Application description
for KNX CD-4C

Contents

1. General information

1.1 Basic information about the KNX/EIB BUS

The operating voltage for the **B.E.G.** KNX 1-10V dimming actuator is supplied through the KNX bus connection through which KNX telegrams may also be transmitted or received.
This means that the switching actuators' communications objects need to be linked to the desired communications objects of other sensors.
Settings are made using the ETS 3/4 programming software. A KNX commissioning and project planning course is required for these instructions to be understood.
Before you can work with them **B.E.G.**- applications need to be imported into the ETS software. The applications may be imported using the menu in the ETS software: File → Import, then select and import application.

Attention:
It is important to check the objects' data types. For instance, a one-bit object can only work with a one-bit object from another device.

1.2 Application versions

Controlling, dimming 4f 1.0:
90180 = KNX CD-4C

Article number:
90180 KNX CD-4C

1.3 Symbols

The following different symbols are employed for a better overview in the following description of the application. The symbols are explained in brief below.

Attention:
This symbol draws attention to passages of text that are necessary to read in order to prevent project planning and commissioning errors.

Recommendation:
This symbol points to parameter settings where experience has shown that the device may be used in the best way possible.

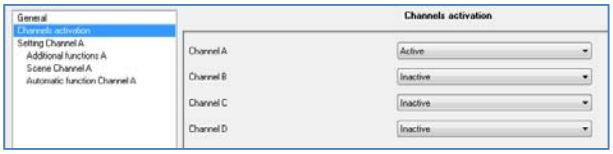
1.4 Display LEDs & manual operation

Manual operation allows the individual channels to be switched on and off and turned up and dimmed down by hand. The right/left buttons are for selecting the respective channel. Selected channels are displayed through status LEDs. These LEDs may indicate the following conditions:

LED display behaviour	Channel status
LED is permanently on	Channel is in operation
LED is permanently off	Channel is switched off
LED flashes at a frequency of 2:1, "long on – short off"	Channel is switched on and selected via manual operation
LED flashes at a frequency of 1:2, "short on – long off"	Channel is switched off and selected via manual operation

The selected channels may be switched / dimmed with the up/down buttons. Briefly pressing the "down" button switches the channel off, briefly pressing the "up" button switches the channel on. The selected channel may be dimmed by a long press of the button. The channel dims up as soon as the "up" button is pressed. The channel dims down when the "down" button is pressed for a long time. Dimming only stops when the channel reaches 100% or the button is released.

2. Channel activation



Each channel may be activated or deactivated individually
When a channel is activated, this channel will appear in the left selection menu as the channel setting [A-D]. Additional parameters may be set for this channel by selecting the tab for this channel. A tab for additional settings is shown for the respective channel along with the corresponding communication objects when the channel is activated.
No further parameters may be set on a channel that has been set as "inactive". No communications objects are displayed for deactivated channels.

Parameters:

- Inactive (default)
- Active

3. Operation/basic functions

The dimming actuator's basic functions are divided into three sections: switching, relative dimming and absolute dimming. It is standard for the basic functions' communications objects to be displayed as soon as a channel has been activated.

3.1 Switching

The switching command allows the channel to be activated or deactivated. A reporting object indicating the output's current switching state also exists. This subject, status on/off, may be used for visualization purposes. If the dimming actuator is to be switched through a binary input using the switching function, the object must be connected with the binary input's status object, "Switching value".

3.2 Relative dimming

Relative dimming permits continuous dimming to be carried out. This allows the connected lamp to be evenly turned up from 0 to 100% and dimmed down from 100 to 0%. Relative dimming may be stopped at any level. The dimming procedure's behaviour may also be individually set using additional parameters, e.g. dimming speed.

3.3 Absolute dimming

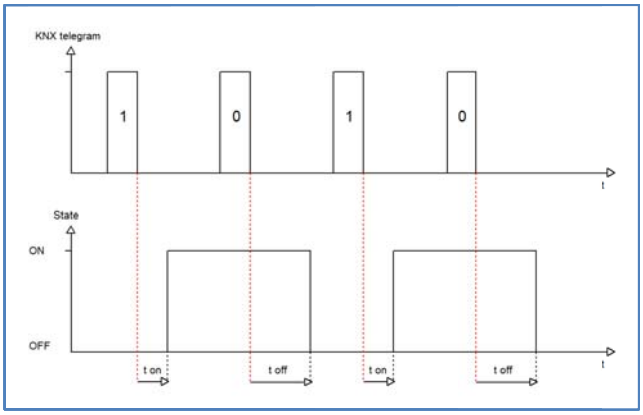
A discreet level of brightness may be set with the help of absolute dimming. Transmitting a percentage value to the one-byte "Absolute dimming" command will assign a specific brightness level to the output.

4. Timer functions

The dimming actuator also allows different timer functions to be integrated. Besides the normal activation / deactivation delay, staircase lighting functions may also be set with the help of additional sub settings.

4.1 Activation / deactivation delay

The activation / deactivation delays allow the dimming actuator's switching telegrams to be delayed. The delay may be initiated when the actuator is activated (activation delay) and when it is deactivated (deactivation delay) Both functions may also be associated with each other.
The following program shows how the two functions activated in this example behave:

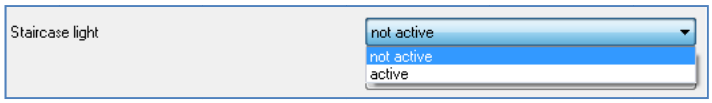


Parameter values:

- **Activation delay:**
  One second to 60 minutes, may be set in increments (default no delay)

- **Deactivation delay:**
  One second to 60 minutes, may be set in increments (default no delay)

5. Activating staircase lighting

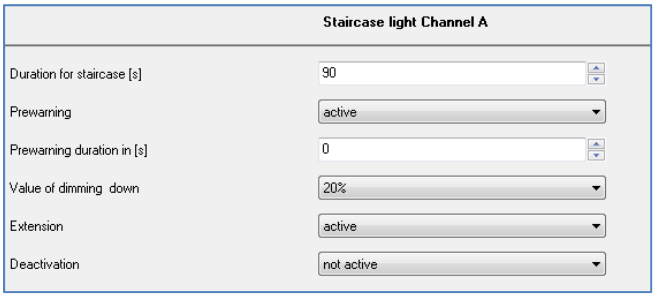


The staircase lighting function permits the channel to be deactivated after a certain amount of time has elapsed. The staircase lighting function must first be activated before it is possible to set any additional parameters.

Parameter values:

- Not active (default)
- Active

6. Staircase lighting settings



A new tab will be displayed in the left selection menu when the staircase lighting function is activated, staircase lighting channel [A-D] in which additional parameters may be set for the staircase lighting function.

When the staircase lighting function is activated, the switching communications object will disappear and the staircase lighting's communications object will appear instead.

The staircase lighting function will not affect relative or absolute dimming.

6.1 Staircase lighting duration

The staircase lighting duration specifies how long the channel is to remain activated after receiving an on telegram. The channel will automatically deactivate once the staircase lighting time has elapsed.

Parameter values:
Staircase lighting duration: 0- 30000 seconds (default 90 seconds)

6.2 Advance warning

The advance warning function permits the lighting to be dimmed when the time for activating the staircase lighting has elapsed. This is to warn users that the lights will switch off after the advance warning time has elapsed. The lighting will therefore be dimmed to the set dimming value after the staircase lighting time has elapsed and will remain on for the time set for the advance warning when this value has been reached.

Parameter values:

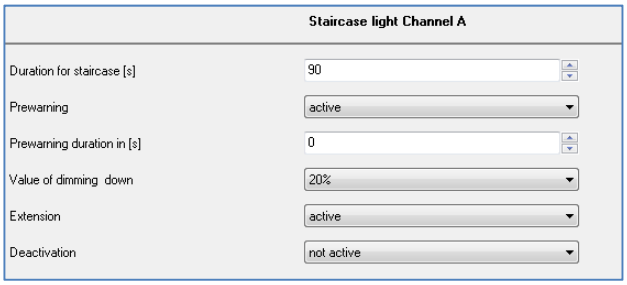
Advance warning:
- Not active
- Active (default)

Advance warning duration:
0 – 30000 seconds (default 0 seconds)

Dimming value:
1- 100% (default 20%)

6.3 Time extension / deactivation

The extension/deactivation parameters allow additional settings to be made for the staircase



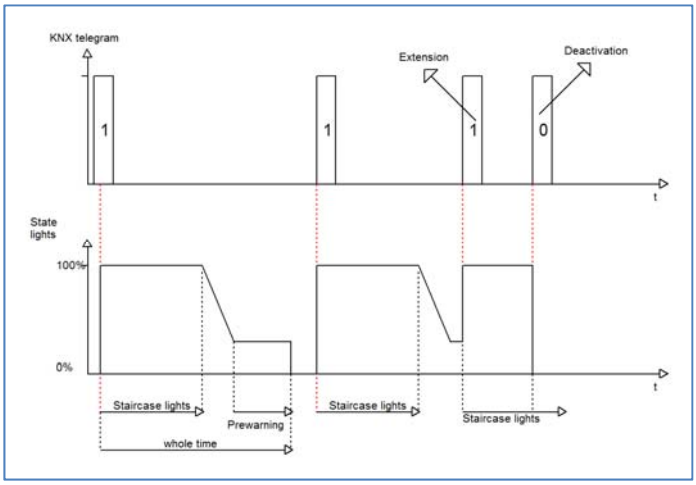
lighting process, i.e. whether it will be permitted to remain active for longer or switch off the staircase lighting after the staircase lighting time has elapsed. If an on telegram is sent before the staircase lighting time has elapsed when the extended time is active, the staircase time will start again at the set staircase lighting duration. Sending an off telegram when deactivation is active will cause the immediate deactivation of the channel.

Parameter values:

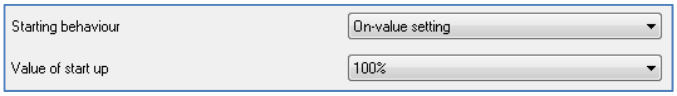
Extension:
- Not active
- Active (default)

Deactivation:
- Not active
- Active (default)

The following is an example of the staircase lighting process. In this example, both the time extension and deactivation are active. Advance warning with a dimming value of 20% has also been set:



7. Activation behaviour



The activation behaviour function may be used to define how the channel is activated. The function's parameters may be set separately each channel.

Parameter values:
- Adjustable activation value
- Last brightness value (memory)

7.1 Adjustable activation value

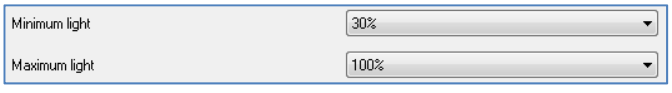
A fixed activation value may be assigned to the channel using the "adjustable activation value" parameter. The activation value covers the entire largest range that is technically possible, i.e. from 1 to 100%. However, if the dimming range is limited, the dimming actuator will activate with at least the minimum brightness value and at most with the maximum brightness value; irrespective of the set activation value (please also refer to the "Dimming Range" section).

Parameter values:
Activation value= 100% 1% - 100% (default 100%)

7.2 Last brightness value (memory)

The "Last brightness value" or "Memory function" will cause the dimming actuator to save the values reached before deactivation and to recall this value when it is switched back on. If, for example, the channel is dimmed to a brightness value of 50% and then deactivated, the channel will switch to the last brightness value with the next activation impulse, in this case 50%.
The function for setting the activation value's parameters only affects the object to be switched, i.e. Object 0:switch / 1:staircase lighting. The parameter value set will be ignored if the lights are relatively turned up from the deactivated state.

7.3 Dimming range

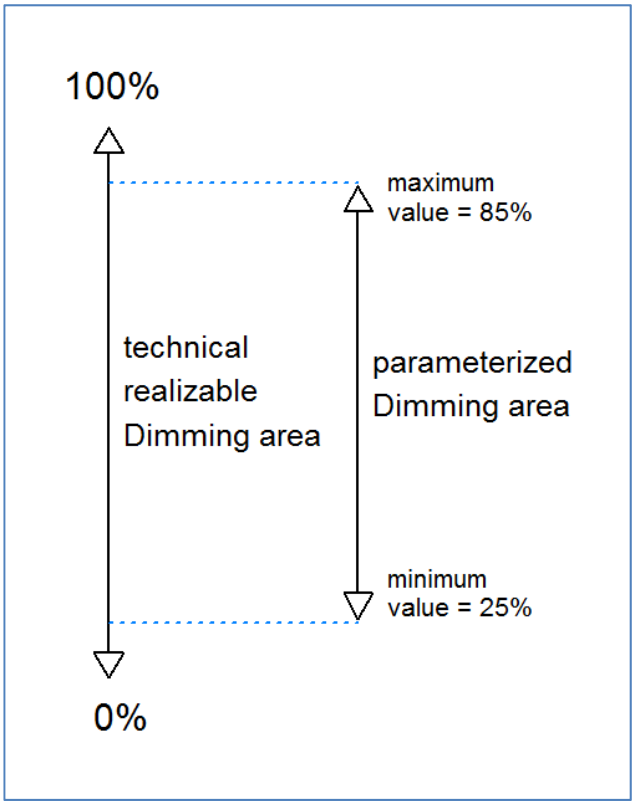


A maximum permissible dimming range may be set using the "Minimum brightness" and "Maximum brightness" parameter.

It is possible to limit the technically possible dimming range (1 to 100%) to a smaller value by setting the minimum and maximum brightness value individually for each channel. The channel will only move within the set limits when the dimming range has been limited. This also has consequences for other parameters: if, for example, a maximum value of 85% is set along with the activation value of 100%, the channel will only switch on with at most the highest permissible value of 85%. This value can no longer be exceeded.
Setting a dimming range is particularly useful when certain values should not be reached for technical reasons, for instance, when it is necessary to extend the bulbs' lifespan or to prevent flickering at the lower dimming values (particularly with energy-saving lamps and fluorescent lamps).

Example:
Minimum brightness value = 25%,
Maximum brightness value = 85%,
Activation value= 100%

- Telegram value On ▶brightness value 85%
- Telegram value 50% ▶brightness value 50%
- Telegram value 95% ▶brightness value 85%
- Telegram value 15% ▶brightness value 25%
- Telegram value Off (brightness value 0% ▶off)



Parameter values:

Minimum brightness:
1% - 100% (default 1 %)

Maximum brightness:
1% - 100% (default 100 %)

7.4 Specific dimming settings

Dimming behaviour may also be individually adapted and made visible for visualization purposes using the dimming speed.

7.5 Dimming speed

The dimming speed settings allow the process of dimming to be individually adapted to requirements. Particularly long dimming speeds, for example, permit almost any discreet dimming value to be achieved through start/stop dimming. Short dimming speeds, on the other hand, will cause the dimming values to be run through rapidly and are particularly useful where brightness does not have to be precisely set or settings are made using absolute values.

Dimming values ranging from five to eight seconds have proved useful in practice for rooms in normal use.

Parameter values:

Dimming speed:
1 – 120 seconds (default 5 seconds)

7.6 Transmitting the dimming value after it has been changed

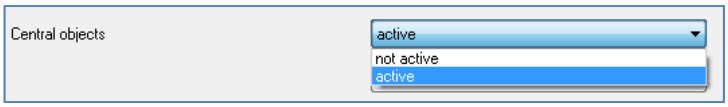
In order to make the dimming process visible, for instance, by way of visualization, the "Status dimming value" must be activated as a communications object.

The communications object for the current dimming value will be shown permanently, however, it will only send the current dimming value when the "Transmit dimming value after change" parameter has been activated. The object's size of one byte will then display the current dimming value from a change of 2% and more.

Parameter values:

Transmitting the dimming value after it has been changed (min. 2%):
- Not active (default)
- Active

8. Central objects

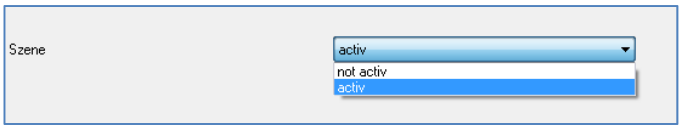


When the "Central objects" function has been activated for a channel, the channel will respond to the central objects with its individually set parameters..

Two central objects that control operation using central objects are available. The first is the one-bit switching object that may be used to activate/deactivate channels with activated central function and the second is the one-byte "Absolute dimming" object. Absolute brightness values may be assigned to the channels using this object. Care must be taken when working with central objects that each channel is called up with its individual parameter settings. If, for example, a channel with activated staircase lighting function and activated central objects is activated using the switching object, the channel will only be activated for the set staircase lighting time and will then deactivate automatically.

Parameter values:
- Not active
- Active (default)

9. Scene function



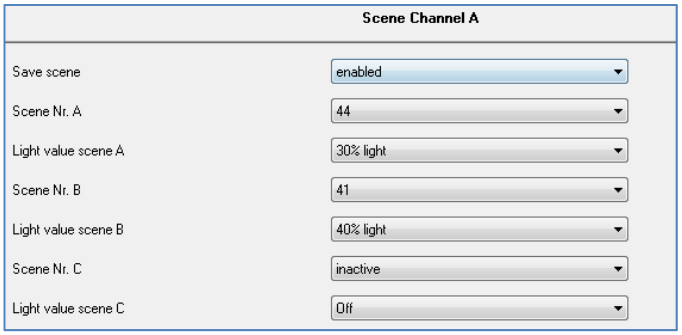
The scene function can only be activated for normal switching use. If the staircase lighting function is activated for a channel, this channel can no longer be activated for the scene function.
In order to call up a specific scene, the value for the respective scene must be sent to the scene function's communications object. The value for calling up the scene is, however, always one number lower than the set scene number. If, for example, Scene 1 is to be called up, a 0 must be sent. Scene numbers may range from 1 to 64, the values for calling up the scene, however, only range from 0 to 63.

Parameter values:

Scene:
- Not active (default)
- Active

9.1 Scene sub item

The left selection menu will display a new menu item for the scene function when the scene function is activated as shown above. Additional parameters may be set in this tab for this channel's scene function.
For each channel, there are eight possible memory settings for the scenes. The eight storage spaces are named from A to H. One of the 64 possible scene numbers may be assigned to each of the eight scenes.
The following picture shows the setting times in the scene sub item (Channel X: scene) for Scenes A to C (Scenes D to H analogous to the first three):



The left selection menu will display a new menu item for the scene function when the scene function is activated as shown above. Additional parameters may be set in this tab for this channel's scene function.
For each channel, there are eight possible memory settings for the scenes. The eight storage spaces are named from A to H. One of the 64 possible scene numbers may be assigned to each of the eight scenes.
The following picture shows the setting times in the scene sub item (Channel X: scene) for Scenes A to C (Scenes D to H analogous to the first three):

During programming, when two or more channels are to respond to the same scene number, it must be noted that the communications objects for the scenes need to be accommodated within the same group addresses. All channels will then be addressed when the address value for the scene is transmitted.

When programming the scene function, it is useful to create divisions according to scenes in order to achieve a tidy programming structure. If a channel is to respond to eight scenes, the corresponding communications object for the scene must also be integrated into eight group addresses.

Parameter values:

Save scene:
- Disabled (default)
- Enabled

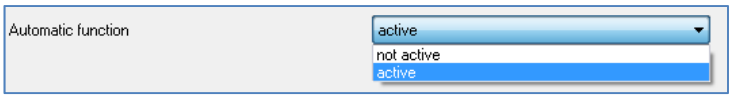
Scene No. A-[H]:
1-64 or inactive (default inactive)

Brightness value Scene A-[H]:
Off, 10% – 100% in 10% steps (default Off)

The corresponding code is transmitted to the scene's appropriate communications objects to call up a scene or to set a new value for a scene:

Scene	Call up		Save	
	Hex.	Dec.	Hex.	Dec.
1	0x00	0	0x80	128
2	0x01	1	0x81	129
3	0x02	2	0x82	130
4	0x03	3	0x83	131
5	0x04	4	0x84	132
6	0x05	5	0x85	133
7	0x06	6	0x86	134
8	0x07	7	0x87	135
9	0x08	8	0x88	136
10	0x09	9	0x89	137
11	0x0A	10	0x8A	138
12	0x0B	11	0x8B	139
13	0x0C	12	0x8C	140
14	0x0D	13	0x8D	141
15	0x0E	14	0x8E	142
16	0x0F	15	0x8F	143
17	0x10	16	0x90	144
18	0x11	17	0x91	145
19	0x12	18	0x92	146
20	0x13	19	0x93	147
21	0x14	20	0x94	148
22	0x15	21	0x95	149
23	0x16	22	0x96	150
24	0x17	23	0x97	151
25	0x18	24	0x98	152
26	0x19	25	0x99	153
27	0x1A	26	0x9A	154
28	0x1B	27	0x9B	155
29	0x1C	28	0x9C	156
30	0x1D	29	0x9D	157
31	0x1E	30	0x9E	158
32	0x1F	31	0x9F	159

10. Automatic function



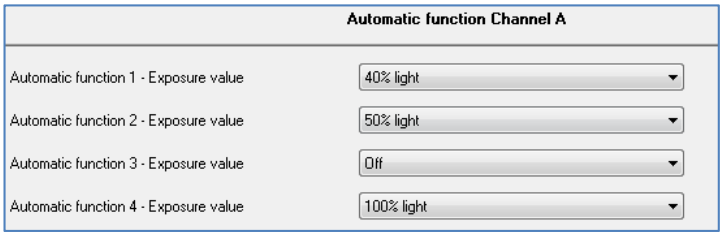
An automatic function may be activated for each channel. The automatic function allows up to four different absolute brightness commands to be directly called up for this channel. They are called up using simple one-bit objects.
The automatic function must be activated for the respective channel before additional parameters may be set. This sub item for this channel will be displayed to allow the parameters to be set for the automatic function when the automatic function has been activated.

Parameter values:

Automatic function:
- Not active (default)
- Active

10.1 Automatic function sub item

Additional parameters may be set for the automatic function in the sub item.

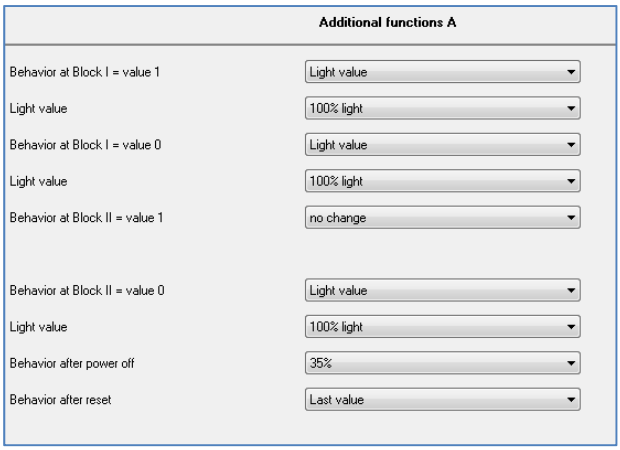


An absolute light value (in increments of 10%) may be assigned to each automatic function. These automatic values may be called up using simple one-bit objects which may be addressed with simple switching commands.
The automatic function makes it possible to call up brightness values with fixed settings by a simple press of a button.

Parameter values:

Automatic function:
1 – 4 - light value:
Off, 10% – 100% in 10% increments (default Off)

11. Additional functions



Additional function parameters may be set for each channel. The additional functions allow the channel's response to various signals to be set for two disable objects and its behaviour after bus-voltage failure / restoration.

11.1 Sperrobjekte

Für die beiden Sperrobjekte kann sowohl eine Aktion für die Aktivierung des Sperrvorgangs, als auch für die Aufhebung des Sperrvorgangs fest-gelegt werden

ETS-text	Value range [default value]	Comment
Behaviour at disable object 1 = Value 1	Off, **no change**, brightness value (10%, 20%,30%,..,100 %)	Defines the action for the deactivation of the first disable process
Behaviour at disable object 1 = Value 0	Off, **no change**, brightness value (10%, 20%,30%,..,100 %)	Defines the action for the deactivation of the first disable process
Behaviour at disable object 2 = Value 1	Off, **no change**, brightness value (10%, 20%, 30%,..,100%)	Defines the action for the deactivation of the first disable process
Behaviour at disable object 2 = Value 0	Off, **no change**, brightness value (10%, 20%, 30%,..,100%)	Defines the action for the deactivation of the first disable process

The disable objects allow the channel to be disabled against further use. The channel may also execute a specific action when the disable action is activated, for example, dimming to a specific brightness value, deactivating the channel or freezing it in its current state. The channel may also execute the same actions when the disable process is deactivated.

It must be noted when activating a disable process that the channel is disabled for all other operations for as long as the disable process is activated.

Manual operation is also disabled in the event of a disable process.

All telegrams that the channel receives during a disable process will not affect the channel.
The first disable process always has priority when both disable processes are activated. If, however, the second disable process is activated while the first disable process is activated, the second disable process will become active when the first disable process is deactivated. The action for deactivating the first disable process will then no longer be executed, the channel will instead call up the action set for activating the second disable process.

Parameter values:

Behaviour at Disable Object 1 = Value 1:
Off, no change, brightness value 10% – 100% in increments of 10% (default no change)

Behaviour at Disable Object 1 = Value 0:
Off, no change, brightness value 10% – 100% in increments of 10% (default no change)

11.2 Behaviour in the event of bus power failure / restoration

In order to prevent undesirable behaviour by the channel in the event of a bus power failure, it is possible to set the behaviour in response to when the bus power fails and to when it is restored.

Each channel is able to respond to bus power failures with individually set parameters. The channel may, for instance, be deactivated, assume certain brightness values or be frozen in its current state with the "No response" setting. Individual parameters may also be set to respond in specific ways when power is returned to the bus. The channel may be the activated, assume certain brightness values or call up the brightness value that the channel had before the bus power failed by using the "Last Value" setting.
This parameter must be carefully chosen, particularly in rooms without other sources of light or in rooms in which the failure of the lighting may pose a risk.

Parameter values:

Behaviour in the event of a bus-power failure:
No response, off, dim to 20%,35%,50%,65%,80%,100% (default no response)

Behaviour when bus power is restored
No response, off, dim to 20%,35%,50%,65%,80%,100% (default last value)

12. Communications objects

12.1 Overview

Communications objects are for programming; they are used for the subsequent assignment of group addresses.
The dimming actuator possesses three global communications objects and communications objects for each individual channel.
The channel-dependent communications objects are displayed for each activated channel. Which communications objects are displayed depends on the setting of the individual parameters for the channel. For each channel, 15 numbers are reserved for the communications objects. Channel A therefore has the numbers 0 – 14, Channel B has the numbers from 15 – 29, etc.

The picture below shows the objects for Channel A:

Communications objects

→ Input object | ←Output object

Object 0: →	Channel A	1 bit
Object 1: →	Channel A	1 bit
Object 2:→	Channel A	4 bit
Object 3:→	Channel A	1 byte
Object 4:←	Channel A	1 bit
Object 5:←	Channel A	1 byte
Object 6:→	Channel A	1 bit
Object 7:→	Channel A	1 bit
Object 8:→	Channel A	1 byte
Object 11:→	Channel A	1 bit
Object 12:→	Channel A	1 bit
Object 13:→	Channel A	1 bit
Object 14:→	Channel A	1 bit

Object +15: Additional channels

Object 60: →	Central	1 bit
Object 61: →	Central	1 byte

12.2 Description of the objects

1. Object 0: **Blinds up/down**
Type: 1 bit DPT1.008
Manual raising/lowering of the blinds/shutters

1. Object 0: **Channel A**
Type: 1 bit DPT1.008
Channel A is switched on via this object

2. Object 1: **Channel A**
Type: 1 bit DPT1.008
The Channel A staircase lighting is activated via this object

3. Object 2: **Channel A**
Type: 4 bit
Channel A is dimmed relatively with four-bit telegrams via Communications Object 2

4. Object 3: **Channel A**
Type: 1 byte
Channel A may be dimmed relatively with one-bit telegrams via Communications Object 3

5. Object 4: **Channel A**
Type: 1 bit
Channel A's current switching state may be shown via Communications Object 4

6. Object 5: **Channel A**
Type: 1 byte
The current absolute dimming value may be shown with this communications object

7. Object 6: **Channel A**
Type: 1 bit
Disable telegrams that call up set functions may be sent to the Disable I object

8. Object 7: **Channel A**
Type: 1 bit
Disable telegrams that call up set functions may be sent to the Disable II object

9. Object 8: **Channel A**
Type: 1 byte
Scenes may be called up using this object

10. Object 11: **Channel A**
Type: 1 bit
Automatic Function 1 may be called up via Object 11

11. Object 12: **Channel A**
Type: 1 bit
Automatic Function 2 may be called up via Object 12

12. Object 13: **Channel A**
Type: 1 bit
Automatic Function 3 may be called up via Object 13

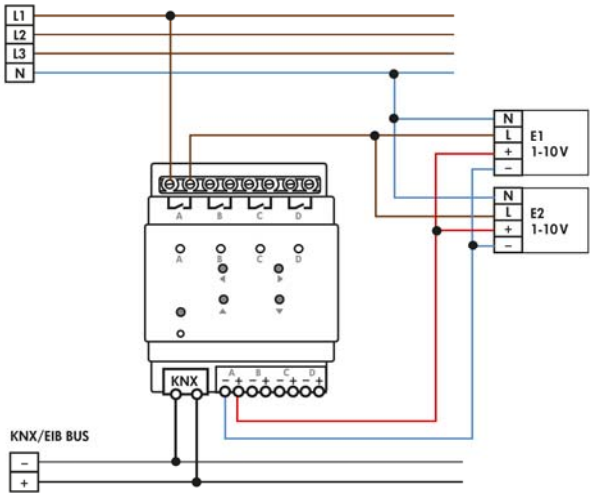
13. Object 14: **Channel A**
Type: 1 bit
Automatic Function 4 may be called up via Object 14

14. Object 60: **Central**
Type: 1 bit
The "Switch central function" is triggered via this object

15. Object 61: **Central**
Type: 1 byte
The "Absolute dimming central function" is triggered via this object

13. Technical data

KNX CD-4



Configuration	**KNX CD-4C**
Number of outputs	4
Nominal voltage	
Switch outputs	230VAC
Analogue control inputs	1 - 10V
Power consumption typ.	< 0.3W
Current per 1-10V control channel	30mA
Maximum switching power switching relay	16A, cos□=1
Maximum capacitive load	100µF
Maximum load	
Light bulbs	2700W
HV halogen lamps	2500W
LV halogen lamps	1000W
Fluorescent lamps uncompensated	1800W
Fluorescent lamps parallel compensated	1000W
Light bulbs	2700W
HV halogen lamps	2500W
Max. cable cross-section	
Screw terminals	2.5mm²
KNX bus terminal	0.8mm
Ambient temperature	0 to +45°C
Degree of protection	IP20
REG dimensions	4TE
Dimensions UP/AP (W x H x D)	72 x 60 x 86mm