

KNX 3-channel dimmer actuator 1-10V



GWA9313

Technical Manual

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1 Introduction

The 3-channel dimmer actuator 1-10V (from DIN rail) is used to command and adjust electronic ballast or transformers with a control voltage of 1-10V.

Each channel has a 16A relay for disconnecting the power supply to the ballast.

The dimmer actuator is powered from the KNX BUS line.

The device has push-buttons and LEDs on the front for commanding and indicating the status of the outputs.

The dimmer actuator is assembled on a DIN rail, or in electric boards or junction boxes.

2 Application

The dimmer actuator is configured with the ETS software, to perform the following functions:

ON/OFF switching

- Setting the degree of light intensity for the execution of the ON switchover command

Relative brightness regulation

- Parameterisation of the maximum and minimum adjustment threshold.
- Parameterisation of the relative adjustment speeds between 0% and 50%, and between 50% and 100%

Absolute brightness regulation

- Setting the mode for reaching the required light intensity (via a ramp or jump to the value)
- Parameterisation of the ramp adjustment speed 0% - 100%

Scenes

- Memorising and activating 8 scenes (value 0 - 63)
- Enabling/disabling of scene learning from BUS

Priority command (forcing)

- Setting the degree of light intensity with forcing activation ON
- Setting the forcing status upon BUS voltage recovery

Timed switchover (Stair raiser light)

- Parameterisation of light value during timing
- Setting the activation time
- Setting the pre-warning time
- Parameterisation of behaviour when a timed activation command is received with timing already active
- Setting the stair raiser light activation time from the BUS

Block function

- Parameterisation of the block activation value, behaviour when block is active, and behaviour when block is deactivated
- Setting the block object value upon download and upon BUS voltage recovery

Slave mode for control from BUS device

- Setting the monitoring time and dimmer behaviour in safe operating mode
- Parameterisation of the slave mode value upon download and upon voltage recovery

Logic function

- Logic operation AND/NAND/OR/NOR with command object and result object of logic operation
- Logic operations AND/NAND/OR/NOR/XOR/XNOR up to 8 logic inputs
- Setting the NOT operation on the 8 inputs
- For all the command objects, you can set:
 - Setting the mode for reaching the required light intensity (via a ramp or jump to the value)
 - Parameterisation of the ramp adjustment speed 0% - 100%
 - The delay at switch-on and switch-off

Other functions

- Parameterisation of the dimming curve
- Parameterisation of the output behaviour upon failure and recovery of BUS voltage
- Setting the transmission of information concerning the ON/OFF status and the current light intensity percentage value
- Setting the transmission of information concerning overloads
- Setting the transmission of information concerning the absence of a 230V voltage (with BUS voltage present)
- Enabling the channel counter for counting the channel ON/OFF period
- Setting the local button key operation

2.1 Association limits

Maximum number of group addresses: 254
 Maximum number of associations: 254

This means that up to 254 group addresses can be defined, and up to 254 associations can be made (communication objects and group addresses).

3 “Main” menu

The **Main** menu contains the parameters used to enable the different functions implemented by the device and to set the main operating parameters.

The basic structure of the menu is as follows:

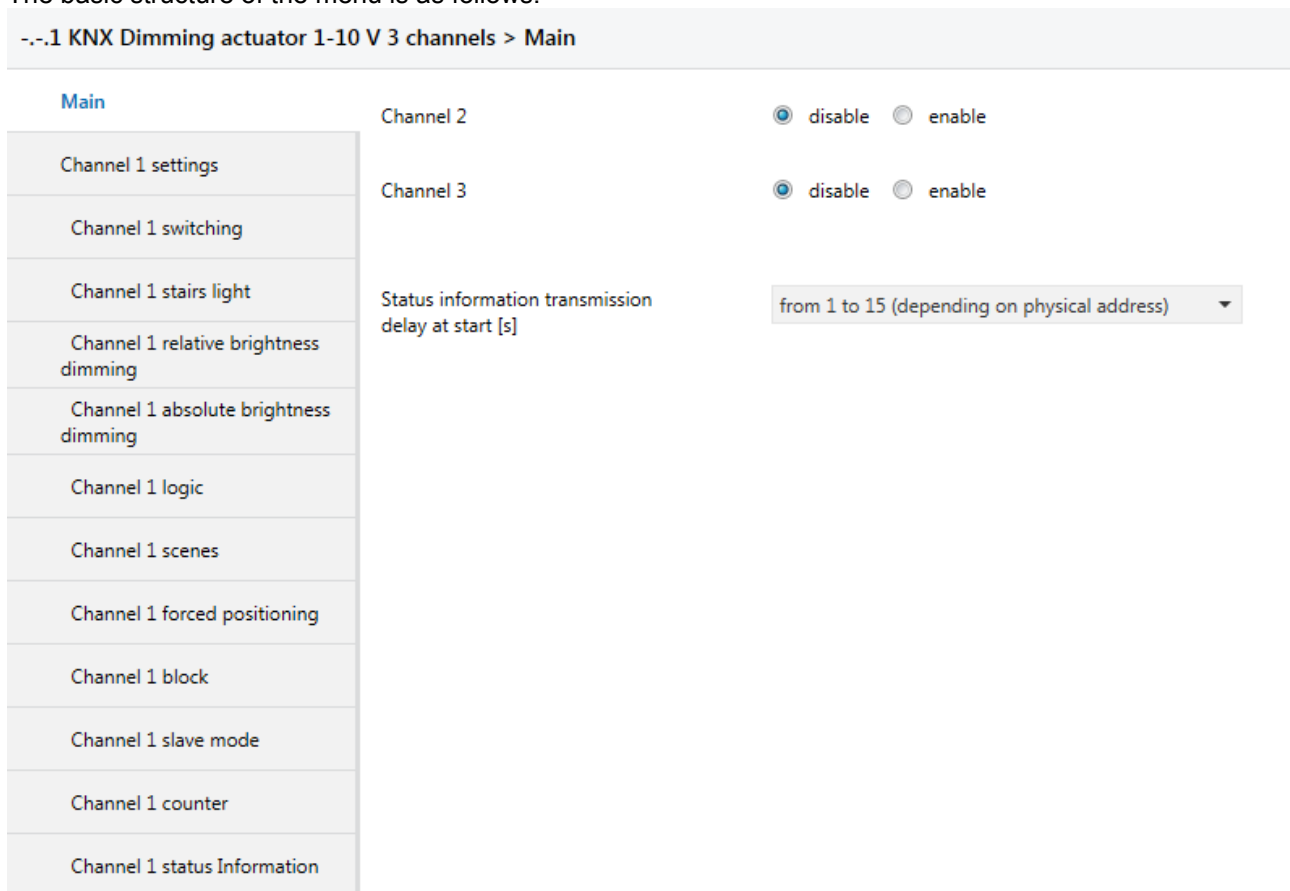


Fig. 3.1

3.1 Parameters

3.1.1 Channel 2, 3

Channel 1 is always enabled. Parameters “**Channel 2**” and “**Channel 3**” are used to visualise and configure all the operating parameters of the relative channels. The values that can be set for these parameters are:

- disable
- **enable (default value)**

if **enable** is selected, the **Channel 2 settings** or **Channel 3 settings** menu is visible.

3.1.2 Status information transmission delay [s]

It is possible to determine the delay for transmitting the status information (brightness values, on/off status) for both channels on the BUS, via the “**Status information transmission delay [s]**” parameter. The parameter may have the following values:

- value from 1 to 15 (depending on physical address) 0 (default value)
- 1..15

4 “Channel x settings” menu

For the sake of simplicity, the items that make up the menus **Channel 1 settings**, **Channel 2 settings** and **Channel 3 settings** will be described only once in the following chapters (in reference to the general **Channel x settings** menu) as all these menus contain the same items.

The **Channel x settings** menu contains the parameters that define the behaviour of channel x beyond the specific functions implemented by the dimmer.

The basic structure of the menu is as follows:

-.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 settings

Main	Maximum dimming threshold	100% ▼
Channel 1 settings	Minimum dimming threshold	0% ▼
Channel 1 switching	Brightness reaching for on/off, stairs light, forcing, block, slave	<input checked="" type="radio"/> with jump to value <input type="radio"/> with ramp
Channel 1 stairs light	Relay status at bus voltage failure	no change ▼
Channel 1 relative brightness dimming	Channel status at bus voltage recovery	as before voltage drop ▼
Channel 1 absolute brightness dimming	Local push button behaviour	single push button dimmer test ▼
Channel 1 logic	Characteristic dimming curve	<input type="radio"/> linear <input checked="" type="radio"/> adjusted
Channel 1 scenes	- [X1] Perceived brightness/KNX value (1 .. 255)	1 ▲▼
Channel 1 forced positioning	- [Y1] Output brightness (1 .. 255)	77 ▲▼
Channel 1 block	- [X2] Perceived brightness/KNX value (1 .. 255)	30 ▲▼
Channel 1 slave mode	- [Y2] Output brightness (1 .. 255)	128 ▲▼
Channel 1 counter	- [X3] Perceived brightness/KNX value (1 .. 255)	120 ▲▼
Channel 1 status Information		

Fig. 4.1

4.1 Parameters

4.1.1 Maximum and minimum dimming threshold

For each general x channel, the brightness regulation is limited by two threshold values that can be set via the parameters:

“**Maximum dimming threshold**” which can have the following values:

- from 55% to **100% (default value)** with steps of 5%

“**Minimum dimming threshold**” which can have the following values:

- from **0% (default value)** to 50% with steps of 5%

4.1.2 Brightness reaching for on/off, stairs light, forcing, block, slave

The brightness value determined by activating/deactivating the on/off switching, stairs light, forcing and block of channel x functions can be reached via a ramp or by jumping to the value. This behaviour is determined by the “**Brightness reaching for on/off, stairs light, forcing, block, slave**” parameter, which can have the values:

- **with jump to value** (default value)
- with ramp

Selecting **with ramp** displays the “**Ramp adjustment speed 0% - 100%**” parameter, for setting the adjustment duration from 0% brightness to 100% brightness for the channel x on/off switching, stairs light, forcing and block. The possible values are:

- 1 second
- 2 seconds
- 3 seconds
- **4 seconds** (default value)
- 5 seconds
- 6 seconds
- 7 seconds
- 8 seconds
- 9 seconds
- 10 seconds
- 15 seconds
- 20 seconds
- 25 seconds
- 30 seconds
- 1 minute
- 2 minutes
- 5 minutes
- 10 minutes

4.1.3 Relay status at BUS voltage failure

In the event of a BUS voltage failure, the micro-controller will not be powered and so cannot control the output 1-10V. In this case, the output has a high resistance that would activate the lamps at 100%; in order to define the lamp status at the time of the voltage failure, you must configure the status of the relay associated with the channel. The status of the relay contact following a BUS voltage failure is defined via the “**Relay status at BUS voltage failure**” parameter, which can assume the following values:

- open
- closed
- **no change** (default value)

With a 230V mains voltage, if the relay contact is closed at the moment of the voltage failure, the lamps will be activated at 100%. If the contact is open, the lamps will switch off (0%)

4.1.4 Channel status at BUS voltage recovery

It is possible to set the status of channel x following BUS voltage recovery using the parameter “**Channel status at BUS voltage recovery**” which can have the following values:

- set fixed value
- minimum dimming threshold value
- maximum dimming threshold value
- **as before voltage drop** (default value)

Selecting the value **set fixed value** displays the parameter “**Channel brightness at BUS voltage recovery**”. The above cited parameter may assume the following values:

- from **0% (default value)** to 100% with step of 5%

4.1.5 Local push-button behaviour

The device has 3 local push-buttons (one per channel); it is possible to define the function of the local push-button associated with channel x with the parameter “**Local push button behaviour**” which can have the following values:

- no effect
the push-button is disabled
- test on/off
In this case, each time the push-button is pressed channel x will toggle between ON (100% brightness) and OFF (0% brightness), jumping to the value. This command has top priority and is executed independently of the active functions, Priority command and Block included.
- **single push-button dimmer test** (default value)
in that case, the front button acts like a single push-button that, when pressed briefly (0.5 sec), turns on (ON 100%) the output associated with channel x, if off, and turns it off (OFF) if the output associated with channel x is on (brightness value >0); if pressed for longer, it toggles the controls for brightness increase and decrease (between 0% and 100%) and stops dimming upon release. The dimming speed is fixed at 5 seconds. This command has top priority and is executed independently of the active functions, Priority command and Block included.

Unless it is set at **no effect**, the local push-button controls the ballast connected to channel x, regardless of the device functions that are active at that moment but without changing the activation status of those functions. This means that if before pressing the local push-button, channel x block/forcing functions were active, they will continue to be active even if the brightness value is changed depending on the type of activation performed on the front push-button.

In the specific case of receiving block/forcing activation commands while the brightness is being regulated by the prolonged pressing of the front button key (only if **single push button dimmer test**), the associated functions are still activated but the ballast is always managed by the relative dimming due to the local push-button.

4.1.6 Characteristic dimming curve

Sometimes it is necessary to adapt the characteristic dimming curve of the output so that the lamp brightness adapts to the sensitivity of the human eye. A linear dimming curve is usually used, where for example the KNX value (or the value perceived by the human eye) “50%” corresponds to an output value of 5V (“50%”); if the brightness adjustment is not very even with this curve, it will be necessary to define a more suitable and personalised dimming curve. The “**Characteristic dimming curve**” parameter is used to select the dimming curve to be used for the output associated with the channel. The values that can be set are:

- linear (default value)
- adjusted

Selecting the value **adjusted** displays the “[X1] Perceived brightness/KNX value (1 .. 255)”, “[Y1] Output brightness (1 .. 255)”, “[X2] Perceived brightness/KNX value (1 .. 255)”, “[Y2] Output brightness (1 .. 255)”, “[X3] Perceived brightness/KNX value (1 .. 255)”, “[Y3] Output brightness (1 .. 255)”, “[X4] Perceived brightness/KNX value (1 .. 255)”, “[Y4] Output brightness (1 .. 255)”, “[X5] Perceived brightness/KNX value (1 .. 255)”, “[Y5] Output brightness (1 .. 255)” parameters, for establishing 5 pairs of coordinates (X,Y) which, interpolated, determine the personalised dimming curve. The values that can be set for the above parameters are:

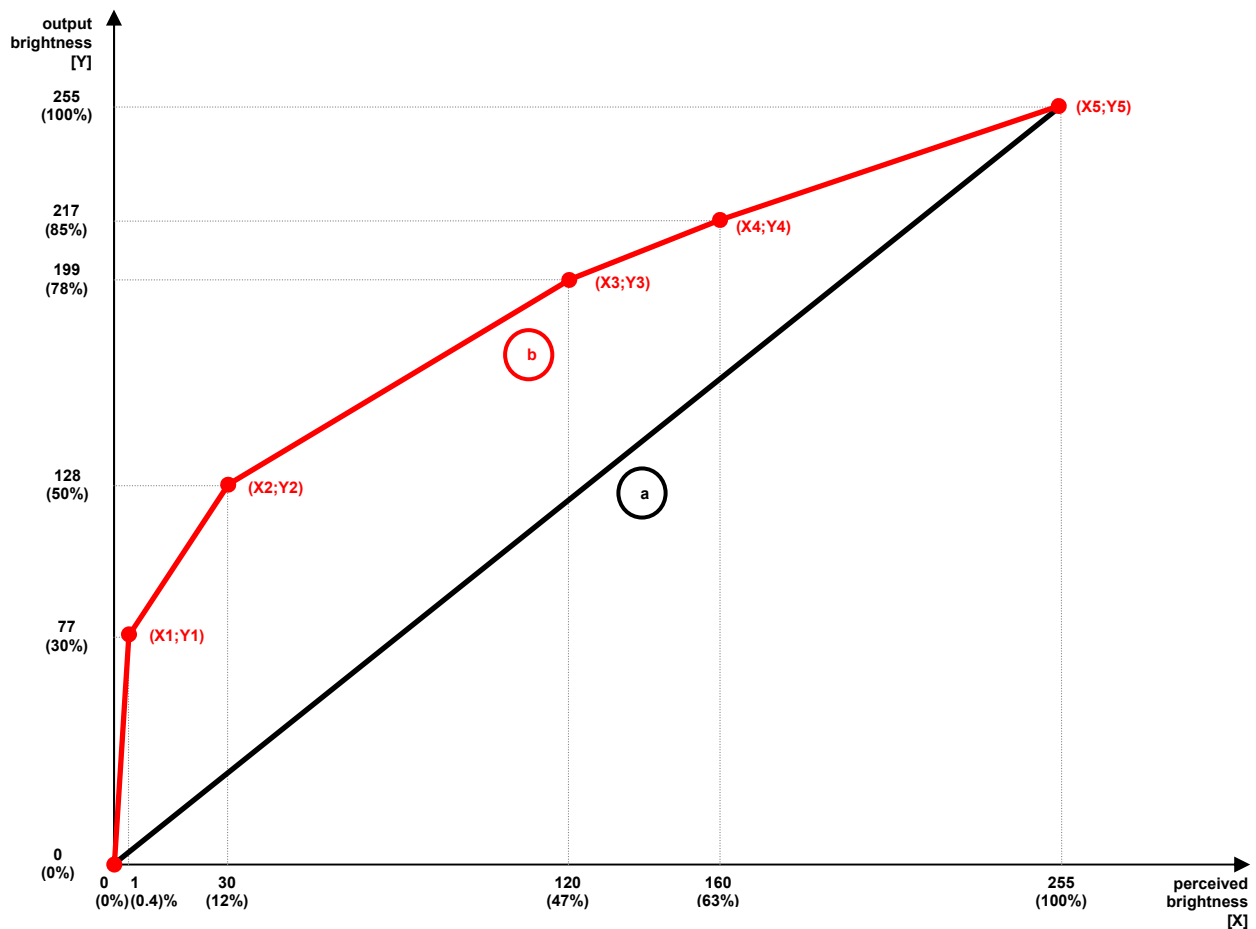
- from 1 to 255 with steps of 1

The values that can be set are in the range 1-255; bear in mind that the ratio between the percentage value and the value 1-255 is:

$$X_{\%} = \frac{X_{(0..255)} \times 100}{255} \qquad X_{0..255} = \frac{X_{\%} \times 255}{100}$$

To ensure correct operation, if the X (n+1) coordinate is less than the X(n) coordinate, the device autonomously rearranges the coordinates in growing order on the X axis. In the same way, if the X coordinate itself is repeated several times, only the last one is taken into consideration.

The chart below shows an example of a personalised curve and a linear curve.



- a) Linear dimming curve.
The perceived brightness (or KNX value) corresponds to the output brightness. If a value of 50% is received via the KNX BUS, the control voltage applied will be 5V (50%).
- b) Personalised dimming curve

The starting point of the characteristic curve is always (0;0). In this example, the 5 pairs of coordinates are:

- (X1;Y1) = (1;77)
- (X2;Y2) = (30;128)
- (X3;Y3) = (120;199)
- (X4;Y4) = (160;217)
- (X5;Y5) = (255;255)

The dimming curve is applied both when a KNX command is received and when the current brightness value is indicated.

To obtain a curve as close as possible to the real output curve, you are advised to consult the datasheet of the ballast used, to verify whether it shows the curve that compares the light flux with the control voltage. If this data item is not available, you are advised to set a linear curve first of all and make some tests, sending % brightness values via the KNX BUS and checking the actual brightness emitted by the lamp (if possible using a tool that can measure the light flux or brightness intensity).

5 “Channel X switching” menu

Each channel can be switched on/off via the relative **Ch. x - Switching** communication object (Data Point Type: 1.001 DPT_Switch) status object. The communication object is always visible.

This function has the same priority as the stairs light function; this means that, for each channel, when one of the two functions is activated while the other is already active, it is executed, ending the one that was previously active.

The structure of the menu is as follows:

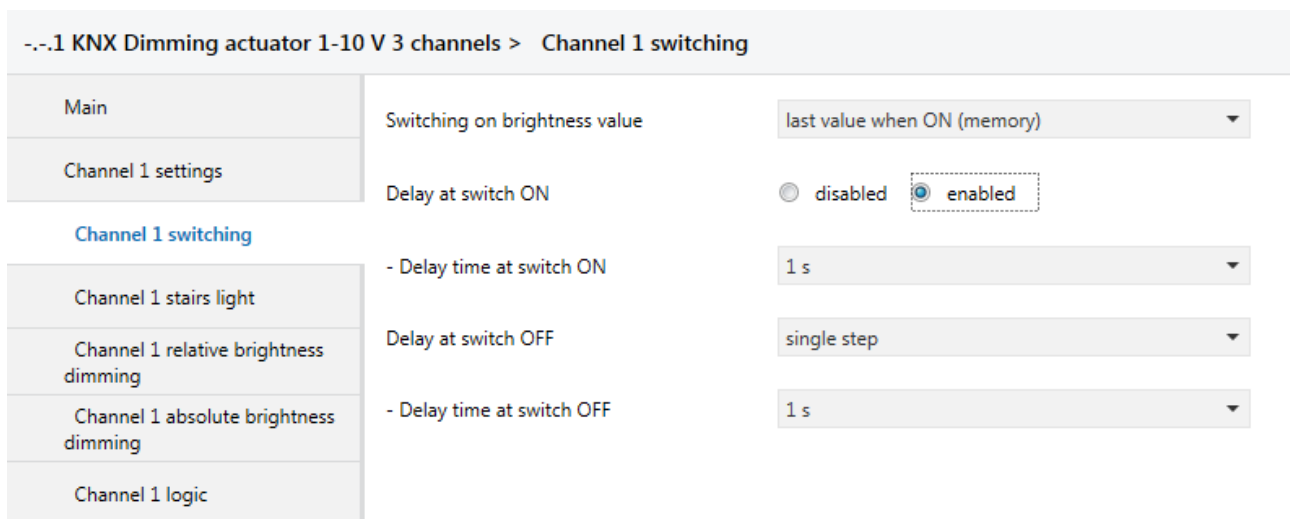


Fig. 5.1

5.1 Parameters

5.1.1 Switching ON brightness value

When receiving the ON value (1) the dimmer switches channel x to the brightness value set by the parameter “**Switching ON brightness value**”, which may assume the following values:

- **last value when ON (memory)** (default value)

(NOTE: in this case, the memory function is active)

- maximum dimming threshold value
- set fixed value

Selecting the value **set fixed value** displays the parameter “**Channel brightness at switch ON**”. The above cited parameter may assume the following values:

- from 5% to **100% (default value)** with steps of 5%

When switched on for the first time, the last ON status value may not be known: the value is initialised with the value “maximum dimming threshold”. The last switching on value to use is always the last brightness value of the channel based on any command, before being switched off. In the case of a BUS voltage failure, the value is saved in the non-volatile memory.

When the OFF value (0) is received, the channel always switches to a brightness value of 0 (0%).

The brightness value can be reached in the ON status and the OFF status 0 (0%) via a ramp or by jumping to the value. This behaviour is determined by the “**Brightness reaching with on/off, stairs light, forcing, block, slave**” parameter in the **Channel x settings** menu (see the "Channel x settings" menu).

5.1.2 Delay at start (ON)

It is possible to enable a start (ON) delay time via the parameter “**Delay at switch ON**”; The parameter may have the values:

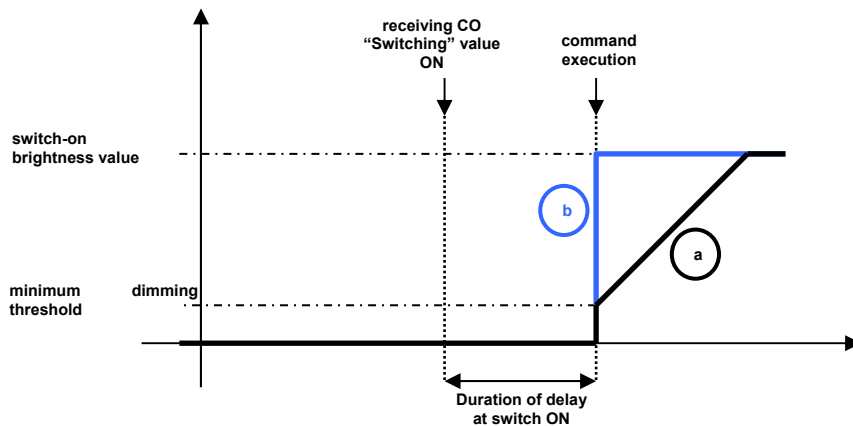
- **disabled (default value)**
- enabled

If enabled, when receiving an ON command (ON), the jump to “Switching ON brightness value” or the start of the dimming ramp are delayed by the value defined by the “**Duration of delay at switch (ON)**” parameter; The parameter may have the values:

- **1 s (default value)**
- 2 s
- 3 s
- 5 s
- 10 s
- 15 s
- 20 s
- 30 s
- 45 s
- 1 min
- 1 min 15 s
- 1 min 30 s
- 2 min
- 2 min 30 s
- 3 min
- 5 min
- 15 min
- 20 min
- 30 min
- 1h
- 2h
- 3h
- 5h
- 12h
- 24h

The switching on delay cannot be reset.

Example:



Reaching the brightness value via:

- a) ramp
- b) jump to value

5.1.3 Delay at switch off (OFF)

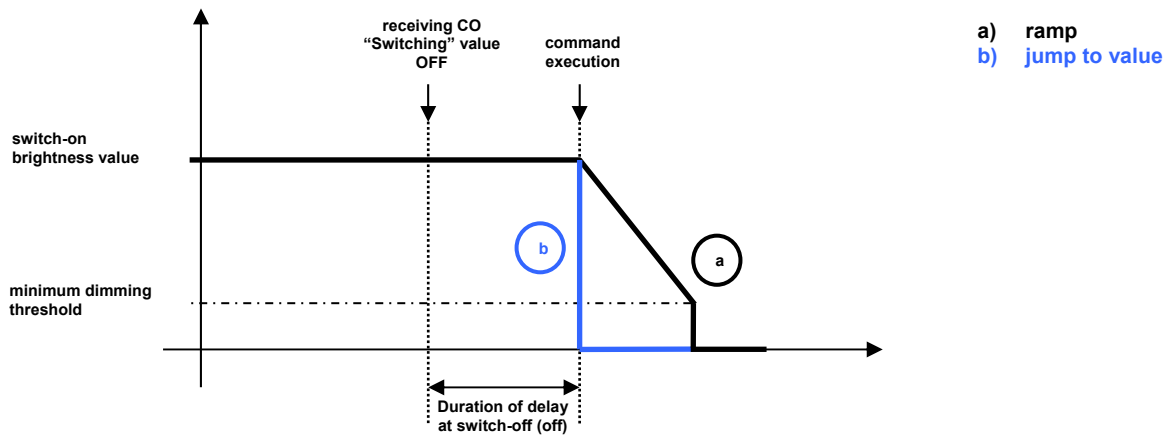
In the same manner as the previous parameter, a delay at switch off (OFF) can be enabled via the parameter "**Delay time at switch OFF**"; The parameter may have the values:

- **disabled** (default value)
- single step
- double step

If selecting the **single step** value, when an OFF command is received, the jump to the 0% value or the start of a down ramp are delayed by the value defined by the parameter "**Duration of delay at switch OFF**"; The parameter may have the values:

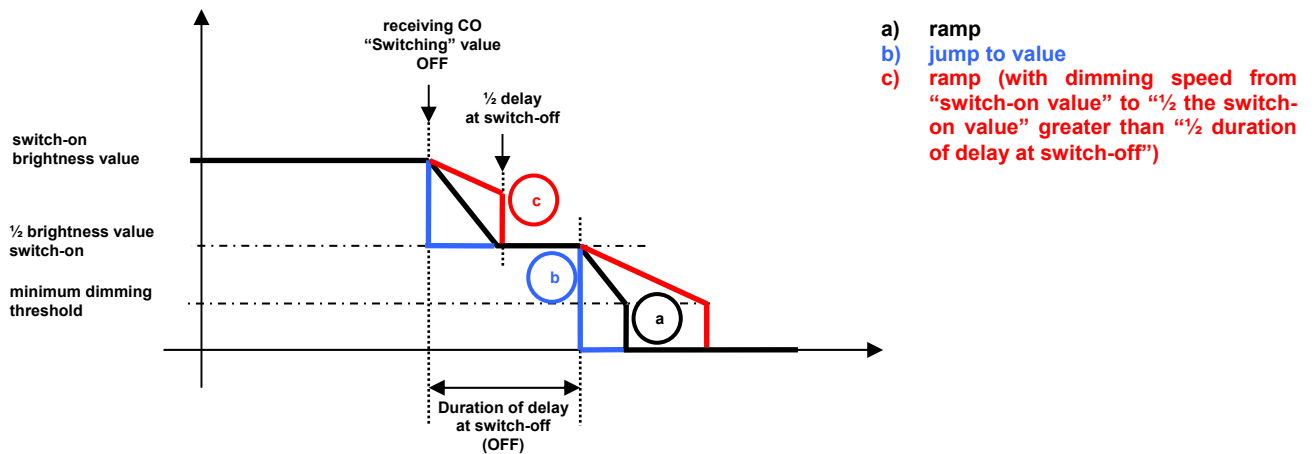
- **1 s** (default value)
- 2 s
- 3 s
- 5 s
- 10 s
- 15 s
- 20 s
- 30 s
- 45 s
- 1 min
- 1 min 15 s
- 1 min 30 s
- 2 min
- 2 min 30 s
- 3 min
- 5 min
- 15 min
- 20 min
- 30 min
- 1h
- 2h
- 3h
- 5h
- 12h
- 24h

Example:



If selecting the **double step** value, the channel switch off phase is divided into two steps. When an off command is received, the jump to value 0% (0) or the start of a down dimming ramp are delayed by 50% of the value defined by the parameter “Duration of delay at switch OFF”. The brightness value is changed (jump or ramp) to 50% of the “Switching ON brightness value” and maintained for the remaining 50% of the time. When the delay has expired, the brightness value is changed to 0% (jump or ramp). Delay at switch off cannot be reset.

Example:



6 “Channel X stairs light” menu

It is possible to enable the timed switching function (stairs light) that automatically switches off the device channel after a period of time after receiving the **Ch. x Timed switching** communication object. This function has the same priority as On/Off switching; this means that, for each channel, when one of the two functions is activated while the other is already active, it is executed, ending the one that was previously active.

The structure of the menu is as follows:

--.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 stairs light		
Main	Stairs light function	<input type="radio"/> deactivated <input checked="" type="radio"/> active
Channel 1 settings	Brightness value during timing	last value when ON (memory) ▼
Channel 1 switching	Activation time [hours]	0 ▲▼
Channel 1 stairs light		
Channel 1 relative brightness dimming	Activation time [minutes]	1 ▲▼
Channel 1 absolute brightness dimming	Activation time [seconds]	0 ▲▼
Channel 1 logic	Delay on timed activation	<input checked="" type="radio"/> disabled <input type="radio"/> enabled
Channel 1 scenes	Prewarning time	disabled ▼
Channel 1 forced positioning	Timing stop function	<input checked="" type="radio"/> disabled <input type="radio"/> enabled
Channel 1 block	Command of activation during timing	restart ▼
Channel 1 slave mode	Absolute or relative brightness dimming command during timing	<input type="radio"/> it's executed and cancels timing <input checked="" type="radio"/> it's executed and continues timing
Channel 1 counter	Stairs light activation time setting from bus	<input checked="" type="radio"/> disabled <input type="radio"/> enabled
Channel 1 status Information		

Fig. 6.1

6.1 Parameters

6.1.1 Stairs light function

The “**Stairs light function**” parameter is used to activate the function and allow the operating parameters and communication objects to be made visible and configurable. The values that can be set are:

- **deactivated - (default value)**
- **active**

Selecting the value **active** displays the parameters and objects relative to that function.

6.1.2 Brightness value during timing

The parameter “**Brightness value during timing**” is used to set the absolute percentage brightness value that channel x should assume during the period that timing is active; The possible values are:

- **last value when ON (memory)** (default value)
- maximum dimming threshold
- set fixed value

Selecting the value **set fixed value** displays the parameter “**Brightness during timing**”; The parameter may assume the following values:

- from 5% to **100% (default value)** with steps of 5%

When switched on for the first time, the last ON status value may not be known: the value is initialised with the value “maximum dimming threshold”. The last value to use is always the last brightness value of the colour based on any command, before being switched off. In the case of a BUS voltage failure, the value is saved in the non-volatile memory.

6.1.3 Activation time [hours]

The “**Activation time [hours]**” parameter is used to define the number of hours for stairs light activation. The values that can be set are:

- *from 0 (default value) to 23, in steps of 1*

6.1.4 Activation time [minutes]

The “**Activation time [minutes]**” parameter is used to define the number of minutes for stairs light activation. The values that can be set are:

- *from 0 to 59 in steps of 1 - 1 (default value)*

6.1.5 Activation time [seconds]

The “**Activation time [seconds]**” parameter is used to define the number of seconds for stairs light activation. The values that can be set are:

- *from 0 (default value) to 59, in steps of 1*

If the set activation time is 0 hours 0 minutes and 0 seconds, the value is reset to 0 hours 0 minutes and 1 second.

6.1.6 Delay at timed activation

The brightness value can be reached in the ON status and the OFF status (0%) via a ramp or by jumping to the value. This behaviour is determined by the “**Brightness reaching with on/off, stairs light, forcing, block, slave**” parameter in the **Channel x settings** menu (see the "Channel x settings" menu).

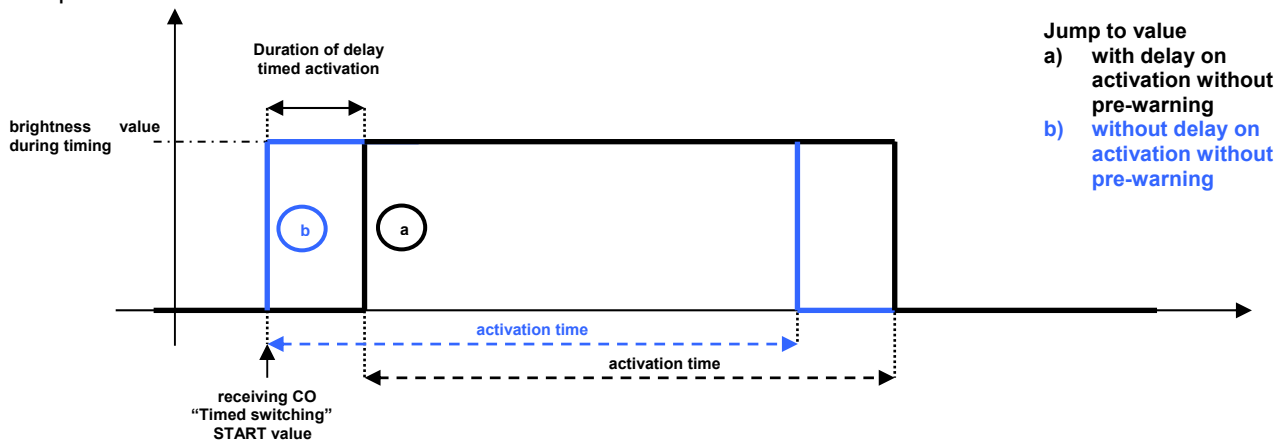
The parameter “**Delay on timed activation**” is used to define a delay between the moment of receiving the communication object **Ch. x - Timed switching** and the instant in which the command is actually executed (i.e. the moment in which the jump or dimming ramp starts); the possible values are:

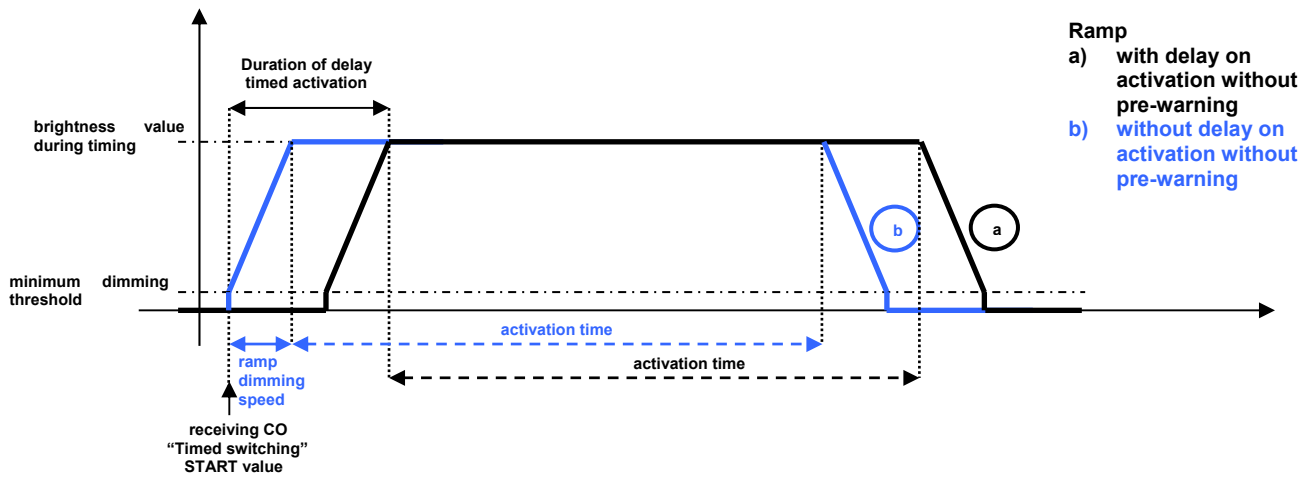
- **disabled** (default value)
- enabled

Selecting the value **enabled** displays the parameter “**Delay on timed activation**” which is used to set the value of the delay itself in seconds. The possible values are:

- **1 s** (default value)
- 2 s
- 3 s
- 5 s
- 10 s
- 15 s
- 20 s
- 30 s
- 45 s
- 1 min
- 1 min 15 s
- 1 min 30 s
- 2 min
- 2 min 30 s
- 3 min
- 5 min
- 15 min
- 20 min
- 30 min
- 1h
- 2h
- 3h
- 5h
- 12h
- 24h

Example:





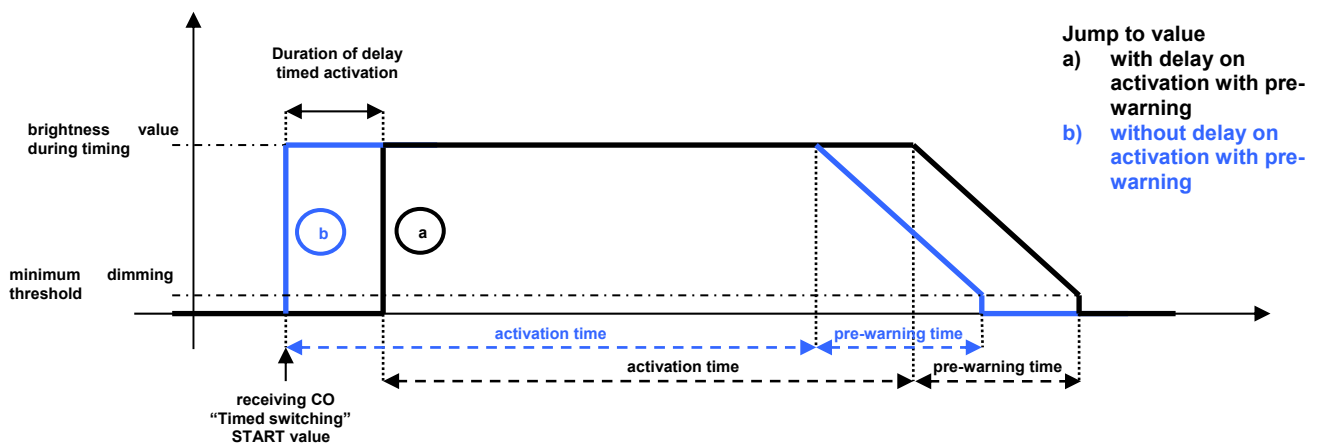
The activation delay cannot be reset.

6.1.7 Pre-warning time

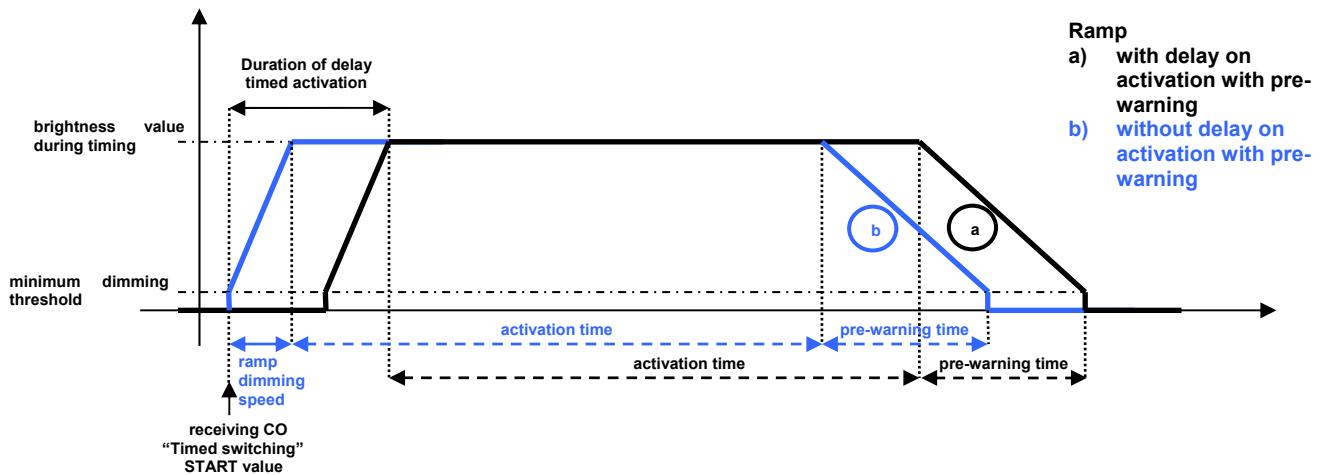
The **Pre-warning time** parameter enables a signal that the channels/colours will soon be switched off. It does this by automatically reducing the brightness with a dimming ramp between the switch-on brightness value and the minimum regulation threshold, for the period of time defined in this parameter. The parameter may assume the following values:

- **no pre-warning - (default value)**
- **15 s**
- **30 s**
- **1 min.**

The following figures show examples of how the pre-warning time works:



Jump to value with or without delay on activation with pre-warning.



Ramp with or without delay on activation with pre-warning.

6.1.8 Timing stop function

The “**Timing stop function**” parameter can be used to enable the possibility of ending the timed activation by receiving the value “0” on the communication object **Ch. x - Timed switching**; The possible values are:

- disabled (default value)
- enabled

Selecting the value **enabled**, when the value “0” is received, the channel will end the timing without any pre-warning and deactivate the ballast according to what is defined by Px “**Brightness reaching for on/off, stairs light, forcing, block, slave**” in the **Channel x settings** menu (see the “Channel x settings” menu).

6.1.9 Activation command during timing

The parameter “**Command of activation during timing**” is used to define the behaviour of the device when a timed activation command is received while it is already in progress; the possible values are:

- no effect
- reset (default value)
- extend (multiply by factor)

Selecting the value **extend** displays the parameter “**Multiplicative factor maximum value**” which can be used to set the maximum number of consecutive activation time extensions. The parameter may have the following values:

- from 2 to **5 (default value)** with steps of 1

6.1.10 Absolute or relative brightness dimming command during timing

The parameter “**Absolute or relative brightness dimming command during timing**” is used to define channel behaviour when receiving a channel x absolute brightness dimming command and/or a relative brightness dimming command influenced by timing while timing is already in progress; The possible values are:

- it's executed and cancels timing
- **it's executed and continues timing** (default value)

By selecting the value **it's executed and cancels timing**, the received command is executed and the active timing of channel x is cancelled; selecting the value **“it's executed and continues timing”** assumes that the execution of the command is the continuance of the active timing, without resetting or extending the activation time. In this case, only the brightness value of channel x is changed during timing.

6.1.11 Stairs light activation time setting from BUS

The parameter **“Stairs light activation time setting from BUS”** displays the input communication object **Ch. x - Stairs light activation time** (Data Point Type: 7.005 DPT_TimePeriodSec), which can be used to receive via BUS the activation time value of the stairs light function; the possible values are:

- **disabled** (default value)
- enabled

7 “Channel X relative brightness dimming” menu

The relative dimming of the brightness of each channel is performed via the communication object **Ch. x - Brightness dimming** (Data Point Type: 3.007 DPT_Control_Dimming). This object makes it possible to increase or decrease the channel brightness based on the step value and direction coded in the command. Receiving a brightness dimming stop command during the dimming process immediately stops the dimming and maintains the brightness value that was reached. The communication object is always visible.

The structure of the menu is as follows:

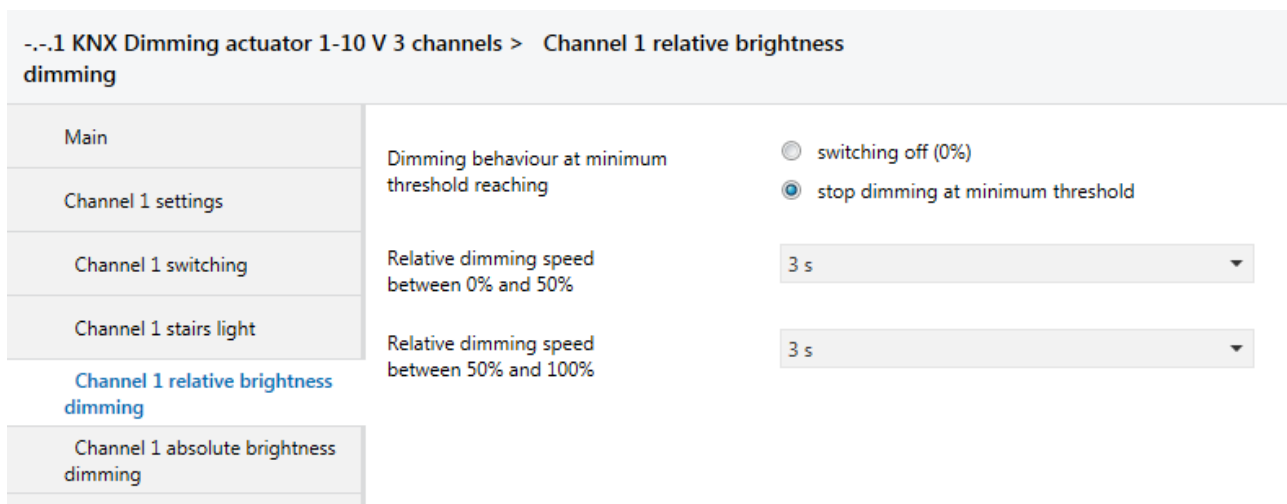


Fig. 7.1

Brightness dimming is limited by two threshold values set via the parameters **“Maximum dimming threshold”** and **“Minimum dimming threshold”** in the **Channel x settings** menu (see the "Channel x settings" menu).

The adjustment process is normally limited to the set threshold values: this means that if the calculated increasing dimming value exceeds the maximum dimming threshold value, the dimming is stopped and the final brightness value that is set will be the value of the maximum dimming threshold. Similarly, if the calculated decreasing dimming value is lower than the minimum dimming threshold value, the dimming is

stopped and the final brightness value that is set will be the value of the minimum dimming threshold. This behaviour can be changed via the “**Dimming behaviour at minimum threshold reaching**” parameter.

7.1 Parameters

7.1.1 Dimming behaviour at minimum threshold reaching

The “**Dimming behaviour at minimum threshold reaching**” parameter can assume the following values:

- switching off (0%)
- **stop dimming at minimum threshold** (default value)

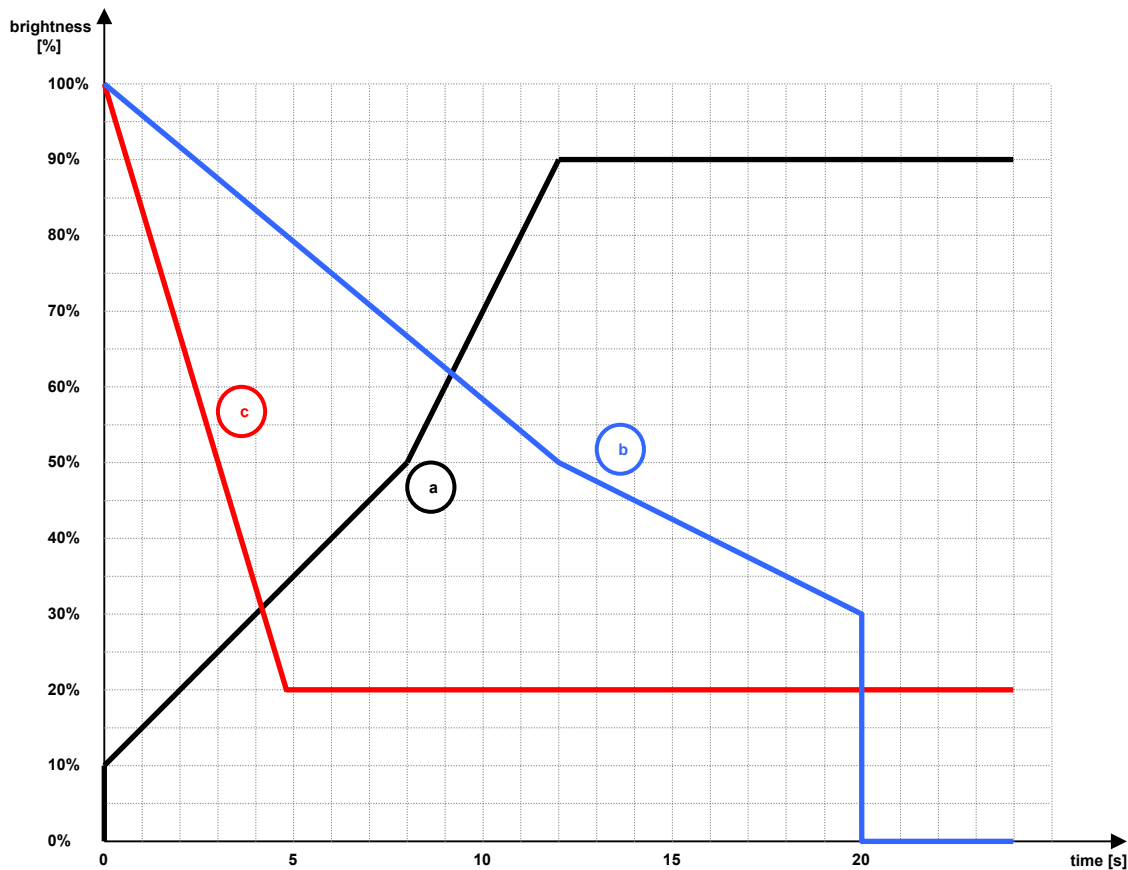
7.1.2 Relative dimming speed between 0% and 50% and between 50% and 100%

The dimming speed is determined by 2 time values that define the time interval for switching from 0% to 50% and for switching from 50% to 100%. The two values are defined via the parameters “**Relative dimming speed between 0% and 50%**” and “**Relative dimming speed between 50% and 100%**”.

The parameters can assume the following values:

- 1 second
- 2 seconds
- 3 seconds
- **4 seconds** (default value)
- 5 seconds
- 6 seconds
- 7 seconds
- 8 seconds
- 9 seconds
- 10 seconds
- 15 seconds
- 20 seconds
- 25 seconds
- 30 seconds

Example:



- c) The graph represents the behaviour of the device upon receiving the command “increase to 100%” on CO Ch. x - *Brightness dimming* with initial brightness 0% (off) and with the following settings: **Minimum dimming threshold** → 10%, **Relative dimming speed between 0% and 50%** → 10 s, **Relative dimming speed between 55% and 100%** → 5 s and **Maximum dimming threshold** → 90%.
- Reaching the minimum threshold starting from brightness value of 0% is always implemented with jump to value.
- d) The graph represents the behaviour of the device upon receiving the command “decrease to 100%” on CO Ch. x - *Brightness dimming* with initial brightness 100% and with the following settings: **Minimum dimming threshold** → 30%, **Relative dimming speed between 0% and 50%** → 20 s, **Relative dimming speed between 55% and 100%** → 12 s and **Dimming behaviour at minimum threshold reaching** → switching off (0%).
- Reaching the value of 0% once the minimum threshold is reached is always implemented with jump to value.
- e) The graph represents the behaviour of the device upon receiving the command “decrease to 100%” on CO Ch. x - *Brightness dimming* with initial brightness 100% and with the following settings: **Minimum dimming threshold** → 20%, **Relative dimming speed between 0% and 50%** → 3 s, **Relative dimming speed between 55% and 100%** → 3 s and **Dimming behaviour at minimum threshold reaching** → stop dimming at minimum threshold.

Reaching the minimum threshold starting from brightness value of 0% is always implemented with a jump.

8 “Channel X absolute brightness dimming” menu

It is possible to set an absolute brightness value for each channel via the communication object **Ch. x - Value command** (Data Point Type: 5.001 DPT_Scaling). The communication object is always visible.

The structure of the menu is as follows:

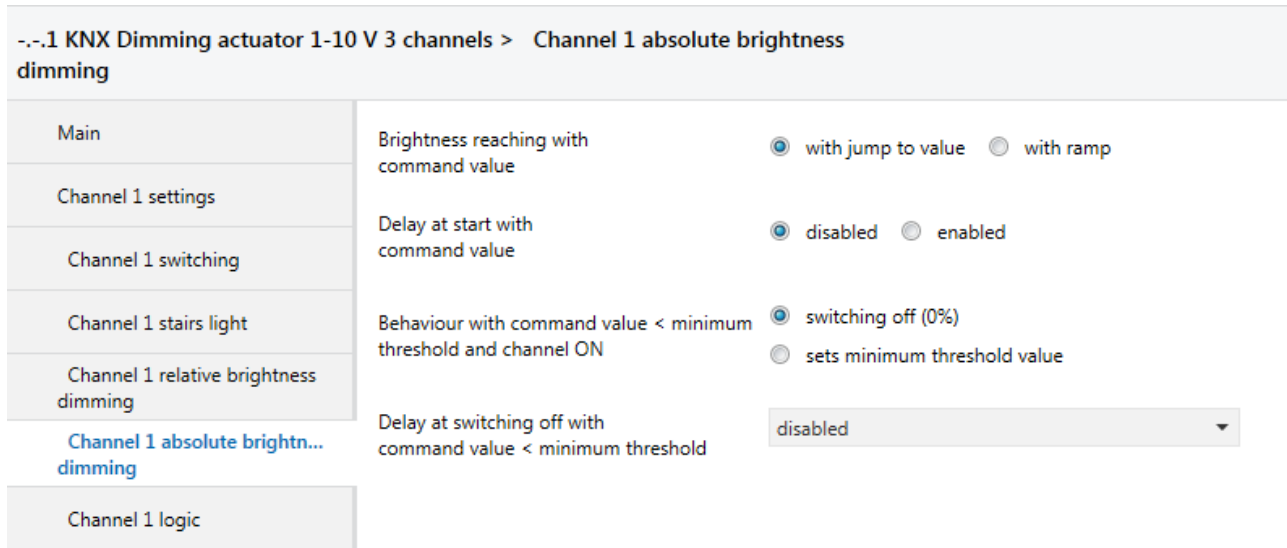


Fig. 9.1

Starting from the OFF condition, if the brightness value received is lower than the minimum dimming threshold value, the brightness value to be set corresponds to the minimum dimming threshold value.

If the brightness value received with the command is higher than the maximum dimming threshold value, the brightness value to set corresponds to the maximum dimming threshold value.

8.1 Parameters

8.1.1 Brightness reaching with value command

Reaching the brightness value received can be implemented with jump to value or with a ramp. This behaviour is determined by the “**Brightness reaching with command value**” parameter, which can have the following values:

- **with jump to value** (default value)
- with ramp

Selecting the value **with ramp** displays the “**Ramp adjustment speed 0% - 100% with command value**” parameter. The parameter may have the following values:

- 1 second
- 2 seconds
- 3 seconds
- **4 seconds** (default value)
- 5 seconds
- 6 seconds

- 7 seconds
- 8 seconds
- 9 seconds
- 10 seconds
- 15 seconds
- 20 seconds
- 25 seconds
- 30 seconds
- 1 minute
- 2 minutes
- 5 minutes
- 10 minutes

8.1.2 Delay at start with value command

It is possible to enable a delay at start (changing from OFF to ON with value command >0) via the parameter “**Delay at start with command value**” which can have the following values:

- **disabled** (default value)
- enabled

by selecting **enabled**, when receiving a command value (with value >0) and with the channel off, the jump to value or the start of the dimming ramp are delayed by the value defined by the new parameter “**Duration of delay at start with command value**” which can have the following values:

- **1 s** (default value)
- 2 s
- 3 s
- 5 s
- 10 s
- 15 s
- 20 s
- 30 s
- 45 s
- 1 min
- 1 min 15 s
- 1 min 30 s
- 2 min
- 2 min 30 s
- 3 min
- 5 min
- 15 min
- 20 min
- 30 min
- 1h
- 2h
- 3h
- 5h
- 12h
- 24h

The delay at start with command value cannot be reset.

8.1.3 Behaviour with command value < minimum threshold and channel ON

It is possible to decide if, starting from the condition with the dimmer on, it is permitted to switch off the dimmer (brightness=0%) after receiving an absolute brightness percentage value that is lower than the

minimum threshold via this parameter, **Behaviour with command value < minimum threshold and channel ON**". The parameter may have the following values:

- **switching off (0%)** (default value)
- set minimum threshold value

Selecting the value **switching off (0%)** makes it possible to delay the actual switch-off with respect to the moment when the absolute brightness dimming communication object is received via the new parameter "**Delay at switching off with command value < minimum threshold**".

8.1.4 Delay at switching off with command value < minimum threshold

The parameter may have the values:

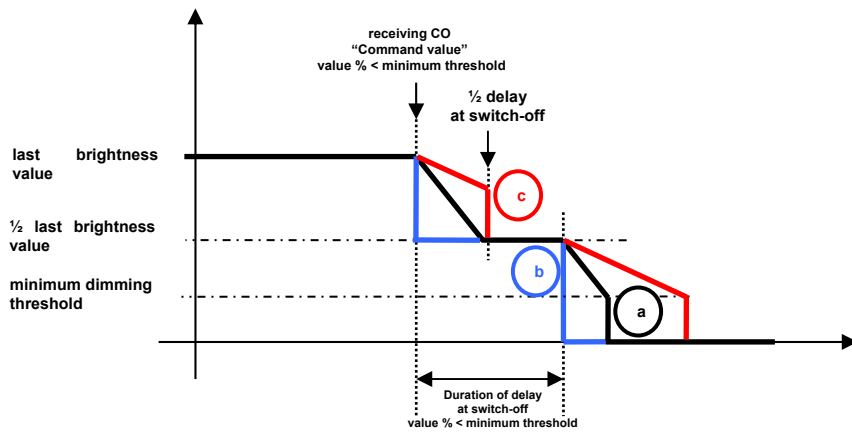
- **disabled - (default value)**
- single step
- double step

by selecting the **single step** value, when a command value is received (with a brightness value lower than the minimum threshold), the jump to value 0% or the start of a down ramp are delayed by the value defined by the parameter "**Duration of delay at switching off with command value < minimum threshold**" parameter, which can have the following values:

- **1 s** (default value)
- 2 s
- 3 s
- 5 s
- 10 s
- 15 s
- 20 s
- 30 s
- 45 s
- 1 min
- 1 min 15 s
- 1 min 30 s
- 2 min
- 2 min 30 s
- 3 min
- 5 min
- 15 min
- 20 min
- 30 min
- 1h
- 2h
- 3h
- 5h
- 12h
- 24h

If the value **double step** is selected, the ballast switch-off phase is divided into two steps. When receiving the command value (with a brightness value lower than the minimum threshold), the jump to value 0% or the start of a down dimming ramp are delayed by 50% of the value defined in the "**Switch off delay time with command value < minimum threshold**" parameter. The brightness value is changed (jump or ramp) to ½ of the brightness value set upon receiving the command and kept constant for the remaining 50% of the time. When the delay has expired, the brightness value is changed to 0% (jump or ramp).

Example:



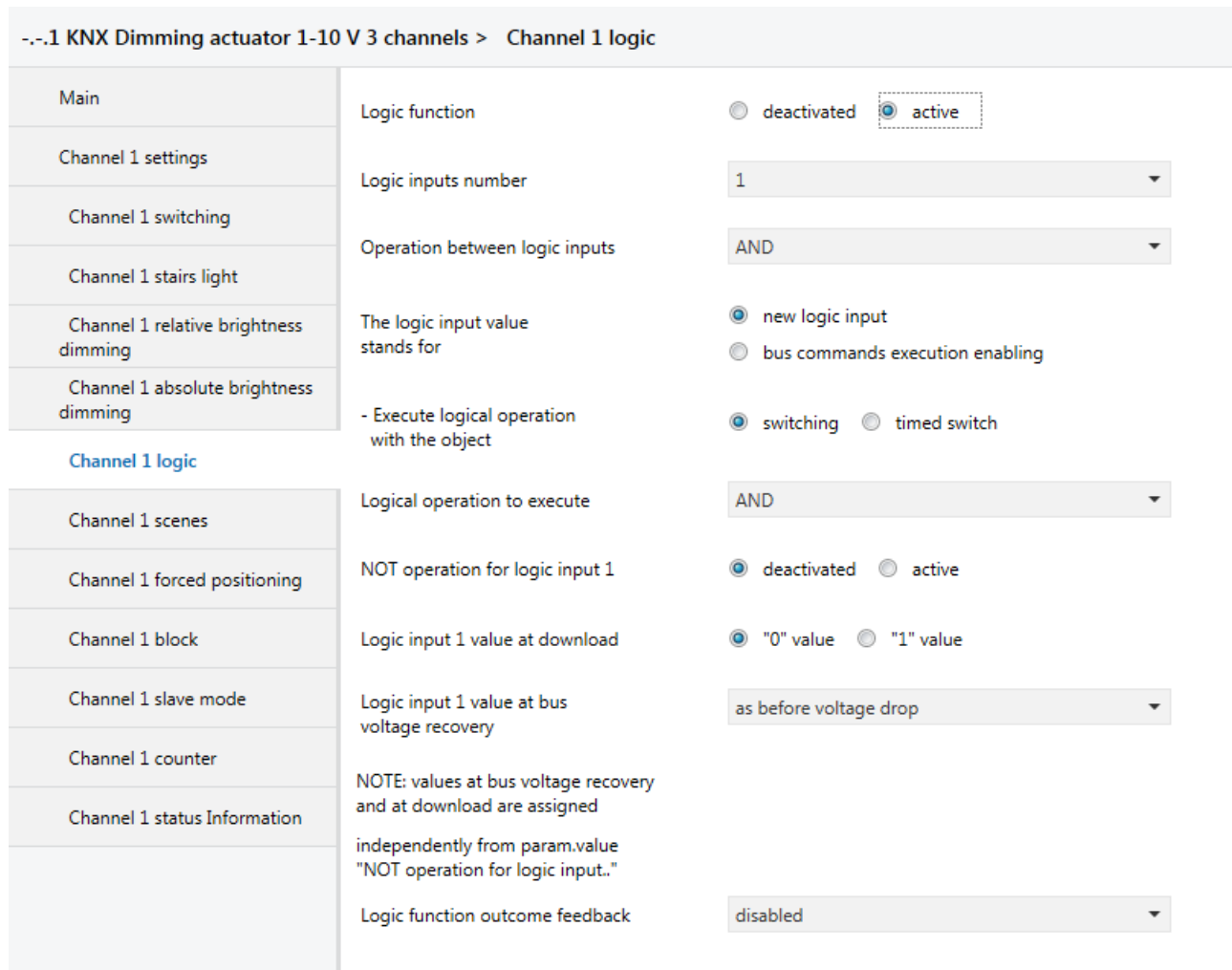
- a) ramp
- b) jump to value
- c) ramp (with dimming speed from "last brightness value" to "1/2 last brightness value" greater than "1/2 duration of delay at switch-off with command value < minimum threshold")

9 “Channel x logic” menu

It is possible to subordinate channel x activation/deactivation according to the result of the logic operations, which have dedicated communication objects as inputs. You can enable the logic function via the “Logic function” parameter, which can assume the following values:

- **disabled** (default value)
- enabled

If it is enabled, the following menu structure appears:



--.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 logic

Main	Logic function	<input type="radio"/> deactivated <input checked="" type="radio"/> active
Channel 1 settings	Logic inputs number	1
Channel 1 switching	Operation between logic inputs	AND
Channel 1 stairs light	The logic input value stands for	<input checked="" type="radio"/> new logic input <input type="radio"/> bus commands execution enabling
Channel 1 relative brightness dimming	- Execute logical operation with the object	<input checked="" type="radio"/> switching <input type="radio"/> timed switch
Channel 1 absolute brightness dimming		
Channel 1 logic		
Channel 1 scenes	Logical operation to execute	AND
Channel 1 forced positioning	NOT operation for logic input 1	<input checked="" type="radio"/> deactivated <input type="radio"/> active
Channel 1 block	Logic input 1 value at download	<input checked="" type="radio"/> "0" value <input type="radio"/> "1" value
Channel 1 slave mode	Logic input 1 value at bus voltage recovery	as before voltage drop
Channel 1 counter	NOTE: values at bus voltage recovery and at download are assigned independently from param.value "NOT operation for logic input.."	
Channel 1 status Information		
	Logic function outcome feedback	disabled

Fig. 9.1

9.1 Parameters

9.1.1 Number of logic inputs

If the function is enabled, it is possible to set the number of logic inputs via the “Logic inputs number” parameter, which can assume the following values:

- 1 (default value)
- 2
- 3

- 4
- 5
- 6
- 7
- 8

Depending on the selected value, the parameters “NOT operation for logic input i”, “Logic input i value at download” and “Logic input i value at BUS voltage recovery” ($1 \leq i \leq 8$) and the communication objects *Ch. x - Logic input 1*, *Ch. x - Logic input 2*, *Ch. x - Logic input 3*, *Ch. x - Logic input 4*, *Ch. x - Logic input 5*, *Ch. x - Logic input 6*, *Ch. x - Logic input 7* and *Ch. x - Logic input 8* will be displayed (Data Point Type: 1.002 DPT_Bool).

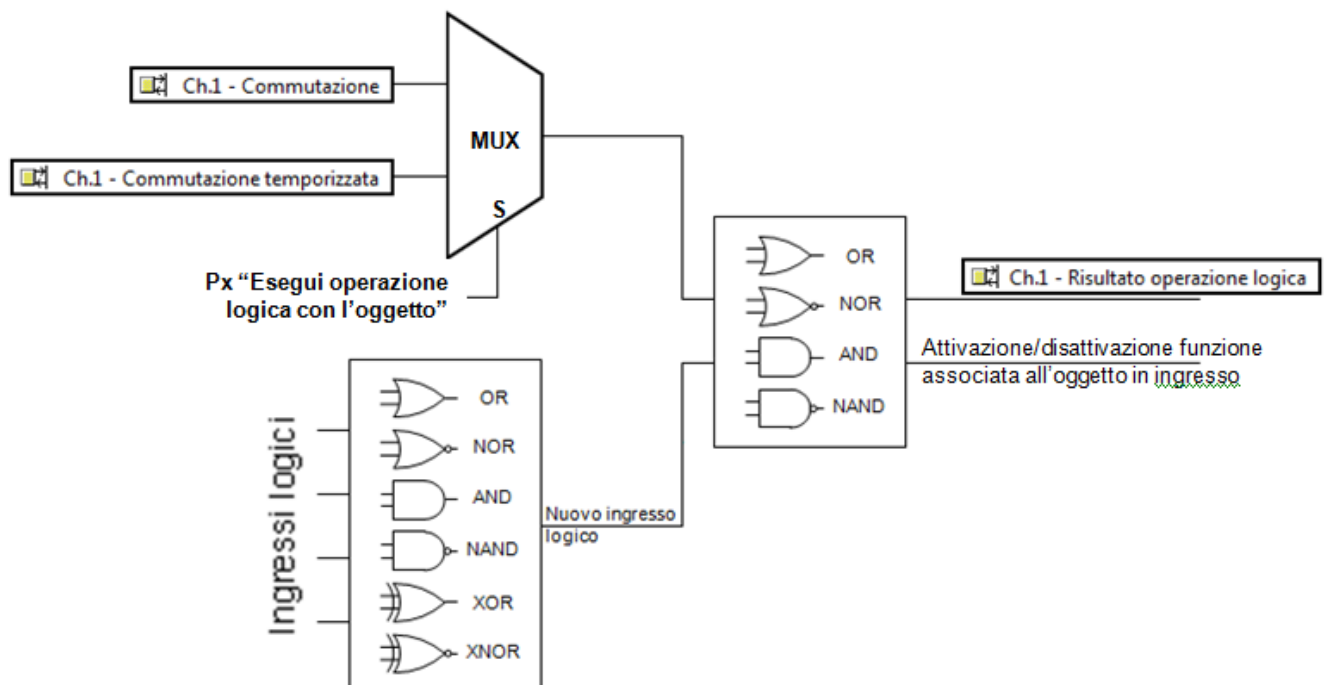
9.1.2 Operation between logic inputs

If the number of logic inputs set is greater than 1, it is possible to set the logic operation to be executed between the logic inputs. The operation is selected using the parameter “Operation between logic inputs” which can assume the following values:

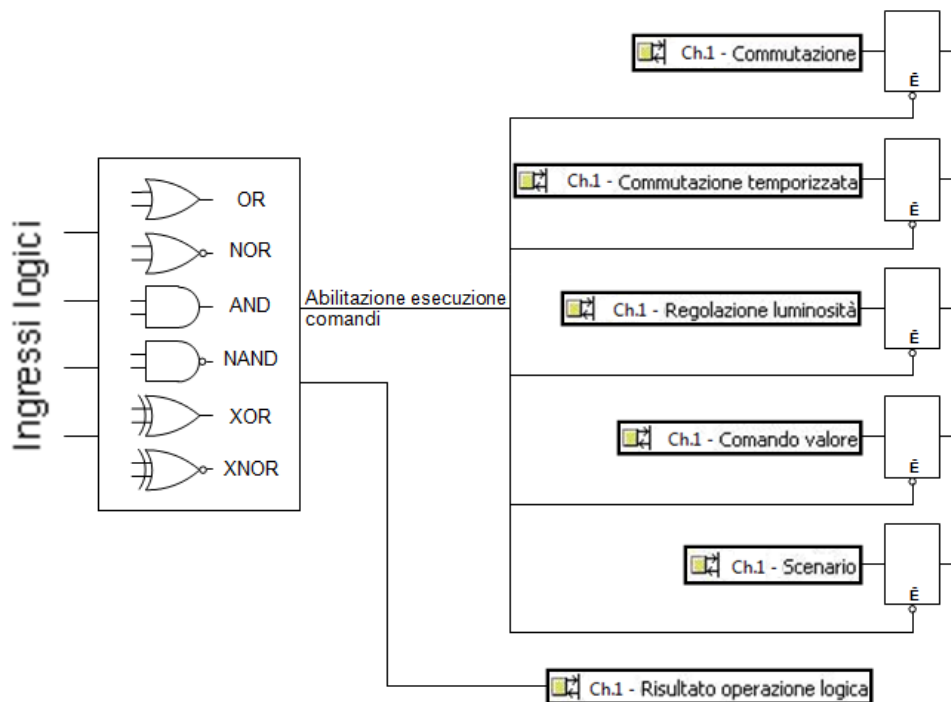
- **AND (default value)**
- OR
- NAND
- NOR
- XOR
- XNOR

The outcome of the operations between logic inputs (or the value of the individual logic input, if only one logic input was set) can be used as follows:

- 1 as the input of another logic operation, performed with one of the objects *Ch. x - Switching* or *Ch. x - Timed switching*.



- 2 to enable the execution of commands received via the BUS on the *Ch. x - Switching*, *Ch. x - Timed switching*, *Ch. x - Brightness dimming*, *Ch. x - Command value* and *Ch. x - Scene* objects.



9.1.3 The outcome of the operation between logic inputs stands for

The parameter for selecting the function of the result of the operation between logic inputs is “**The outcome of the operation between logic inputs stands for**”; in the case of a single logic input, this is replaced by the “**The logic input value stands for**” parameter. These parameters can assume the following values:

- **new logic input (default value)**
- BUS commands execution enabling

If the value **new logic input** was selected (case 1), it is possible to define which object should be used to execute the new logic operation via the parameter “**Execute logical operation with the object**” and the logic operation to execute with the selected object via the parameter “**Logical operation to execute**”.

9.1.4 Execute logical operation with the object

The “**Perform logic operation with the object**” Px (=Execute logical operation with the object)” parameter may assume the following values:

- **Switching (default value)**
- timed switching

9.1.5 Logical operation to execute

The “**Logical operation to be executed**” parameter may assume the following values:

- **AND (default value)**
- OR
- NAND
- NOR

9.1.6 On/off switching commands – Absolute brightness dimming commands – Relative brightness dimming commands – Timed switching commands – Scene commands

If the value **BUS command execution enabling** is selected (case 2), a series of parameters appear that are used to set which commands received from the bus require enabling to be executed; these parameters are “**Switching (on/off) commands**”, “**Absolute brightness dimming commands**”, “**Relative brightness dimming commands**”, “**Timed switching commands**” and “**Scene commands**”. The possible values for these parameters are:

- **regardless of logic function (=independent from logic function) (default value)**
- enabled from logic function

The commands enabled by the logic function are only executed if the outcome of the logic operation is true. If the outcome of the logic operation changes from false to true, the commands received after the status change will be executed. The commands received when the outcome of the logic function is false are ignored.

-.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 logic

Main	Logic function	<input type="radio"/> deactivated <input checked="" type="radio"/> active
Channel 1 settings	Logic inputs number	2
Channel 1 switching	Operation between logic inputs	AND
Channel 1 stairs light	The outcome of the operation with logic inputs stands for	<input type="radio"/> new logic input <input checked="" type="radio"/> bus commands execution enabling
Channel 1 relative brightness dimming	- Switching commands (on/off)	<input checked="" type="radio"/> independent from logic function
Channel 1 absolute brightness dimming		<input type="radio"/> enabled by logic function
Channel 1 logic	- Brightness relative dimming commands	<input checked="" type="radio"/> independent from logic function
Channel 1 scenes		<input type="radio"/> enabled by logic function
Channel 1 forced positioning	- Brightness absolute dimming commands	<input checked="" type="radio"/> independent from logic function
Channel 1 block		<input type="radio"/> enabled by logic function
Channel 1 slave mode	- Timed switch commands	<input checked="" type="radio"/> independent from logic function
Channel 1 counter		<input type="radio"/> enabled by logic function
Channel 1 status Information	- Scene commands	<input checked="" type="radio"/> independent from logic function
		<input type="radio"/> enabled by logic function
	NOT operation for logic input 1	<input checked="" type="radio"/> deactivated <input type="radio"/> active

Fig. 9.2

9.1.7 NOT operation for logic input N

It is possible to refuse the value received from the BUS on the communication objects associated with the logic inputs via the “**NOT operation for logic input 1**”, “**NOT operation for logic input 2**”, “**NOT operation for logic input 3**”, “**NOT operation for logic input 4**”, “**NOT operation for logic input 5**”, “**NOT operation for logic input 6**”, “**NOT operation for logic input 7**” and “**NOT operation for logic input 8**” parameters (displayed or not, depending on the number of enabled logic inputs), which can have the following values:

- **deactivated** (default value)
- active

9.1.8 Logic input N value at download

It is possible to set the value of the logic inputs at ETS download via the parameters “**Logic input 1 value at download**”, “**Logic input 2 value at download**”, “**Logic input 3 value at download**”, “**Logic input 4 value at download**”, “**Logic input 5 value at download**”, “**Logic input 6 value at download**”, “**Logic input 7 value at download**” and “**Logic input 8 value at download**” (they are displayed depending on the number of enabled logic inputs), which can have the following values:

- **value “0”** (default value)
- value “1”

9.1.9 Logic input N value at BUS voltage recovery

It is possible to set the value of the logic inputs in the case of BUS power supply voltage recovery via the parameters “**Logic input 1 value at BUS voltage recovery**”, “**Logic input 2 value at BUS voltage recovery**”, “**Logic input 3 value at BUS voltage recovery**”, “**Logic input 4 value at BUS voltage recovery**”, “**Logic input 5 value at BUS voltage recovery**”, “**Logic input 6 value at BUS voltage recovery**”, “**Logic input 7 value at BUS voltage recovery**” and “**Logic input 8 value at BUS voltage recovery**” (they are displayed depending on the number of enabled logic inputs), which can have the following values:

- value “0”
- value “1”
- **as before voltage drop** (default value)

NOTE: The values at BUS voltage recovery and downloading are assigned to logic objects independently of the value of the parameters “**NOT operation for logic input i**” ($1 < i < 8$).

9.1.10 Logic function outcome warning

Finally, it is possible to enable the sending of the outcome of the logic function on the BUS, and specify whether this information should always be sent when an input changes, or only if the outcome of the logic function changes via the “**Logic function outcome warning**” parameter, which can have the following values:

- **disabled** (default value)
- only if the outcome changes
- even if the outcome does not change

Setting a value other than **disabled** displays the output communication object **Ch. x - Logic operation outcome**. (Data Point Type: 1.002 DPT_Bool).

The value transmitted on the BUS is the result of the operation between the outcome of the operation with logic inputs and the object selected in the Px “**Execute logic operation with the object**” parameter, if the “**The outcome of the operation with logic inputs stands for**” parameter assumes the **new logic input** value, or the result of the operation between logic inputs if the parameter assumes the **BUS commands execution enabling** value.

Upon BUS voltage recovery, the logic is calculated and the outcome of the operation is transmitted spontaneously on the BUS via the relative object **Ch. x - Logic operation outcome**.

10 “Channel x scenes” menu

The scenes function is used to replicate a certain pre-set or previously memorised status upon receipt of the scene execution command.

The structure of the menu is as follows:

--.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 scenes		
Main	Scenes function	<input type="radio"/> disabled <input checked="" type="radio"/> enabled
Channel 1 settings	Scene number 1	unassigned
Channel 1 switching	Brightness starting value for scene 1	100%
Channel 1 stairs light	Scene 1 execution brightness reaching	<input checked="" type="radio"/> with jump to value <input type="radio"/> with ramp
Channel 1 relative brightness dimming	Scene number 2	unassigned
Channel 1 absolute brightness dimming	Brightness starting value for scene 2	100%
Channel 1 logic	Scene 2 execution brightness reaching	<input checked="" type="radio"/> with jump to value <input type="radio"/> with ramp
Channel 1 scenes	Scene number 3	unassigned
Channel 1 forced positioning	Brightness starting value for scene 3	100%
Channel 1 block	Scene 3 execution brightness reaching	<input checked="" type="radio"/> with jump to value <input type="radio"/> with ramp
Channel 1 slave mode		
Channel 1 counter		
Channel 1 status Information		

Fig. 10.1

10.1 Parameters

10.1.1 Scene function

The **Scene function** parameter is used to activate and configure the function, displaying various function configuration parameters and the relative communication objects.

The scene function is used to send two possible commands to the device:

- scene execution, which is the command to switch to a determined previously memorised brightness value
- scene storage, which is a command to memorise the current brightness (the moment the command is received).

This function provides 8 scenes, for which the device can store/reproduce 8 different conditions of these functional parameters. The values that can be set are:

- **disabled** (default value)
- enabled

Selecting the value **enabled** displays the “**Scene number i**”, “**Brightness starting value for scene i**”, “**Scene i execution brightness reaching**” ($1 \leq i \leq 8$) and “**Scene storing enabling**” parameters and the **Ch. x - Scene** (Data Point Type: 18.001 DPT_SceneControl) communication object via which the scene execution/storage telegrams are received

10.1.2 Scene number

Via the parameter “**Scene number i**” ($1 \leq i \leq 8$) it is possible to set the numerical value that is used to identify and therefore execute/memorise the i-th scene; The possible values are:

- **not assigned (default value)**
- 0
- ...
- 63

NOTE: scene execution/storage commands with an index not corresponding to one of those set for the 8 scenes managed by the device will be ignored.

10.1.3 Brightness starting value for scene i

The parameters “**Brightness starting value for scene i**” ($1 \leq i \leq 8$) are used to define the initial brightness value that the channel with which the parameter is associated must reach after receiving the telegram for executing the i-th scene; this value must be overwritten following a scene storing command. The possible values are:

- minimum dimming threshold value
- maximum dimming threshold value
- from 0% to **100% (default value)** with steps of 5%

10.1.4 Scene i execution brightness reaching

The parameter “**Scene i execution brightness reaching**” ($1 \leq i \leq 8$) determines how the channel or colours reach the brightness value associated with the i-th scene. The parameter may have the following values:

- **with jump to value** (default value)
- with ramp

Selecting the value **with ramp** displays the “**Ramp adjustment speed 0% - 100% for scene i execution**” parameter. The parameter may have the following values:

- 1 second
- 2 seconds
- 3 seconds
- **4 seconds** (default value)
- 5 seconds
- 6 seconds
- 7 seconds
- 8 seconds
- 9 seconds
- 10 seconds
- 15 seconds
- 20 seconds
- 25 seconds
- 30 seconds
- 1 minute

- 2 minutes
- 5 minutes
- 10 minutes

10.1.5 Scene storing enabling

The parameter “**Scene storing enabling**” makes it possible to enable/disable the possibility of scene learning via the communication object **Ch. x - Scene**; The parameter may assume the following values:

- disabled
- **enabled** (default value)

If the value **disable** is selected, any scene storing command received from the BUS will be ignored and all the scenes will always replicate the initial conditions set in the relative configuration menus; in this case, the format of the communication object **Ch. x - Scene** becomes *17.001 DPT_SceneNumber*.

Selecting the value **enable** displays the **Ch. x - Scene storing enabling**(Data Point Type: 1.003 DPT_Enable) which enables or disables (via BUS) the possibility of scene storing via the communication object **Ch. x - Scene**.

11 “Channel X forced positioning” menu

You can enable the forced positioning function on the load via the **Channel X forced positioning** parameter.

Fig. 11.1

11.1 Parameters

11.1.1 Forcing function

It is possible to enable the function via the “**Forced positioning function**” parameter, which can have the following values:

- **disabled (default value)**
- enabled

If the function is enabled, this displays the **Ch. x - Priority command** (Data Point Type: 2.001 DPT_Switch_Control) and the configuration parameters of the function.

11.1.2 Brightness value at ON forcing activation

When receiving a priority command with the ON forcing activation value, channel x switches to the brightness value set via the parameter “**Brightness value at ON forcing activation**” which can have the following values:

- **switching ON brightness value (default value)**
- maximum dimming threshold
- set fixed value

Selecting the value **set fixed value** displays the parameter “**Channel brightness at ON forcing activation**”. The parameter may assume the following values:

- from 5% to **100% (default value)** with steps of 5%

When receiving a priority command with the forcing value OFF, the channel will switch to the brightness value of 0%.

The brightness value can be reached in the ON and the OFF (0%) forcing status via a ramp or by jumping to the value. This behaviour is determined by the “**Brightness reaching with on/off, stairs light, forcing, block, slave**” parameter in the **Channel x settings** menu (see the "Channel x settings" menu).

11.1.3 Channel status at forcing end

When receiving a forcing deactivation command, the channel will switch to the brightness value defined by the parameter “**Channel status at forcing end**”; The possible values are:

- **follows last command received (default value)**
- status prior to forcing
- no change
- maximum dimming threshold value
- minimum dimming threshold value
- set fixed value

By selecting the value **follows last command received**, the output follows the dynamics determined by the last command, as if the execution of the command was initiated at the moment in which it was effectively received. Essentially, the command is executed in the background and is applied to the channel at the moment forcing is ended. This behaviour applies, for example, to timed actuation commands with timing that has a duration that goes beyond the moment of forcing deactivation or to brightness absolute value dimming commands in which the moment of reaching the set brightness is later than the moment of forcing deactivation. If no telegram is received during the forcing activation period, upon deactivation of the forcing the channel will return to its conditions prior to the activation itself.

Selecting the value **set fixed value** displays the parameter “**Brightness at forcing end**”, which can have the following values:

- from 0% to **100% (default value)** with steps of 5%

In the extreme case in which the behaviour **no change** upon forcing deactivation is set and a forcing deactivation command is received while the dimming ramp is in progress for reaching the requested forced value, dimming is stopped and the brightness reached at the moment of receiving the forcing deactivation command is maintained.

The “**Channel status at forcing end**” parameter is used to set the reaching of the value at the end of forcing. If the selected value is **status prior to forcing/maximum dimming threshold value/minimum dimming threshold value/set fixed value**, the reaching of that value is determined by the “**Brightness reaching with on/off, stairs light, forcing, block, slave**” parameter in the **Channel x settings** menu (see the "Channel x settings" menu).

11.1.4 Forcing status at BUS voltage recovery

The parameter “**Forcing status at BUS voltage recovery**” (“**Forced positioning status at BUS voltage recovery**”) is used to determine the status of the forcing function at BUS voltage recovery. This parameter is useful if the function is active when the BUS voltage drops and you want to have the channel behaviour not be changed after voltage drop. The parameter may assume the following values:

- deactivated
- **as before voltage drop (default value)**

Selecting the value **deactivated** (and if forcing was active prior to the BUS voltage drop), when the BUS voltage is recovered the forcing function is deactivated and the channel behaves as set in the “**Channel status at forcing end**” parameter. If the value set for this last parameter is **follows last command received**, the channel will execute the last command received before the BUS voltage drop that, as a result,

must be stored in the non-volatile memory. If the last command received before voltage drop is a timed activation command, when the BUS voltage is recovered the command will not be executed and the channel will switch to the OFF status (brightness 0%).

If the value **as before voltage drop** is selected (and forcing was activated before BUS voltage drop), when the BUS voltage is recovered the forcing function is reactivated and the channel switches to the status determined by the forcing activation command. If a forcing deactivation command is received and the value of the parameter "**Channel status at forcing end**" is **follows last command received**, the channel executes the last command received before the BUS voltage drop, which, as a result, must be stored in the non-volatile memory. If the last command received before voltage drop is a timed activation command, when the BUS voltage is recovered the command will not be executed and the channel will switch to the OFF status (brightness 0%).

The device indicates the activated status of the forcing function via the associated communication object **Ch.x - Priority command status** (Data Point Type: 2.001 DPT_Switch_Control), regardless of whether or not functions with a higher priority are active. The communication object is sent on request, when the BUS voltage is recovered, and spontaneously. It is sent spontaneously when the status passes from "activate forcing ON" to "activate forcing OFF" or "deactivate forcing", and vice versa.

12 “Channel X block” menu

It is possible to block the channel in a certain (settable) condition after receiving the **Ch. x - Block** (Data Point Type: 1.003 DPT_Enable) which activates the block function; until it is deactivated, any command received on all other input communication objects will not be executed.

The block function is the function with the highest priority. This function can be enabled via the **Px “Block function”** menu. The menu that ETS displays is as follows:

Fig. 12.1

12.1 Parameters

12.1.1 Block function

You can enable the function via the “**Block function**” parameter, which can have the following values:

- **disabled** (default value)
- **enabled**

Selecting the **enabled** value displays the communication object **Ch. x - Block** as well as the function configuration parameters.

12.1.2 Block activation value

The parameter “**Block activation value**” determines which logic value received via the communication object **Ch. x - Block** activates the function. The possible values are:

- value “0”
- **value “1”** (default value)

12.1.3 Channel status with active block

The parameter “**Channel status with active block**” is used to set the status the channel must assume when the block function is activated. The possible values are:

- **maximum dimming threshold value** (default value)
- minimum dimming threshold value
- no change
- last switching on value (memory)
- set fixed value

Selecting the value **set fixed value** displays the parameter “**Channel brightness with active block**”. The parameter may assume the following values:

- from 0% to **100% (default value)** with steps of 5%

In the extreme case in which the behaviour **no change** with active block is set and a block activation command is received while the dimming ramp is in progress for reaching the requested value by a function with lower priority than blocking, dimming is stopped and the brightness reached at the moment of receiving the block activation command is maintained.

12.1.4 Channel status at block deactivation end

The parameter “**Channel status at block deactivation end**” is used to set the status the channel must assume after the block is deactivated. The possible values are:

- maximum dimming threshold value
- minimum dimming threshold value
- no change
- last switching on value (memory)
- **follows last command received (default value)**
- as prior to the block activation
- set fixed value

By selecting the value **follows last command received**, the channel follows the dynamics determined by the last command, as if the execution of the command was initiated at the moment in which it was effectively received. Essentially, the command is executed in the background and is applied to the output in the moment in which the block is deactivated. This behaviour applies, for example, to timed actuation commands with timing that has a duration that goes beyond the moment of block deactivation or to brightness absolute value dimming commands in which the moment of reaching the set brightness is later than the moment of block deactivation. If no telegram is received during the block activation period, upon deactivation of the block the channel will return to its conditions prior to the activation itself.

Selecting the value **set fixed value** displays the parameter “**Brightness at block end**”. The possible values are:

- from 0% to **100% (default value)** with steps of 5%

In the extreme case in which the behaviour **no change** upon block deactivation is set and a block deactivation command is received while the dimming ramp is in progress for reaching the requested forced value with the block active, dimming is stopped and the brightness reached at the moment of receiving the block deactivation command is maintained.

Reaching the brightness value following block activation/deactivation can be reached via a ramp or by a jump to value. This behaviour is determined by the “**Brightness reaching with on/off, stairs light, forcing, block, slave**” parameter in the **Channel x settings** menu (see the "Channel x settings" menu).

12.1.5 Block on download function

The parameter “**Block on download function**” sets the block function status after downloading the application from ETS. The possible values are:

- **deactivated** (default value)
- active

12.1.6 Block function at BUS voltage recovery

The parameter “**Block function at BUS voltage recovery**” is used to set the status of the block function after the BUS power supply voltage is recovered. The possible values are:

- deactivated
- active
- **as before voltage drop** (default value)

Selecting the value **deactivated** (and the block function was activated before BUS voltage drop), when the BUS voltage is recovered the block function is deactivated and the channel behaves as set in the parameter “**Channel status at block deactivation end**”. If the value set for this last parameter is **follows last command received**, the channel will execute the last command received before the BUS voltage drop that, as a result, must be stored in the non-volatile memory. If the last command received before voltage drop is a timed activation command, when the BUS voltage is recovered the command will not be executed and the channel will switch to the OFF status (brightness 0%).

If the **as before BUS voltage drop** value is selected (and the block function was activated before the BUS voltage drop), when the BUS voltage is reset the block function will be reactivated and the channel will switch to the status determined in the “**Channel status with active block**” parameter. If a block deactivation command is received and the value of the parameter “**Channel status at block deactivation end**” is **follows last command received**, the channel executes the last command received before the BUS voltage drop, which, as a result, must be stored in the non-volatile memory. If the last command received before voltage drop is a timed activation command, when the BUS voltage is recovered the command will not be executed and the channel will switch to the OFF status (brightness 0%).

The device indicates the activated status of the block function via the associated communication object **Ch.x - Block status** (Data Point Type: 1.003 DPT_Enable). The communication object is sent on request, when the BUS voltage is recovered, and spontaneously. It is sent spontaneously when the status passes from "enabled" to "disabled" and vice versa.

13 “Channel x slave mode” menu

Channel x can be configured so it can be controlled by a single KNX device as a sensor with constant brightness control in the master-slave configuration; in this configuration, the channel periodically receives, via the communication object **Ch.x - Slave command value** (Data Point Type 5.001 DPT_Scaling) **Ch.x - Slave brightness dimming** (Data Point Type 3.007 DPT_Control_Dimming), brightness percentage dimming values or relative dimming values from the master device, so that it can maintain constant brightness in the environment controlled by the channel.

When this function is enabled, ETS displays the following menu:

--.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 slave mode	
Main	Slave mode <input type="radio"/> disabled <input checked="" type="radio"/> enabled
Channel 1 settings	Monitoring time [minutes] 5
Channel 1 switching	Channel status in safety mode no change
Channel 1 stairs light	Slave mode value at download <input checked="" type="radio"/> disabled <input type="radio"/> enabled
Channel 1 relative brightness dimming	Slave mode value at bus voltage recovery as before voltage drop
Channel 1 absolute brightness dimming	Channel status at slave mode deactivation follows last command received
Channel 1 logic	
Channel 1 scenes	
Channel 1 forced positioning	
Channel 1 block	
Channel 1 slave mode	NOTE: the brightness value reaching and eventual speed depending on parameters settings in menus "Brightness relative dimming" and "Brightness absolute dimming"

Fig. 13.1

13.1 Parameters

13.1.1 Slave mode

This function can be enabled via the “**Slave mode**” parameter, which can assume the following values:

- disabled (default value)
- enabled

13.1.2 Monitoring time [minutes]

If the function is enabled, it is possible to set the monitoring time (in seconds) within which channel x waits to receive one of the two possible command objects via the “**Monitoring time [minutes]**” parameter. The parameter may have the following values:

- from 0 to 60 with steps of 1 (default value 5)

Selecting the value “0”, no monitoring is carried out on the regular reception of one of the two possible command objects of the slave function.

If a command with a higher priority (block or forcing) is received during slave operation, this interrupts and resets the monitoring time counter; the latter restarts the count from the moment in which the functions with a higher priority are deactivated.

13.1.3 Channel status in safety mode

If the dimmer does not receive any command from the master device during the monitoring period, it is possible to set the safety status to which the channel must be brought via this parameter “**Channel status in safety mode**”, which can have the following values:

- maximum dimming threshold value
- minimum dimming threshold value
- **no change** (default value)
- set fixed value

Selecting the value **set fixed value** displays the parameter “**Channel brightness in safety mode**”. The parameter may assume the following values:

- from 0% to **100% (default value)** with steps of 5%

Enabling the function displays the communication objects **Ch.x - Slave command value** and **Ch.x - Slave brightness dimming** to receive brightness dimming commands and the object **Ch.x - Slave mode enabling** (Data Point Type: 1.005 DPT_Enable) which is used to enable/disable the slave function via the BUS command.

13.1.4 Slave mode value at download

If the channel mode is slave, any command that is received is ignored (except for the forcing function and block function activation commands) and the dimming thresholds are ignored.

The initial value of the function after the ETS download is determined via the parameter “**Slave mode value at download**”. The parameter may have the following values:

- **disabled** (default value)
- enabled

If the **disabled** value is selected, the slave function must be enabled via the communication object **Ch.x - Slave function enabling** (value 1 = enable).

13.1.5 Slave mode value at BUS voltage recovery

The parameter “**Slave mode value at BUS voltage recovery**” is used to determine the value of the function after BUS voltage recovery. The parameter may have the following values:

- deactivated
- active
- **as before voltage drop** (default value)

13.1.6 Channel status at slave mode deactivation

When the function is deactivated (value 0 = disable the **Ch.x - Slave function enabling** communication object), it is possible to configure the behaviour of the dimmer channel via the “**Channel status at slave mode deactivation**” parameter, which can have the following values:

- maximum dimming threshold value
- minimum dimming threshold value
- no change
- last switching on value (memory)
- **follows last command received (default value)**
- as prior to activation
- set fixed value

By selecting the value **follows last command received**, the channel follows the dynamics determined by the last command, as if command execution was begun at the moment in which it was effectively received. Essentially, the command is executed in the background and is applied to the output in the moment slave mode is deactivated. This behaviour applies, for example, to timed actuation commands with timing that has a duration that goes beyond the moment of slave mode deactivation or to brightness absolute value dimming commands in which the moment of reaching the set brightness is later than the moment of slave mode deactivation. If no telegram is received during the slave mode activation period, upon deactivation the channel will return to its conditions prior to the activation of the mode itself.

Selecting the value **set fixed value** displays the parameter “**Channel brightness at slave mode deactivation**”. The possible values are:

- from 0% to **100% (default value)** with steps of 5%

The “**Channel status at slave mode deactivation**” parameter is used to set the value at the end of slave mode. If the selected value is **as prior to activation/maximum dimming threshold value/minimum dimming threshold value/set fixed value/last activation value (memory)**, the reaching of that value is determined by the “**Brightness reaching with on/off, stairs light, forcing, block, slave**” parameter in the **Channel x settings** menu (see the "Channel x settings" menu).

The dimming speed and the behaviour for reaching the brightness value set depend on the settings of the relative parameters present in the menus **Channel x relative brightness dimming** and **Channel x absolute brightness dimming**.

The device indicates the activated status of slave mode via the associated communication object **Ch.x - Slave mode status** (Data Point Type: 1.003 DPT_Enable), regardless of whether or not functions with a higher priority are active. The communication object is sent on request, when the BUS voltage is recovered, and spontaneously. It is sent spontaneously when the status passes from "enabled" to "disabled" and vice versa.

14 “Channel x counter” menu

This is used to enable the counter for the ON or OFF period of the output connected to channel x by setting the counter parameters.

When this function is enabled, ETS displays the following menu:

-.-.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 counter	
Main	Counter function <input type="radio"/> disabled <input checked="" type="radio"/> enabled
Channel 1 settings	
Channel 1 switching	Increase the count if <input type="radio"/> output is OFF (brightness = 0%) <input checked="" type="radio"/> output is ON (brightness > 0%)
Channel 1 stairs light	Counter value format 2 bytes (hours) ▼
Channel 1 relative brightness dimming	Overflow value [hours] 65535 ▲▼
Channel 1 absolute brightness dimming	Counter value overflow feedback <input checked="" type="radio"/> disable <input type="radio"/> enable 1 bit object
Channel 1 logic	Counter value sending condition sending on demand only ▼
Channel 1 scenes	
Channel 1 forced positioning	Counter reset object <input checked="" type="radio"/> disable <input type="radio"/> enable
Channel 1 block	
Channel 1 slave mode	
Channel 1 counter	

Fig. 14.1

14.1 Parameters

14.1.1 Counter function

This function can be enabled via the parameter “Counter function”, which can assume the following values:

- disabled (default value)
- enabled

Selecting the value **enabled** displays the function configuration parameters.

14.1.2 Increase the count if

The count is based on the detection of the output status. Two statuses can be detected: output is ON (brightness > 0%) and output is OFF (brightness = 0%); the “Increase the count if” parameter is used to set the status of the output that is considered for increasing the counter. The values that can be set are:

- output is OFF (brightness = 0%)
- output is ON (brightness > 0%) (default value)

The count takes place only if BUS voltage is present; otherwise, the counter is not increased.

14.1.3 Counter value format

The counter that is used for the count can have different formats depending on the format selected for transmitting the value on the KNX BUS; therefore, with the “**Counter value format**” parameter, it is possible to define the size and code of the communication object used to communicate the counter value. The values that can be set are:

- 2 bytes (seconds)
Maximum countable value: 65535 seconds \approx 18.2 hours
- 2 bytes (minutes)
Maximum countable value: 65535 minutes \approx 45.5 days
- **2 bytes (hours) (default value)**
Maximum countable value: 65535 hours \approx 7.4 years

The value set in this item will cause, as a result, the values set for the parameter “**Overflow value**” and the format of the communication object **Ch.x - Count**. The initial value is always 0, regardless of the format selected.

14.1.4 Overflow value

The “**Overflow value**” parameter is used to set the maximum value of the counter; in fact, it is possible to set the maximum count value - i.e. the value beyond which the counter is in an overflow condition.

Depending on the value set for the **Counter format** parameter, the values that can be set for this item will be different:

- If the counter format is **2 bytes (seconds)**, this displays the communication object **Ch.x - Count** (Data Point Type: 7.005 DPT_TimePeriodSec) and the values that can be set for the above parameter are:
 - from 1 to **65535 (default value, \approx 18.2 hours)** with steps of 1
- If the counter format is **2 bytes (minutes)**, this displays the communication object **Ch.x - Count** (Data Point Type: 7.006 DPT_TimePeriodMin) and the values that can be set for the above parameter are:
 - from 1 to **65535 (default value, \approx 45.5 days)** with steps of 1
- If the counter format is **2 bytes (hours)**, this displays the communication object **Ch.x - Count** (Data Point Type: 7.007 DPT_TimePeriodHrs) and the values that can be set for the above parameter are:
 - from 1 to **65535 (default value, \approx 7.4 years)** with steps of 1

Once the maximum value has been reached, the counter restarts from 0.

14.1.5 Counter overflow feedback

The parameter “**Counter overflow feedback**” is used to enable the display, and therefore the use, of the communication objects that indicate when the differential counter has exceeded its maximum value. The values that can be set are:

- **disabled (default value)**
- enable object of 1 bit

Selecting the value **enable 1 bit object** displays the **Ch.x - Count overflow** (Data Point Type: 1.002 DPT_Bool) communication object by which the device indicates the overflow of the counter. When the overflow occurs, a value of “1” is sent; a value of “0” is never sent.

14.1.6 Counter sending condition

The parameter “**Counter sending condition**” is used to define the conditions for sending the current value of the counter. The values that can be set are:

- **send on demand only** (default value)
- send on change
- send periodically
- send on change and periodically

Selecting a value other than **send on demand only**, the **Ch.x - Counter sending trigger** communication object is made visible (Data Point Type: 1.017 DPT_Trigger). Selecting the value **send on change** or **send on change and periodically**, displays the parameter “**Minimum counter variation for sending value**” whereas selecting the value **send periodically** or **send on change and periodically** displays the parameter “**Counter sending period**”.

Selecting the value **send on demand only**, no new parameter will be enabled because the counter value is not sent spontaneously by the device; only in the case of a status read request will it send the user a telegram in response to the command received, giving information about the current value of the counter.

If the differential counter sending condition is different from **on demand only**, there is the possibility to indirectly generate the sending of the current counter value following receipt of a BUS telegram on the **Ch.x - counter sending trigger** object (with both a value of “1” and a value of “0”); each time the device receives a telegram on that object, it must immediately send the current value of the counter.

After a BUS voltage recovery, the value of the counter should be sent in order to update any connected devices.

The parameter “**Minimum counter variation for sending value**”, which is visible if the counter value is sent on change, is used to define the minimum count variation (in relation to the last value sent) that causes the new value to be spontaneously sent. The values that can be set are:

- from 1 to 100 with steps of 1, **10 (default value)**

The unit of measurement of the minimum variation is the same as what is set for the counter format.

The parameter “**Counter sending period [seconds]**”, which is visible if the counter value is sent periodically, is used to define the period with which telegrams indicating the current counter value are spontaneously sent. The values that can be set are:

- from 1 to 255 with steps of 1, **15 (default value)**

14.1.7 Counter reset object

The “**Counter reset object**” parameter is used to enable the visualisation, and therefore the use, of the **Ch.x - Counter reset** (Data Point Type: 1.017 DPT_Trigger) communication object, in order to receive, via BUS, the counter reset command for resetting the value. The values that can be set are:

- **disable** (default value)
- enable

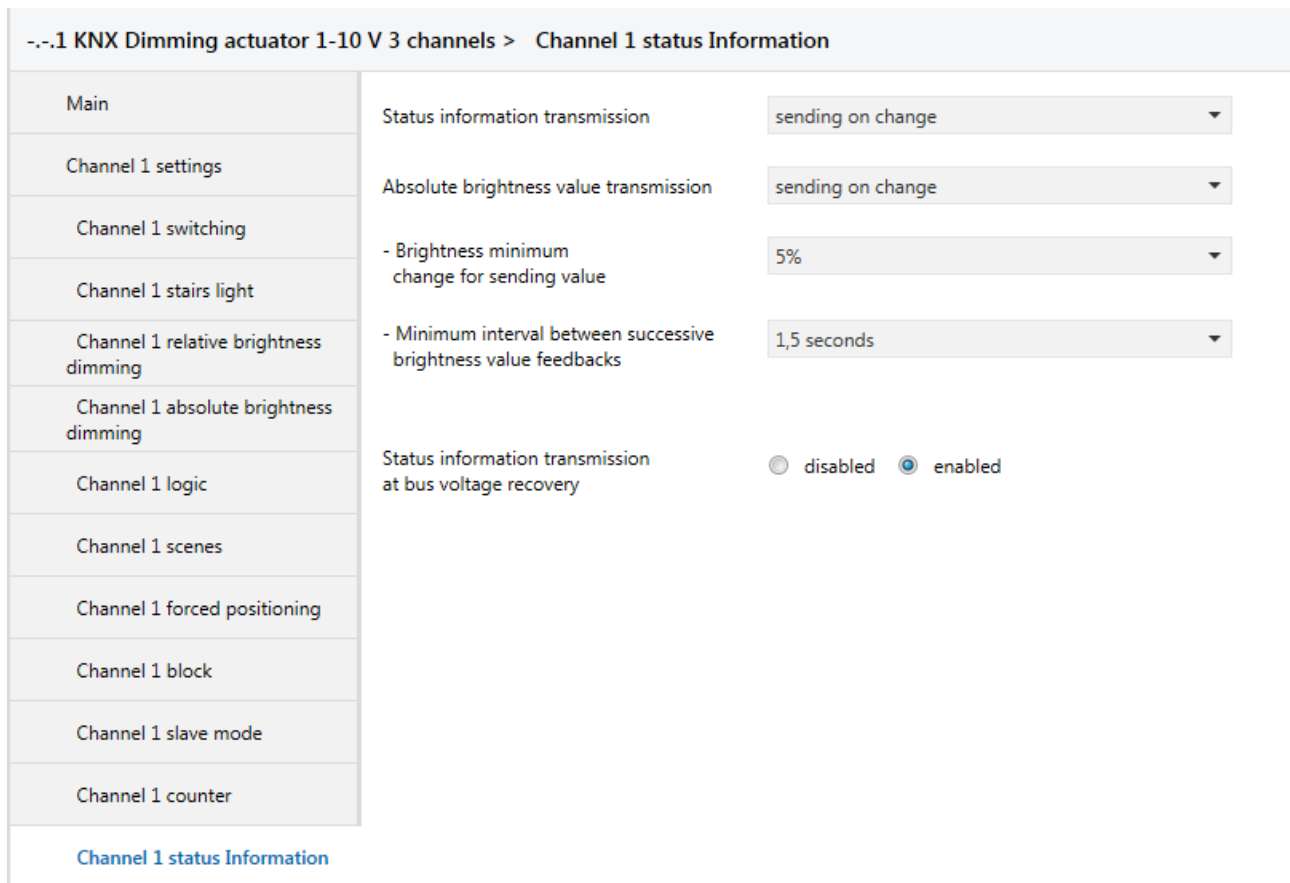
Selecting **enable** displays the **Ch.x - Counter reset** communication object, via which the device receives the counter reset command; if a value “1” or “0” is received, the counter is reinitialised to 0.

In the event of a BUS voltage failure, the counter value must be saved in a non-volatile memory and restored when the BUS voltage is recovered.

15 “Channel X status information” menu

The **Status information** menu contains the parameters used to set the conditions for sending the channel x status feedback that the device sends via BUS telegrams.

The structure of the menu is as follows:



--.1 KNX Dimming actuator 1-10 V 3 channels > Channel 1 status Information		
Main	Status information transmission	sending on change
Channel 1 settings	Absolute brightness value transmission	sending on change
Channel 1 switching	- Brightness minimum change for sending value	5%
Channel 1 stairs light	- Minimum interval between successive brightness value feedbacks	1,5 seconds
Channel 1 relative brightness dimming		
Channel 1 absolute brightness dimming		
Channel 1 logic	Status information transmission at bus voltage recovery	<input type="radio"/> disabled <input checked="" type="radio"/> enabled
Channel 1 scenes		
Channel 1 forced positioning		
Channel 1 block		
Channel 1 slave mode		
Channel 1 counter		
Channel 1 status Information		

Fig. 15.1

15.1 Parameters

15.1.1 Status information transmission

The device signals the status of the ballast connected to the channel x connected to it via the **Ch. x - Status** (Data Point Type 1.001 DPT_Switch) communication object. The communication object assumes the value 1 = ON when the absolute dimming percentage value >0, and the value 0 = OFF when the percentage dimming value is = 0.

It is possible to set the conditions that determine the sending via the “**Status information transmission**” parameter, which can have the following values:

- disabled
- on demand only
- **sending on change** (default value)

Selecting a value other than **disabled** displays the communication object **Ch. x - Status**. Selecting the value **sending on change**, the communication object is sent spontaneously when the status switches from ON to OFF and vice versa. This means that if the brightness dimming is changed, staying higher than 0 (“ON” status), the communication object does not need to be retransmitted on the BUS.

15.1.2 Absolute brightness value transmission

The device signals the current brightness percentage value of channel x via the communication object **Ch. x - Brightness value** (Data Point Type 5.001 DPT_Scaling); It is possible to set the conditions that determine the sending of the brightness value feedback communication object using the parameter “**Absolute brightness value transmission**”, which can have the following values:

- disabled
- on demand only
- **on change** (default value)

Selecting a value other than **disabled** displays the communication object **Ch. x - Brightness value**. Selecting the value **sending on change** displays the parameters “**Brightness minimum change for sending value**” and “**Minimum interval between successive brightness value feedbacks**”.

The “**Brightness minimum change for sending value**” parameter is used to set the value of the minimum change necessary for triggering the sending of the communication object dedicated to the brightness value. The parameter may have the following values:

- 1%
- 2%
- **5%** (default value)
- 10%
- 15%
- 25%

If the channel x brightness value feedback takes place "on change", it may occur during a dimming ramp that the brightness values change quickly and the device is not able to send all feedback correctly. To avoid this problem, a minimum time interval can be defined between sending one brightness value and the next one via the “**Minimum interval between successive brightness value feedbacks**” parameter, which is only assessed if there was a change in brightness that exceeds the minimum value set via the “**Brightness minimum change for sending value**” parameter.

The “**Minimum interval between successive brightness value feedbacks**” parameter can assume the following values:

- 500 ms
- 1 second
- **1.5 seconds** (default value)
- 2 seconds

15.1.3 Status information transmission at BUS voltage recovery

Via the “**Status information transmission at BUS voltage recovery**” parameter it is possible to determine whether the “Status” and “Brightness value” communication objects (configured to be sent upon change) must also be sent at BUS voltage recovery. The parameter may have the following values:

- disabled
- **enabled** (default value)

16 Front button keys operation and priority functions

The functions of the front button keys on the device, associated with channel 1,2,3, are determined by the “**Local push button behaviour**” parameter of the **Channel x settings** menu (see the “Channel x settings” menu).

The priority of the functions is shown in the following table:

Function	Priority	
Relative brightness dimming	1	low
On/off switching	1	
Timed switching	1	
Absolute brightness dimming	1	
Scenes	1	
Brightness sequences	1	
Logic function (if used for enabling of commands)	2	
Channel status at forcing end	3	
Channel status at block deactivation end	4	
Channel status at BUS voltage recovery	5	
Slave mode value at BUS voltage recovery	6	
Forcing status at BUS voltage recovery	7	
Block function at BUS voltage recovery	8	
Slave mode	9	
Forced positioning	10	
Block	11	
Front button key	12	
Relay status at BUS voltage failure	13	high

17 Communication objects

The communication objects implemented in the device are shown in the following table:

Input objects

#			Object name	Object function	Description	Datapoint type
Ch 1	Ch 2	Ch 3				
0	30	60	Ch.1 - Switch	On/Off	ON/OFF switching command of channel 1	[1.1] DPT_Switch
1	31	61	Ch.1 - Brightness dimming	Increase/Decrease	Brightness relative dimming of channel 1	[3.7] DPT_Control_Dimming
2	32	62	Ch.1 - Command value	% Value	Sets the brightness absolute value (% value) of channel 1	[5.1] DPT_Scaling
3	33	63	Ch.1 - Timed switch	Start/Stop	Stairs light timing command of channel 1	[1.10] DPT_Start
4	34	64	Ch.1 - Scene	Execute/Store	Allows scenes execution/learning of channel 1	[18.1] DPT_SceneControl
5	35	65	Ch.1 - Priority command	On/Off forced positioning	Forces the value of the channel 1 output in a given state	[2.1] DPT_Switch_Control
7	37	67	Ch.1 - Priority command status	On/Off forced positioning	Sends priority command function status	[2.1] DPT_Switch_Control
9	39	69	Ch.x - Logic input 1	Logic	Logic input of channel x	[1.2] DPT_Bool
10	40	70	Ch.x - Logic input 2	Logic	Logic input of channel x	[1.2] DPT_Bool
11	41	71	Ch.x - Logic input 3	Logic	Logic input of channel x	[1.2] DPT_Bool
12	42	72	Ch.x - Logic input 4	Logic	Logic input of channel x	[1.2] DPT_Bool
13	43	73	Ch.x - Logic input 5	Logic	Logic input of channel x	[1.2] DPT_Bool
14	44	74	Ch.x - Logic input 6	Logic	Logic input of channel x	[1.2] DPT_Bool
15	45	75	Ch.x - Logic input 7	Logic	Logic input of channel x	[1.2] DPT_Bool
16	46	76	Ch.x - Logic input 8	Logic	Logic input of channel x	[1.2] DPT_Bool
20	50	80	Ch.x - Stairs light activation time	Value in seconds	Staircase light time value of channel x	[7.5] DPT_TimePeriodSec
21	51	81	Ch.x - Scene storing enabling	Enable/Disable	Enable/disable scenes storing of channel x	[1.3] DPT_Enable
22	52	82	Ch.x - Slave mode enabling	Enable/Disable	Enable/disable the slave mode	[1.3] DPT_Enable
23	53	83	Ch.x - Slave brightness dimming	Increase/Decrease	Brightness relative dimming during slave mode	[3.7] DPT_Control_Dimming
24	54	84	Ch.x - Slave value command	% Value	Sets the brightness absolute value (% value) during slave mode	[5.1] DPT_Scaling
28	58	88	Ch.x - Counter value sending trigger	Counter value transmission	Receives counter value sending request (trigger)	[1.17] DPT_Trigger
29	59	89	Ch.x - Counter reset	Value reset	Receives counter value reset command	[1.17] DPT_Trigger

Output objects

#			Object name	Object function	Description	Datapoint type
Ch 1	Ch 2	Ch 3				
6	36	66	Ch.x - Priority command status	On/Off forced positioning	Sends priority command function status	[2.1] DPT_Switch_Control
8	38	68	Ch.x - Block	Switching On/Off	Block channel x status in a settable condition	[1.3] DPT_Enable
17	37	67	Ch.x - Status	On/Off	On/Off status of channel 1	[1.1] DPT_Switch
18	38	68	Ch.x - Brightness value	% Value	Current brightness value of channel x	[5.1] DPT_Scaling
19	39	69	Ch.x - Logical operation outcome	Logic	Logic output of channel x	[1.2] DPT_Bool
25	55	85	Ch.x - Slave mode status	Activated/Deactivated	Sends slave mode status	[1.3] DPT_Enable
26	56	86	Ch.x - Counter	Value 0 .. 65535 [s]	Sends the counter value in seconds	[7.5] DPT_TimePeriodSec
26	56	86	Ch.x - Counter	Value 0 .. 65535 [min]	Sends the counter value in minutes	[7.6] DPT_TimePeriodMin
26	56	86	Ch.x - Counter	Value 0 .. 65535 [h]	Sends the counter value in hours	[7.7] DPT_TimePeriodHrs
27	57	87	Ch.x - Counter overflow	Overflow state	Sends counter overflow feedback	[1.2] DPT_Bool

Ai sensi dell'articolo 9 comma 2 della Direttiva Europea 2004/108/CE si informa che responsabile dell'immissione del prodotto sul mercato Comunitario è:
According to article 9 paragraph 2 of the European Directive 2004/108/EC, the responsible for placing the apparatus on the Community market is:
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