Satel®

KNX-DIM21

Universal two-channel dimming actuator
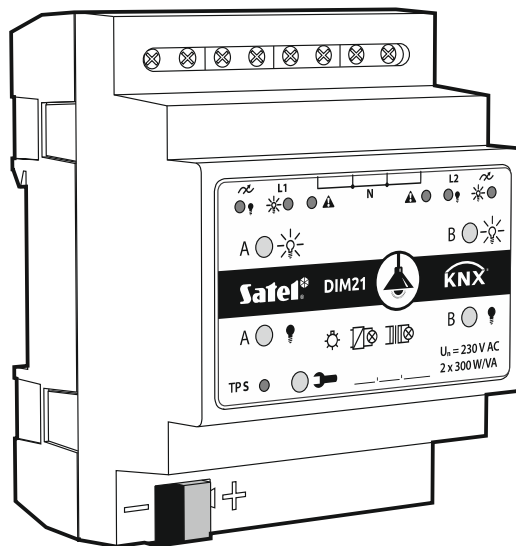
KNX®

CE

IMPORTANT

The device should be installed by qualified personnel.

Prior to installation, please read carefully this manual in order to avoid mistakes that can lead to malfunction or even damage to the equipment.

Changes, modifications or repairs not authorized by the manufacturer shall void your rights under the warranty.

SATEL aims to continually improve the quality of its products, which may result in changes in their technical specifications and software. Current information about the changes being introduced is available on our website.
Please visit us at:
http://www.satel.eu

The declaration of conformity may be consulted at www.satel.eu/ce

The following symbols may be used in this manual:

i - note,

⚠ - caution.

CONTENTS

The KNX-DIM21 module is a universal two-channel dimming KNX actuator that allows stepless control of light sources up to 300 W per channel. The light can be turned on / off, dimmed down (darker) / dimmed up (brighter), set by using a predefined scene or another function via the KNX bus. The actuator can be used with resistive, inductive and capacitive loads (R, L, C).

⚠ **This module is designed for use with 230 VAC power and may not be used for dimming light sources supplied with DC current, as this might damage the module and the connected load.**

1. Features

- Communication with KNX bus via integrated bus connector.
- Automatic recognition of the connected load type.
- Adjustable lighting characteristic to suit the load type.
- Two-stage, firmware-hardware overheating protection system.
- Overload protection.
- Feedback on status of module and individual channels.
- Definable reaction of each channel in case of KNX voltage loss and recovery.
- Definable behavior of each channel in case of voltage recovery.
- Time functions (switching delay, staircase function with warning option and operating time change).
- Value forcing function.
- Option to call scenes for each channel by using 1- and 8-bit commands.
- Manual operation of each channel status by using buttons on the enclosure.
- LEDs to indicate each channel status and signal troubles.
- Ability to be mounted on DIN rail (35 mm).
- Module configuration using ETS software.

2. Description
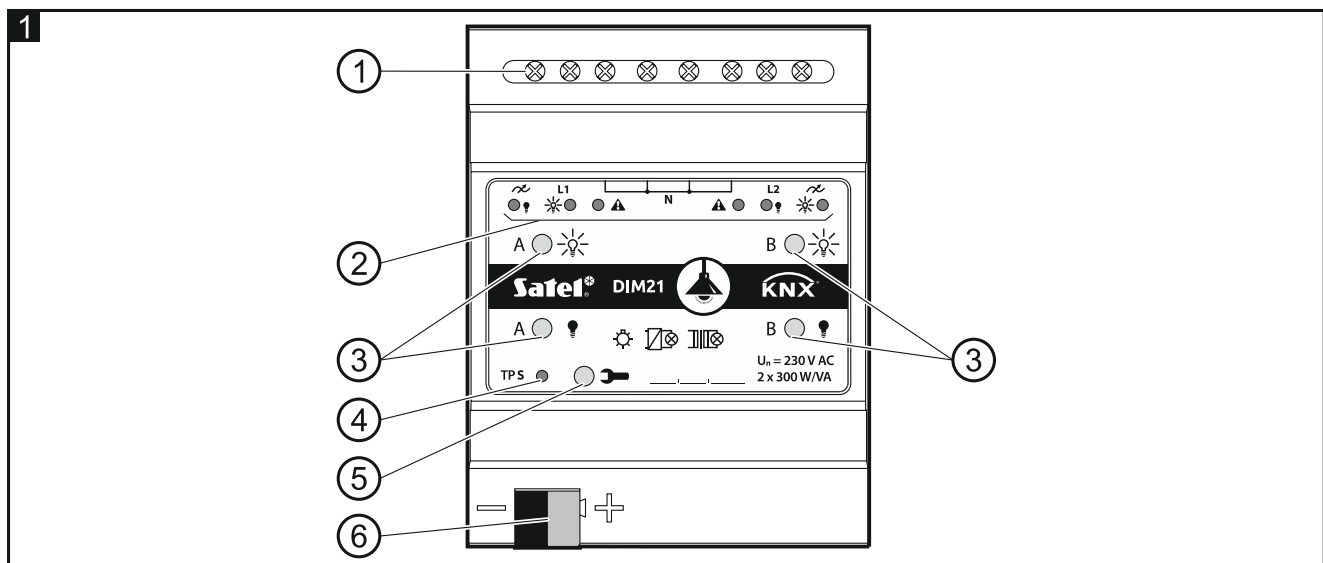
① load circuit terminals L1, L2, N, ∿.

② LEDs to indicate channel status / troubles (☼ and ♀ – green, ⚠ – red) – see Table 1.

LED			A / B channel status
☼	♀	⚠	
○	○	☼	blocked (startup delay)
☼	☼	○	mains synchronization / load detection
○	○	●	no load / unknown load type before detection
○	●	○	switched off
●	○	○	switched on
			Trouble type
○	○	☼	overload
☼	☼	☼	overheat
○	○	○	voltage trouble
●	●	●	hardware failure
○ – OFF, ● – ON, ☼ – flashing.			

Table 1.

⚠ **If a hardware failure is reported, de-energize the 230 VAC load circuit and disconnect the KNX bus cable to reset the module. If, after power-on and restart of the module, the channel keeps on reporting failure, power off the module and notify the service technicians about the fault. Further operation of the module may pose hazard to the health or life of the operator and may damage the module as well as the connected load.**

③ buttons for manual control of the channels – see Table 2.

Button	Operation	Reaction
☼	short press	switch on
	long press	dim up
♀	short press	switch off
	long press	dim down
☼ + ♀	short press	detection of load connected to the channel
The module will interpret button press as a long one when the button is held down longer than for 1 second.		

Table 2.

ℹ *The brightness value set by using buttons is not saved to the non-volatile memory of the module.*

Starting detection of the connected load by using the buttons is only possible when the automatic mode of load detection is selected for the channel in the ETS program (see "Configuring the channels").

You can also use the buttons to restore factory settings of the module (see "Restoring the module factory settings").

④ red LED – ON when a physical address is being assigned by using the ETS program. The address assignment can be activated manually with the ➤ button on the enclosure or remotely from the ETS program.

⑤ programming button (to be used to assign the physical address).

⑥ terminal to connect the KNX bus.

2.1 Load types

The module is designed for use with the following load types:

☼ – resistive (R),

⫴⊗ – inductive (L),
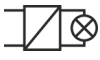
⬓⊗ – capacitive (C).

After connecting the mains voltage, the module can automatically recognize the type of connected load. How the connected load will be detected is defined separately for each channel in the ETS program (see "Configuring the channels").

It is recommended that automatic detection of the connected load be performed. Selecting an incorrect type of load for the channel may damage the module and the connected load.

You can combine different types of loads within the lighting groups connected to one channel. Resistive (R) and inductive (L) loads, as well as resistive (R) and capacitive (C) loads can be combined into groups. For detailed information, see section "Configuring the channels".

You must not combine inductive loads with capacitive ones. Connecting the loads of this type to one channel will damage the module.
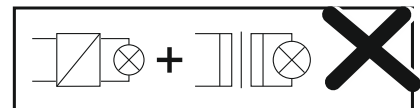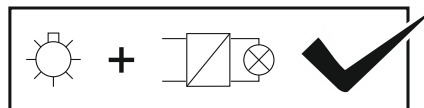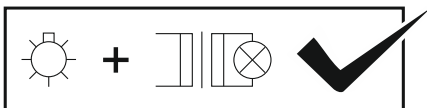
2.2 Overheating protection

The module heats up during operation, because part of the power is converted into heat as power loss. For protection against overheating, the module is provided with firmware / hardware safety protections which switch off and lock the channels at all times when the module temperature reaches its maximum permissible value. After the module cools down, the channels are unlocked, but they still remain switched off. The specified operating parameters will only be restored after the channel is enabled by the user.

2.3 Wiring diagram of module outputs
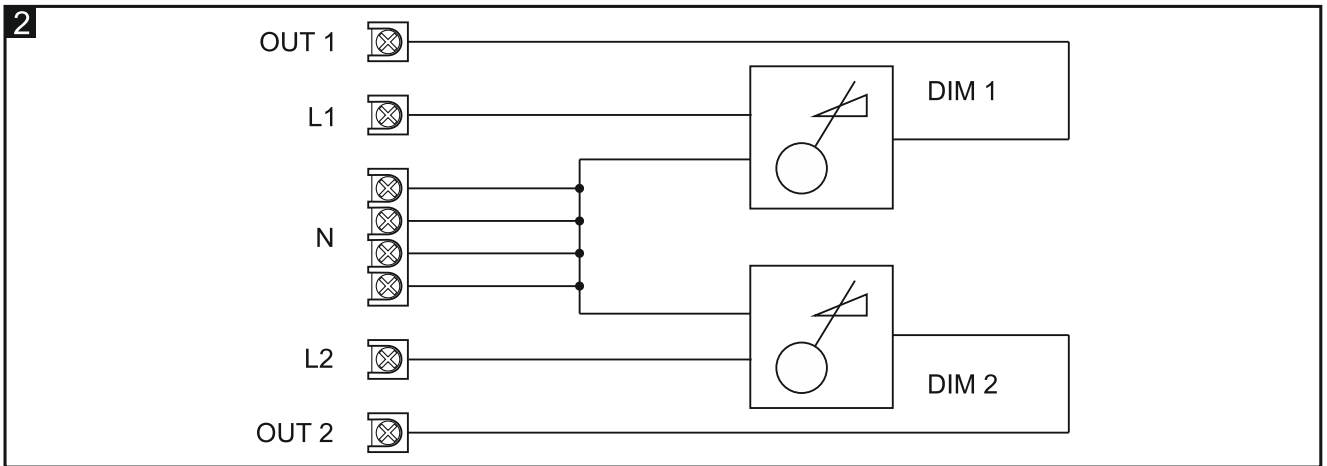
The module has two independent channels based on two independent circuits with a common neutral point.

2.4 Enclosure
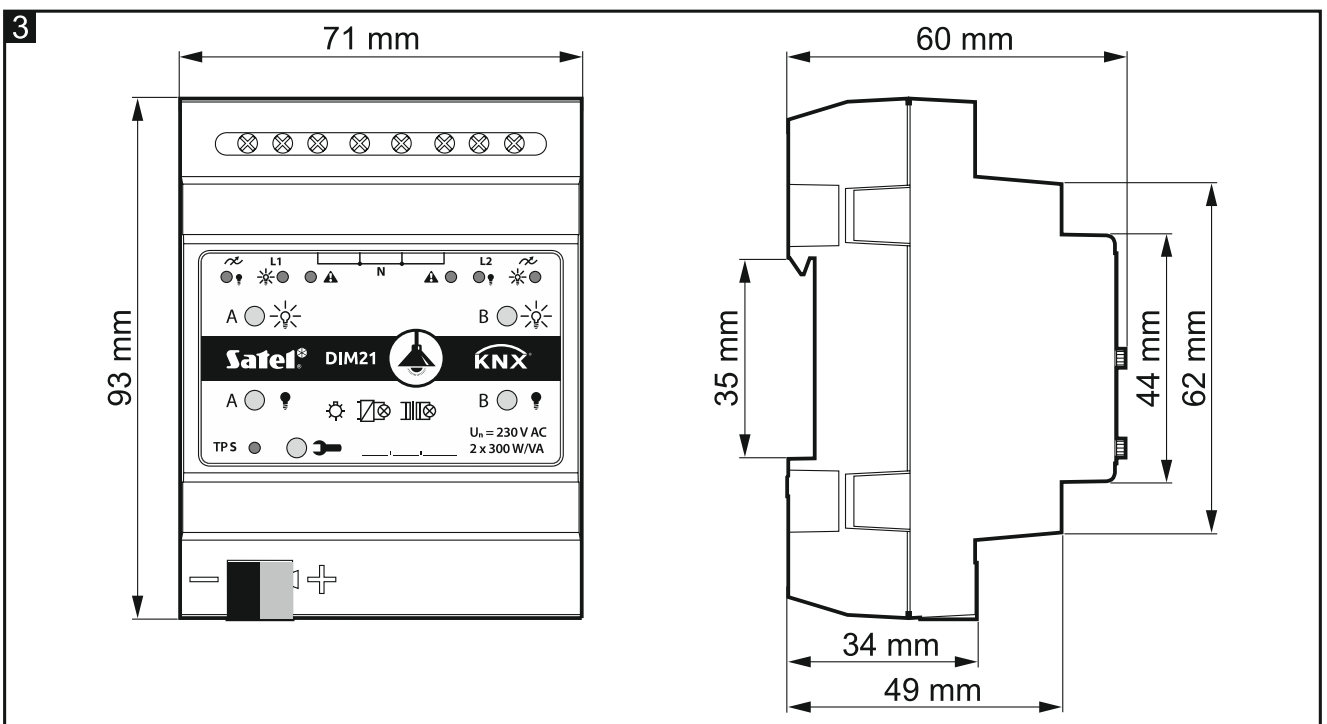
The module occupies 4 units on the 35 mm DIN rail.

3. Installation

Disconnect power before making any electrical connections.

The module is designed for indoor installation, in spaces with normal air humidity, e.g. in distribution boxes on 35 mm DIN rail.

1. Mount the module on the mounting rail.
2. Connect the loads to load terminals. For designations of the terminals see the front panel.

All connections should be made in accordance with the wiring diagram (see "Connection diagram").

3. Use the connection terminal to connect the KNX bus cable to the module.

i | *The module is supplied with voltage from the KNX bus and requires no additional power supply.*

4. Connect a computer running ETS program to the KNX bus and configure the module.

i | *To configure the module, you will require a computer running the ETS program version 5.5 or newer, provided with USB or Ethernet (TCP/IP) connector. The SATEL ETS application file, which can be downloaded from www.satel.eu/ets, must be imported into the program.*

3.1 Connection diagram
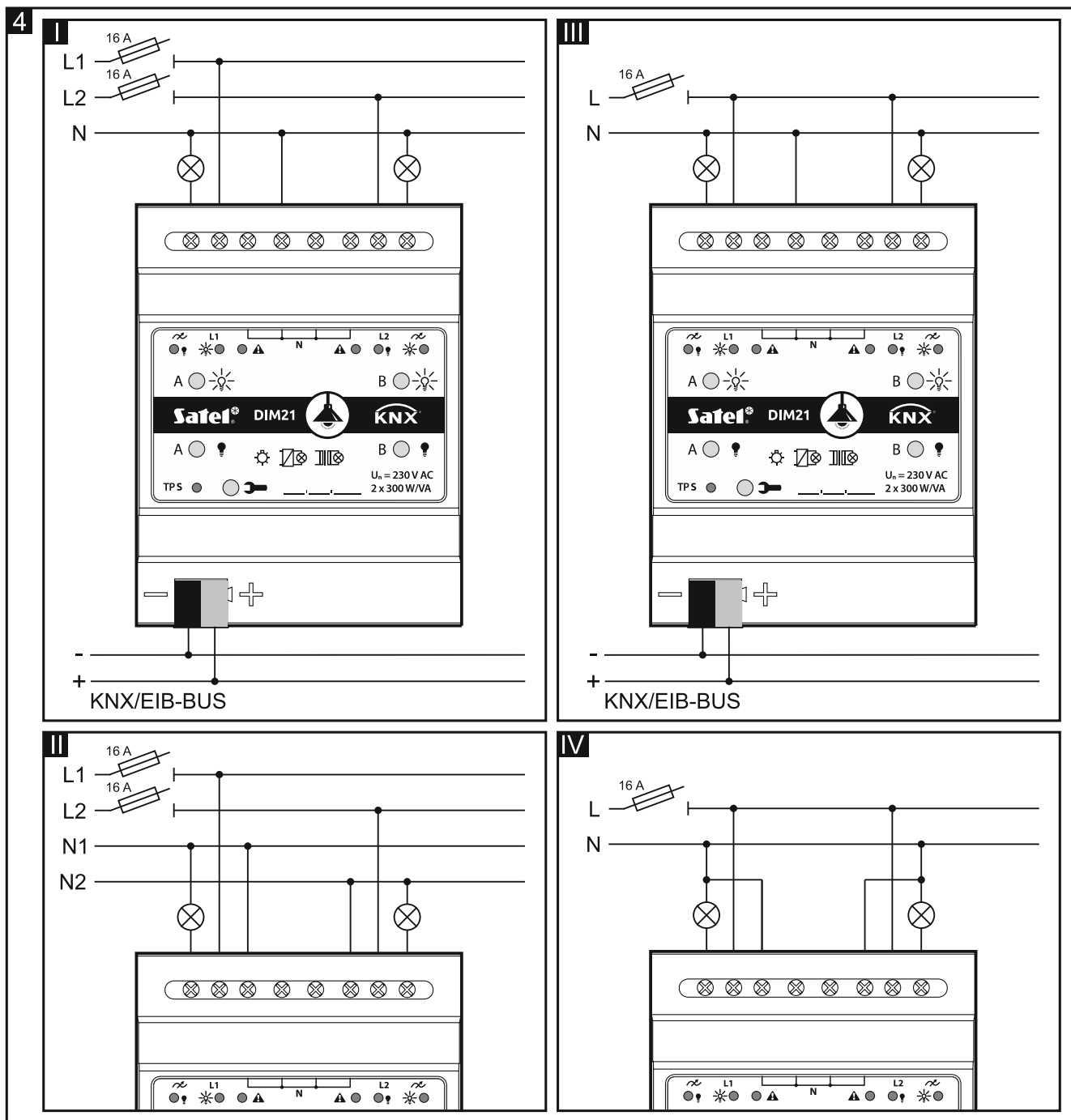
Fig. 4 shows how the load can be connected to the module:

I and II – multi-phase mode,

III and IV – single-phase mode.

The maximum load that can be connected to each channel is **300 W**. The load can only be connected to one channel.

⚠ **Never connect the module channels in parallel to increase the maximum load power (Fig. 5). This may cause damage to the module and the connected load.**
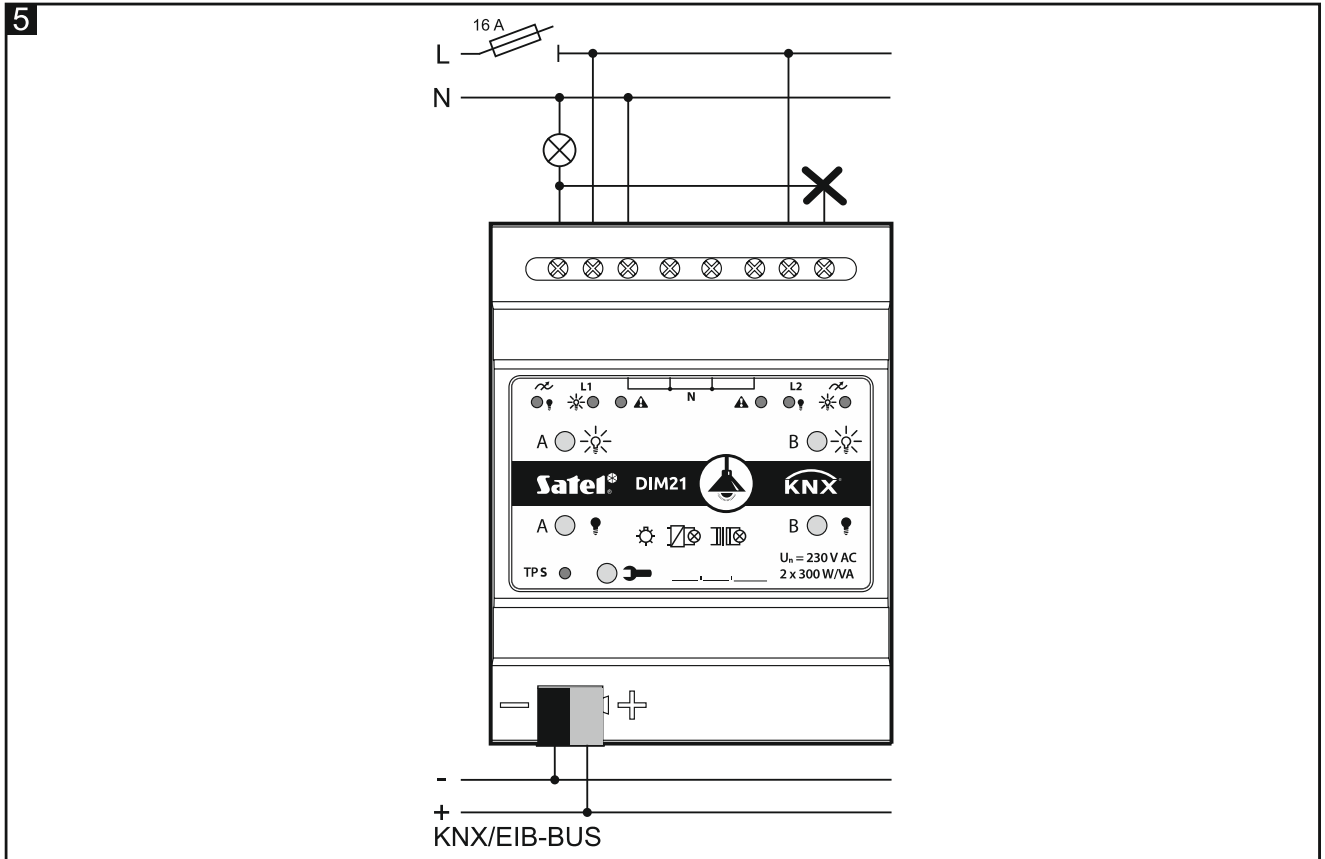
4. Configuring the module

Working parameters of the module are defined in the ETS program (version 5.5 or higher). The tabs for defining individual parameters are built dynamically. Depending on the selected options, further parameters may be displayed in the tabs or further tabs may be displayed when defining parameters. Moving the cursor over the selected parameter will display a tooltip with default value or value range for that parameter.

The module has two groups of configuration parameters. The first group includes global parameters which define general functionality of the module, but have no immediate effect on individual channels (see "Configuring global parameters"). The other group includes parameters assigned to the channel. These parameters have direct effect on how the channel will react to functions activated in the module or how its status will change (see "Configuring the channels").

i *The module working parameters defined in the ETS program, automatically detected (connected load type) and set as a result of learning scenes by the module, are saved to the non-volatile memory of the module. Remember that using the "Download" command to save the new settings defined in the ETS program will erase the other data saved to that memory.*

4.1 Function priorities

Control — Functions

Lowest priority

Absolute brightness value

Relative brightness value

Central absolute dim

Switching functions

| Switching |
| 8-bit scenes |
| 1-bit scenes |
| Central switch |

Dimming functions

| Central absolute dim |
| Relative dimming |
| Absolute dimming |

KNX BUS

Switching

Call/save 8-bit scene

Call/save 1-bit scene

Central switch

Time functions — No

Yes

Change duration

Time end warning

Time functions

| • Staircase | Delay |

Brightness value calculation

Value forcing function

Value forcing — No

Yes

Value forcing

Highest priority

Change minimum value

Change maximum value

Value limits

Channel status enabled/ disabled

Brightness value

Brightness value settings

The order in which the functions can change the status of channels in the module depends on what priority the given function has. The value forcing function has the highest priority, whereas the switching and dimming functions have the same priority (see Fig. 5). A higher priority function can override the channel status previously set by a lower priority function.

i *The lower priority functions cannot control the channel state as long as a higher priority function is active.*

In the ETS program, you can define the minimum and maximum limit value of brightness that can be set for the channel (see "Value limits"). If the brightness value defined for a function is higher than the maximum one or lower than the minimum one, the corresponding limit value will be set for the channel. The limit values can be changed by a telegram from the KNX bus.

Example. If the "Value forcing function" is activated when the "Staircase" time function is running, the time function will be terminated, and the channel status will be set by the forcing function. However, if the channel status is set by the "Value forcing function", the activated "Staircase" time function cannot change the channel status (it will be ignored).

4.2   Configuring global parameters

The main operating parameters of the module are defined in the "Global" tab, as shown below.

Startup delay – time period by which the module startup will be delayed after power-on. Value 00:00:00 will disable the delay.

During the delay period the telegram functionality is stopped and the channels do not change their status. The module sends no telegrams to the KNX bus. After the delay expires, the telegrams will be sent and the status of channels will be set according to the parameters defined. If any telegrams are received from communication objects during the delay period, they will be stored. Replies to these telegrams will be sent after the delay time has expired.

i *The startup delay may be used to reduce load on the KNX bus and supply circuit after power-on.*

Interval of cyclic device status sending – frequency with which a telegram with the module status information is sent to the bus by the "Device operation status" communication object. Information contained in the telegram makes it possible to monitor the module operation by other devices on the KNX bus. Value 00:00:00 disables the sending.

i *Sending telegrams may be enabled either permanently, for continuous monitoring of the module operation, or during testing only. If you do not want to load the bus with an excessive number of telegrams, you can set the sending cycle time at the highest possible value.*

Interval of cyclic device load alarm sending – frequency of sending a telegram with information about missing load in one of the module channels (e.g. as a result of bulb burnout). The telegram is sent by the "Device load alarm" communication object. Value 00:00:00 disables the cyclic telegram sending.

Interval of cyclic device fault alarm sending – frequency of sending a telegram with information about fault in one of the module channels. The telegram is sent by the "Device fault alarm" communication object for each fault type: overload (overcurrent flow in the channel), overheat, voltage loss in the load circuit (230 V) or hardware failure. Value 00:00:00 disables the cyclic telegram sending.

Channel A – enabling / disabling channel "A" (Disable / Enable). Enabling the channel will enable the communication objects that allow you to monitor the lighting connected to the channel and display the "Channel A" tab to define the channel operating parameters.

Channel B – enabling / disabling channel "B" (Disable / Enable). Enabling the channel will enable the communication objects that allow you to monitor the lighting connected to the channel and display the "Channel B" tab to define the channel operating parameters.

4.3 Configuring the channels

The status of each channel can be changed by using one of the three methods:

- switch on / switch off – 1-bit object (1.001 Switch),
- dim up / dim down – 4-bit object (3.007 Dimming control),
- set brightness values – 8-bit object (5.001 Percentage).

Each module channel has the same group of parameters. How to define the parameters has been discussed based on the channel A. Shown below is the "General" tab for defining parameters.

Load type – you can select:

Detect after programming and load restore – the module itself will recognize the type of load connected to the channel after programming and each time when load restore is detected in the 230 V circuit.

Detect only once after programming

i *The automatic detection process will be triggered only when the brightness value set for the channel is higher than 0. If the value is 0, the detection process will only be triggered after this value is changed, e.g. as a result of switching on a channel or calling a scene.*

Resistive (leading edge)

Resistive (trailing edge)

Inductive / Conventional transformer (leading edge)

Capacitive / LED / CFL / Electronic transformer (trailing edge)

⚠ **Do not connect a conventional (inductive) transformer to the module unless a load is connected. Lack of transformer load will cause a resonance effect that will damage the module. It is recommended that the connected transformer be loaded with at least two incandescent bulbs. This will protect the module from damage in case one of the bulbs burns out.**

When selecting the load type (in the ETS program), follow the table below:

Load type in ETS	Load connected to the channel		
	traditional incandescent light bulbs, halogen light bulbs HV	halogen light bulbs NV, 12V-LED powered via conventional transformer (inductive)	halogen light bulbs NV, 12V-LED powered via electronic transformer, 230V-LED (capacitive)
Detect after programming and load restore	✔	✔	✔
Detect only once after programming	✔	⚠	⚠
Resistive (leading edge)	✔	✔	✘
Resistive (trailing edge)	✔	≈	✔
Inductive / Conventional transformer (leading edge)	✔	✔	✘
Capacitive / LED / CFL / Electronic transformer (trailing edge)	✔	✘	✔
✔ – recommended type, ≈ – not recommended type, but can be used, ⚠ – type requires checking if can be used, ✘ – prohibited type (may damage the module and connected load).			

⚠ **Remember that selecting a load type that is unsuitable for the channel may damage the module and the connected load. If you are not sure which load type to choose, it is recommended that you select the "Detect after programming and load restore" or "Detect only once after programming" option to perform automatic detection.**

Selecting the load type will also define the channel operation mode:

– **load controlled by leading edge** – suitable for resistive and inductive loads. Control signal switches on the load when voltage between lines L and N is higher than 0 (during

the sine wave), and switches it off when the voltage is 0 V. This prevents a voltage shock from occurring when an inductive load is connected to the channel.

⚠️ **Connecting a capacitive load to the channel operating in the "load controlled by leading edge" mode may damage the module.**

– **load controlled by trailing edge** – suitable for resistive and capacitive loads. Control signal switches on the load when voltage between lines L and N is 0 V, and switches it off during sine wave (voltage higher than 0). This prevents a voltage shock from occurring when a capacitive load is connected to the channel. Selecting this operating mode for incandescent light sources may prolong their life.

⚠️ **Connecting an inductive load to the channel operating in the "load controlled by trailing edge" mode may damage the module.**

Characteristic adjustment – you can select:

linear – no correction (light source characteristic),

quadrate,

semi-logarithmic,

logarithmic.

Different types of light sources (load types) have different lighting characteristics. This characteristic shows how the source brightness (the intensity of light emitted by the source) changes depending on the increase in the control value. Some sources need a high initial value to start lighting, while others quickly start lighting with maximum brightness. By selecting one of the methods to adjust the characteristic you can change the linear characteristic (Fig. 7-I) to one that provides the best dimming up / down parameters for the source connected to the channel. The figure below shows how changing the value of communication object (X) that controls dimming up / down affects brightness of the source (Y), depending on which adjustment method has been selected (Fig. 7-II – semi-logarithmic method, Fig. 7-III – logarithmic method, Fig. 7-IV – quadrate method).
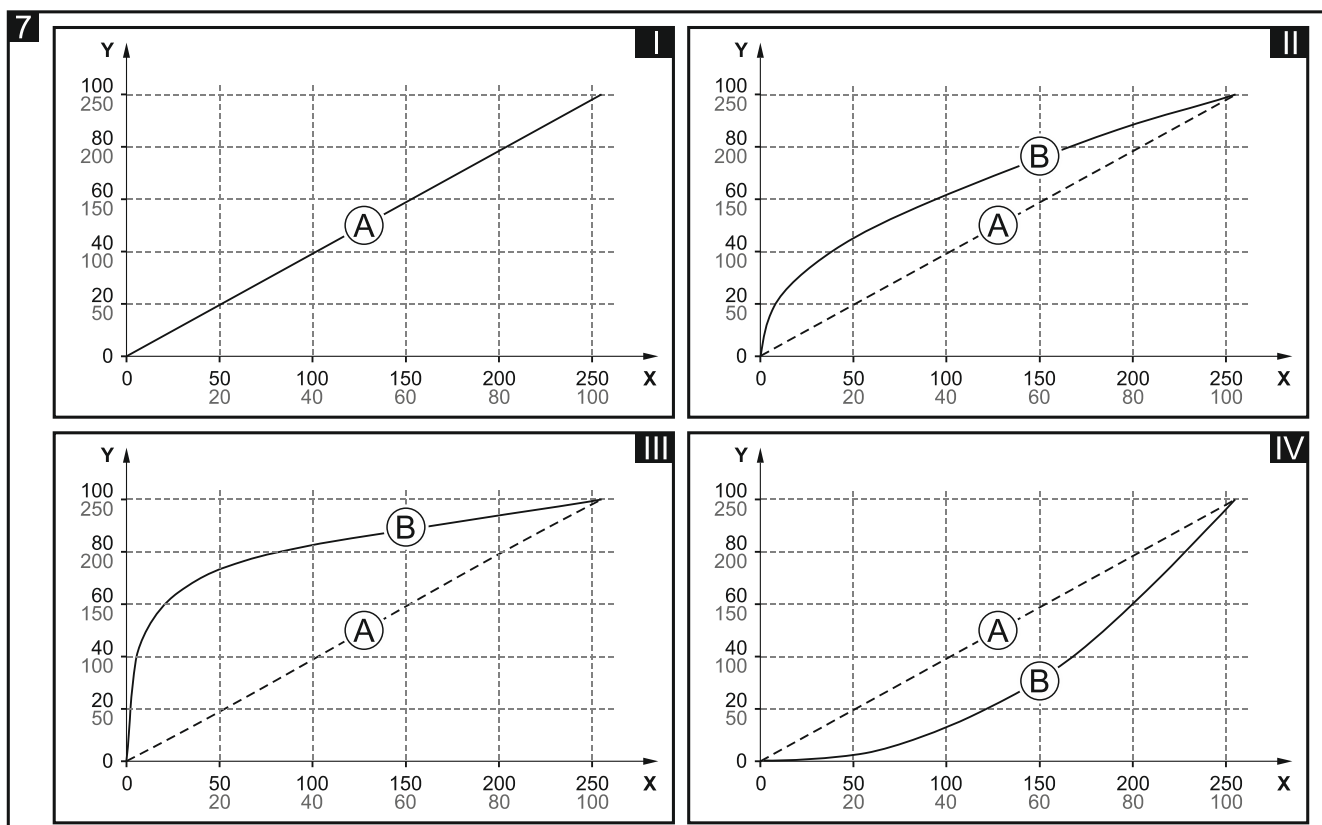
Legend to Fig. 7:

X – communication object value (0 = 0%, 255 = 100%),

Y – source brightness (0%...100% – percentage value, 0…255 – value on KNX bus),

A – linear characteristic,

B – corrected characteristic.

> *i*   *Adjustment of the characteristic results in bending the lighting characteristic curve, however changing the light source brightness is perceived by the human eye as linear.*
>
> *By defining the minimum and maximum limit value of brightness that can be set for the channel (see "Value limits"), you can limit the characteristic to the interval in which the dimming up / down process can be controlled. By doing so you can reject the "dead" portions of the characteristic in which the brightness value change is negligible with a simultaneous large change of the control value.*

Interval of cyclic channel state sending (On / Off) – frequency with which a telegram with information on the channel status (switched on/switched off) is sent to the bus. The telegram is sent by the "Switch status" communication object. Information contained in the telegram enables the channel status to be monitored by other devices on the KNX bus. Value 00:00:00 disables the cyclic telegram sending.

Interval of cyclic absolute dim value sending – frequency with which a telegram with information on the brightness value set for the channel is sent to the bus. The telegram is sent by the "Absolute dim status" communication object. Information contained in the telegram enables the channel status to be monitored by other devices on the KNX bus. Value 00:00:00 disables the cyclic telegram sending.

Reaction to KNX bus recovery – channel reaction to the bus power recovery (last value on channel [the last value stored in the channel will be set] / on / off).

Reaction to KNX bus failure – channel reaction to the bus power loss (last value on channel [the last value stored in the channel will be set] / on / off).

Reaction to supply mains recovery – channel reaction to the mains power recovery (last value on channel [the last value stored in the channel will be set] / on / off).

> *i*   *The parameter defines the initial channel status after starting the module. Restart of the device is also interpreted as loss of supply voltage. Note that each change of settings in the ETS program will force the module restart.*

Central switch – enabling / disabling the central switching function in the channel (Disable / Enable). Enabling the function will make the channel react to any change of the "Switch function" communication object status. As a result of the function action, the channel will be switched to the status corresponding to the value stored in the communication object.

The "Switch function" object makes it possible to enable / disable all channels with one telegram.

Central absolute dim – enabling / disabling the central function of setting brightness for the channel (Disable / Enable). Enabling the function will make the channel react to any change of the "Absolute dim function" communication object status. As a result of the function action, brightness will be set in the channel according to the value stored in the communication object.

The "Absolute dim function" object makes it possible to set the same brightness value for all channels by using one telegram.

Value limits – enabling / disabling the possibility to define limit values for the channel (Disable / Enable). Selecting the "Enable" option will display the "Value limits" tab.

Time – enabling / disabling the time function for the channel (Disable / Enable). Enabling the function will display the "Time" tab.

Scene 1-bit – enabling / disabling the possibility to define 1-bit scenes for the channel (Disable / Enable). Enabling the 1-bit scenes will enable the "Call scene 1-bit (1/2)" communication object and display the "Scene 1-bit" tab in the program.

Scene – enabling / disabling the possibility to define scenes for the channel (Disable / Enable). Enabling the scenes will enable the "Scene" communication object and display the "Scene" tab in the program.

Value forcing – enabling / disabling the value forcing function in the channel (Disable / Enable). Enabling the function will enable the "Forced value" communication object and display the "Value forcing" tab in the program.

4.3.1 Value limits

The limit values make it possible to define the minimum and maximum brightness value that can be set for the channel. If limit values are defined for the channel, the maximum value will be set for the "ON" channel status, and the minimum value for the "OFF" channel status. The dimming down / up process in the channel will also remain within the limit values, irrespective of what value has been defined for the function activated in the channel (e.g. "Staircase") or for the called scene. If the option of setting the limit values from KNX bus is selected during configuration, the "Set minimum value" and "Set maximum value" communication objects will be enabled.

Description of parameters

Learning limiting values from bus – selecting the "Yes" option will enable the "Set minimum value" and "Set maximum value" communication objects, which allow you to change the minimum and maximum brightness value for the channel from the bus. The "Minimum initial value" and "Maximum initial value" selection fields will be displayed.

Minimum initial value – you can select how the initial value of the "Set minimum value" object will be set:

> **default** – value defined in the "Minimum dim value" field.

> **last value from bus** – value that was set by the last telegram from the bus. If the value of the "Set minimum value" object was not changed by the telegram from the bus, the default value from the "Minimum dim value" field will be set.

Minimum dim value – the minimum brightness value that can be set for the channel (0 – 100).

Maximum initial value – you can select how the initial value of the "Set maximum value" object will be set:

> **default** – value defined in the "Maximum dim value" field.

> **last value from bus** – value that was set by the last telegram from the bus. If the value of the "Set maximum value" object was not changed by the telegram from the bus, the default value from the "Maximum dim value" field will be set.

Maximum dim value – the maximum brightness value that can be set for the channel (0 – 100).

4.3.2 Time

Two time functions are available in the module:

- Staircase.
- Delay (switching/dimming).

Staircase

Switches on the channel for a defined period of time. You can define in the function:

- value of the function control telegram.

- brightness value V_{ON}, up to which the light source will be dimmed up after the function is activated (Fig. 9).

- time T_{ON} during which light will be on. After enabling the "Duration set from bus" option, the channel ON time can be changed from the bus by using the "Staircase duration" communication object.

- warning that the channel is about to be switched off in the form of:

  – a special "Staircase warning" group object,

  – dimming the light down / up,

  – both methods at the same time.

- brightness value V_{DIM}, down to which the light source will be dimmed during the warning period (Fig. 9).

- warning duration T_W, which defines how long the warning will be activated before the channel is switched off (Fig. 9-I). If the time T_W is longer than the time T_{ON}, switching on the channel will activate the warning, and the channel will be ON for the time T_W (Fig. 9-II).

- number of telegrams L_T that can prolong the light ON duration. If the channel is switched off, each successive telegram will extend the channel ON time by the time T_{ON} (Fig. 10-I). Figures 10-II & 10-III show how the channel will react to telegrams when it is switched on.
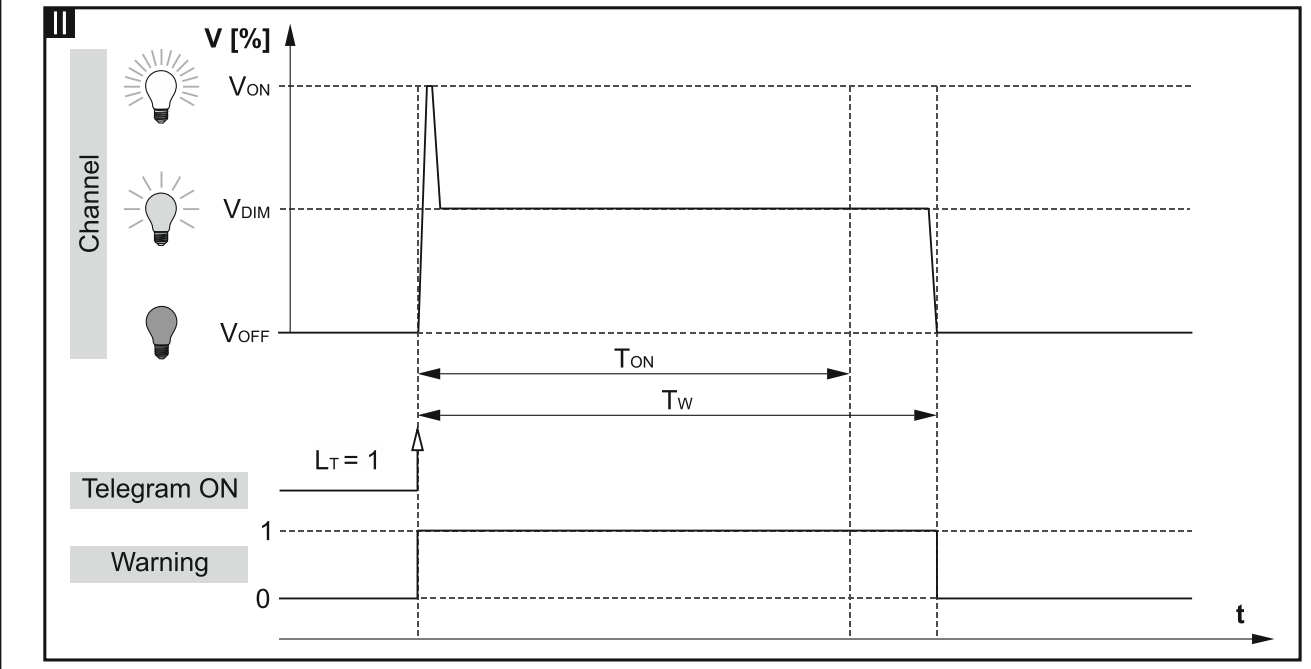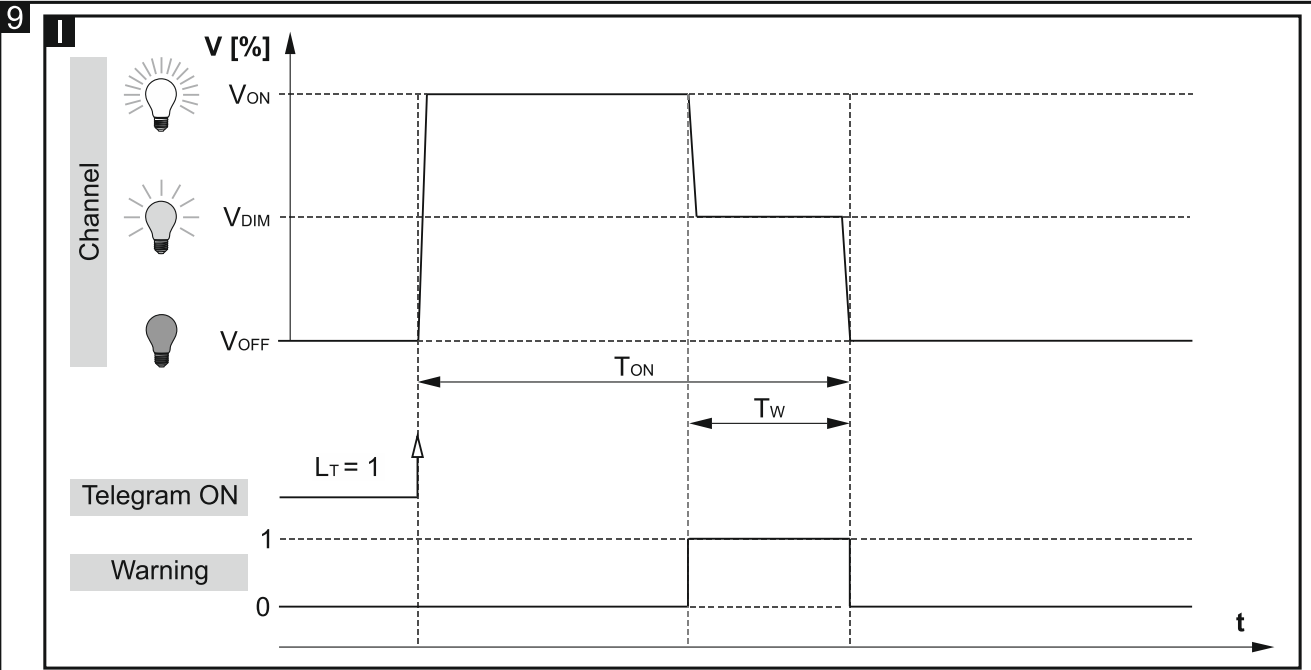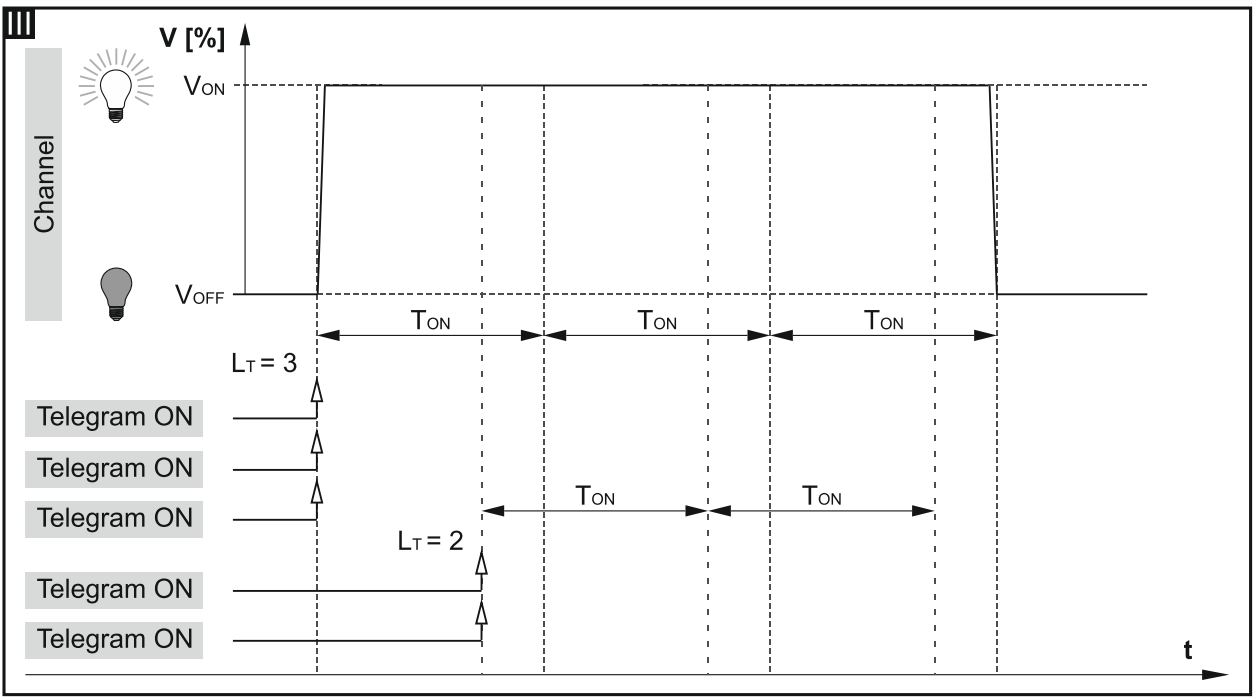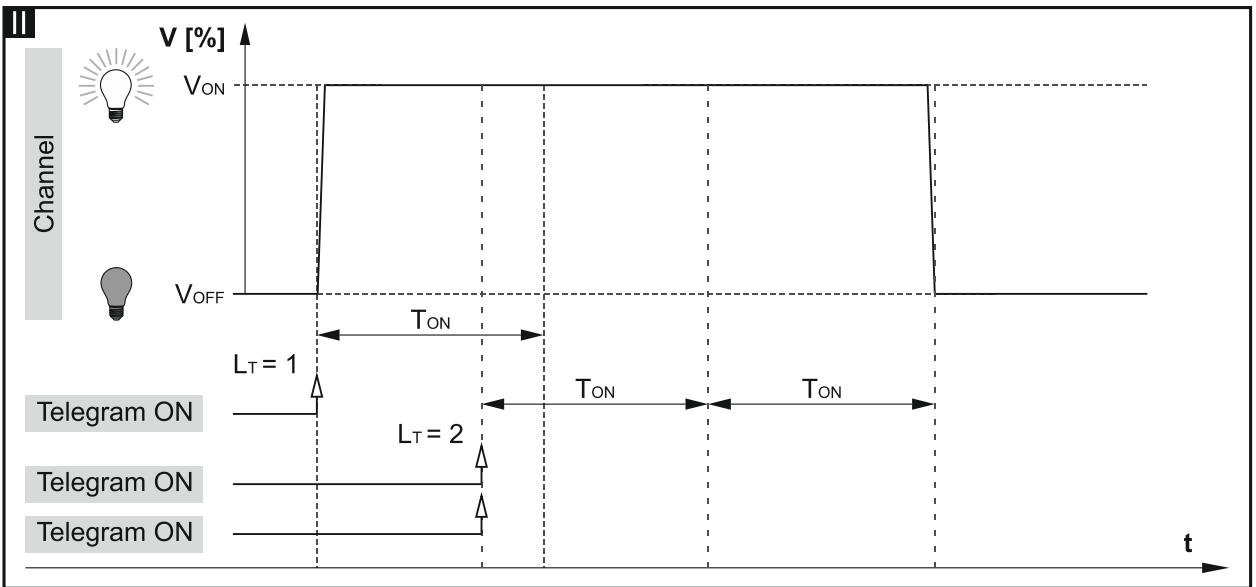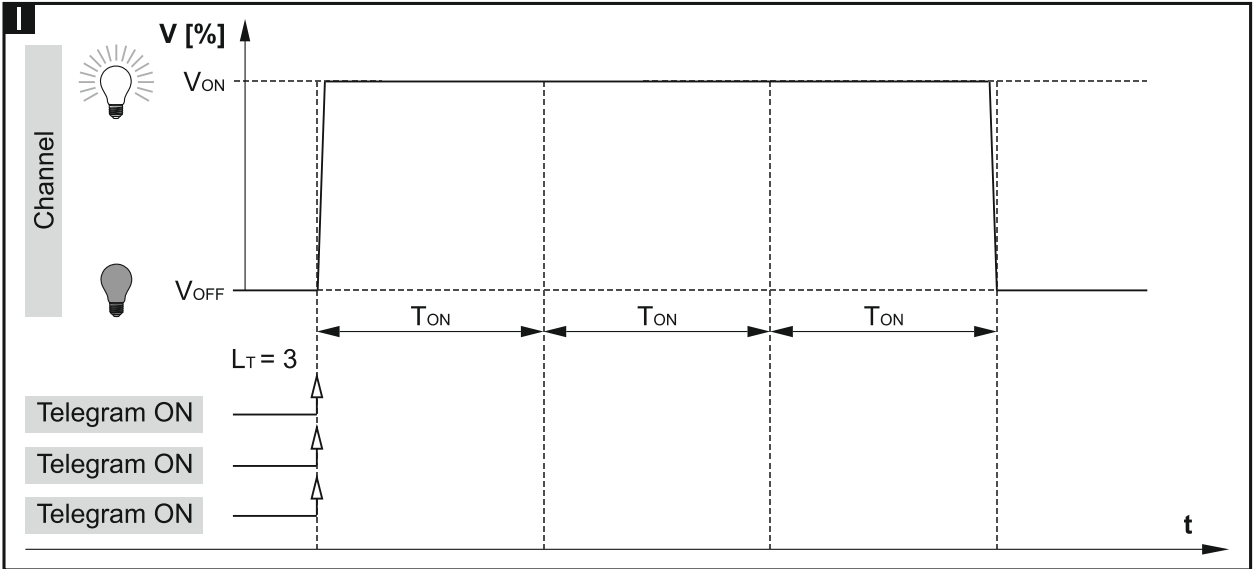
Delay (switching/dimming)

You can define the following parameters in the function:

- delay time that must elapse from the moment of receiving an "ON" / "OFF" control telegram to the moment of triggering the switching function in the channel (Fig. 10):
  - T_{D-ON} – delay time to switching on,
  - T_{D-OFF} – delay time to switching off.

i | *If, during the delay countdown, the channel receives another control telegram, the delay countdown restarts.*

- time of transition between statuses (Fig. 10):
  - T_B – switched off -> switched on (dimming up time),
  - T_{DIM} – switched on -> switched off (dimming down time).
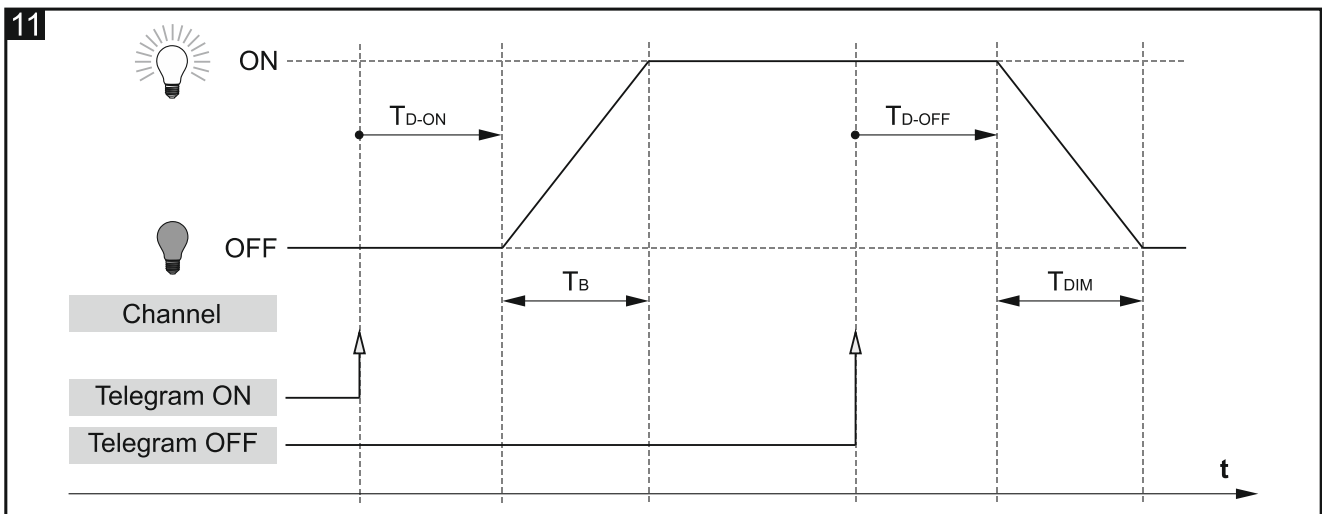
i | *Transition time T_B and T_{DIM} makes it possible to control dimming up / down the light by means of "ON" / "OFF" telegrams.*

- time of dimming up / down (Fig. 11):
  - T_{B-UP} – dimming up time – time that must elapse for the channel brightness to be changed from 0 to 100 percent of the value,
  - T_{B-DOWN} – dimming down time – time that must for the channel brightness to be changed from 0 to 100 percent of the value.
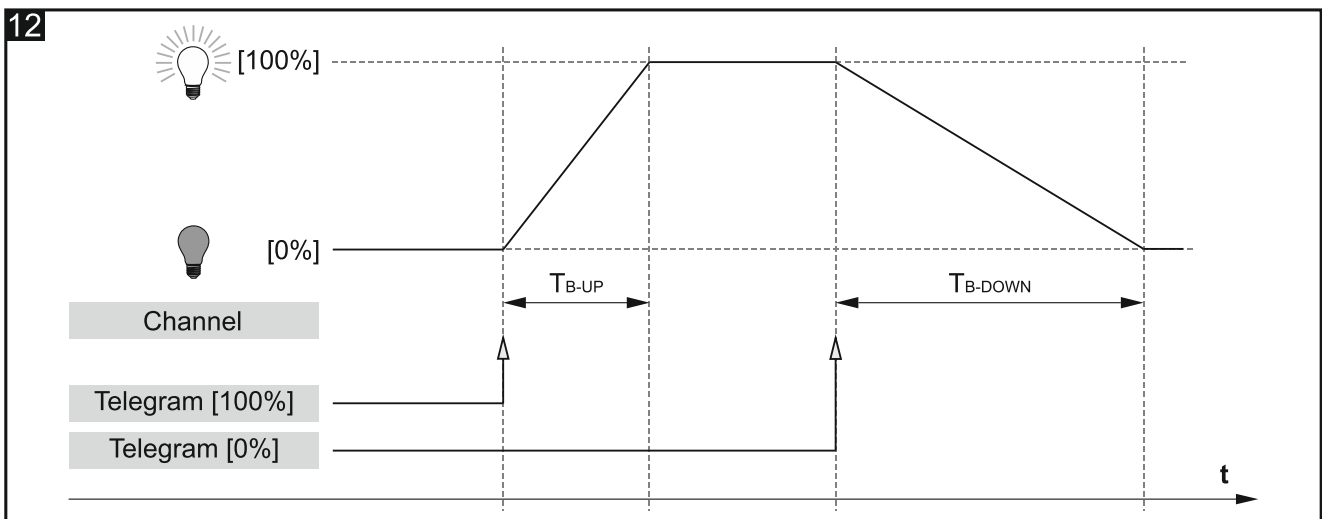
> *i* *Time of dimming up / down between values different from 0 and 100 percent of brightness is automatically calculated by the module as a fraction of the values defined for T_{B-UP} and T_{B-DOWN}. (e.g. the time of dimming up from 50 % to 75 % = ¼T_{B-UP}, and the time of dimming down from 75 % to 25 % = ½T_{B-DOWN}).*

Description of parameters

Function – you can select:

Not used – disables the time function in the channel.

Staircase – switches on the channel for a defined time period (see "Staircase").

Delay (switching/dimming) – the time that must elapse from the moment of receiving the control telegram to the moment of changing the channel status and the time of transition between the "OFF" / "ON" statuses. It also allows you to define the time of dimming up from 0 to 100 and dimming down from 100 to 0 percent brightness. (see "Delay (switching/dimming)").

Staircase

Control – possible values of the control telegram:

ON=1; ON=0; OFF not possible – telegram with the value "1" or "0" switches on the channel; switching off is not possible.

ON=1; OFF=0 – "1" telegram switches on, "0" telegram switches off the channel.

ON=0; OFF=1 – "0" telegram switches on, "1" telegram switches off the channel.

ON=1; OFF not possible – telegram with the value "1" switches on the channel; switching off is not possible.

ON=0; OFF not possible – telegram with the value "0" switches on the channel; switching off is not possible.

Staircase sets value – value up to which the light will be dimmed up after the channel is switched on (0 – 100).

> i　*If the value in the "Light brightness value when enabled" field is higher than the maximum limit value defined for the channel ("Value limits"), the light will be dimmed up to the limit value.*

Default duration – time during which the channel will be switched on (00:00:00 - 18:12:15 [hh:mm:ss]).

Duration set from bus – selecting the "Yes" will enable the "Staircase duration" communication object that can be used to change duration of the "Staircase" function from the bus. The following parameter will be displayed:

　Duration value – you can select how the initial value will be set:

　　default – value defined in the "Default duration" field.

　　last value from bus – value that was set by the last telegram from the bus. If the object was not changed by a telegram from the bus, the default value from the "Default duration" will be set.

Maximum number of repeats – number of telegrams that can prolong the time during which the channel will be switched on (1 – 10).

Warning method – method of warning the users that the channel is about to be switched off (staircase light will be switched off):

　none – channel will be switched off after staircase duration has elapsed.

　via object – warning by means of the "Staircase warning" special communication object. If the object will be set to "1", a warning will be activated. After the warning duration has elapsed, the object value will be set to "0".

　via dim value – warning by dimming the light up / down.

　via object and dim value – warning with the use of two methods at the same time.

Warning dim value – light brightness value that will be set during the warning time (0 – 100).

> i　*If the value in the "Warning dim value" field is higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), then the corresponding limit value will be set as a warning for the channel.*

Warning duration – duration of the warning that the channel is about to be switched off (00:00:00 - 18:12:15 [hh:mm:ss]).

> i　*If the value entered in the field is higher than 0, the staircase duration will be prolonged by this value.*

Delay (switching/dimming)

On delay – time that must elapse from receiving a control telegram with the "ON" value to the moment of triggering the switching function in the channel (00:00:00 - 18:12:15 [hh:mm:ss]).

Off delay – time that must elapse from receiving a control telegram with the "OFF" value to the moment of triggering the switching function in the channel (00:00:00 - 18:12:15 [hh:mm:ss]).

Transition time Off -> On – time of transition between the off -> on statuses (1 - 250 [seconds]).

Transition time On -> Off – time of transition between the on -> off statuses (1 - 250 [seconds]).

Transition time dimming up – time that must elapse for the channel brightness to be changed from 0 to 100 percent of the value after receiving a telegram from the "Dim relative" or "Dim absolute" object (1 - 250 [seconds]).

Transition time dimming down – time that must elapse for the channel brightness to be changed from 100 to 0 percent of the value after receiving a telegram from the "Dim relative" or "Dim absolute" object (1 - 250 [seconds]).

i | *The time of dimming up / down between values other than 0 and 100 percent brightness is calculated by the module automatically as a fraction of the value defined in the "Time of dimming up from 0 to 100 %" and "Time of dimming down from 100 to 0 %" fields (e.g. the time of dimming up from 50 % to 75 % = ¼ value from the "Time of dimming up from 0 to 100 %" field, and the time of dimming down from 75 % to 25 % = ½ value from the "Time of dimming down from 100 to 0 %").*

4.3.3   Scene 1-bit

Eight 1-bit scenes (activated by 1-bit telegram) can be defined for each channel in the module. The scenes are divided into four pairs (1/2, 3/4, 5/6, 7/8). Each pair of scenes activated in the program enables the "Call scene 1-bit (X/Y)" communication object (where: X/Y = 1/2, 3/4, 5/6, 7/8). A telegram with value "0" received from this object activates the scene 1 from the given X/Y pair (with odd number), and a telegram with value "1" – the scene 2 (with even number).

The channel can learn 1-bit scenes from the bus. If the learning option is selected when configuring the module, the "Set scene 1-bit (X/Y)" communication object is activated for each pair of scenes in the channel for storing 1-bit scenes. When the channel receives a telegram with the value "0" from this object, the current channel status will be assigned to the scene 1 from the given X/Y pair. Telegram with the value "1" will assign the current channel status to the scene 2 from the given pair.

i | *If the "Staircase" time function is activated in the channel, the user can select how the channel will react to a telegram calling a scene with given number. The telegram can call a scene with parameters set for the scene or can call the "Staircase" function with parameters defined for this function in the "Time" tab. If the second reaction is selected, you can only define delay for the scene.*

Description of parameters

Number of 1-bit scene pairs – number of 1-bit scene pairs assigned to the channel (up to 4). For each activated pair, the "Call scene 1-bit (X/Y)" communication object is enabled and a group of parameters is displayed: "Scene X/Y: delay", "Scene X/Y: value" and "Scene X/Y: transition time" (where: X/Y = 1/2, 3/4, 5/6, 7/8). If the "Staircase" function is enabled in the channel, the "Scene X/Y: reaction" parameter is displayed in the tab.

Learning 1-bit scenes from bus – if you select "yes", the function of learning 1-bit scenes by the channel will be enabled. For each activated pair of scenes, the "Set scene 1-bit (X/Y)" communication object will be enabled and the "Scene X: initial value" and "Scene Y: initial value" parameters will be displayed (where: X/Y = 1/2, 3/4, 5/6, 7/8).

> *i* | *If the "Staircase" function is enabled in the channel, the "Scene X: initial value" and "Scene Y: initial value" fields are only displayed when the "Scene" option is selected in the "Scene X/Y: reaction" field.*

Successive steps of defining the 1-bit scenes are presented below for the first pair of scenes with numbers 1/2. The other pairs are defined in the same way.

Scene 1: delay – time that must elapse from receiving the telegram to calling the scene (00:00:00 - 18:12:15 [hh:mm:ss]).

Scene 1: reaction – you can select the channel reaction to the telegram calling the scene, if the "Staircase" function is activated in the channel:

scene – scene with values defined in the "Scene 1: delay", "Scene 1: value" and "Scene 1: transition time" fields will be called in the channel.

staircase – "Staircase" function with parameters defined for this function in the "Time" tab will be called in the channel. Function call will be delayed according to the value defined in the "Scene 1: delay" field. When this option is selected, the "Scene 1: value", "Scene 1: transition time" and "Scene 1: initial value" parameters are not displayed for the scene. The "NOTE: "Staircase" function is selected. Parameters of "Staircase" are set in it's tab." message is displayed instead.

> *i* | *The "Scene 1: reaction" parameter is only displayed when the "Staircase" function is activated in the channel.*

Scene 1: value – brightness value that will be set in the channel after receiving a telegram with the value "0" from the "Call scene 1-bit (1/2)" (0-100) communication object.

> *i* | *If the value from "Scene 1: value" field is higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), the corresponding limit value will be set in the channel for the scene.*

Scene 1: transition time – time during which the channel will reach the brightness value defined for the scene in the "Scene 1: value" field (1-250 [seconds]).

Scene 1: initial value – you can select how the initial value will be set for the "Set scene 1-bit (1/2)" object:

default – value defined in the program. After receiving a telegram with the value "0", the value from the "Scene 1: value" field will be set.

last value from bus – value that was set by the last telegram from the bus. If the object value was not changed by the learning function, the default value will be set.

> *i* | *If the "Staircase" option is selected for the "Scene 1: reaction" parameter, the "Scene 1: initial value" parameter is not displayed. The initial value of the "Set scene 1-bit (1/2)" object will be set according to the parameters defined for the "Staircase" function in the "Time" tab.*

Scene 2: delay – time that must elapse from receiving a telegram to calling the scene (00:00:00 - 18:12:15 [hh:mm:ss]).

Scene 2: reaction – you can select the channel reaction to the telegram calling the scene, if the "Staircase" function is activated in the channel:

scene – scene with values defined in the "Scene 2: delay", "Scene 2: value" and "Scene 2: transition time" fields will be called in the channel.

staircase – "Staircase" function with parameters defined for this function in the "Time" tab will be called in the channel. The function call will be delayed according to the value defined in the "Scene 2: delay" field. When this option is selected, the "Scene 2: value", "Scene 2: transition time" and "Scene 2: initial value" parameters are not displayed for the scene. The "NOTE: "Staircase" function is selected. Parameters of "Staircase" are set in it's tab." message is displayed instead.

> *i* | *The "Scene 2: reaction" parameter is only displayed when the "Staircase" function is activated in the channel.*

Scene 2: value – brightness value that will be set in the channel after receiving a telegram with value "1" from the "Call scene 1-bit (1/2)" (0-100) communication object.

> *i* | *If the value from "Scene 2: value" field is higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), the corresponding limit value will be set in the channel for the scene.*

Scene 2: transition time – time during which the channel will reach the brightness value defined for the scene in the "Scene 2: value" field (1-250 [seconds]).

Scene 2: initial value – you can select how the initial value will be set for the "Set scene 1-bit (1/2)" object:

default – value defined in the program. After receiving a telegram with the value "1", the value from the "Scene 2: value" field will be set.

last value from bus – value that was set by the last telegram from the bus. If the object value was not changed by the learning function, the default value will be set.

> *i* | *If the "Staircase" option is selected for the "Scene 2: reaction" parameter, the "Scene 2: initial value" parameter is not displayed. The initial value of the "Set scene 1-bit*

(1/2)" object will be set according to the parameters defined for the "Staircase" function in the "Time" tab.

4.3.4 Scene

8 scenes can be defined for each channel in the module. This will allow to manage up to 16 different scenes in the module using one group address. Communication with all participants linked in scenes takes place via the same group address. Consequently, one telegram is sufficient to call or save a scene. Such a telegram contains the number of the scene and information on whether the scene is to be called or the learning during which the current value set in the channel will be saved for the scene with this number.

The scenes make it possible to limit the telegram traffic and relieve the bus. They enable all information about what is to be done by the scene participants to be saved to the module memory. This information is not sent when the scene is being called or saved. What is only sent is a telegram to call up or store the scene.

The following parameters can be set for each scene:

- scene number,
- brightness value to be set for the scene,
- transition time, i.e. the time of dimming up / darker during which the value of channel brightness will be changed into the value defined for the scene,
- delay (the time that must elapse from receiving the telegram to calling the scene).

If the "Staircase" time function is activated in the channel, the user can select the channel reaction to the telegram calling the scene with the given number. The telegram can call the scene with parameters set for the scene or can call the "Staircase" function with parameters defined for this function in the "Time" tab. When the second reaction is selected, you can only define the scene number and delay for the scene.

Description of parameters

Number of scenes – number of scenes assigned to the channel (up to 8). For each activated scene, a group of parameters is displayed: "Scene 1…8: number", "Scene 1…8: delay", "Scene 1…8: value" and "Scene 1…8: transition time". If the "Staircase" function is enabled in the channel, the "Scene 1…8: reaction" parameter is displayed in the tab.

Learning scenes from bus – selecting "yes" will enable the function of learning scenes by the channel. If the "Scene" communication object receives the telegram activating the learning function, it can not only call the given scene but to store it as well. For each activated scene, the "Scene 1..8: initial value" parameter will be displayed.

i | *If the "Staircase" function is enabled in the channel, the "Scene 1…8: initial value" parameter will only be displayed when the "Scene" option is selected for the "Scene 1…8: reaction" parameter.*

Scene 1…8: number – unique number of scene assigned to the channel (1-64).

Scene 1…8: delay – time that must elapse from receiving the telegram to calling the scene (00:00:00 - 18:12:15 [hh:mm:ss]).

Scene 1…8: reaction – channel reaction to telegram calling up the scene, if the "Staircase" function is activated in the channel:

scene – scene with values defined in the "Scene 1…8: delay", "Scene 1…8: value" and "Scene 1…8: : transition time" fields will be called in the channel.

staircase – "Staircase" function with parameters defined for this function in the "Time" tab will be called in the channel. Selecting the function will be delayed according to the value defined in the "Scene 1…8: delay" field. If this option is selected, the "Scene 1…8: value", "Scene 1…8: transition time" and "Scene 1…8: initial value" parameters will not be displayed for the scene. The "NOTE: "Staircase" function is selected. Parameters of "Staircase" are set in it's tab." message is displayed instead.

i | *The "Scene 1…8: reaction" parameter will only be displayed, if the "Staircase function" is activated in the channel.*

Scene 1…8: value – brightness value that will be set for the channel, after a telegram with the scene number selected in the "Scene 1…8: number" field (0-100) is received.

i | *If the value in the "Scene 1…8: value" field is higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), the corresponding limit value will be set in the channel for the scene.*

Scene 1…8: transition time – time during which the channel will reach the brightness value defined for the scene in the "Scene 1…8: value" field (1-250 [seconds]).

Scene 1…8: initial value – you can select how to set the initial value for the "Scene" object:

default – each scene assigned to the channel has its own unique number and value defined in the "Scene 1…8: value" field. If the object receives a telegram with the scene number, its value will be set to that defined for the scene with this number.

last value from bus – value that was set by the last telegram from the bus. If the object value was not changed by the learning function, the default value will be set.

i | *If the "Staircase" option is selected for the "Scene 1…8: reaction" parameter, the "Scene 1…8: initial value" parameter is not displayed. Initial value of the "Scene" object will be set according to the parameters defined for the "Staircase" function in the "Time" tab.*

4.3.5 Value forcing

You can define the brightness value that is to be set in the channel in response to changing status of the "Forced value" communication object. When the object will be set to "1", the defined brightness value will be set in the channel and the channel will be blocked. Unblocking the channel will only be possible, when the object will be set to "0". After unblocking, the channel brightness value that was set before the blocking will not be restored.

i | *Note that the brightness value set in the channel by the value forcing function cannot be changed by other functions, since it has the highest priority (see "Function priorities").*

Description of parameters

Dim value – brightness value that will be set in the channel after receiving a telegram with the value "1" from the "Forced value" communication object (0-100).

> ℹ️ *If the value in the "Dim value" field is higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), the corresponding limit value will be set in the channel.*

4.4 Communication objects

4.4.1 Global objects

Global communication objects				
No.	**Object name**	**Object function**	**Data type**	**Flags**
1	**General**	**Device operation status**	**1 bit, DPT 1.011**	**C, R, T**
The object sends cyclically a telegram to the KNX bus with information about the module status. To disable the sending, enter the value 00:00:00 in the "Interval of cyclic device status sending" field, "Global" tab. Telegram: 1 = module is running				
2	**General**	**Device load alarm**	**1 bit, DPT 1.005**	**C, R, T**
The object allows telegram to be sent to the KNX bus with information about missing load in one of the module channels (e.g. as a result of burnt-out light source). The information is sent at each occurrence of the event and cyclically at defined time intervals. To disable the cyclic sending, enter the value 00:00:00 in the "Interval of cyclic device load alarm sending" field, "Global" tab. Telegram: 1 = missing load in one of the channels, 0 = module is working properly.				

Global communication objects				
No.	Object name	Object function	Data type	Flags
3	General	Device fault alarm	1 bit, DPT 1.005	C, R, T

The object allows a telegram to be sent to the KNX bus with information that there is a fault in one of the channels. The object sends telegrams for each type of fault: overload (overcurrent flow through the channel), overheat, loss of (230 V) power in load circuit and hardware failure. When a fault occurs, the object is set to value "1". The information is sent at each occurrence of the event and cyclically at defined time intervals. To disable the cyclic sending, enter the value 00:00:00 in the "Interval of cyclic device fault alarm sending" field, the "Global" tab.

Telegram:

1 = fault in one of channels,

0 = module is working properly.

4	Central	Switch function	1 bit, DPT 1.001	C, W

The object allows the status of multiple channels to be changed with one 1-bit telegram from the bus (ON / OFF). The channel will react to a change of object value if the "Enable" option is selected for the "Central switch" parameter in the "General" tab for the Channel A.

Telegram:

1 = ON

0 = OFF

i | *If limit values are defined for the channel, the "ON" telegram will set the maximum brightness value defined for the channel, and the "OFF" telegram – the minimum value; see "Value limits".*

5	Central	Absolute dim function	1 byte, DPT 5.001	C, W

The object allows the brightness value to be set for multiple channels with one telegram from the bus. The channel will react to a change of object value if the "Enable" option is selected for the "Central absolute dim" parameter in the "General" tab for the Channel A.

Telegram:

0% (OFF)

…

100%.

i | *If the brightness value to be set with a telegram is to be higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), the corresponding limit value will be set in the channel.*

Flag: C – communication, R – read, W – write, T – transmit, U – update.

4.4.2 Channel objects

Communication objects for all channels are the same and have been discussed based on the channel A.

	Number ▲	Name	Object Function	Length	C	R	W	T	U
⬛	6	Channel A	Switch	1 bit	C	-	W	-	-
⬛	7	Channel A	Dim relative	4 bit	C	-	W	-	-
⬛	8	Channel A	Dim absolute	1 byte	C	-	W	-	-
⬛	9	Channel A	Switch status	1 bit	C	R	-	T	-
⬛	10	Channel A	Absolute dim status	1 byte	C	R	-	T	-
⬛	11	Channel A	Staircase warning	1 bit	C	R	-	T	-
⬛	12	Channel A	Staircase duration	2 bytes	C	-	W	-	-
⬛	14	Channel A	Scene	1 byte	C	-	W	-	-
⬛	15	Channel A	Call scene 1-bit (1/2)	1 bit	C	-	W	-	-
⬛	16	Channel A	Call scene 1-bit (3/4)	1 bit	C	-	W	-	-
⬛	17	Channel A	Call scene 1-bit (5/6)	1 bit	C	-	W	-	-
⬛	18	Channel A	Call scene 1-bit (7/8)	1 bit	C	-	W	-	-
⬛	19	Channel A	Set scene 1-bit (1/2)	1 bit	C	-	W	-	-
⬛	20	Channel A	Set scene 1-bit (3/4)	1 bit	C	-	W	-	-
⬛	21	Channel A	Set scene 1-bit (5/6)	1 bit	C	-	W	-	-
⬛	22	Channel A	Set scene 1-bit (7/8)	1 bit	C	-	W	-	-
⬛	23	Channel A	Forced value	1 bit	C	-	W	-	-
⬛	24	Channel A	Set minimum value	1 byte	C	-	W	-	-
⬛	25	Channel A	Set maximum value	1 byte	C	-	W	-	-
⬛	26	Channel A	Overload	1 bit	C	R	-	T	-
⬛	27	Channel A	Overheat	1 bit	C	R	-	T	-
⬛	28	Channel A	Hardware failure	1 bit	C	R	-	T	-
⬛	29	Channel A	No load	1 bit	C	R	-	T	-
⬛	30	Channel A	No mains	1 bit	C	R	-	T	-

Channel communication objects				
No.	Object name	Object function	Data type	Flags
6	**Channel A**	**Switch**	**1 bit, DPT 1.001**	**C, W**

The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. Communication object allows switching between the channel ON / OFF statuses. To configure reaction of the channel to changing the object value, define the delay time for switching the channel on / off and the time of transition between individual statuses (see the "Delay (switching/dimming)" time function).

If the "Staircase" time function is activated in the channel, changing the object value to "1" will trigger this function.

Telegram:

1 = ON

0 = OFF

i | *If limit values are defined for the channel, the "ON" telegram will set the maximum value of brightness defined for the channel, and the "OFF" telegram – the minimum value; see "Value limits".*

Channel communication objects				
No.	Object name	Object function	Data type	Flags
7	**Channel A**	**Dim relative**	**4 bit, DPT 3.007**	**C, W**

The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object allows receiving telegrams of the "BRIGHTER", "DARKER", "STOP" type (relative dimming down / up). If the object receives the "BRIGHTER" or "DARKER" telegram, the brightness value will be changed in the required direction to the value defined in the ETS program. If, before completion of the dimming down / up process, the "STOP" telegram is received, the process will be terminated (at the reached brightness value). To configure reaction of the channel to changing the object value, define the transition time for dimming up / down (see the "Delay (switching/dimming)" time function).

i | *If the brightness value to be set with a telegram is to be higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), the corresponding limit value will be set in the channel.*

8	**Channel A**	**Dim absolute**	**1 byte, DPT 5.001**	**C, W**

The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object allows setting the absolute (percentage) brightness value for the channel. To configure reaction of the channel to changing the object value, define the transition time for dimming up / down (see the "Delay (switching/dimming)" time function).

Telegram:

0% (OFF)

…

100%.

i | *If the brightness value to be set with a telegram is to be higher than the maximum or lower than the minimum limit value defined for the channel ("Value limits"), the corresponding limit value will be set in the channel.*

9	**Channel A**	**Switch status**	**1 bit, DPT 1.011**	**C, R, T**

The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object value indicates the current channel status: ON / OFF. The object sends a telegram with information about channel status to the KNX bus. The information is sent at each change of the channel status as well as cyclically at defined time intervals. To disable the cyclic sending, enter the value 00:00:00 for the channel A in the "Interval of cyclic channel state sending (On / Off)" field, the "General" tab.

Telegram:

1 = ON

0 = OFF

10	**Channel A**	**Absolute dim status**	**1 byte, DPT 5.001**	**C, R, T**

The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object value indicates the current brightness value set in the

Channel communication objects				
No.	**Object name**	**Object function**	**Data type**	**Flags**

channel. The object sends a telegram with information about brightness value to the KNX bus. The information is sent at each change of the value as well as cyclically at defined time intervals. To disable the cyclic sending, enter the value 00:00:00 for the channel A in the "Interval of cyclic absolute dim value sending" field, the "General" tab.

Telegram:

0% (OFF)

…

100%.

11	**Channel A**	**Staircase warning**	**1 bit, DPT 1.017**	**C, R, T**

The object will be enabled, if the "via object" or "via object and dim value" option is selected in the "Warning method" field, the "Time" tab. At the beginning of the warning time, the object value is set at "1". The value only changes to "0" when the warning time is up.

See "Staircase".

i | *The "Time" tab is visible when the "Enable" option is selected for the "Time" parameter in "General" tab for the channel A.*

12	**Channel A**	**Staircase duration**	**2 bytes, DPT 7.005**	**C, W**

The object will be enabled, if the "yes" option is selected for the "Duration set from bus" parameter in the "Time" tab (the field is visible when the "Staircase" option is selected in the "Function" field). The staircase duration is saved to the object.

See "Staircase".

i | *The "Time" tab is visible when the "Enable" option is selected for the "Time" parameter in "General" tab for the channel A.*

14	**Channel A**	**Scene**	**1 byte DPT 18.001**	**C, W**

The object will be enabled, if the "Enable" option is selected for the "Scene" parameter in the "General" tab for the channel A. The object allows sending a 1-byte telegram that can call a scene or activate the scene learning function. Such a telegram contains the scene number (1-64) and information on whether the scene is to be called, and whether learning is to be activated, during which the current value set in the channel will be stored for the scene with this number. To activate the scene learning function, select the "Yes" option for the "Learning scenes from bus" parameter in the "Scene" tab.

See "Scene".

15 … 18	**Channel A**	**Call scene 1-bit (X/Y)** where: X/Y = 1/2, 3/4, 5/6, 7/8	**1 bit, DPT 1.022**	**C, W**

The object will be enabled, if the "Enable" option is selected for the "Scene 1-bit" parameter in the "General" tab for the channel A. The objects with numbers 3/4, 5/6 or 7/8 will be

Channel communication objects				
No.	**Object name**	**Object function**	**Data type**	**Flags**

enabled, when the value 2, 3 or 4 is selected in the "Number of 1-bit scene pairs" field, the "Scene 1-bit" tab. The object with number X/Y allows calling the 1-bit scene with number X or Y, assigned to the channel.

Telegram:

0 = activates scene number X (X = 1, 3, 5, 7),

1 = activates scene number Y (Y = 2, 4, 6, 8).

See "Scene 1-bit".

19 **…** **22**	**Channel A**	**Set scene 1-bit (X/Y)** where: X/Y = 1/2, 3/4, 5/6, 7/8	**1 bit,** **DPT 1.022**	**C, W**

The objects will be enabled (only for scenes activated in the channel), if the "yes" option is selected for the "Learning 1-bit scenes from bus" parameter in the "Scene 1-bit" tab for the channel A. The object with number X/Y allows the current channel status to be assigned to the 1-bit scene with number X or Y.

Telegram:

0 = current channel status will be assigned to scene number X (X = 1, 3, 5, 7),

1 = current channel status will be assigned to scene number Y (Y = 2, 4, 6, 8).

See "Scene 1-bit" description.

23	**Channel A**	**Forced value**	**1 bit,** **DPT 1.003**	**C, W**

The object will be enabled, if the "Enable" option is selected for the "Value forcing" parameter iin the "General" tab for the channel A. The object allows setting the brightness value in the channel and blocks any possibility to change it again. The brightness value is defined in the "Value forcing" tab. The value cannot be changed until an unlocking telegram is received by the object. After receiving the telegram, the brightness value in the channel set before the locking will not be restored. Its status will only be changed after receiving a telegram from the bus.

Telegram:

1 = set brightness value and lock

0 = unlock

See "Value forcing".

24	**Channel A**	**Set minimum value**	**1 byte,** **DPT 5.001**	**C, W**

The object will be enabled, if the "Yes" option is selected for the "Learning limiting values from bus" parameter in the "Value limits" tab (the tab is visible when the "Enable" option is selected for the "Value limits" parameter in the "General" tab for the channel A). The object allows setting the minimum limit value of brightness that can be obtained in the channel.

Telegram:

0% (OFF)

…

Channel communication objects				
No.	**Object name**	**Object function**	**Data type**	**Flags**
100%. See "Value limits".				
25	**Channel A**	**Set maximum value**	**1 byte, DPT 5.001**	**C, W**
The object will be enabled, if the "Yes" option is selected for the "Learning limiting values from bus" parameter in the "Value limits" tab (the tab is visible when the "Enable" option is selected for the "Value limits" parameter in the "General" tab for the channel A). The object allows setting the maximum limit value of brightness that can be obtained in the channel. Telegram: 0% (OFF) … 100%. See "Value limits".				
26	**Channel A**	**Overload**	**1 bit, DPT 1.005**	**C, R, T**
The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object allows sending a telegram to the KNX bus with information about overload in the channel. If there is an overcurrent flow in the channel, the object is set to the value "1". The information is sent each time when the event occurs. Telegram: 1 = overload in the channel, 0 = normal current in the channel.				
27	**Channel A**	**Overheat**	**1 bit, DPT 1.005**	**C, R, T**
The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object allows sending a telegram to the KNX bus with information about overheat in the channel. If the channel detects a temperature rise above the permissible value, the object will be set to the value "1". The information is sent each time when the event occurs. Telegram: 1 = overheat in the channel, 0 = normal temperature in the channel.				
28	**Channel A**	**Hardware failure**	**1 bit, DPT 1.005**	**C, R, T**
The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object allows sending a telegram to the KNX bus with information about hardware failure in the channel. Failure occurrence will set the object value to the "1". The information is sent each time when the event occurs. Telegram: 1 = hardware failure in the channel,				

Channel communication objects				
No.	**Object name**	**Object function**	**Data type**	**Flags**

0 = channel is working properly – no hardware failure.

⚠️ **If a hardware failure is reported, turn off power in the 230 VAC load circuit and disconnect the KNX bus cable to reset the module. If, after power-on and restart of the module, the channel is still reporting a fault, power off the module and notify the service about the trouble. Further operation of the module poses hazard to the health or life of the operating personnel and may damage the module and the connected load.**

29	**Channel A**	**No load**	**1 bit, DPT 1.005**	**C, R, T**

The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object allows sending a telegram to the KNX bus with information about missing load in the channel. If there is no load, the object is set to the value "1". The information is sent each time when the event occurs.

Telegram:

1 = no load,

0 = normal load.

30	**Channel A**	**No mains**	**1 bit, DPT 1.005**	**C, R, T**

The object will be enabled, if the "Enable" option is selected for the "Channel A" parameter in the "Global" tab. The object allows sending a telegram to the KNX bus with information about 230 VAC mains loss. In the event of mains loss, the object is set to the value "1". The information is sent each time when the event occurs.

Telegram:

1 = no power in the load circuit,

0 = normal power in the load circuit.

Flag: C – communication, R – read, W – write, T – transmit, U – update.

4.5   Restoring the module factory settings

1. Press simultaneously the four channel status control buttons situated on the module enclosure (see "Description"). The status LEDs above the buttons will come on.
2. Hold down the buttons until the status LEDs go off (about 10 seconds). Restart of the module will follow and the factory settings will be restored.

5. Specifications

Supply

Supply voltage (KNX bus)..20…30 VDC

Current consumption from KNX bus ....<10 mA

Load circuit

Rated voltage U_n..230 VAC

Mains frequency ....50/60 Hz

Maximum power loss ....4 W
Standby power loss..0.8 W
Contact type... ε, MOSFET
Maximum output load
      Incandescent lamps ....300 W
      HV halogen lamps .... 300 VA
      Inductive transformers..300 W
      Tronic (electronic) transformers...300 W
      HV-LED lamps...typical 3…60 W
      Compact fluorescent lamps..typical 3…60 W
Mixed load
      resistive-inductive..20…300 VA
      resistive-capacitive .... 20…300 W
Maximum device load ....600 W / VA

Connections

Maximum wire cross-section..2.5 mm^2
Maximum tightening torque... 0.5 Nm

KNX parameters

Maximum time of reaction to telegram .... <20 ms
Maximum number of communication objects 58
Maximum number of group addresses.. 256
Maximum number of associations...256

Other parameters

Operating temperature range...0°C...+45°C
Storage/transport temperature range..-25°C...+70°C
IP code..IP20
Number of units on DIN rail..4
Enclosure dimensions... 70 x 92 x 60 mm
Weight... 160 g

⚠ **Exceeding the limit values of the module working parameters may damage the module and pose hazard to human health or life.**