

Dimmers

RGBWL-K

DM480440

Programming manual



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1 General description

The RGBWL-K (reference DM480440) is an electronic constant-voltage 4 channel dimmer which allows to control and regulate RGB or RGBW led strip modules or any other low voltage lamp.

It has been designed to obtain a precise digital regulation receiving orders through the KNX bus, including the possibility to control each channel individually or the 3 or 4 channels simultaneously for RGB or RGBW applications.

The dimming time (the progressive on/off lighting) can be configured individually for each channel. The RGB mode allows to select a particular color by dimming with pushbuttons or directly with any color palette and then modify the brightness of the chosen color or individual channels.

The device allows to program scenes and sequences and it incorporates an advanced logic unit with 8 blocks of comparison, logic and arithmetic operations and also timers and counters blocks.



General characteristics:

- 4 Regulation channels that can be controlled individually or simultaneously with RGBW features.
- Up to 8 scenes with memorization function.
- Up to 8 programmable sequences with the possibility of simultaneous execution.
- PWM (pulse with modulation) dimming method.
- Short-circuit and overload protection.
- Last position memory in case of power failure.
- 8 arithmetic and logic unit blocks and 8 timers and counters blocks.

2 Technical information

Input led power supply	From +10 to +24 Vdc
KNX Supply	29Vdc from KNX bus
Current consumption	5mA from KNX bus
Mounting	Luminaire or ceiling integration
Size	77x35x17mm
Connections	KNX bus connection terminal Screw terminals for input supply and outputs
Outputs	4 regulation channels
Maximum output current	3 A per channel
Maximum output power	4 x 30 W (10 Vdc) 4 x 78 W (24 Vdc)
Environment temperature range	Operation: -10°C/55°C Storage: -30°C/60°C Transportation: -30°C/60°C
Regulation	According to the directives of electromagnetic compatibility and low voltage: EN 50090-2-2 / UNE-EN 61000-6-3:2007 / UNE-EN 61000-6-1:2007 / UNE-EN 61010-1.

3 Programming

3.1 Application program information

Application program: Ingenium / RGBWL-K (manufacturer / program name).

Catalogue version: v1.0

Maximum number of communication objects: 104.

Maximum number of assignments: 254.

3.2 Individual address assignment

This device has a programming button for the KNX individual address assignment which is located on the front of it.

A red led near the programming button lights up when it is pressed manually or if the device is set remotely to programming mode state.

The led is automatically turned off if the ETS has assigned an individual address correctly or if the programming button is pressed again manually.

3.3 Parameters

General	Working mode	<input checked="" type="radio"/> RGBW mode <input type="radio"/> Individual channels
+ Channel 1	Color object type	<input checked="" type="radio"/> 3-byte object (RGB) <input type="radio"/> 4-byte object (RGBW)
+ Channel 2	Lock/unlock function	<input checked="" type="radio"/> No <input type="radio"/> Yes
+ Channel 3	Staircase timers	<input checked="" type="radio"/> No <input type="radio"/> Yes
+ Channel 4	Advanced functions	<input checked="" type="radio"/> No <input type="radio"/> Yes
	Scenes	Disabled ▾
	Sequences	Disabled ▾
	Cyclical transmission of feedbacks	<input checked="" type="radio"/> No <input type="radio"/> Yes

3.3.1 General

Name	Working mode
Values	RGBW mode / Individual channels
Description	Allows selecting the working mode of the dimmer. In RGBW mode it is possible to use RGBW communication objects to control the channels simultaneously. In individual channels mode, it is only possible to control each channel independently.
Name	Color object type
Values	3-bytes RGB / 4-bytes RGBW
Description	Allows to select the size of the color communication object in RGBW mode. If 3-bytes is selected, the color object controls the RGB channels and the W channel is controlled independently. If 4-bytes is selected, the color object controls the 4 channels simultaneously.
Name	Lock/unlock function
Values	Enable/disable
Description	This parameter enables the device lock/unlock functionalities (see lock/unlock parameters menu).
Name	Staircase timers
Values	Enable/disable
Description	This parameter enables the device lock/unlock functionalities (see lock/unlock parameters menu).
Name	Scenes
Values	Disabled / 1 ... 8
Description	This parameter allows to select the number of scenes (up to 8) which you would want to configure in the gateway and which will be saved in the device memory.
Name	Sequences
Values	Disabled / 1 ... 8
Description	This parameter allows to select the number of sequences (up to 8) which you would want to configure and which will be saved in the device memory. A sequence is an advanced group of commands that are executed consecutively and can be defined by the programmer.

3.3.2 Lock / Unlock function

The following parameters menu is enabled in the General tab.

General	Lock/unlock polarity	<input checked="" type="radio"/> 0=lock / 1=unlock <input type="radio"/> 1=lock / 0=unlock
Lock/unlock		
+ Channel 1	Behavior when lock	<input checked="" type="radio"/> No change <input type="radio"/> Defined value
+ Channel 2	Behavior when unlock	<input checked="" type="radio"/> No change <input type="radio"/> Defined value
+ Channel 3		
+ Channel 4		

Name	Lock/unlock polarity
Values	0 = lock / 1 = unlock, 1 = lock / 0 = unlock
Description	This parameter allows to select the value with which the device is locked and unlocked.
Name	Behavior when lock / unlock
Values	No change / Defined value
Description	These parameters allow to select what the device do when it is locked and unlocked. It can be set to keep the actual value (no change) or setting a defined brightness value for each channel.

3.3.3 Staircase timers

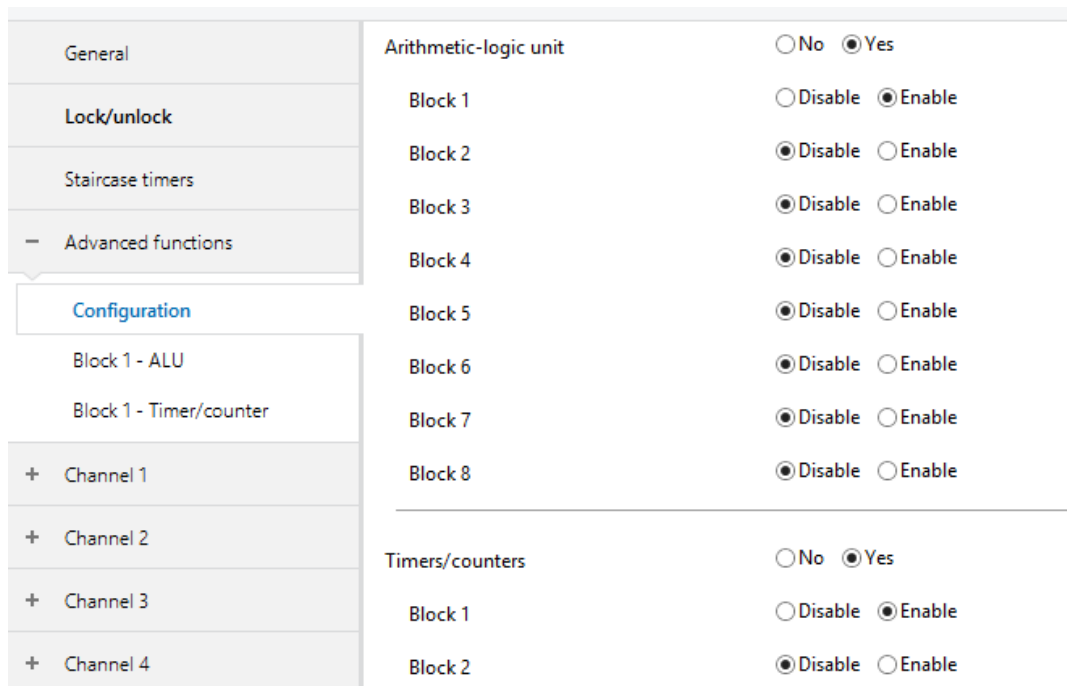
The following parameters menu is enabled in the General tab.

General	Channel 1	15 sec
Lock/unlock	Allow timer retrigger	<input checked="" type="radio"/> No <input type="radio"/> Yes
Staircase timers		
+ Channel 1	Channel 2	10 sec
+ Channel 2	Allow timer retrigger	<input type="radio"/> No <input checked="" type="radio"/> Yes
+ Channel 3	Channel 3	Disabled
+ Channel 4	Channel 4	Disabled

Name	Channel 1/2/3/4
Values	Disabled / From 5 seconds to 790 minutes
Description	<p>A staircase lighting function can be configured for each channel with this parameter.</p> <p>If enabled, the channel will be switched off automatically after the time configured. During the staircase function, take into account the following behaviour:</p> <ul style="list-style-type: none"> -The countdown can be retriggerable or not (see next parameter). -The channel can always be switched off manually. <p>It is possible to enable/disable the staircase light timer by sending values 1 and 0 to the corresponding channel communication object (objects 20, 21, 22 and 23).</p>
Name	Allow tiger retrigger
Values	No / Yes
Description	Defines if the staircase countdown of the channel can be retriggered or not. If set to yes, it can be retriggered with on, dimming or brightness value telegrams.

3.3.4 Advanced functions

If the advanced functions are enabled in the General menu, a new submenu appears on the left.



In this configuration menu it is possible to select what Arithmetic and logic or timers / counters blocks are enabled.

Name	Arithmetic-logic block X
Values	Enable / Disable
Description	Allows to enable or disable each arithmetic and logic block.

Name	Timer / counter block
Values	Enable / Disable
Description	Allows to enable or disable the each timer / counter blocks.

3.3.5 Arithmetic and Logic block (ALU)

General	Operation	AND
Lock/unlock	Number of inputs	2
Staircase timers	Input 1	<input checked="" type="radio"/> Communication object <input type="radio"/> Constant value
Advanced functions	Format	1 bit
Configuration	Input 2	1 bit
Block 1 - ALU	Output	1 bit

Name	Operation
Values	AND, NAND, OR, NOR, XOR, XNOR, NOT, BUFFER, ==, !=, <, >, <=, >=, +, -, *, /.
Description	<p>It allows to select the arithmetic or logic operation of the block:</p> <p>Logic operations:</p> <ul style="list-style-type: none"> - AND: Logic product - NAND: Negative logic product - OR: Logic addition - NOR: Negative logic addition - XOR: Exclusive logic addition - XNOR: Negative exclusive logic addition - NOT: Negation - BUFFER: Saves the input value in the output. <p>Comparison operation:</p> <ul style="list-style-type: none"> - == : equality - != : inequality - < : smaller than - > : greater than - <= : smaller or equal than - >= : greater or equal than <p>Arithmetic operations:</p> <ul style="list-style-type: none"> - + : addition - - : subtraction - * : multiplication - / : division

Name	Number of inputs
Values	From 2 to 4
Description	This parameter defines the number of inputs of the block. Depending on the type of operation it is allowed two or more inputs.
Name	Input 1
Values	Communication object / Constant value
Description	This parameter allows to select the type of the input 1, that can be a constant value or a value received from a communication object.
Name	Format
Values	1 bit, 1 byte unsigned (dpt 5.001), 1 byte unsigned (dpt 5.010), 1 byte signed (6.*), 2 bytes unsigned (dpt 7,*), 2 bytes unsigned (dpt 8,*), 2 bytes float (dpt 9,*).
Description	This parameter allows to select the size and format of the input 1. Depending on the type of operation different formats are allowed.
Name	Input 2/3/4
Values	1 bit, 1 byte unsigned (dpt 5.001), 1 byte unsigned (dpt 5.010), 1 byte signed (6.*), 2 bytes unsigned (dpt 7,*), 2 bytes unsigned (dpt 8,*), 2 bytes float (dpt 9,*).
Description	This parameter allows to select the size and format of the other inputs communication objects. Depending on the type of operation different formats are allowed.
Name	Output
Values	1 bit, 1 byte unsigned (dpt 5.001), 1 byte unsigned (dpt 5.010), 1 byte signed (6.*), 2 bytes unsigned (dpt 7,*), 2 bytes unsigned (dpt 8,*), 2 bytes float (dpt 9,*).
Description	This parameter allows to select the size and format of the output communication object. Depending on the type of operation different formats are allowed.

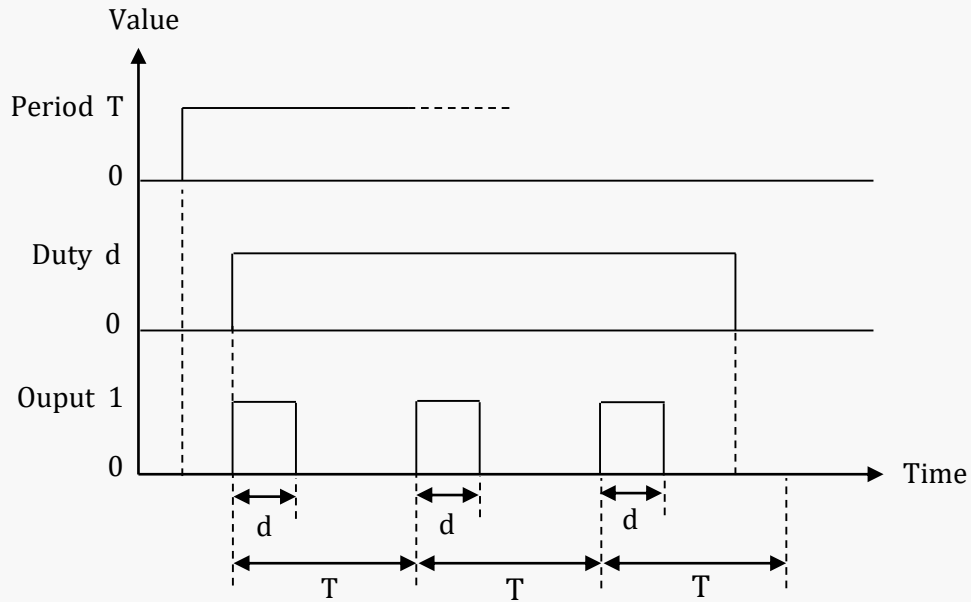
3.3.6 Timer / counter block

General	Type of block	<input checked="" type="radio"/> Timer <input type="radio"/> Counter
Lock/unlock	Timer type	PWM
Staircase timers	Period of time	<input checked="" type="radio"/> Communication object <input type="radio"/> Constant value
— Advanced functions	Format	1 byte (dpt 5.010)
Configuration	Duty	1 byte (dpt 5.010)
Block 1 - ALU		
Block 1 - Timer/counter		

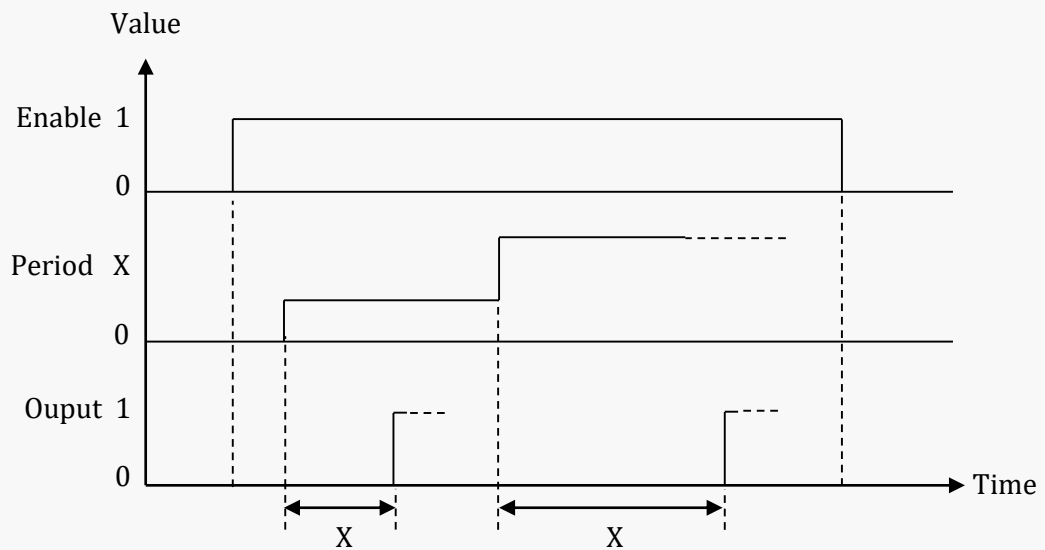
Name	Timer type
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Values	PWM, Limit, Cyclic
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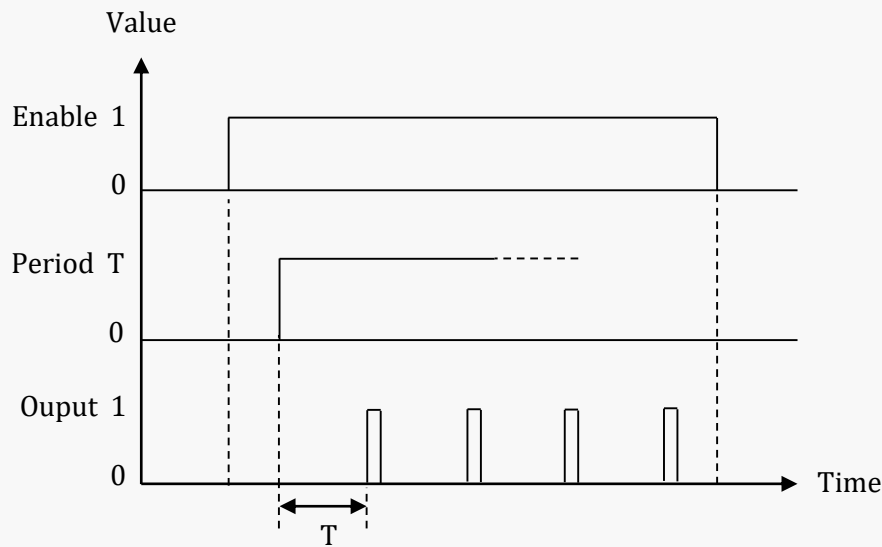
Description	PWM: It generates a pulse width modulated output according to the period of time and a duty.
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Limit: It sends a bit telegram '1' to the bus when a limit value is exceeded.



Cyclic: It sends a bit telegram '1' to the bus each time the limit value is exceeded cyclically.



Name	Period of time
Values	Communication object / Constant value
Description	<p>It is the count time of the timer. It can be configured as a constant value or a value received through the bus with one of the following communication object formats:</p> <p>1 byte (dpt 5.010): Value from 0 to 255 (x 100 ms) 2 bytes (7.004): Value from 0 to 6553500 ms 2 bytes float (9.010): Value from 0 to 670760 s</p>
Name	Duty
Values	1 byte (dpt 5.010), 2 bytes (7.004) or 2 bytes float (9.010)
Description	<p>Only visible if timer type PWM is selected. It is the time that the output signal is at high level ("1") within the period of time. Its value can be received through the bus with one of the following communication object formats:</p> <p>1 byte (dpt 5.010): Value from 0 to 255 (x 100 ms) 2 bytes (7.004): Value from 0 to 6553500 ms 2 bytes float (9.010): Value from 0 to 670760 s</p>

General	Type of block	<input type="radio"/> Timer <input checked="" type="radio"/> Counter
Lock/unlock	Counter type (increase with)	Rising edge
Staircase timers	Limit value	10
Advanced functions	Output behavior	Send 1 if limit reached
Configuration		
Block 1 - ALU		
Block 1 - Timer/counter		

Name	Counter type
Values	Rising edge, falling edge, 1 or 0
Description	It is the change that the counter may detect in its "event" object to increase the count.
Name	Limit value
Values	From 0 to 65535
Description	It is the number of events over which the counter sends the finish telegram.
Name	Output behaviour
Values	Send 1 when limit reached, Send counter value (5.010), Send counter value (7.001)
Description	This parameter allows to select the format and behaviour of the counter output. It can be send a 1 when the count limit is reached or it can send the count value each time an event is detected.

3.3.7 Scenes

The dimmer allows to configure up to 8 scenes. The enabled scenes appear in the left menu with the name from A to H.

General	Number of scene	1
Lock/unlock	Channel 1	<input checked="" type="checkbox"/> Included
Staircase timers	Channel 2	<input checked="" type="checkbox"/> Included
Advanced functions	Channel 3	<input type="checkbox"/> Included
Scenes	Channel 4	<input type="checkbox"/> Included
Scene A		
Scene B		
Scene C		
Scene D		

Name	Number of scene
Values	1 - 64
Description	This parameter is the value number that will execute the scene (there should never be two scenes with the same number).
Name	Channel 1/2/3/4
Values	Included / Not included
Description	With this parameter it can be selected if the channel is included in the scene or not.

3.3.8 Sequences

The dimmer allows to configure up to 8 sequences. The enabled sequences appear in the left menu with the name from A to H. A sequence is an advanced group of commands (steps) that are executed consecutively and can be defined by the programmer. In order to program each sequence, do click on the desired sequence of the list on the left and access to the following parameters menu:

General	Number of sequence	1
Lock/unlock	Status sending	Normal
Staircase timers	Number of steps	1
+ Advanced functions	Step 1	
+ Scenes	Step command	Brightness value
- Sequences	Channel	Channel 1
Sequence A	Brightness value	0%
Sequence B	Dimming time	00:00:05
Sequence C		
Sequence D		

Name	Number of sequence
Values	From 1 to 64
Description	This number is the value with which the sequence will be executed through the sequences object.

Name	Status sending
Values	Normal, disabled or only at end
Description	This parameter allows to change the status sending behaviour of the device while the sequence is in execution. If <i>disabled</i> , the channels affected by the sequence will not send any status telegram during the execution. If <i>only at end</i> is set, the status telegrams will be sent when the sequence finishes or it is stopped.
Name	Number of steps
Values	From 1 to 24
Description	Each sequence can have up to 24 steps. For each step, a different action or command can be configured. A sequence can be executed individually or simultaneously from bus commands or from other sequences.
Name	Step command
Description	<p>Brightness value: this type of step allows to change the brightness value of a channel during the sequence. The brightness will increase or decrease with the dimming time programmed in parameter for this purpose.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Step command Brightness value ▾</p> <p>Channel Channel 1 ▾</p> <p>Brightness value 0% ▾</p> <p>Dimming time <input type="text" value="00:00:05"/></p> </div>
	<p>Wait: With this type of step a delay is executed. The wait time can be defined from 0 to 4'15".</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Step command Wait ▾</p> <p>Wait time <input type="text" value="00:00:10"/></p> </div>
	<p>Loop: This command makes the sequence start from the beginning automatically. No other step of the sequence is executed after this command.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Step command Loop ▾</p> </div>
	<p>Activate scene: This command executes the scene indicated.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Step command Activate scene ▾</p> <p>Scene/sequence A ▾</p> </div>
	<p>Start sequence and stop / Start sequence and continue: These commands allow to start the execution of another sequence simultaneously and stop or continue the current one.</p>

3.3.9 Channel 1 (Red) / 2 (Green) / 3 (Blue) / 4 (White)

The following parameters can be configured independently for each channel of the dimmer.

General	Dimming time (0...100%)	5 s
Lock/unlock	Switch on time	0 s
Staircase timers	Switch off time	0 s
+ Advanced functions	Switch on value	Last value
+ Scenes	Maximum brightness	100%
+ Sequences	Minimum brightness	0%
- Channel 1		

Red

Name	Dimming time (0...100%)
Values	From 0 seconds to 5 minutes
Description	It is the brightness change time measured in seconds/minutes when using brightness value or dimming communication objects.
Name	Switch on time
Values	From 0 seconds to 5 minutes
Description	It is the brightness change time measured in seconds/minutes when the channel is switched on from 0% to 100% through the on/off communication object.
Name	Switch off time
Values	From 0 seconds to 5 minutes
Description	It is the brightness change time measured in seconds/minutes when the channel is switched off from 100% to 0% through the on/off communication object.
Name	Switch on value
Values	Last value / fixed value from 1% to 100%
Description	This parameter defines the channel behaviour when receiving a switch on bit telegram. The channel will be dimmed to the last value (different from 0%) or to defined and fixed value in % from the list.
Name	Maximum brightness
Values	From 0% to 100%
Description	This is the maximum brightness value allowed for the channel. The dimming will stop when reached this value. The user can dim any value from 0 to 100% but the real brightness value is internally adjusted according to the minimum and maximum limitation span.

Name	Minimum brightness
Values	From 0% to 100%
Description	<p>This is the minimum brightness value allowed for the channel. The dimming will stop when reached this value.</p> <p>The user can dim any value from 0 to 100% but the real brightness value is internally adjusted according to the minimum and maximum limitation span.</p>

3.4 Communication objects table

Object	Name Function	Length	DPT	Flags				
				C	R	W	T	U
0	Channel 1 On/Off	1 bit	1.001	•		•		
1	Channel 1 On/Off status	1 bits	1.001	•	•		•	
2	Channel 1 Dimming	4 bits	3.007	•		•		
3	Channel 1 Brightness value	1 byte	5.001	•		•		
4	Channel 1 Brightness value status	1 byte	5.001	•	•		•	
5	Channel 2 On/Off	1 bit	1.001	•		•		
6	Channel 2 On/Off status	1 bits	1.001	•	•		•	
7	Channel 2 Dimming	4 bits	3.007	•		•		
8	Channel 2 Brightness value	1 byte	5.001	•		•		
9	Channel 2 Brightness value status	1 byte	5.001	•	•		•	
10	Channel 3 On/Off	1 bit	1.001	•		•		
11	Channel 3 On/Off status	1 bits	1.001	•	•		•	
12	Channel 3 Dimming	4 bits	3.007	•		•		
13	Channel 3 Brightness value	1 byte	5.001	•		•		
14	Channel 3 Brightness value status	1 byte	5.001	•	•		•	
15	Channel 4 On/Off	1 bit	1.001	•		•		
16	Channel 4 On/Off status	1 bits	1.001	•	•		•	
17	Channel 4 Dimming	4 bits	3.007	•		•		
18	Channel 4 Brightness value	1 byte	5.001	•		•		
19	Channel 4 Brightness value status	1 byte	5.001	•	•		•	

20	Channel 1 Staircase timer enab./disab.	1 bit	1.003	•	•	•		
21	Channel 2 Staircase timer enab./disab.	1 bit	1.003	•	•	•		
22	Channel 3 Staircase timer enab./disab.	1 bit	1.003	•	•	•		
23	Channel 4 Staircase timer enab./disab.	1 bit	1.003	•	•	•		
24	RGBW On/Off	1 bit	1.001	•		•		
25	RGBW On/Off status	1 bit	1.001	•	•		•	
26	RGB Brightness dimming	4 bits	3.007	•		•		
27	RGB Color value	4 bytes	13.001	•		•		
28	RGB Color value status	4 bytes	13.001	•	•		•	
29	General Lock / Unlock	1 bit	1.001	•	•		•	
248	General Scene activate / learn	1 byte	18.001	•		•		
249	General Sequence start/stop	1 byte	18.001	•		•		
250	General Sequences full stop = 0	1 bit	1.001	•		•		

3.5 Communication object description

3.5.1 Individual channels

Name	Object: Channel x On/Off
Function	1-bit communication object to switch on and off the channel.
Description	When a "1" is received through this object the channel is switched on and the brightness level goes up to the last one memorized (different from "0") or to a fixed value according to the parameters configured. When a "0" is received through this object the channel is switched off. By default, the behaviour of the channel when it is switched on through this object is jump to last (see parameter "switch on value").
Name	Object: Channel x - On/Off status
Function	1-bit communication object for feedback signalling of the on / off state of the channel.
Description	When the channel is off and receives a switch on telegram or a brightness value, a "1" is sent through this object. When the channel is on and it receives a switch off telegram or a brightness value of 0% a "0" is sent through this object.

Name	Object: Channel x - Dimming
Function	4-bits communication object for dimming control with pushbuttons.
Description	Depending on the dimming steps set in the pushbutton, telegrams will make the brightness level go up or down according to the ramp speed configured. Break telegrams to this object will stop the brightness at the current level. By default, the behaviour of the channel when it is off and it receives an increase telegram through this object is switching on and dimming. The channel cannot be switched off by decrease telegrams.
Name	Object: Channel x - Brightness value
Function	1 byte communication object for precise control by setting a new brightness level directly.
Description	The brightness level will go up or down slowly according to the channel ramp speed configured. By default, the behaviour of the channel when it is switched off and it receives a value different from 0% through this object is switching on and dimming to receive value. The channel can be switched off with 0% telegrams too.
Name	Object: Channel x - Brightness value status
Function	1-byte communication object for feedback signalling of the current brightness level of the channel.
Description	When it receives a new brightness value or an increase/decrease telegram the final brightness value is sent through this object.
Name	Object: Channel x - Staircase timer enable/disable (=1/0)
Function	1-bit communication object to enable/disable the staircase timer.
Description	It enables or disables the staircase timer of the channel when it receives a 1 or 0 respectively.

3.5.2 RGB / RGBW mode

Name	Object 24: RGB – On/Off
Function	1 bit communication object to switch on and off the 3 or 4 regulation channels at the same time.
Description	When a “1” is received through this object the channels are switched on and brightness level goes up to the last one memorized (different from “0”) or to a fixed value according to the parameters configured (see parameter “Switch on value”). When a “0” is received through this object the channels are switched off. By default, the behaviour of the channels when it are switched on through this object is jump to last value (see parameters “switch on/off time”).

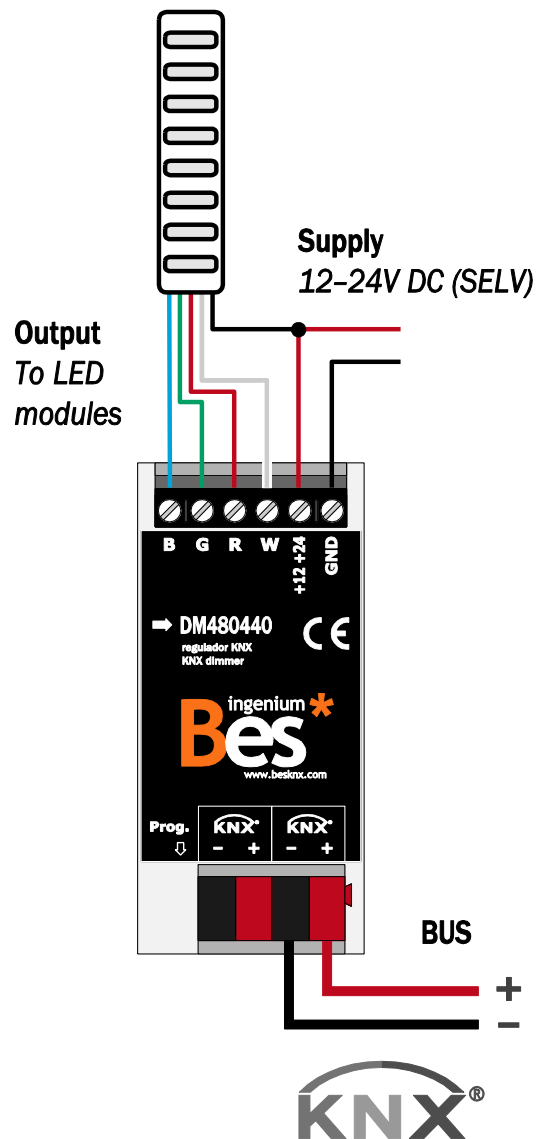
Name	Object 25: RGB - On/Off status
Function	1 bit communication object for feedback signalling of the on / off state of the RGB mode.
Description	When the 3 or 4 channels are off and any of them is switched on a "1" is sent through this object. When all the channels are switched off a "0" is sent through this object.
Name	Object 26: RGB - Dimming
Function	4 bits communication object for color or brightness dimming with pushbuttons.
Description	Brightness dimming function: Depending on the dimming steps set in the pushbutton, telegrams will make the brightness level go up or down according to the individual ramp speed configured without changing the current color. Break telegrams to this object will stop the brightness at the current level.
Name	Object 27: RGB/RGBW – Color value
Function	3/4 bytes communication object for precise control by setting a new color value directly.
Description	It allows to set the color through a 3 or 4 bytes object for the RGB or RGBW channels. The color level will go up or down slowly according to the individual parameter "dimming time" configured.
Name	Object 28: RGB/RGBW - Color value status
Function	1 byte communication object for the status of the RGB/RGBW color.
Description	Communication object for feedback signalling or read the status value of the 3 or 4 channels.

3.5.3 General

Name	Object 29: Lock / unlock
Function	1 bit communication object to lock / unlock the device.
Description	The device can be locked / unlocked by writing "1" / "0" in this object (see parameter "lock/unlock polarity"). When the device is locked the channels values cannot be changed.
Name	Object 248: Scenes: activate / learn
Function	1 byte communication object for internal scenes control.
Description	There are up to 8 scenes available. When a value from 1 to 64 (0x00 to 0x40) is sent to this object the channel will recall its memorized value if it is included in the scene. When a value from 128 to 192 (0x80 to 0xC0) is sent to this object the channel will save its current value in the scene if it is included in it.

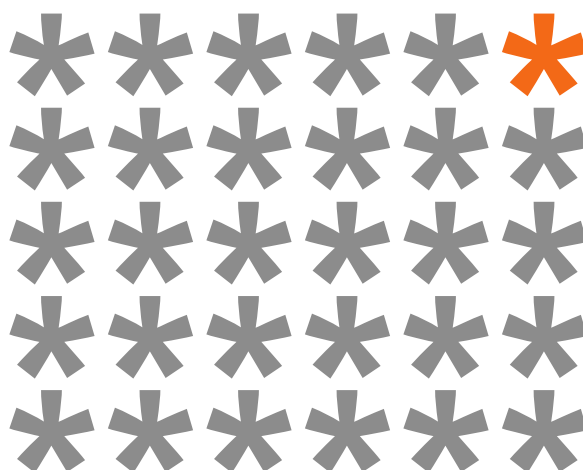
Name	Object 249: Sequences start / stop
Function	1 byte communication object for the programmed sequences control.
Description	<p>There are up to 8 sequences available that can be configured by the programmer. It is possible to execute more than one sequence at the same time.</p> <p>When a value from 1 to 64 (0x00 to 0x40) is sent to this object the sequence will be executed. If the sequence is already in execution it will start again from the beginning.</p> <p>When a value from 128 to 192 (0x80 to 0xC0) is sent to this object the corresponding sequence stops.</p>
Name	Object 250: Sequences: full stop = 0
Function	1 bit communication object to stop all the sequences in execution.
Description	If a value of 0 is received all the sequences in execution stop. A value of 1 has no action.

4 Installation



Feed low voltage lines (BUS and inputs) in separate ducting to that of power (230V) and outputs to ensure there is enough insulation and avoid interferences.

Do not connect the main voltages (230V) or any other external voltages to any point of the BUS or inputs.



KNX products by ingenium



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www.besknx.com

www.ingeniumsl.com

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