figure 11 - Scene store / recall command code

6.3.4.9 Operating hours / Energy counter function

For each output, an activation counter can be associated which accumulates the count of hours that the output passed in the “on” state. In terms of communication objects, this counter has the format of a KNX hour counter, thus it also has a “reset” command ad a “runout” alarm in case the maximum value is overflowed.

Together 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 of electrical power in W associated with the load.

An additional parameter allows to define a conventional electrical power which is associated to the load; although this is not a “real” power metering, but merely a conversion factor between activation time and the estimated consumed power, nonetheless it can supply a useful indication for approximate power monitoring, particularly for resistive or fixed-power loads like lights or many other home or office appliances.

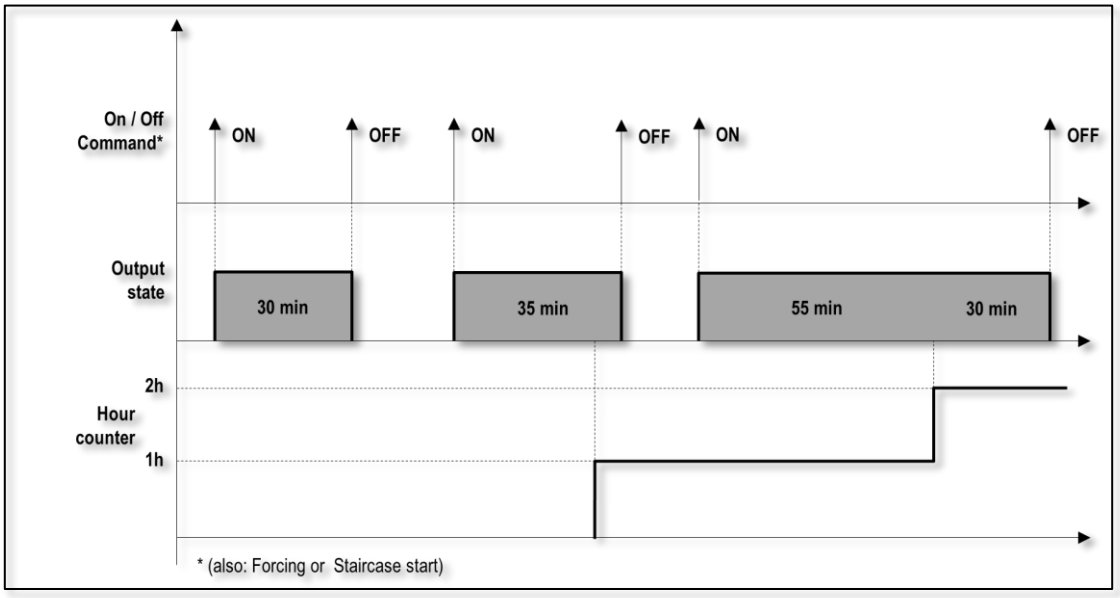


Figure 12 - Operating hours and energy counter

6.3.4.10 Output restore values

As mentioned in an earlier paragraph, the status of the device after some significant events (see paragraph 6.1.1 for description) can be defined by configuration.

The values available for restore after system events for independent inputs are:

- On
- Off

- no change[1]
- previous value[2]
  (* this option is not available for either “bus off” or “after download” events).

The difference between “no change” and “previous state” is following:

- “no change” refers to before the event itself (e.g. for the “bus on” event, an output which was “off” before bus recovery will remain “off” thereafter);
- “previous state” refers to before the condition that is terminated by the event (e.g. for the “bus on” event, an output which was “on” before bus failure will return “on” after bus recovery).

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

[1] This option is not available for the “Behavior after download” event.
[2] This option is not available for the “Behavior at bus on” and “Behavior after download” events.

6.3.5 Output features in coupled mode

In coupled mode, output pairs can be used to drive three categories of devices: these are grouped under the denomination of 3-way v*alve*, *Shutters* and *Venetian Blinds.*

These categories have basically a similar operation mode, that is, they move a physical device from one to another endpoint; this can happen stepwise, with full stroke, or possibly stopping at given intermediate positions. The mentioned actuators, in the order they are listed, could be seen – apart from minor details - an increasingly sophisticated version of the same basic mechanism. Anyway, all three of them are driven through two lines, one for each direction.

For any single channel, one of these three types of behavior can be chosen.

Beside the distinctive features of these categories, there are further features common to all of them, like the locking and forcing functions, the meteo alarms and the scene management, which will be described below. Some of these features are similar to those described for those of single outputs in independent mode; in these cases, the corresponding sections in the previous paragraph are referenced.

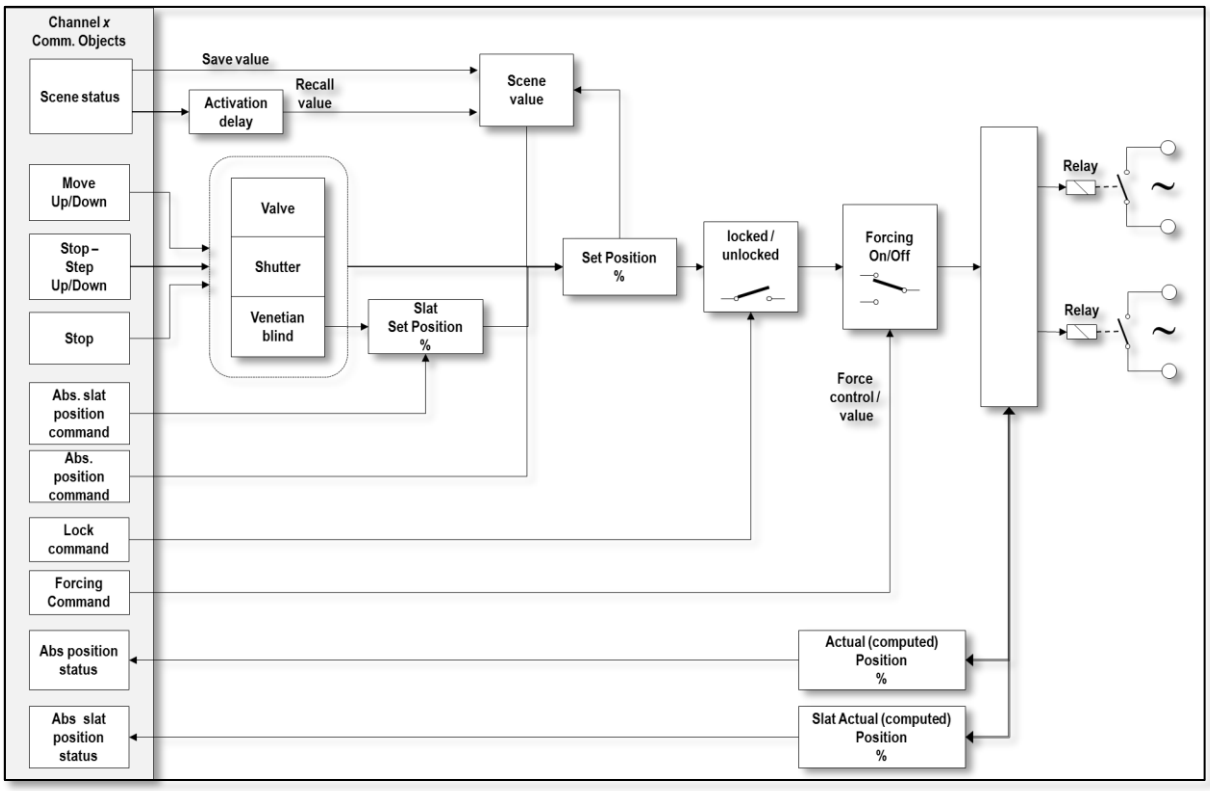


Figure 13 - Functional blocks – Coupled mode (referred to a single output)

6.3.5.1 Coupled output control basics

The control with coupled outputs is based on three main telegrams, all of which are 1-bit values and thus can convey up to two commands each:

Command	Control
Move Up (Open) / Down (Close) (only for shutter or venetian blind)	When the telegram is received, the actuator starts moving all the way towards the specified endpoint.
Dedicated stop	When the telegram is received, the actuator stops any movement and remains in the current position
Stop –Step Up / Down (only for shutter or venetian blind)	This command allows a gradual or stepwise movement of the actuator. It actually has a dual purpose: • when the actuator is at rest, it acts similarly to the Move Up/Down command. When the telegram is received, the actuator moves in the specified direction, but just by one “step” (i.e. a length predefined by timing); • when the actuator is moving, it stops in the current position.

In most actual systems, as also defined by KNX standards, the difference between “Move” and “Step” (aside from the additional “Stop” function of the latter) is just the length of the time interval: in principle, a “Move” command is just a “Step” command which duration is guaranteed to be long enough to allow the actuator to reach the endpoint.

Looking at it another way, the same timing that in the case of stepping defines the Step duration, in the case of the Move command has the role of a *timeout* that deactivates the output when it is no longer necessary to drive it. (Of course there are different parameters for these timings). Actuators, anyway, will normally have electrical end switches that will prevent overloads caused by unnecessarily applying power when at the endpoints.

In cases where a movement must be performed to ensure that the end of travel is reached, to better characterize the up/down times it is possible to enable an “extra time mode” (full scale), which allows you to set two distinct time intervals:

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

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

Warning:

Make sure your motor has adequate limit switches, otherwise this option may damage the operation.

Since no position feedback is available from the mechanical actuator, the shutter position is determined through movement timing: given the full-scale movement time value (i.e. the exact time the shutter / actuator

takes to move from one endpoint to the other), a partial movement expressed in a percent fraction of the full stroke will then correspond to the same fraction of movement time. The device keeps an internal position counter which is realigned whenever a full Move up/down command is issued.

In order to have the correct timing to be applied to output switches, the full-scale movement time value must be set through a parameter.

This is just a basic generic description; actual actuator types may not have the same control possibilities (e.g. they might not be capable of stopping in positions other than the two endpoints) or they may have more options and features. This will be described below in the explanation of specific functions.

6.3.5.2 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 extreme positions; the movement may not be instantaneous, but intermediate rest positions are not possible.

A 3-way actuator works in much the same way, except that the stroke is gradual (and usually slower); therefore, if both control lines are deactivated while the actuator is running, it will stop at the position reached at that moment.

The operating mode of the 3-way actuator is similar to that of the roller shutter (or shutter), except that it does not provide the On/Off type opening/closing command but only the absolute position command. Since 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 explained in paragraph 6.3.5.1; however, the “Stop / Step” command is implemented because it is required by the KNX specifications, but it has no effect since progressive movements are not possible. Even the “Stop” command has no real effect on the movement (it simply immediately deactivates both output lines).

The ordinary way 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 in the two possible positions.

An additional communication object allows you to query the movement status of the actuator (i.e. it indicates whether the valve is moving or at rest).

6.3.5.3 Shutter control

The shutter control is the one most similar to the generic one described in paragraph 6.3.5.1; its description also applies exactly to the valve with 2-way actuator (for single outputs).

This control supplies the three basic commands already described in the “basics” section; however, the “Stop/Step” command is provided because it is required by KNX specifications, but only acts when used as a “Stop” command (it has no effect when the actuator is not moving).

The standard way of driving a shutter channel is therefore the following:

- issue the “Move” command with either direction set, in order to start the motion of the shutter;
- either leave the shutter to arrive to the endpoint (the output will be deactivated after a timeout anyway, see below) or issue either a “Stop” or a “Step/Stop” command as soon as the shutter has reached the desired intermediate position.

In order to better exploit the possibility of intermediate positioning, this control has additional ways to specify the actuator position:

- the position can be specified as “absolute position” (in percentage); a feedback value for the actual current position and a telegram of “valid position” (setpoint reached) are also available;
- if enabled, a dimmer-type control for the position is also available, as illustrated in figure below. Please refer to the parameter description section for more details.

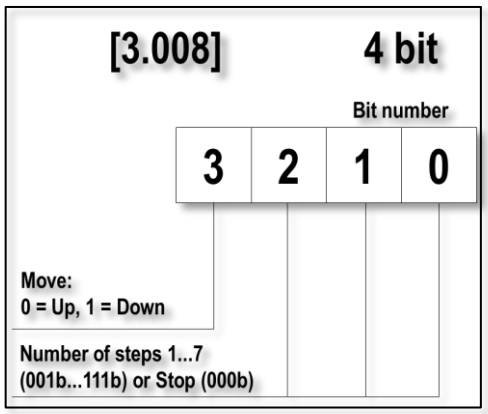


Figure 14 - Shutter control with dimming

As already mentioned, the full-scale movement time value must be set; there are two parameters for this purpose, one for the upward and one for the downward direction. Times in two directions may be different for mechanical reasons (e.g. heavy shutters) or functional reasons.

The time to be specified is the actual and precise time of travel from end to end, which will be used for timing calculations. In cases where a movement must be made that guarantees reaching the end of travel, the full scale times can be used.

The time amount to be specified is the actual and exact stroke time frome one endpoint to another; this will be used to compute the timings for the requested movement stretches. If a movement must be effected that guarantees that the endpoint is surely reached, its duration will be set to 120% of the specified value.

Another parameter which must be defined for the shutter movement is the reversion pause time, i.e. a pause to be made when a movement command in one direction is issued while the shutter is moving the opposite direction. This is mainly made to allow the shutter to correctly stop without excessive strain on mechanical organs.

6.3.5.4 Venetian blind control

The Venetian Blind has the same features as the Shutter control, but with a few additional parameters dedicated to the management of slats (or louvers).

In terms of available commands and parameters, Venetian blinds differ from Shutters in following respects:

- The 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

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 (*opening/closing time of the slat step*), i.e. the activation time of the outputs that causes the movement relative to the desired step; this period is repeated for a number of times specified by the *Number of slats step* parameter;

- an additional set of communication objects is available for setting and reading the absolute position of the slats, in addition to a “position reached” object;
- it is also possible to enable a dimmer control object for the slats.

For the up/down movement there are two separate parameters to configure the total movement time. Since slats also have their own absolute positioning feature, a parameter for the total movement time of the slats, similar to the one defined for the blinds, is also provided (but in this case common to both directions, since little or no mechanical asymmetry is to be expected). An internal position counter, similar to the one for the blinds or shutter position, is managed to guarantee the best possible precision in positioning.

As in the case of the roller shutter, also in the case of the venetian blind it is possible to enable a “extra time mode” (full scale), with the same methods described in the previous paragraphs.

Standard blinds’ actuators control both blind and slat movement through only two interface lines, the same as shutters discussed in previous paragraph; in order to achieve control of both movements, they are driven as described below. Please bear in mind that this is a principle description of a simplified, albeit realistic, mechanism just for illustration purpose; actual devices may employ different or more sophisticated solutions to realize the same functionalities.

As a general description, each of the driving lines (for respectively upward and downward movement) of the actuator motor directly moves the blind panel towards the corresponding direction. In doing so, the slats are “dragged” in the same direction as the panel (i.e. opening or closing) until they reach their fully open or fully closed position.

We first assume that the blinds start in fully closed position. Activating the “open” line, the motor starts to drag the blinds’ array upwards; the slats also move towards the open position. Once these have reached their endpoint, the further action of the motor just continues to lift the blinds.

Assuming now that the blind is stopped halfway, we have a partially open blind with fully open slats; we may naturally continue from here all the way until fully open. If we now activate the downward driver line, though, the slats are moved towards the closed position while the blinds’ panel begins to move. The slats are eventually fully closed and the blinds continue to move downwards.

If the activation time of the downward driver line was brief, i.e. not long enough to have the slats span all the way to the closed position, we would obtain a situation where the blind has moved down slightly, but the slats are in an intermediate position; in fact, by alternating the activation of the up / down lines, they can be brought in any desired intermediate position.

The following picture illustrates how the blinds react to a command sequence:

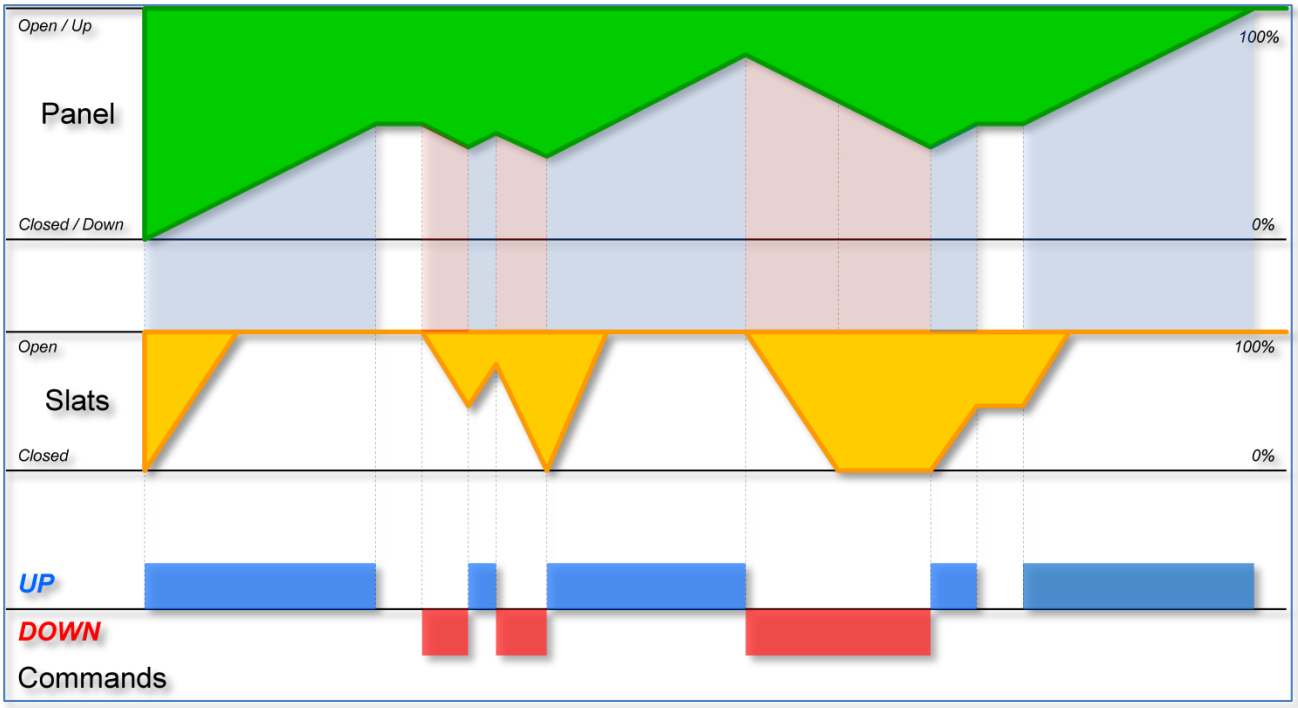


Figure 15 - Venetian blind control diagram

As apparent from the description above, the slats cannot be moved independently from the blinds' array, i.e. small drive pulses do move the slats as desired but also modify the blinds' position slightly. In order to compensate for this effect and achieve a slat movement without changing the blinds' position (unless temporarily), a "recovery" movement is effected, much like the backlash recovery in automated tools.

This recovery works as follows. Let's assume for example that we would like to lower (close) the slats starting from a 50% position to a 70% position. When the downward line is activated, the blinds' panel is also lowered a little (length "L1" in the picture below). The actual movement is therefore corrected as illustrated in the second part of the picture (which is shown from the original starting position for clarity's sake).

The blinds are initially raised until the slats are fully open (length L2), and then further to compensate for the mentioned length L1. After that, the downward line is activated for as long as necessary to bring the slats to their desired position. The final result is as intended.

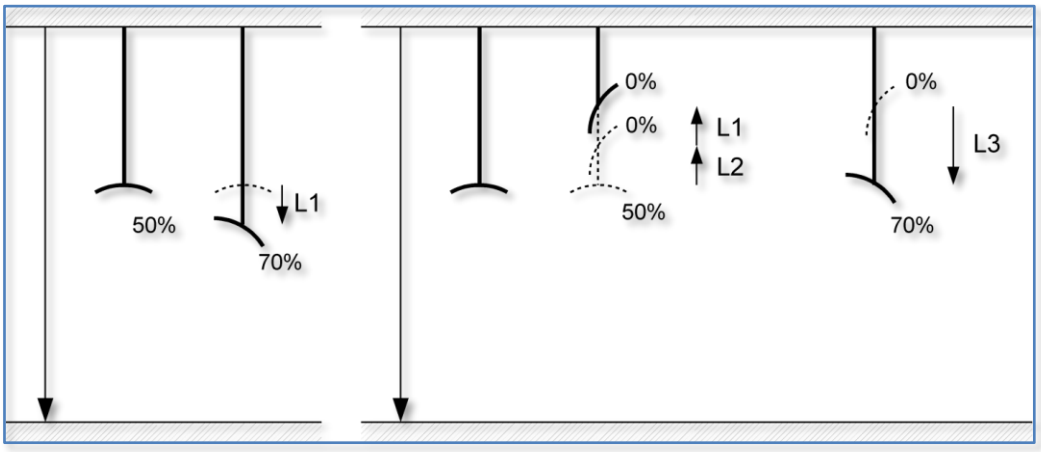


Figure 16 - Compensation for slat movement

All the lengths (and corresponding movement times) are computed by the device according to the defined time values for full-range movement times for both slats and blinds' panel; both of these times must be configured for the actuator in use as precisely as possible. The compensation mechanism is automatically managed and does not need being accounted for either by the configurator or the final user.

6.3.5.5 Lock function

The locking feature is similar to the case of independent inputs; the only actual difference is in the wider range of values that can be assigned to the actuator position with respect to simple binary outputs. In particular, these values include stopping current motion, moving the actuator to one of the endpoints, to a programmed position or to the position the actuator had before locking.

Further details can be found in the configuration section.

6.3.5.6 Forcing function

The forced control is basically similar to the case of independent inputs; the very same considerations apply as for the case of the Lock function.

6.3.5.7 Scene management

Scene management function is similar to the case of independent inputs; the same considerations apply as for the case of the Lock function. The values that can be assigned to a scene are the two endpoints, a specified intermediate position, or a stop (the scene interrupts any current movement).

6.3.5.8 Meteo alarms

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

Three types of meteo alarms can be managed independently, in particular for wind, frost and rain. The attribution is in fact only descriptive, since these three alarms are perfectly equivalent and could even be used for different types of events.

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

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

KNX alarms include an optional *heartbeat* function, which monitors at regular intervals the reception 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 decreases the probability that an alarm condition will not be detected in case of a telegram loss, and on the other hand it confirms that the source is communicating and that no alarm is in progress if this is the case (alarm telegrams must be sent by the source with an "alarm inactive" information).

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 starts at the same time. If no alarm information telegram is received within the configured timeout interval, the alarm is assumed to be active and the actuator is controlled accordingly. In practice, the alarm condition is a logical OR between the "alarm active" condition and the timeout expiration.

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

6.3.5.9 Output restore values

As mentioned in an earlier paragraph, the status of the device after some significant events (see "*Output restore"* paragraph for description) can be defined by configuration.

The values available for restore after system events for coupled outputs are:

- None
- Up / Open
- Down / Close
- Move to position

Further details can be found in the configuration section.

6.3.6 Logic functions

The device has a limited provision for the logic processing of internal variables in order to condition the status of outputs.

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

- *OR;*
- *AND;*
- *XOR (Exclusive OR);* the output is ON if the number of inputs ON is odd;
- *NOR (Negated OR);*
- *NAND (Negated AND);*
- *XNOR;* the output is ON if the number of inputs 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:

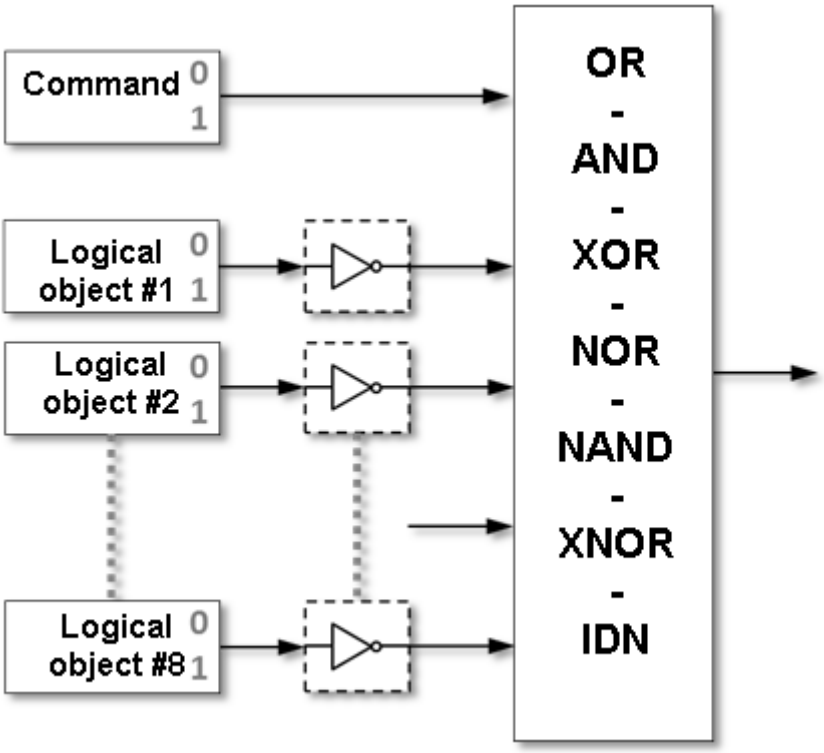


Figure 17 - Logical combination function

The logic combination block on the right works as follow according to which logical operation is selected:

It must be noted that, in the above description, "input" and "output" are referred to the logical block; for the purpose of operation, the actual "inputs" are the logic objects, thus the optional inverters must be factored in.

This structure allows to implement fairly complex logical combinations; a more generic and powerful programming capability would add more complexity and therefore it would be far beyond the scope of an output module that is simple to use.
In the following pictures, the basic logic functions are illustrated, assuming the output command and one logic object are used:

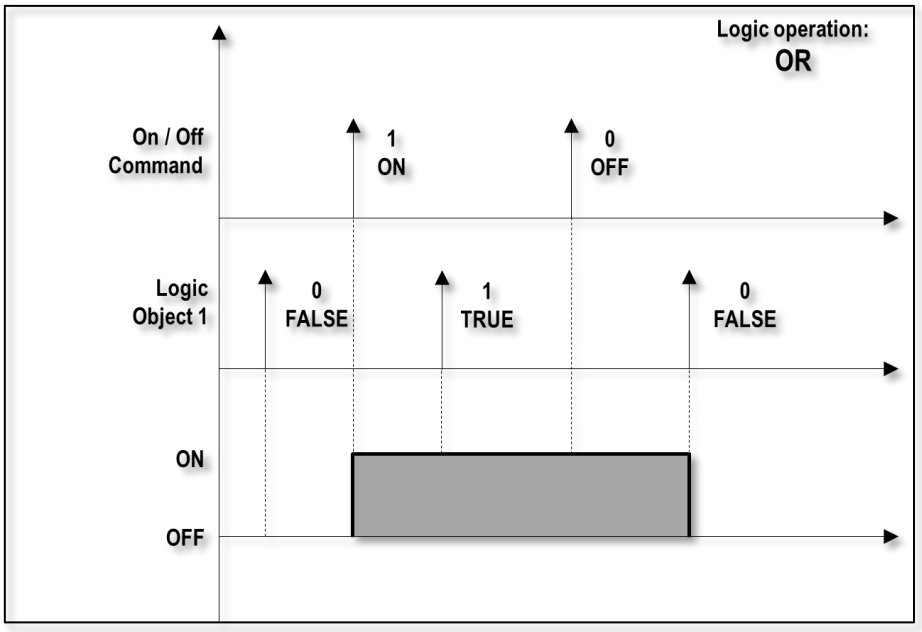


Figure 18 - Logic OR function

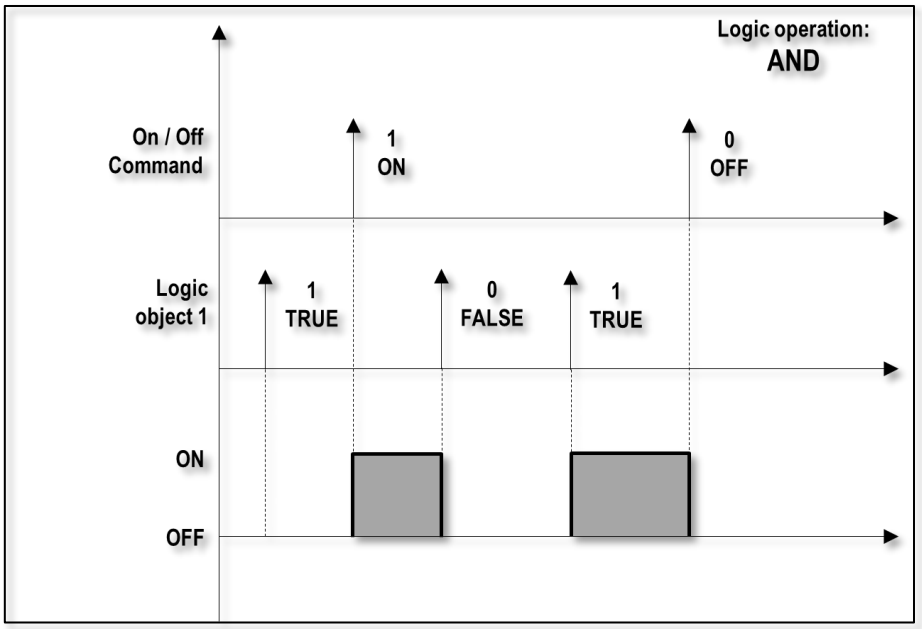


Figure 19 - Logic AND function

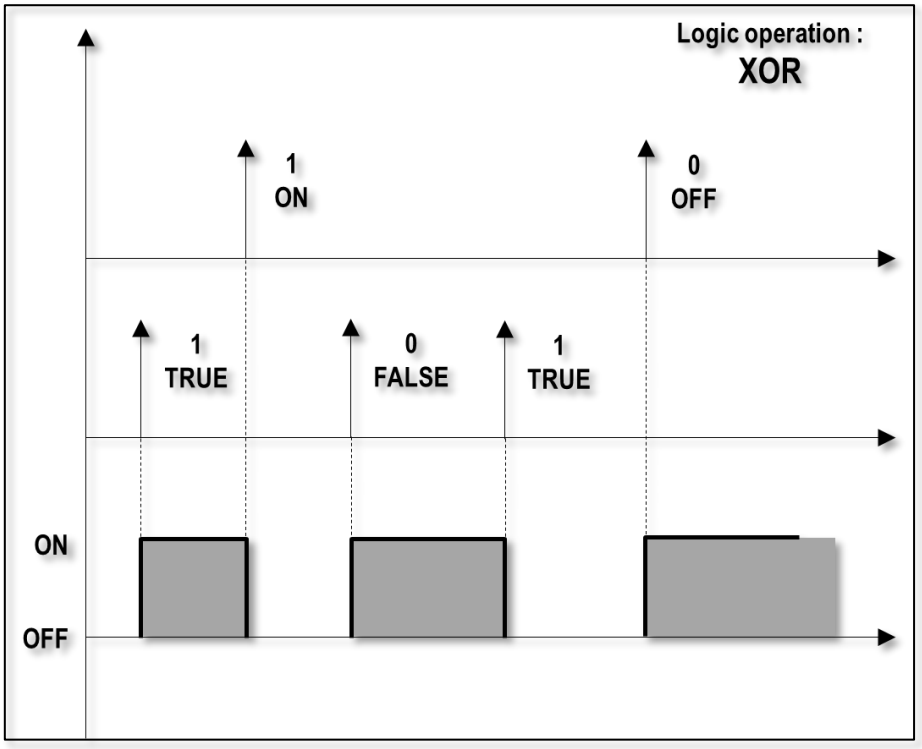


Figure 20 - Logic XOR function

6.3.7 Comparison functions

Up to 8 comparison functions are available to compare two objects with assigned data types. The output of the operation can be True or False.

The comparison objects can be:

- Communication objects, with the following data types:
  - 1 bit;
  - 2 bit;
  - 1 byte percentage;
  - 1 byte signed;
  - 1 byte unsigned;
  - 2 byte signed;
  - 2 byte unsigned;
  - 2 byte float.
- Objects internal to the device (only for Comparison 1 object), namely:
  - Value of the output relay (from 1 to 8 for EK-FG1-TP, from 1 to 16 for EK-FI1-TP);
  - Value of the output channel (A,B,C,D for EK-FG1-TP, or A,B,C,D,E,F,G,H for EK-FI1-TP).
  - Numeric value (only for Comparison 2 object), expressed in 2 byte float, in the interval [-671088,…,670597].

The available comparison operations are:

- Equality;
- Diversity;
- Less than;
- Greater than;
- Less than or equal;
- Greater than or equal.

It is also possible to assign a hysteresis for the comparison, in percentage value. This means that the comparison operation is true or false, unless the assigned hysteresis: for example, the comparison of equality between the numeric values 100 and 90, with a hysteresis of 10%, returns the value "True", because this hysteresis gives the value 90 to all values between 90±15% = [76.5 ÷ 103.5] and 100.

Note: Hysteresis applies to the second comparison object.

Note: Due to the limitations imposed by the KNX protocol, for the 2 bytes floating point data type, values greater than 670100 or less than -670100 are not considered valid. For this reason the results of operations performed on them are not reliable.

7 Firmware upgrade

It is possible to update the device firmware via KNX, using the Ekinex Firmware Updater tool.

Consult the specific guide of the update software and consult the Ekinex website of the product to always have the latest versions available.

8 ETS application program

This section of the manual lists all configurable parameters and describes the related communication objects at the same time.

Each channel/output has the same parameters and makes the same types of communication objects available, but the configuration is independent for each of them.

In the following, a generic output will be referred to with “x” (where x = 1…8 for EK-FG1-TP or x = 1…16 for EK-FI1-TP).

The parameter values highlighted in bold represent the default value.

The device parameters are divided into general parameters and specific parameters, grouped into tabs.

Figure 21 shows the tree structure of the application program with the main tabs.

The numbers of communication objects in the “Comm. Object No.” column of each table are divided into 2 groups. The objects of the second group (in *italics*) are related to the 16-output device EK-FI1-TP only.

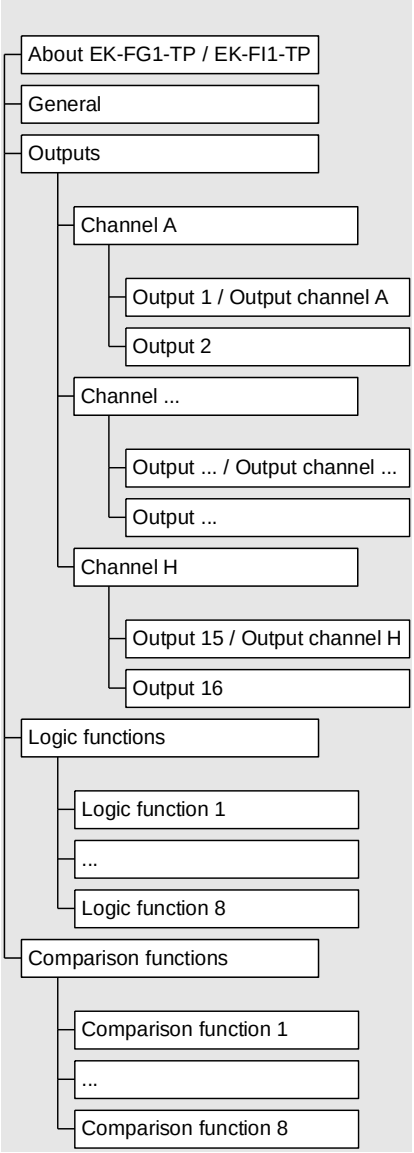


Figure 21 - ETS application program parameters

8.1 About

The **About EK-FG1-TP / EK-FI1-TP** sheet is for informational purposes only and does not contain any parameters to be set. The information provided is:

Application software per ETS5 e ETS6
Versione 1.00 (or later)
EK-FG1-TP – KNX 8-output universal actuator, or

EK-FI1-TP – KNX 16-output universal actuator

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

8.2 General

The following parameters are available in the General tab:

Parameter name	*Conditions*	*Settings*
Product type	-	**EK-FG1-TP**, or **EK-FI1-TP**
	It allows the user to select the device type. The field is currently fixed, as only 1 device is supported.	
Manual operation	-	**disabled** enabled
	Enables the front button that allows you to switch to manual mode.	
Manual disable from bus	Manual operation = enabled	**disabled** enabled
	Allows you to disable switching to manual mode via a bus command.	
Enable logic module	-	**disabled** enabled
	Enable or disable the section for logical functions.	
Number of logic functions	Enable logic module= enabled	**0**…8
	Sets the number of logic functions to enable.	
Restore auto mode	Manual operation = enabled Manual disable from bus = disabled	hh:mm:ss (**00:15:00**)
	Sets the time after which the device returns to automatic mode.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Manual commands disabled	Manual operation = enabled Manual disable from bus = enabled	1 bit	C-W--	[1.001] switch	1

The remaining device settings are divided in two main groups: the general channel configuration settings and the channel-specific settings.

8.3 Outputs configuration

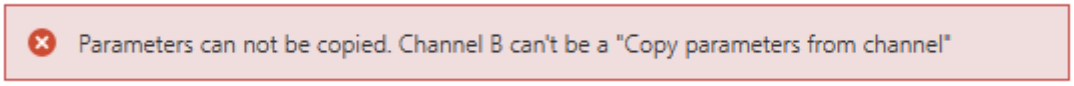
These settings configure which outputs of the device are activated and in which mode.

Activating an output causes the creation of a few communication objects in the minimal number required to switch the output relays through a bus telegram.

For outputs 2 and above, instead of being explicitly defined, the output configuration can be copied from any of the preceding channels. If this option is selected, the corresponding channel can be made to perform the exact same kind of function as the source channel. This allows the user to spare time in configuring the device,

at the same time assuring that there is no inconsistency between two channels that are meant to be configured in exactly the same way.

Additionally, it is also possible to copy a channel: for example, channel B can be copied from channel A. Please note that a channel can only be a copy of a channel that is not itself copied, otherwise a message like the following will be displayed:



It must be noted that to copy the configuration from another output or channel is just a shortcut for the selection of configuration options; it is in no way implied that the two channels share any of the involved communication objects.

If the configuration of the original channel is varied, then so is the “derived” channel; in the same fashion, if the original channel is disabled, so is also the derived one.

8.3.1.1 Main parameters

Parameter name	*Conditions*	*Settings*
Output channel *n*	-	disabled **independent or single** 3-way valve / shutter / venetian blind Copy parameters from channel*
	Enable output channel n (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP) ** This option is only available for channels B,C,D for EK-FG1-TP and B,C,D,E,F,G,H for EK-FI1-TP.*	
Output channel *n* Source channel	Output channel n = copy parameters from channel	**A** / B / C for EK-FG1-TP **A** / B / C / D / E / F / G for EK-FI1-TP
	For output channel n (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP), copy the parameters from one of the previous channels, provided that it is not already a copied channel.	
Output channel *n* - Output 1 Output 3 Output 5 Output 7	Output channel n = independent or single	disabled **enabled**
	Enables the first of the two outputs of channel n (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).	
Output channel *n* - Output 2 Output 4 Output 6 Output 8	Output channel n = independent or single	disabled enabled **copy parameters from output (A1/B3/C5/D7)** or **copy parameters from output (A1/B3/C5/D7/E9/F11/G13/H15)** for EK-FI1-TP
	Enables the second of the two outputs of channel n (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP),	
Output channel *n* - Use	Output channel n = 3-way valve / shutter / venetian blind	**valve** shutter venetian blind

Parameter name	Conditions	Settings
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Defines the functionality associated with the output pair.*	

Object name	Conditions	Size	Flags	DPT	CO number(s)
Output x – On/Off command	Output channel n = independent or single valve function = disabled	1 bit	C-W--	[1.001] switch	451, 454, 457, 460, 463, 466, 469, 472, *475, 478,* *481, 484,* *487, 490,* *493, 496*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *This communication object is the direct command for setting the output (x=1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				
Output x – On/Off status	Output channel n = independent or single AND Status feedback telegram = enabled	1 bit	CR-T-	[1.001] switch	453, 456, 459, 462, 465, 468, 471, 474, *477, 480,* *483, 486,* *489, 492,* *495, 498*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Sent at each output state change, and also periodically if configured (x=1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				

8.3.2 Independent outputs: channel n / output x configuration

This section lists all settings for the output channels when used as independent outputs.

In general, the following nomenclature is intended for channels and outputs: n=A,B,C,D and x=1,…,8 for EK-FG1-TP, or n=A,B,C,D,E,F,G,H and x=1,…,16 for EK-FI1-TP.

8.3.2.1 Main parameters

In this section most of the configurable parameters for the output are listed.

Parameter name	*Conditions*	*Settings*
Relay operation	Output channel n = independent or single Ouput x = enabled	**not inverted** inverted
	In the "not inverted" mode, the relay contacts (i.e. the physical output terminals) are shorted when the output is On (active). (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-*FG1-*TP, or x=1,…,16 for EK-*FI1-TP).	
Behaviour at bus on	Output channel n = independent or single Ouput x = enabled	off on **no change**
	Allows to determine the state of the output after bus recovery. (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8* for EK-FG1-*TP, or x=1,…,16 for EK-*FI1-TP).	
Status feedback telegram	Output channel n = independent or single Ouput x = enabled	disabled / **enabled**
	Enables or disables the output change notification through a bus telegram. *Updating the object from "ON" to "ON" or from "OFF" to "OFF" has no influence on the switching status feedback.* (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-*FG1-*TP, or x=1,…,16 for EK-*FI1-TP).	
Transmission cycle time	Output channel n = independent or single Ouput x = enabled Status feedback telegram = enabled	hh:mm:ss (**00:00:00**)
	Frequency with which the output status telegram is sent on the bus. *If set to 00:00:00, the telegram is sent only if there is a change in the status.* (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-*FG1-*TP, or x=1,…,16 for EK-*FI1-TP).	
Behaviour after download	Output channel n = independent or single Ouput x = enabled	**Off** on
	Allows to determine the state of the output when the device resumes operation after a new parametrization has been downloaded. (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-*FG1-*TP, or x=1,…,16 for EK-*FI1-TP).	

Parameter name	*Conditions*	*Settings*
Delay after bus recovery	Output channel n = independent or single Ouput x = enabled	hh:mm:ss.fff (**00:00:03.000**)
	Time after bus voltage recovery before status feedback telegrams begin to be sent. *The delay has no effect on the behaviour of the outputs; only the feedback telegrams are delayed. The outputs can therefore be activated during the delay after a bus voltage recovery.* *During this delay, no feedback telegram will be transmitted even if a switching occurs; the feedback telegram for a switch during the delay period is lost.* (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK*-FG1-*TP, or x=1,…,16 for EK*-FI1-TP).	

Parameter name	*Conditions*	*Settings*
Valve function	Output channel n = independent or single Output x = enabled	**Disabled** enabled
	Allows you to enable the valve function on independent output. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Valve position after timeout	Output channel n = independent or single Ouput x = enabled Valve function = enabled	**50 %** [other values in the OFF…100 % range]
	Expresses the valve position, as a percentage of the stroke, in the absence of command update and upon reaching the timeout. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Valve command timeout	Output channel n = independent or single Ouput x = enabled Valve function = enabled	hh:mm:ss (**00:00:00**) [other values in the 00:00:00 … 04:39:37 range]
	Sets the timeout after which the valve is no longer controlled, if no other commands intervene. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
PWM cycle time	Output channel n = independent or single Ouput x = enabled Valve function = enabled	hh:mm:ss (**00:01:00**) [other values in the 00:01:00 … 04:39:37 range]
	Allows you to set the period in which the output is maintained at the ON value for a time proportional to the value of the control variable. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Minimum valve value [%]	Output channel n = independent or single Ouput x = enabled Valve function = enabled	**0 %** [other values in the 0 %…30 % range]
	It allows to adapt the PWM cycle for use with electrothermal actuators with very long opening times. For control variable values lower than the set one, the NC actuator remains unpowered, the NO actuator remains powered. *The set value does not affect the valve position after timeout.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Maximum valve value [%]	Output channel n = independent or single Ouput x = enabled Valve function = enabled	**100 %** [other values in the 70 %…100 % range]
	It allows to adapt the PWM cycle for use with electrothermal actuators with very long opening times. For values of the control variable higher than the set one, the NC actuator remains powered, the NO actuator remains not powered. *The set value does not affect the valve position after timeout.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

Parameter name	*Conditions*	*Settings*
On delay time	Output channel n = independent or single Ouput x = enabled Valve function = disabled	hh:mm:ss.ff (**00:00:00.00**) [other values in the 00:00:00.00 … 04:39:37.21 range]
	Delay between the "On" command telegram and the actual output activation. *This time delay does not affect the output of the staircase and forced control functions.* *For the scene function the delay can be set separately.* *Updating the object from "ON" to "ON" or from "OFF" to "OFF" retrigger the delay time.* (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-*FG1-*TP, or x=1,…,16 for EK-*FI1-TP).	
Off delay time	Output channel n = independent or single Ouput x = enabled Valve function = disabled	hh:mm:ss.fff (**00:00:00.000**) [other values in the 00:00:00.00 … 04:39:37.21 range]
	Delay between the "Off" command telegram and the actual output deactivation. *Same comments as for the "On delay time" parameter apply.* (n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8* for EK-FG1-*TP, or x=1,…,16 for EK-*FI1-TP).	
Staircase lighting function	Output channel n = independent or single Ouput x = enabled	**disabled** enabled
	Enables or disables the staircase lighting feature. *For further details and parameter descriptions see the corresponding section (par. 6.3.4.4).* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Locking function	Output channel n = independent or single Ouput x = enabled	**disabled** enabled
	Enables or disables the capability of locking the input through a remote command. *For further details and parameter descriptions see the corresponding section (par. 6.3.4.6).* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Forcing function	Output channel n = independent or single Ouput x = enabled	**disabled** enabled
	Enables or disables the capability of forcing the input, i.e. the ability to force a value on the output with precedence over other functions. *For further details and parameter descriptions see the corresponding section (par. 6.3.4.7).* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Scenes function	Output channel n = independent or single Ouput x = enabled	**disabled** enabled
	Enables or disables the Scene function. *For further details and parameter descriptions see the corresponding section (par. 6.3.4.8).* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

Parameter name	*Conditions*	*Settings*
Operating energy / time counter	Output channel n = independent or single Ouput x = enabled	**disabled** enabled
	Enables or disables the Hour / Energy counter function. *For further details and parameter descriptions see the corresponding section (par. 6.3.4.9).* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output x – Valve continuous command	Output channel n = independent or single valve function = enabled	8 bit unsigned	C–W– –	[5.001] percentage (0…100%)	452, 455, 458, 461, 464, 467, 470, 473, *476, 479, 482, 485, 488, 491, 494, 497*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).* *This communication object is the direct command for setting the output (x=1,…,8 or x=1,…,16) when the valve function has been enabled.*				

8.3.2.2 Locking function

These parameters are found under the Tab *Channel n (n=A,B,C,D for EK-FG1-TP, or n=A,B,C,D,E,F,G,H for EK-FI1-TP) – Output x (x=1,…,8 for EK-FG1-TP, x=1,…,16 for EK-FI1-TP).*

The lock function allows you to inhibit the operation of the output of a specific channel.

For a comprehensive discussion of the lock function, refer to paragraph 6.3.4.6.

Parameter name	***Conditions***	***Settings***
Lock device signal	Output channel n = independent or single Ouput x = enabled Locking function = enabled	**not inverted** / inverted
	Allows to set a "lock activate" telegram as "unlock" and vice-versa. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
After bus recovery	Output channel n = independent or single Ouput x = enabled Locking function = enabled	unlock lock **no change**
	Defines how to set the lock status after bus voltage recovery. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Behaviour at locking	Output channel n = independent or single Ouput x = enabled Locking function = enabled	off on **no change**
	Defines how to set the output value when the lock is activated. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Behaviour at unlocking	Output channel n = independent or single Ouput x = enabled Locking function = enabled	off on **no change** previous updated value
	Defines how to set the output value when the lock is deactivated. ***Previous*** *is the value that the output had before the lock was activated (see par.6.3.4.10).* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output x – Lock command	Output channel n = independent or single Ouput x = enabled Locking function = enabled	1 bit	C-W--	[1.003] enable	523, 524, 525, 526, 527, 528, 529, 530, *531, 532, 533, 534, 535, 536, 537, 538.*
	Inhibits the switching commands for the output when an "enable" telegram is received, and unlocks them when a "disable" telegram is received. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				

8.3.2.3 Forcing function

These parameters are found under the Tab *Channel n (n=A,B,C,D for EK-FG1-TP, or n=A,B,C,D,E,F,G,H for EK-FI1-TP) – Output x (x=1,…,8 for EK-FG1-TP, x=1,…,16 for EK-FI1-TP).*

The forcing function allows you to force a value on the output of a specific channel, with precedence over other functions.

For a comprehensive discussion of the forcing function, refer to paragraph 6.3.4.7.

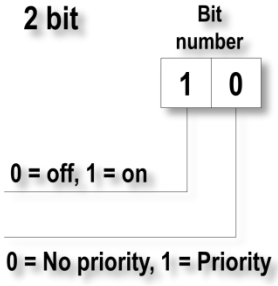
Parameter name	*Conditions*	*Settings*
Forced function - Behaviour end forced control	Output channel n = independent or single Ouput x = enabled Forcing function = enabled	on off **no change** previous
	Allows to determine the state of the output when the forcing is released. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Forced function - Behaviour after bus recovery	Output channel n = independent or single Ouput x = enabled Forcing function = enabled	Not forced Forced up / open Forced down / close Previous **No change**
	Allows to determine the state of the output when the device resumes operation after bus voltage recovery. *Please notice that this is the status of the output, not the forcing status: forcing is maintained over bus failure and bus recovery.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

Object name	Conditions	Size	Flags	DPT	CO number(s)
Output *x* – Forcing command	Output channel n = independent or single Ouput x = enabled Forcing function = enabled	2 bit	C-W--	[2.001] switch control	547, 548, 549, 550, 551, 552, 553, 554, *555, 556, 557, 558, 559, 560, 561, 562*

(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).
(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).

Allows to force the status of an output.

It is composed of 2 bits: the first one is used for the priority value (i.e. defines whether the forcing is in effect, "Priority", or not) and the second one for the imposed value (which is not considered if forcing is not effective).



8.3.2.4 Staircase lighting function

These parameters are found under the Tab *Channel n (n=A,B,C,D for EK-FG1-TP, or n=A,B,C,D,E,F,G,H for EK-FI1-TP) – Output x (x=1,…,8 for EK-FG1-TP, x=1,…,16 for EK-FI1-TP).*

For a comprehensive discussion of the stair light function, refer to paragraph 6.3.4.4.

Parameter name	Conditions	Settings
Staircase lighting time	Output channel n = independent or single Ouput x = enabled Staircase function = enabled	hh:mm:ss (**00:00:30**) [range 00:00:03…04:39:37]

Duration of staircase lighting time.

*This time is the one shown on the time diagram in the descriptive section of this manual as "**Ts**" in paragraph 6.3.4.4.*

(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).
(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).

Parameter name	*Conditions*	*Settings*
Manual off	Output channel n = independent or single Ouput x = enabled Staircase function = enabled	disabled **enabled**
	When enabled, it allows an "Off" command to terminate the lighting time. *The "Off" command can be sent at any time with the same effect, including when the pre-warning is activated.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Retriggerable	Output channel n = independent or single Ouput x = enabled Staircase function = enabled	disabled **enabled**
	When enabled, it allows a new "On" command to restart the timing. *The "On" command can be sent at any time with the same effect, including when the pre-warning is activated.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Pre-warning	Output channel n = independent or single Ouput x = enabled Staircase function = enabled	disabled **enabled**
	Activates the pre-warning feature. *For a detailed description see in paragraph 6.3.4.4 of this manual.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Pre-warning – Pre-warning time	Output channel n = independent or single Ouput x = enabled Staircase function = enabled Pre-warning = enabled	hh:mm:ss (**00:00:10**) [range 00:00:02…04:39:37]
	Specifies how much time before the end of the timing a pre-warning light interruption will be carried out. *The time interval specified includes the interruption time.* *This time is the one shown on the time diagram in the descriptive section of this manual as "**Tp-w**" in paragraph 6.3.4.4.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Pre-warning – Interruption time	Output channel n = independent or single Ouput x = enabled Staircase function = enabled Pre-warning = enabled	ss.fff (**00.250**) [range 00.250…01.000]
	Specifies the duration of the pre-warning interruption. *This time is the one shown on the time diagram in the descriptive section of this manual as "**Ti**" in paragraph 6.3.4.4.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

- The pre-warning time should be shorter than the staircase time ($T_{P-W} < T_S$) and the interruption time shorter than the pre-warning time ($T_I < T_{P-W}$).
- Time delays have no influence on the staircase function (if enabled).
- A staircase timing in progress will be terminated by a reset of the actuator (bus voltage recovery or ETS reprogramming) or by using any function that affects the output (i.e. normal switching, forced control, logic function, scene recall), even if the function does not cause an actual change in the output value.
  On a forced termination, the value of the output remains unchanged; the same that is true also if the termination occurs during pre-warning time.

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output *x* – Staircase lighting start stop command	Output channel n = independent or single Ouput x = enabled Staircase function = enabled	1 bit	C–W––	[1.010] start/stop	571, 572, 573, 574, 575, 576, 577, 578, *579, 580, 581, 582, 583, 584, 585, 586.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).* *Starts the staircase light timing with an On value.* *The timed activation automatically stops at the end of the preset time.* *If "Manual off" is enabled, the communication object will stop the timing with an Off value.*				

8.3.2.5 Scenes function

These parameters are found under the Tab *Channel n (n=A,B,C,D for EK-FG1-TP, or n=A,B,C,D,E,F,G,H for EK-FI1-TP) – Output x (x=1,…,8 for EK-FG1-TP, x=1,…,16 for EK-FI1-TP).*

For a comprehensive discussion of the scenario function, refer to paragraph 6.3.4.8.

Parameter name	*Conditions*	*Settings*
Learning mode	Output channel n = independent or single Ouput x = enabled Scenes function = enabled	**disabled** enabled
	When disabled, the "save scenario" commands are simply ignored and only the values assigned in configuration are used for the scenarios. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Download overwrites learned behavior	Output channel n = independent or single Ouput x = enabled Scenes function = enabled Learning mode = enabled	no / **yes**

Parameter name	*Conditions*	*Settings*
	Defines whether the download of a program on the device should erase and overwrite the stored scene output values previously learned and stored in the device. *When the device is put into operation for the first time, this parameter should be set to "yes" (default value) so that the output is initialized with valid scene values. Otherwise, the values are set to "0" (off) for all scenes.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Scene k	Output channel n = independent or single Ouput x = enabled Scenes function = enabled	enabled / **disabled**
	Enables or disables a new scene code to be assigned to the output. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).* *k=1,…,8.*	
Scene k – Scene number	Output channel n = independent or single Ouput x = enabled Scenes function = enabled Scene *n* = enabled	1…64 (**1**)
	Scene number to be assigned to the output. The output will respond to scene commands that match the specified number. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).* *k=1,…,8.*	
Scene k – Activation delay	Output channel n = independent or single Ouput x = enabled Scenes function = enabled Scene *n* = enabled	hh:mm:ss.ff (**00:00:00.0**) [range 00:00:00.0…04:39:37.2]
	Delay between a scene "recall" command and the actual output switching. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).* *k=1,…,8.*	
Scene *k* – Output behavior	Output channel n = independent or single Ouput x = enabled Scenes function = enabled Scene *n* = enabled	off / **on**
	(Initial) output value for the selected scene. This value will be possibly overwritten by a scene "store" command if the "Learning mode" option is enabled. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).* *k=1,…,8.*	

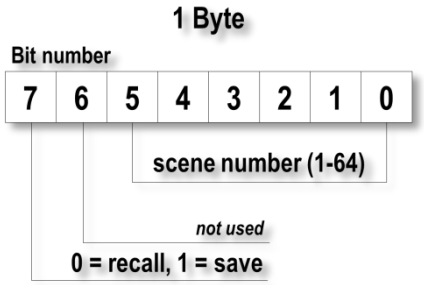
- Each scene recall telegram restarts the activation delay.
- If a new scene recall telegram is received while a delay is active (scene recall not yet executed), the old - and not yet recalled - scene will be rejected and the newest scene value will be in effect.

- The scene recall delay has no influence on the saving of scene values when the learning mode is active.
- If the same scene number is set for several scene entries, only the scene with the lowest entry number (1...8) will be considered. The other internal scenes will be ignored in this case.
- The scene recall can be overridden by a *forced control* or a *lock* function.

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output *x* – Scene number	Output channel n = independent or single Ouput x = enabled Scene function = enabled	1 Byte	C–W– –	[17.001] scene number [18.001] scene control	595, 596, 597, 598, 599, 600, 601, 602, *603, 604, 605, 606, 607, 608, 609, 610.*

(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).
(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).

Allows to recall a scene setting for the status of the output, and to store current status in association to the specified scene.



8.3.2.6 Operating energy / Time counter

These parameters are found under the Tab *Channel n (n=A,B,C,D for EK-FG1-TP, or n=A,B,C,D,E,F,G,H for EK-FI1-TP) – Output x (x=1,…,8 for EK-FG1-TP, x=1,…,16 for EK-FI1-TP).*

For a comprehensive discussion of the scenario function, refer to paragraph 6.3.4.9.

Parameter name	*Conditions*	*Settings*
Output load [W]	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	**50** [W] [range 0…5000]

Parameter name	*Conditions*	*Settings*
	Defines the nominal rated power to be considered in computing the accumulated power consumption for the load connected to this output. *The total energy consumed [Wh] is calculated as the product of the specified value [W] and the operating hours [h].* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Energy / time cyclic sending	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	hh:mm:ss (**00:00:00**) [range 00:00:00…04:39:37]
	Defines the time interval for the cyclic retransmission of the counter values (both for accumulated time and energy). *A value of zero (00:00:00) disables cyclic transmission.*	

- During ETS programming or bus voltage failure, the counter stops counting.

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output *x* – Energy counter (Wh)	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	4-byte signed value	CR-T-	[13.013] active energy [kWh]	619, 624, 629, 634, 639, 644, 649, 654, *659, 664,* *669, 674,* *679, 684,* *689, 694.*
	Stores the current counter value of the accumulated energy. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				
Output *x* - Energy counter reset command	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	1 bit	C-W--	[1.015] reset	620, 625, 630, 635, 640, 645, 650, 655, *660, 665,* *670, 675,* *680, 685,* *690, 695.*
	Resets the energy counter to 0. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output *x* - Hours counter	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	2-byte unsigned value	CR-T-	[7.007] time [h]	621, 626, 631, 636, 641, 646, 651, 656, *661, 666, 671, 676 681, 686 691, 696.*
	Stores the current value of the operating time counter, expressed in hours. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				
Output *x* - Hours counter reset	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	1 bit	C-W--	[1.015] reset	622, 627, 632, 637, 642, 647, 652, 657, *662, 667, 672, 677, 682, 687, 692, 697.*
	Resets the operating hour counter to 0. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				
Output *x* - Hours counter overflow	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	1 bit	CR-T-	[1.005] alarm	623, 628, 633, 638, 643, 648. 653, 658, *663, 668, 673, 678, 683, 688, 693, 698.*
	1-bit alarm sent when the time counter reaches the maximum value of 65535 hours. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				
Output *x* - Operating seconds counter	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	4-byte signed value	CR-T-	[13.100] time lag [s]	837, 840, 843, 846, 849, 852, 855, 858, *861, 864, 867, 870, 873, 876, 879, 882.*
	Stores the current value of the operating time counter, expressed in seconds. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*				

8.3.3 Coupled outputs: channel *n* configuration

This paragraph lists the configuration parameters of the output channels when they are used as coupled outputs.

In general, the following nomenclature is intended for channels and outputs: n=A,B,C,D for EK-FG1-TP, or n=A,B,C,D,E,F,G,H for EK-FI1-TP.

For all the items in this section, the condition *"Output channel n = 3-way valve/Shutter/Venetian blind"* is implicitly assumed but not indicated, for greater clarity.

8.3.3.1 Main parameters

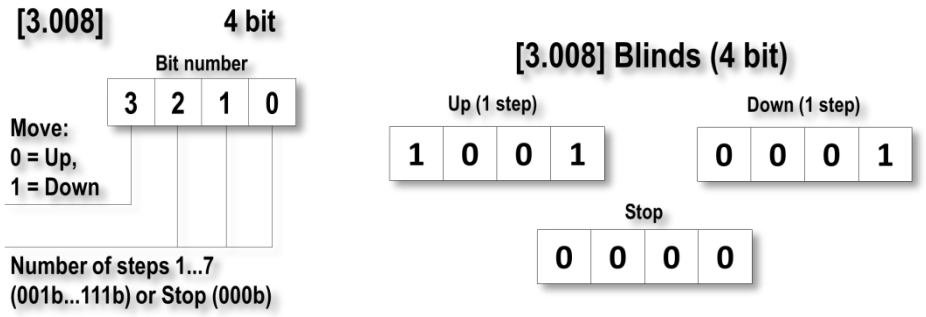
In this section most of the configurable parameters for the output are listed.

Parameter name	*Conditions*	*Settings*
Relay operation	Use = all	**Not inverted** inverted
Status feedback telegram	Use = all	Disabled **enabled**
Reversion pause time	Use = all	hh:mm:ss.fff **00:00:00.300** [range 00:00:00.000 … 04:39:37.215]
	The minimum pause time between contact activation when switching from one output to another.	
Open time	Use = all	hh:mm:ss (**00:00:15**) [range 00:00:00 … 04:39:37]
	The time for the actuator to run the full stroke between the endpoints, in the opening direction. *It is important that the specification of this time is particularly accurate, since the accuracy of positioning depends heavily on it.*	
Close time	Use = all	hh:mm:ss (**00:00:15**) [range 00:00:00 … 04:39:37]
	The time for the actuator to run the full stroke between the endpoints, in the closing direction. *It is important that the specification of this time is particularly accurate, since the accuracy of positioning depends heavily on it.*	
Position control with dimmer	Use = all	**no** / yes
	If this option is selected, a dimmer-type communication object is made available for the control of the actuator. It can be used, as an alternative, at the same time as the other standard control mechanisms.	

Parameter name	*Conditions*	*Settings*
Enable extra time	Use = all	Disabled **enabled**
	Enable or disable additional time to reach the full scale of the movement.	
Time over full scale when moving up / opening	Use = all Enable extra time = enabled	0…60 s **(3 s)**
	Allows the user to set the additional time period for reaching the full scale of the travel during move up/opening.	
Time over full scale in descent / closing	Use = all Enable extra time = enabled	0…60 s **(3 s)**
	Allows the user to set the additional time period for reaching the full scale of the travel during move down/closing.	
Number of slat steps	Use = venetian blind	1…64 **5**
	Number of steps necessary for the motorized actuator to run the slats over the full movement between the endpoints.	
Opening time of the slat step	Use = venetian blind	00:00:00.000…04:39:37.215 hh:mm:ss.fff (**100 ms**)
	Output activation time corresponding to the elementary step of desired amplitude for the opening of the slats.	
Closing time of the slat step	Use = venetian blind	00:00:00.000…04:39:37.215 hh:mm:ss.fff (**100 ms**)
	Output activation time corresponding to the elementary step of desired amplitude for the closing of the slats.	
Slats control with dimmer	Use = venetian blind	**no** / yes
	If this option is selected, a dimmer-type communication object is made available for the control of the actuator. It can be used, as an alternative, at the same time as the other standard control mechanisms.	
Behaviour at bus on	Use = all	**No change** up / open down / close move to position
	Allows to determine the state of the output after bus recovery.	
Delay after bus recovery	Use = all	00:00:00.00…04:39:37.21 hh:mm:ss.ff (**00:00:03.00**)
	Time, starting from bus recovery, after which feedback telegrams can start to be transmitted. *The delay has no effect on the behavior of the outputs, but only affects the transmission of telegrams. The outputs can therefore be activated during the delay time.* *The transmission of telegrams is not delayed but inhibited; for any switching that occurs during the delay time, no feedback is therefore generated.*	
Locking function	Use = all	enabled / **disabled**
	Enables or disables the capability of locking the input through a remote command. *For further details and parameter descriptions see the corresponding section 6.3.5.5*	
Forcing function	Use = all	enabled / **disabled**

Parameter name	*Conditions*	*Settings*
	Enables or disables the capability of forcing the input through a remote command. *For further details and parameter descriptions see the corresponding section 6.3.5.6.*	
Scenes function	Use = all	enabled / **disabled**
	Enables or disables the Scene function. *For further details and parameter descriptions see the corresponding section 6.3.5.7.*	
Meteo alarms	Use = shutter or venetian blind	enabled / **disabled**
	Enables or disables the meteo alarms management function. *For further details and parameter descriptions see the corresponding section 6.3.5.8.*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output channel *n* – Move up-down command	Output channel n = 3-way valve / shutter / venetian blind Use = shutter or venetian blind	1 bit	C-W--	[1.008] up/down	319, 330, 341, 352, *363, 374, 385, 396.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Continuous motion command object: if received, starts motion in the specified direction.*				
Output channel *n* – Stop-step up-down command	Output channel n = 3-way valve / shutter / venetian blind Use = shutter or venetian blind	1 bit	C-W--	[1.007] step	320, 331, 342, 353, *364, 375, 386, 397.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Command object for step motion: if received (and there are no movements in progress), starts a movement of a predetermined duration in the specified direction. If the actuator is already moving, instead, stops the movement in progress.*				
Output channel *n* – Dedicated Stop command	Output channel n = 3-way valve / shutter / venetian blind Use = all	1 bit	C-W--	[1.017] trigger	321, 332, 343, 354, *365, 376, 387, 398.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Upon receipt, stops the current movement.*				
Output channel *n* – Info move	Output channel n = 3-way valve / shutter / venetian blind Use = all	1 bit	CR-T-	[1.011] state	322, 333, 344, 355, *366, 377, 388, 399.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Returns information about the current direction of movement.*				
Output channel *n* – Valid current abs position	Output channel n = 3-way valve / shutter / venetian blind Use = all	1 bit	CR-T-	[1.002] boolean	323, 334, 345, 356, *367, 378, 389, 400.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Indicates that the actuator has reached the requested absolute position. Transmitted following absolute positioning commands.*				

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output channel n – Dimmer blind position command	Use = venetian blind Position control with dimmer = yes	4 bit	C-W--	[3.008] blind control	324, 335, 346, 357, *368, 379, 390, 401.*
	Allows to command the actuator through a dimmer-style command. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* 				
Output channel n – Dimmer shutter position command	Use = shutter Position control with dimmer = yes	4 bit	C-W--	[3.008] blind control	324, 335, 346, 357, *368, 379, 390, 401*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).				
Output channel n – Dimmer valve position command	Use = valve Position control with dimmer = yes	4 bit	C-W--	[3.008] blind control	324, 335, 346, 357, *368, 379, 390, 401*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).				
Output channel *n* – Abs [valve / shutter / blind] position command	Output channel n = 3-way valve / shutter / venetian blind Use = all	1 bit	C-W--	[5.001] percentage (0..100%)	325, 336, 347, 358, *369, 380, 391, 402.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Sets the absolute position to reach and starts the movement in the appropriate direction.* *In the case of Venetian blinds, the absolute position to which it refers is that of the panel.*				
Output channel *n* – Abs [valve / shutter / blind] position status	Output channel n = 3-way valve / shutter / venetian blind Use = all	1 bit	CR-T-	[5.001] percentage (0..100%)	326, 337, 348, 359, *370, 381, 392, 403.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *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 to which it refers is that of the panel.*				
Output channel n – Dimmer slats command	Use = venetian blind Slats control with dimmer = yes	4 bit	C-W--	[3.008] blind control	327, 338, 349, 360, *371, 382, 393, 404.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Allows to command the slats position through a dimmer-style command.* *See previous entry for bit field details.*				

Object name	Conditions	Size	Flags	DPT	CO number(s)
Output channel *n* – Abs slats position command	Output channel n = 3-way valve / shutter / venetian blind **Use = venetian blind**	1 bit	C-W--	[5.001] percentage (0..100%)	328, 339, 350, 361, *372, 383, 394, 405.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Sets the absolute position to be reached for the slats and starts the movement in the appropriate direction.*				
Output channel *n* – Abs slats position status	Output channel n = 3-way valve / shutter / venetian blind **Use = venetian blind**	1 bit	CR-T-	[5.001] percentage (0..100%)	329, 340, 351, 362, *373, 384, 395, 406.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *Returns the current absolute position of the slats.* *The absolute position is calculated based on the sequence of requested movements and is realigned whenever the slats reach the end of their travel; this happens when the uninterrupted duration of movement in one direction is at least equal to the full travel time specified as a parameter.*				
Output channel *n* - Direction status output x	Output channel n = 3-way valve / shutter / venetian blind AND Status feedback telegram = enabled	1 bit	CR-T-	[1.001] switch	453, 456, 459, 462, 465, 468, 471, 474, *477, 480, 483, 486, 489, 492, 495, 498.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).* *Sent at each output state change.*				

8.3.3.2 Locking function

Parameter name	Conditions	Settings
Lock device signal	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Locking function = enabled	**not inverted** / inverted
	Allows to interpret a "lock activate" telegram as unlock and vice-versa. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).*	
After bus recovery	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Locking function = enabled	unlock lock **no change**
	Defines how to set the lock status after bus voltage recovery. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).*	

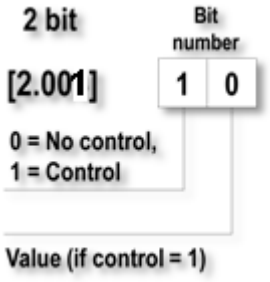
Parameter name	*Conditions*	*Settings*
Behaviour at locking	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Locking function = enabled	**no change** up / open down / close stop move to position
	Defines how to set the output value when the lock is activated. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).*	
Behaviour at unlocking	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Locking function = enabled	**no change** up / open down / close stop move to position previous updated value
	Defines how to set the output value when the lock is deactivated. *For the meaning of the "previous" option, see the details in par. 6.3.4.10.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* ***Previous** is the value that the output had when the block was activated.* ***Updated value** behaves as follows:* *1) If during the block the user makes an up or down movement, when the block is removed the shutter/venetian blind/valve is positioned at the bottom of the scale fully up or down, depending on the direction set during the block;* *2) If during the block the user sends an absolute position command, for example 50%, when the block is removed the actuator moves exactly to that percentage value.*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output channel n – Lock command	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Locking function = enabled	1 bit	C–W– –	[1.003] enable	523, 525, 527, 529, *531, 533, 535, 537.*
	Inhibits the switching commands for the output when an "enable" telegram is received, and unlocks them when a "disable" telegram is received. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).*				

8.3.3.3 Forcing function

Parameter name	*Conditions*	*Settings*
Forced function - Behaviour on forced control end	Output channel n = independent or single Ouput x = enabled Forcing function = enabled	**no change** up / open down / close stop move to position previous

Parameter name	Conditions	Settings
	Allows to determine the state of the output when the forcing is released. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	
Forced function - Behaviour after bus recovery	Output channel n = independent or single Ouput x = enabled Forcing function = enabled	Not forced Forced up / open Forced down / close Previous **no change**
	Allows to determine the state of the output when the device resumes operation after bus voltage recovery. *Please notice that this is the status of the output, not the forcing status: forcing is maintained over bus failure and bus recovery.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

Object name	Conditions	Size	Flags	DPT	CO number(s)
Output channel n – Forcing command	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Forcing function = enabled	2 bit	C–W– –	[2.001] switch control	547, 549, 551, 553, *555, 557,* *559, 561.*
	Allows to force the status of an output pair. The command is a "direction control" telegram, which can force movement in one direction, the other, or release forcing. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* 				

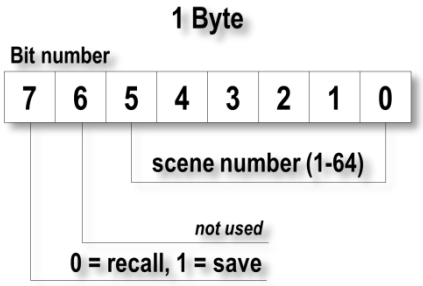
8.3.3.4 Scenes function

Parameter name	Conditions	Settings
Learning mode	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled	**disabled** enabled
	When disabled, the "save scenario" commands are simply ignored and only the values assigned in configuration are used for the scenarios. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *(x= 1,…,8 for EK-FG1-TP, or x=1,…,16 for EK-FI1-TP).*	

Parameter name	*Conditions*	*Settings*
Download overwrites learned behavior	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled Learning mode = enabled	no / **yes**
	Defines whether the download of a program on the device should erase and overwrite the stored scene output values previously learned and stored in the device. *When the device is put into operation for the first time, this parameter should be set to "yes" (default value) so that the output is initialized with valid scene values. Otherwise, the values are set to "0" (off) for all scenes.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).*	
Scene *k*	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled	enabled / **disabled**
	Enables or disables a new scene code to be assigned to the output. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *k=1,…,8.*	
Scene *k* – Scene number	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled Scene *n* = enabled	1…64 (**1**)
	Scene number to be assigned to the output. The output will respond to scene commands that match the specified number. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *k=1,…,8.*	
Scene *k* – Activation delay	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled Scene *n* = enabled	hh:mm:ss.f (**00:00:00.0**) [range 00:00:00.0…04:39:37.2]
	Delay between a scene "recall" command and the actual output switching. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *k=1,…,8.*	
Scene *k* – Output behaviour	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled Scene *n* = enabled	**Stop** Open Close Move to position
	Value to assign to the output for the selected scene. *This is an initialization value that can remain fixed or, if the learning mode is enabled, be overwritten by a "save scene" command.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *k=1,…,8.*	
Scene *k* - position	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled Scene *n* = enabled Output behaviour = move to position	**0** [0…100%]

Parameter name	Conditions	Settings
	Absolute position that the actuator must reach for the selected scene. *This is an initialization value that can remain fixed or, if the learning mode is enabled, be overwritten by a "save scene" command.* *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *k=1,…,8.*	
Scene *k* – slats position	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scenes function = enabled Scene *n* = enabled Output behaviour = move to position	**0** [0…100%]
	Absolute position to assign to the slats for the selected scene. This is an initialization value that can remain fixed or, if the learning mode is enabled, be overwritten by a "save scene" command. *(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP).* *k=1,…,8.*	

- Each scene recall telegram restarts the activation delay.
- If a new scene recall telegram is received while a delay is active (scene recall not yet executed), the old - and not yet recalled - scene will be rejected and the newest scene value will be in effect.
- The scene recall delay has no influence on the saving of scene values when the learning mode is active.
- If the same scene number is set for several scene entries, only the scene with the lowest entry number (1...8) will be considered. The other internal scenes will be ignored in this case.
- The scene recall can be overridden by a *forced control* or a *lock* function.

Object name	Conditions	Size	Flags	DPT	CO number(s)
Output channel n – Scene number	Output channel n = 3-way valve/Shutter/Venetian blind Use = all Scene function = enabled Scene *k* = enabled	1 Byte	C–W– –	[17.001] scene number [18.001] scene control	595, 597, 599, 601, *603, 605,* *607, 609.*
	(n = A,B,C,D for EK-FG1-TP, or n = A,B,C,D,E,F,G,H for EK-FI1-TP). *k=1,…,8.* *Allows to recall a scene setting for the status of the output, and to store current status in association to the specified scene.*  				

8.3.3.5 Meteo alarms

Parameter name	*Conditions*	*Settings*
Reaction to [wind / frost / rain]	Meteo alarms = enabled	**none** Up / Open Down / Close
	Defines the movement that the actuator must perform when the corresponding alarm is activated.	
[wind / frost / rain] timeout	Meteo alarms = enabled	0…65535 [minutes] (**10 Min.**)
	Defines the timeout interval for the heartbeat function. *If a timeout is set, "Alarm not active" telegrams must be sent regularly by the source with a period shorter than the specified timeout, to prove that alarm communication is occurring properly. If an "Alarm not active" telegram is not received for a period longer than the timeout, the alarm condition is activated.* *A null value (0) disables the heartbeat function.*	
Action at the end of the alarm	Meteo alarms = enabled	**none** Up / Open Down / Close Previous
	Defines the movement that the actuator must perform when all alarms cease.	

8.4 Logic functions

For a comprehensive discussion of the logic function, refer to paragraph 6.3.6.

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

8.4.1.1 Main parameters

Parameter name	*Conditions*	*Settings*
Logic function n	Number of logic functions ≠ 0	**disabled** enabled
	It allows to enable a specific logic function. *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 input objects. *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 the specified time before evaluating the logical objects configured as inputs; for those for which a value has not yet been received at the end of the time, a request is sent on 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. *Logical objects configured as disabled are ignored and their communication objects are not generated.* *n=1,…,8. x= 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. *n=1,…,8. x= 1,…,8.*	

Il calcolo della Logic function viene effettuato solo se e quando almeno uno degli oggetti logici di ingresso viene aggiornato.

Object name	Conditions	Size	Flags	DPT	CO number(s)
Logic function n - Logic object *x*	Logic function n = enabled Logic object x = enabled	1 bit	C-W--	[1.001] switch	Function 1: 739,…,746 Function 2: 748,…,755 Function 3: 757,…,764 Function 4: 766,…,773 Function 5: 775,…,782 Function 6: 784,…,791 Function 7: 793,…,800 Function 8: 802,…,809
	n=1,…,8. x= 1,…,8. *These are the objects related to the inputs for each logical function.*				
Logic function n – Logic object status	Logic function n = enabled Logic object x = enabled	1 bit	C-W--	[1.001] switch	747, 756, 765, 774, 783, 792, 801, 810.
	n=1,…,8. x= 1,…,8. *These are the objects related to the outputs for each logical function..*				

8.5 Comparison functions

For a comprehensive discussion of comparison functions, see section 6.3.7.

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

Additionally, depending on the comparison type set, new communication objects can be enabled, internal objects or numeric values can be used.

8.5.1.1 Main parameters

Parameter name	Conditions	Settings
Comparison function n	Number of compare functions ≠ 0	**disabled** enabled
	It allows to enable a specific comparison function. *n=1,…,8.*	
Comparison operation	Comparison function n = enabled	**=** != < > >= <=
	It defines the comparison operation to be calculated. *n=1,…,8.*	

Parameter name	*Conditions*	*Settings*
Hysteresis	Comparison function n = enabled	0… 15 % (**0**)
	Defines a hysteresis value to be used in the comparison operation between the 2 values.. *n=1,…,8.*	
Comparison 1	Comparison function n = enabled	**Communication object** Internal object
	Allows you to set whether the first comparison object is a communication or internal object. *n=1,…,8.*	
DPT	Comparison function n = enabled Comparison 1 = communication object	**1 bit (DPT 1.001)** 2 bit (DPT 2.001) 4 bit (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)
	Expresses the data type of comparison term 1, when it is set as a communication object. *n=1,…,8.*	
Internal value	Comparison function n = enabled Comparison 1 = internal object	**Internal type**
	By selecting "internal object", the type matches that of the object selected subsequently.	
Internal type	Comparison function n = enabled Comparison 1 = internal object	**Output value** Output channel value
	It allows you to select the type of internal object, between independent output and channel (coupled output).	
Output number	Comparison function n = enabled Comparison 1 = internal object Internal type = output value	1…8 **(1)**
	It selects the independent output as the internal object.	
Output channel number	Comparison function n = enabled Comparison 1 = internal object Internal type = output channel value	A, B, C, D **(A)**
	It selects the channel (coupled output) as the internal object.	
Comparison 2	Comparison function n = enabled	**Communication object** Numeric value
	It allows to set whether the second comparison object is a communication object or a numeric value. *n=1,…,8.*	

Parameter name	*Conditions*	*Settings*
DPT	Comparison function n = enabled Comparison 2 = communication object	**1 bit (DPT 1.001)** 2 bit (DPT 2.001) 4 bit (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)
	Expresses the data type of comparison term 2, when it is set as a communication object. *n=1,…,8.*	
Valore	Comparison function n = enabled Comparison 2 = numeric value	**0** [-671088…670597]
	Expresses the data type of comparison term 2, when it is set as a numeric value. *n=1,…,8.*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Compare n - Object 1 *[DataType]*	Comparison function n = enabled Comparison 1 = communication object	Depending on the configuration **1 bit**	C-W--	Depending on the configuration **([1.001] switch)**	811, 814, 817, 820, 823, 826, 829, 832
	n=1,…,8. *Types and sizes of individual objects can be configured as described in Table 1.*				
Compare n - Object 2 *[DataType]*	Comparison function n = enabled Comparison 2 = communication object	Depending on the configuration **1 bit**	C-W--	Depending on the configuration **([1.001] switch)**	812, 815, 818, 821, 824, 827, 830, 833
	n=1,…,8. *Types and sizes of individual objects can be configured as described in Table 1.*				
Status compare *n*	Comparison function n = enabled	1 bit	CR-T-	[1.001] switch	813, 816, 819, 822, 825, 828, 831, 834.
	n=1,…,8. *It expressed the result of the comparison operation, such as True or False.*				

The data sizes 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, pulses difference
2 byte unsigned	[8.001] 2-byte unsigned value, pulses
2 byte float	[9.002] 2-byte float value, temperature difference

Table 1 - DPT for comparison objects

9 Appendix

9.1 Communication objects table

Following is a summary of all KNX Communication Objects (CO) and corresponding Data Point Types (DPT) defined by the application program according to configuration options.

The listing order is generally by CO number.

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Manual commands disabled	Manual operation = enabled Manual disable from bus = enabled	1 bit	C-W--	[1.001] switch	1
Output channel n – Move up/down command	Output channel n = 3-way valve / shutter / Venetian blind Use = shutter or venetian blind	1 bit	C-W--	[1.008] up/down	319, 330, 341, 352, *363, 374, 385, 396*
Output channel n – stop-step up/down command	Output channel n = 3-way valve / shutter / Venetian blind Use = shutter or venetian blind	1 bit	C-W--	[1.007] step	320, 331, 342, 353, *364, 375, 386, 397*
Output channel n – Dedicated stop command	Output channel n = 3-way valve / shutter / Venetian blind Use = all	1 bit	C-W--	[1.017] trigger	321, 332, 343, 354, *365, 376, 387, 398*
Output channel n – Info move	Output channel n = 3-way valve / shutter / Venetian blind Use = all	1 bit	CR-T-	[1.011] state	322, 333, 344, 355, *366, 377, 388, 399*
Output channel n – Valid current abs position	Output channel n = 3-way valve / shutter / Venetian blind Use = all	1 bit	CR-T-	[1.002] boolean	323, 334, 345, 356, *367, 378, 389, 400*
Output channel n – Dimmer blind position command	Output channel n = 3-way valve / shutter / Venetian blind Use = Venetian blind Position control with dimmer = yes	4 bit	C-W--	[3.008] blind control	324, 335, 346, 357, *368, 379, 390, 401*
Output channel n – Dimmer shutter position command	Output channel n = 3-way valve / shutter / Venetian blind Use = shutter Position control with dimmer = yes	4 bit	C-W--	[3.008] blind control	324, 335, 346, 357, *368, 379, 390, 401*
Output channel n – Dimmer valve position command	Output channel n = 3-way valve / shutter / Venetian blind Use = Valve Position control with dimmer = yes	4 bit	C-W--	[3.008] blind control	324, 335, 346, 357, *368, 379, 390, 401*
Output channel n – Abs [valve/shutter/blind] position command	Output channel n = 3-way valve / shutter / Venetian blind Use = all	1 bit	C-W--	[5.001] percentage (0..100%)	325, 336, 347, 358, *369, 380, 391, 402*

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output channel n – Abs [valve/shutter/blind] status command	Output channel n = 3-way valve / shutter / Venetian blind Use = all	1 bit	CR-T-	[5.001] percentage (0..100%)	326, 337, 348, 359, *370, 381, 392, 403*
Output channel n – Dimmer slats command	Output channel n = 3-way valve / shutter / Venetian blind Use = Venetian blind Slats control with dimmer = yes	4 bit	C-W--	[3.008] blind control	327, 338, 349, 360, *371, 382, 393, 404*
Output channel n – Abs slat position command	Output channel n = 3-way valve / shutter / Venetian blind Use = Venetian blind	1 bit	C-W--	[5.001] percentage (0..100%)	328, 339, 350, 361, *372, 383, 394, 405*
Output channel n – Abs slat position status	Output channel n = 3-way valve / shutter / Venetian blind Use = Venetian blind	1 bit	CR-T-	[5.001] percentage (0..100%)	329, 340, 351, 362, *373, 384, 395, 406*
Output x – On/off command	Output channel n = independent or single valve function = disabled	1 bit	C-W--	[1.001] switch	451, 454, 457, 460, 463, 466, 469, 472, *475, 478, 481, 484, 487, 490, 493, 496*
Output x – Valve continuous command	Output channel n = independent or single valve function = enabled	8 bit unsigned	C-W--	[5.001] percentage (0…100%)	452, 455, 458, 461, 464, 467, 470, 473, *476, 479, 482, 485, 488, 491, 494, 497*
Output x – On/off status	Output channel n = independent or single AND Status feedback telegram = enabled	1 bit	CR-T-	[1.001] switch	453, 456, 459, 462, 465, 468, 471, 474, *477, 480, 483, 486, 489, 492, 495, 498*.
Output channel n – Direction status output x	Output channel n = independent or single AND Status feedback telegram = enabled Use = all	1 bit	CR-T-	[1.001] switch	453, 456, 459, 462, 465, 468, 471, 474, *477, 480, 483, 486, 489, 492, 495, 498*.

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output *x* – Lock command	Output channel n = independent or single Output x = enabled Locking function = enabled	1 bit	C-W--	[1.003] enable	523, 524, 525, 526, 527, 528, 529, 530, *531, 532,* *533, 534,* *535, 536,* *537, 538*
Output channel n – Lock command	Output channel n = 3-way valve / shutter / Venetian blind Use = all Locking function = enabled	1 bit	C-W--	[1.003] enable	523, 524, 525, 526, 527, 528, 529, 530, *531, 532,* *533, 534,* *535, 536,* *537, 538*
Output *x* – Forcing command	Output channel n = independent or single Output x = enabled Forcing function = enabled	2 bit	C-W--	[2.001] switch control	547, 548, 549, 550, 551, 552, 553, 554, *555, 556,* *557, 558,* *559, 560,* *561, 562*
Output channel n – Forcing command	Output channel n = 3-way valve / shutter / Venetian blind Use = all Forcing function = enabled	2 bit	C-W--	[2.001] switch control	547, 549, 551, 553, *555, 557,* *559, 561*
Output *x* – Staircase lighting start stop command	Output channel n = independent or single Output x = enabled Staircase function = enabled	1 bit	C-W--	[1.010] start/stop	571, 572, 573, 574, 575, 576, 577, 578, *579, 580,* *581, 582,* *583, 584,* *585, 586*

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output *x* – Scene number	Output channel n = independent or single Output x = enabled Scenes function = enabled	1 Byte	C-W--	[17.001] scene number [18.001] scene control	595, 596, 597, 598, 599, 600, 601, 602, *603, 604,* *605, 606,* *607, 608,* *609, 610*
Output channel n – Scene number	Output channel n = 3-way valve / shutter / Venetian blind Use = all Scenes function = enabled	1 Byte	C-W--	[17.001] scene number [18.001] scene control	595, 597, 599, 601, *603, 605,* *607, 609*
Output *x* – Energy counter (Wh)	Output channel n = independent or single Output x = enabled Operating energy/time counter = enabled	4-byte signed value	CR-T-	[13.0130 active energy [Wh]	619, 624, 629, 634, 639, 644, 649, 654, *659, 664,* *669, 674,* *679, 684,* *689, 694*
Output *x* – Energy counter reset command	Output channel n = independent or single Output x = enabled Operating energy/time counter = enabled	1 bit	C-W--	[1.015] reset	620, 625, 630, 635, 640, 645, 650, 655, *660, 665,* *670, 675,* *680, 685,* *690, 695*
Output *x* – Hours counter	Output channel n = independent or single Output x = enabled Operating energy/time counter = enabled	2-byte unsigned value	CR-T-	[13.100] time lag [s]	621, 626, 631, 636, 641, 646, 651, 656, *661, 666,* *671, 676* *681, 686* *691, 696*
Output *x* – Hours counter reset	Output channel n = independent or single Output x = enabled Operating energy/time counter = enabled	1 bit	C-W--	[1.015] reset	622, 627, 632, 637, 642, 647, 652, 657, *662, 667,* *672, 677,* *682, 687,* *692, 697*

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO number(s)*
Output *x* – Hours counter overflow	Output channel n = independent or single Output x = enabled Operating energy/time counter = enabled	1 bit	CR-T-	[1.005] alarm	623, 628, 633, 638, 643, 648. 653, 658, *663, 668, 673, 678, 683, 688, 693, 698*
Logic function 1 - Logic object *x*	Logic function 1 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	739, 740, 741, 742, 743, 744, 745, 746.
Logic function 1 - Logic object status	Logic function 1 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	747
Logic function 2 - Logic object *x*	Logic function 2 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	748, 749, 750, 751, 752, 753, 754, 755
Logic function 2 - Logic object status	Logic function 2 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	756
Logic function 3 - Logic object *x*	Logic function 3 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	757, 758, 759, 760, 761, 762, 763, 764.
Logic function 3 - Logic object status	Logic function 3 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	765
Logic function 4 - Logic object *x*	Logic function 4 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	766, 767, 768, 769, 770, 771, 772, 773,
Logic function 4 - Logic object status	Logic function 4 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	774
Logic function 5 - Logic object *x*	Logic function 5 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	775, 776, 777, 778, 779, 780, 781, 782.
Logic function 5 - Logic object status	Logic function 5 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	783
Logic function 6 - Logic object *x*	Logic function 6 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	784, 785, 786, 787, 788, 789, 790, 791.

Object name	Conditions	Size	Flags	DPT	CO number(s)
Logic function 6 - Logic object status	Logic function 6 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	792
Logic function 7 - Logic object *x*	Logic function 7 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	793, 794, 795, 796, 797, 798, 799, 800.
Logic function 7 - Logic object status	Logic function 7 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	801
Logic function 8 - Logic object *x*	Logic function 8 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	C-W--	[1.001] switch	802, 803, 804, 805, 806, 807, 808, 809.
Logic function 8 - Logic object status	Logic function 8 = enabled Logic object x = enabled (x = 1,…,8)	1 bit	CR-T-	[1.001] switch	810
Compare n – Object 1 *[Data Type]* *n=1,…,8*	Comparison function n = enabled Comparison 1 = communication object	See Table 1	C-W--	See Table 1	811, 814, 817, 820, 823, 826, 829, 832
Compare n – Object 2 *[Data Type]* *n=1,…,8*	Comparison function n = enabled Comparison 2 = communication object	See Table 1	C-W--	See Table 1	812, 815, 818, 821, 824, 827, 830, 833
Status compare n *n=1,…,8*	Comparison function n = enabled	1 bit	CR-T-	[1.001] switch	813, 816, 819, 822, 825, 828, 831, 834.
Output channel n – Wind alarm	Output channel n = 3-way valve / shutter / Venetian blind Use = shutter or venetian blind Meteo alarms = enabled	1 bit	C-W--	[1.005] alarm	835, 841, 847, 853, *859, 865, 871, 877.*
Output channel n – Frost alarm	Output channel n = 3-way valve / shutter / Venetian blind Use = shutter or venetian blind Meteo alarms = enabled	1 bit	C-W--	[1.005] alarm	836, 842, 848, 854, 860, 866, 872, 878.
Output x - Operating second counter	Output channel n = independent or single Ouput x = enabled Operating energy/time counter = enabled	4-bytes signed value	CR-T-	[13.100] time lag [s]	837, 840, 843, 846, 849, 852, 855, 858, *861, 864, 867, 870, 873, 876, 879, 882.*
Output channel n – Rain alarm	Output channel n = 3-way valve / shutter / Venetian blind Use = shutter or venetian blind Meteo alarms = enabled	1 bit	C-W--	[1.005] alarm	838, 844, 850, 856, *862, 868, 874, 880.*

9.2 Warning

- Installation, electrical connection, configuration and commissioning of the device may only be carried out by qualified personnel.
- Opening the device container causes the immediate expiration of the warranty.

9.3 Return of defective devices

Devices that have problems or defects can be returned for repair or replacement by following the procedure described below.

9.3.1 Devices purchased directly from ekinex®

It is necessary to first contact ekinex® technical support by sending an e-mail to support@ekinex.com with the following information (mandatory):

- Exact model of the device;
- Serial number (found on the label applied to the product);
- Date and/or references of the purchase document;
- Precise description, and as detailed as possible, of the fault or problem.

ekinex® technical support will promptly contact the customer, depending on the case, to investigate the problem, suggest possible solutions or authorize the return of the device for repair or replacement.

The devices must be shipped 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 the technical support during the support phase.

9.3.2 Devices purchased through resellers

For assistance relating to devices purchased through resellers, it is necessary to contact the technical support structure of the latter.

Depending on the type of problem and any other factors, at the sole decision of ekinex® and in agreement with the dealer, the customer may be advised to contact ekinex® directly according to the same procedure as above.

9.4 Other 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 service at support@ekinex.com or visit the website www.ekinex.com.