



Dimmer

BES-DM470320

# Programming manual



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# 1 General description

El Ref. DM470320 Bes device is a three channel proportional actuator (triac output) that allows to regulate halogens or incandescent lightning up to 500W with transformers incorporated or not.

Designed to obtain a precise digital regulation receiving orders through the bus or from a pushbutton connected to its low voltage input by using long/short pulsations.

The regulating ramp speed (the progressive on/off lighting) another dimming characteristics can be configured by programming.



General characteristics:

- 3 Regulation channels.
- Applicable power per channel depending on the type of load (see technical information).
- 3 low voltage input (SELV) for pushbuttons (non-programmable).
- 16 Programmable scenes that can be executed from bus commands.
- Remote enable / disable of bus control.
- Overload circuit protection.
- Digital regulation control based on microcontroller with more than 250 regulation points.

## 2 Technical information

Main power supply	230Vac	
Max. power consumption	0,5W @ 230Vac	
KNX Supply	29Vdc from KNX BUS	
KNX current consumption	5mA from KNX BUS	
Mounting	DIN rail	
Size	4 DIN modules	
Connections	BUS connection terminal KNX Screw terminals for main supply, outputs and inputs	
Outputs	3 regulation channels (triac output)	
Output power per channel	Incandescent or halogen loads 230V	500W
	Low voltage loads with a conventional transformer incorporated	300W
	Low voltage loads with an electronic transformer incorporated	160W
Inputs	3 low voltage inputs (SELV) referred to an internal reference.	
Inputs current activation	Minimum 15 mA	
Inputs cable distance	30 meters maximum (from the mechanism to the input)	
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

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### 3.1 Application program information

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Catalogue: Ingenium / Dimmers (manufacturer / program name).

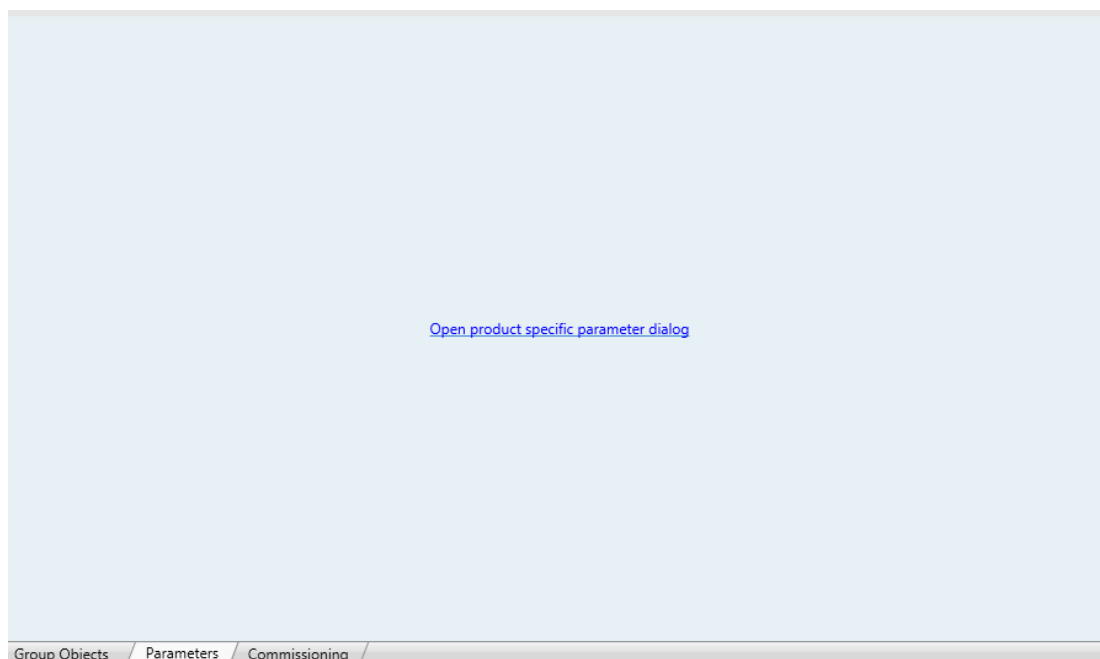
Catalogue Version: v2.1.2

Maximum number of communication objects: 24.

Maximum number of assignments: 25.

ETS minimum required version: 4.1.8 (build 3614)

The parameters of the device are configured with a specific parameter dialog (plug-in); do click on “open” from the parameters menu in the ETS to run it.



### 3.2 Individual address assignment

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

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 Communication objects table

Object	Name   Function	Length	DPT	Flags				
				C	R	W	T	U
0	CH1   On/Off	1 bit	1.001	•		•		•
1	CH1   Dimmer	4 bits	3.007	•		•		•
2	CH1   Value	1 byte	5.001	•		•		•
3	CH1   On/Off state	1 bit	1.001	•	•		•	
4	CH1   Value state	1 byte	5.001	•	•		•	
5	CH2   On/Off	1 bit	1.001	•		•		•
6	CH2   Dimmer	4 bits	3.007	•		•		•
7	CH2   Value	1 byte	5.001	•		•		•
8	CH2   On/Off state	1 bit	1.001	•	•		•	
9	CH2   Value state	1 byte	5.001	•	•		•	
10	CH3   On/Off	1 bit	1.001	•		•		•
11	CH3   Dimmer	4 bits	3.007	•		•		•
12	CH3   Value	1 byte	5.001	•		•		•
13	CH3   On/Off state	1 bit	1.001	•	•		•	
14	CH3   Value state	1 byte	5.001	•	•		•	
15	CH2   Enable/disable timer	1 bit	1.001	•		•		
17	CH2   Scene	1 byte	18.001	•		•		•
18	CH3   Scene	1 byte	18.001	•		•		•
19	CH3   Enable/disable timer	1 bit	1.001	•		•		
21	Enable	1 bit	1.001	•	•	•		
22	CH1   Scene	1 byte	18.001	•		•		•
24	CH1   Enable/disable timer	1 bit	1.001	•		•		

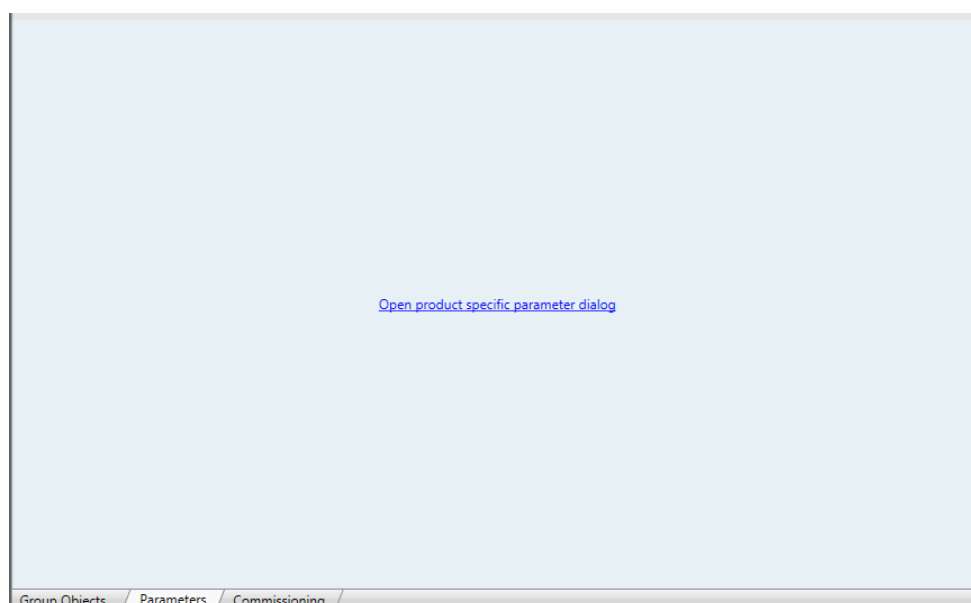
### 3.4 Communication objects description

Name	Object: CHX - On/Off
Function	1-bit communication object to switch on and off the channel.
Description	<p>When a "1" is received through this object the light is switched on and the brightness level goes up to the last one memorized (different from "0").</p> <p>When a "0" is received through this object the light is switched off.</p> <p>By default, the behaviour of the light when it is switched on through this object is jump to last value.</p>
Name	Object: CHX - Dimmer
Function	4-bits communication object for dimming control with pushbuttons.
Description	<p>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.</p> <p>Break telegrams to this object will stop the brightness at the current level.</p> <p>By default, the behaviour of the light when it is off and it receives an increase telegram through this object is switching on and dimming. The light cannot be switched off by decrease telegrams.</p>
Name	Object: CHX - Value
Function	1.byte communication object for precise control by setting a new brightness level directly.
Description	<p>The brightness level will go up or down slowly according to the ramp speed configured.</p> <p>By default, the behaviour of the light 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 light can be switched off with 0% telegrams too.</p>
Name	Object: CHX - On/Off state
Function	1-bit communication object for feedback signalling of the on / off state of the channel.
Description	<p>When the light is off and receives a switch on telegram or a brightness value, a "1" is sent through this object.</p> <p>When the light is on and it receives a switch off telegram or a brightness value of 0% a "0" is sent through this object.</p>
Name	Object: CHX - Value state
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.

<b>Name</b>	<b>Object: Enable</b>
<b>Function</b>	1-bit communication object to enable or disable the device control through the KNX BUS.
<b>Description</b>	<p>When a “0” is received through this object the device cannot be controlled by BUS telegrams (inputs are not disabled). When a “1” is received the device control is enabled.</p> <p>By default the enable function is activated. It is not necessary to use this object to enable the normal function of the device.</p>
<b>Name</b>	<b>Object: CHx - Scene</b>
<b>Function</b>	Objeto de comunicación de 1 byte para la ejecución de escenas internas.
<b>Description</b>	<p>When a value from 1 to 16 (0x00 to 0x0F) is sent to this object the channel will recall its internal scene which number corresponds to the value.</p> <p>The initial value of the first 4 scenes can be programmed in the scenes parameters window.</p> <p>When a value from 128 to 143 (0x80 to 0x8F) is sent to this object the channel will save its current brightness in the scene which number corresponds to the value.</p>
<b>Name</b>	<b>Object: CHx - Enable/disable timer</b>
<b>Function</b>	1-bit communication object to enable or disable the staircase function of the channel.
<b>Description</b>	When a “0” is received through this object the staircase timer of the channel is disabled. When a “1” is received the staircase timer is enabled again.

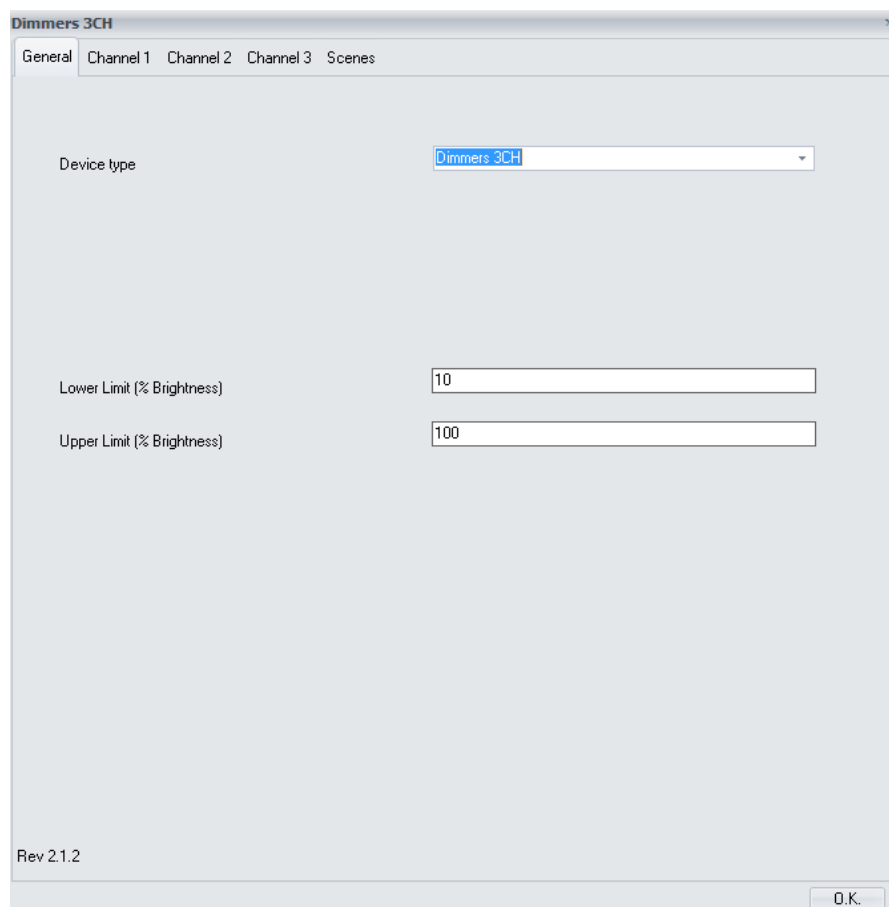
## 3.5 Parameters

The parameters of the device are configured with a specific parameter dialog; do click on “open” from the parameters menu in the ETS to run it.





There are several tabs to configure different parameters depending on the type of the device selected; in this case the device that must be selected is Dimmer 3CH.



Some parameters can be hidden depending on the device selected or the previous configuration. The description of every parameter is shown next:

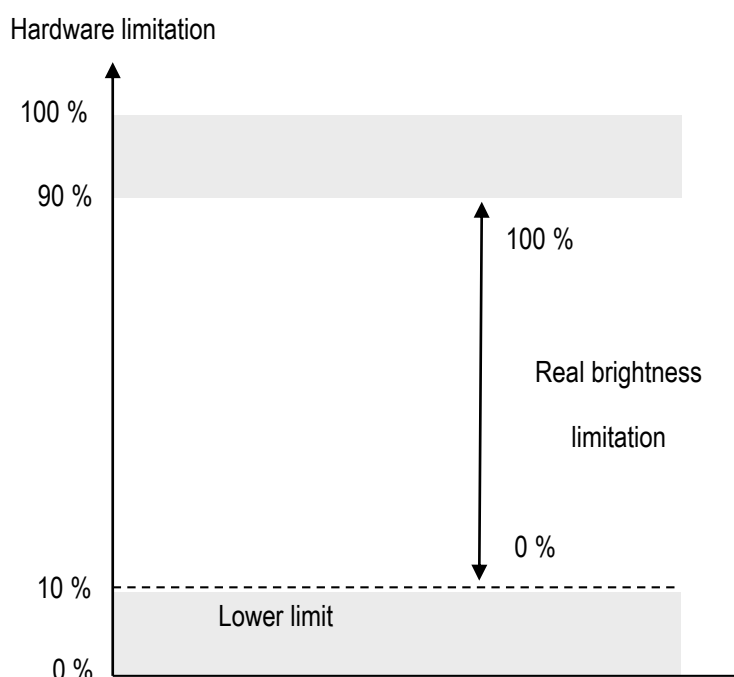
### 3.5.1 General

Name	Device type
Values	Dimmer 1 channel, 2 channels, 3 channels or Dimmer Led RGB.
Description	It allows to select the type of device that will be programmed by the application. The ETS will show or hide communications objects and parameters according to this parameter. In this case the type that must be selected is a 3 channels dimmer

Name	Lower limit (% Brightness)
Values	From 0 to 100
Description	<p>It is the minimum regulation value (hardware limitation) in percentage % that any channel of the dimmer can reach.</p> <p>The brightness level of the dimmer will stop at the lower limit when receiving decrements by precise control telegrams (by objects 2,7 and 12) or dimming telegrams (by objects 1,6,11) and it can only be switched off with a "0" through the on/off or value objects (objects 0,5,10 and 2,7,12).</p> <p>This parameter is only a hardware limitation. The user can dim any value from 0 to 100% but the real brightness value is internally adjusted according to the lower and upper limitation span.</p>
Name	Upper limit (% Brightness)
Values	From 0 to 100
Description	<p>Is the maximum regulation value (hardware limitation) in percentage % that any channel of the dimmer can reach.</p> <p>The brightness level of the dimmer will stop at the upper limit when receiving increments by precise control telegrams (by objects 2, 7 and 12) or dimming telegrams (by objects 1, 6, 11).</p> <p>This parameter is only a hardware limitation. The user can dim any value from 0 to 100% but the real brightness value is internally adjusted according to the lower and upper limitation span.</p>



*The lower and upper limitations are parameters that depend on the model and technology of the lamp. To adjust them correctly first set a 0% value for the lower limit and a 100% value for the upper limit, then check the dimming behaviour of the lamp with the <<CHx - Value>> object, finally set the values with which the behavior of the lamp suits better.*



### 3.5.2 Channel 1/2/3

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

The screenshot shows a software window titled "Dimmers 3CH" with four tabs: "General", "Channel 1", "Channel 2", and "Scenes". The "Channel 1" tab is active. It contains the following settings:

- Ramp time:** 0 min 10 sec
- Switch ON time:** 0 min 00 sec
- Switch OFF time:** 0 min 00 sec
- Behaviour when switching ON:** Last Value
- Allow switching on when new brightness value:** Yes
- Stairs light time:** Disabled
- Retriggerable:** No

An "O.K." button is located at the bottom right of the window.

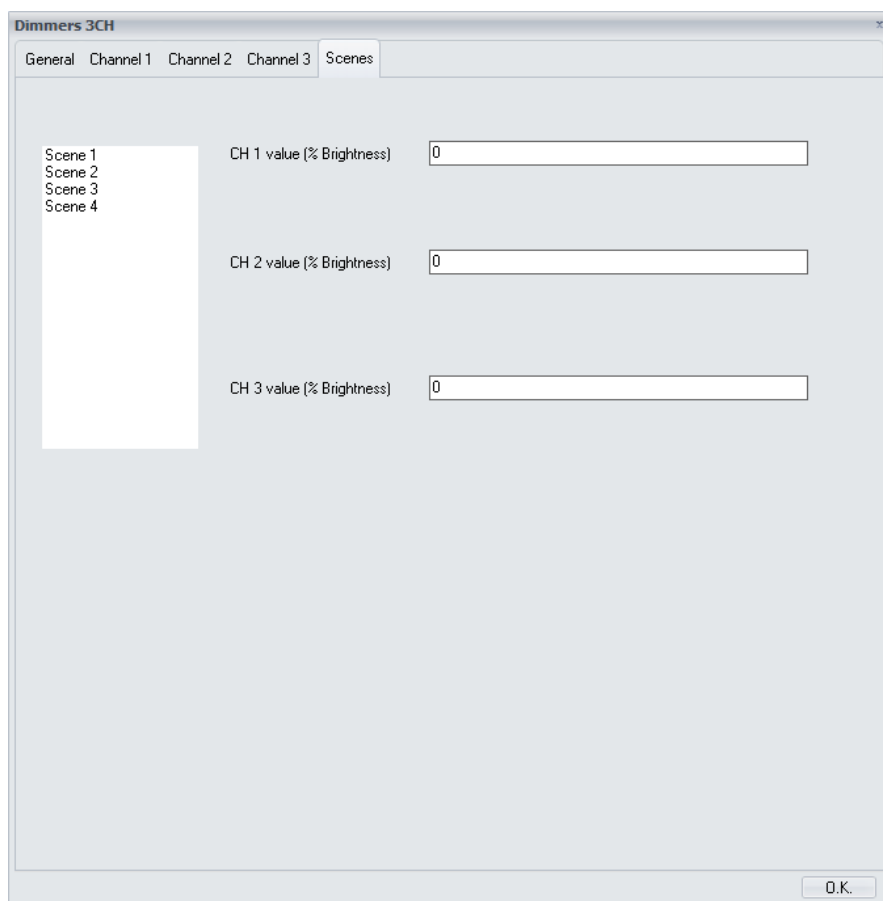
Name	Ramp time (seconds)
Values	From 0min,0sec to 4min,13sec
Description	It is the brightness change rate measured in seconds/minutes. The brightness changes gradually when using Channel X value or dimming communication objects. Typical value = 0min, 10sec (seconds). Lower values will make difficult to obtain a desired value when dimming (by objects 1, 6, 11).
Name	Switch on time
Values	From 0min,0sec to 4min,13sec
Description	It is the brightness change rate measured in seconds/minutes when the channel is switched on (by objects 0, 5 and 10).

Name	Switch off time
Values	From 0min,0sec to 4min,13sec
Description	It is the brightness change rate measured in seconds/minutes when the channel is switched off (by objects 0, 5 and 10).
Name	Behaviour when switching on
Values	Last value or fixed value from 0,78% to 98,82%
Description	It is the brightness level of the channel when it is switched on (by objects 0, 5 and 10). The channel can be configured to dimm up to the last value (different from "0") memorized or dimm to a selected fixed value.
Name	Allow switching on with new brightness value
Values	Yes/no
Description	By default, this parameter is set to yes, and the behaviour of the light when it is switched off and it receives a brightness value different from 0% (by objects 2,7 and 12) is switching on and dimming to received value. If this parameter is set to No, the channel must be switched on first and then it will respond to new brightness values.
Name	Stairs light time
Values	Disabled or fixed value from 5 seconds to 790 minutes
Description	A staircase lighting function can be configured for each channel with this parameter. If enabled, the channel will be switched off automatically after the time configured. During the staircase function, take into account the following behaviour: -The countdown can be retriggerable or not (see next parameter). -The channel can always be switched off manually. It is possible to enable/disable the staircase light timer by sending values 1 and 0 to the corresponding channel communication object (objects 15, 19 and 24).
Name	Retriggerable
Values	Yes/no
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.

### 3.5.3 Scenes

The DM470320 supports up to 16 scenes that can be saved or executed from bus commands with the corresponding communication objects (number 17, 18 and 22). The first 4 scenes brightness presets of the three channels can be configured by programming in the following parameters tab:

:



These values can be overwritten when sending a save telegram to the scene object. The value of the other scenes must be saved by sending the corresponding value to the communication.

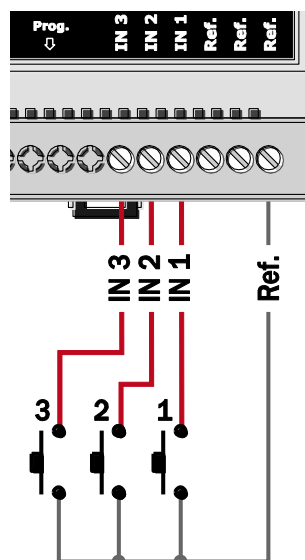
Nombre	Channel 1/2/3 Value
Valores	From 0 to 100 %
Descripción	Is the initial value memorized in the scene for the brightness level of the channel. The brightness level will go up or down slowly according to the ramp speed configured if the scene is executed.

## 3.6 Inputs

### 3.6.1 Connection

This dimmer has 3 low voltage inputs (SELV) that allow to control each of the three regulation channels through pushbuttons.

The inputs are activated when they are connected to “reference” as shown in the next picture:



### 3.6.2 Working mode

Each input is internally associated to its corresponding output: the input IN1 controls the output L1, input IN2 controls the output L2 and input IN3 controls the output L3 (they cannot be programmed with the ETS or associated to any other function).

The working mode for the dimmer control is the classic long/short press:

- A **short press** in the input switches on and off the light completely and instantly. The switch on brightness level will be the last one and the switch off brightness level is always 0%.
- On the other side, a **long press** in the input increases or decreases the brightness slowly according to the ramp configured (if the ramp speed is very fast it will be difficult for the customer to set the brightness level desired).

## 4 Application notes

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### 4.1 Individual channel control with scenes

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#### 4.1.1 Devices

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DM470320: Three channel proportional actuator.

KNX 3 gang pushbutton

KNX 1 gang switch.

#### 4.1.2 Description

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










The dimmer regulates 3 light circuits of the room that are connected to the output 1 (L1), output 2 (L2) and the output 3 (L3) and these lights should be controlled from different pushbuttons situated in two zones of the room.

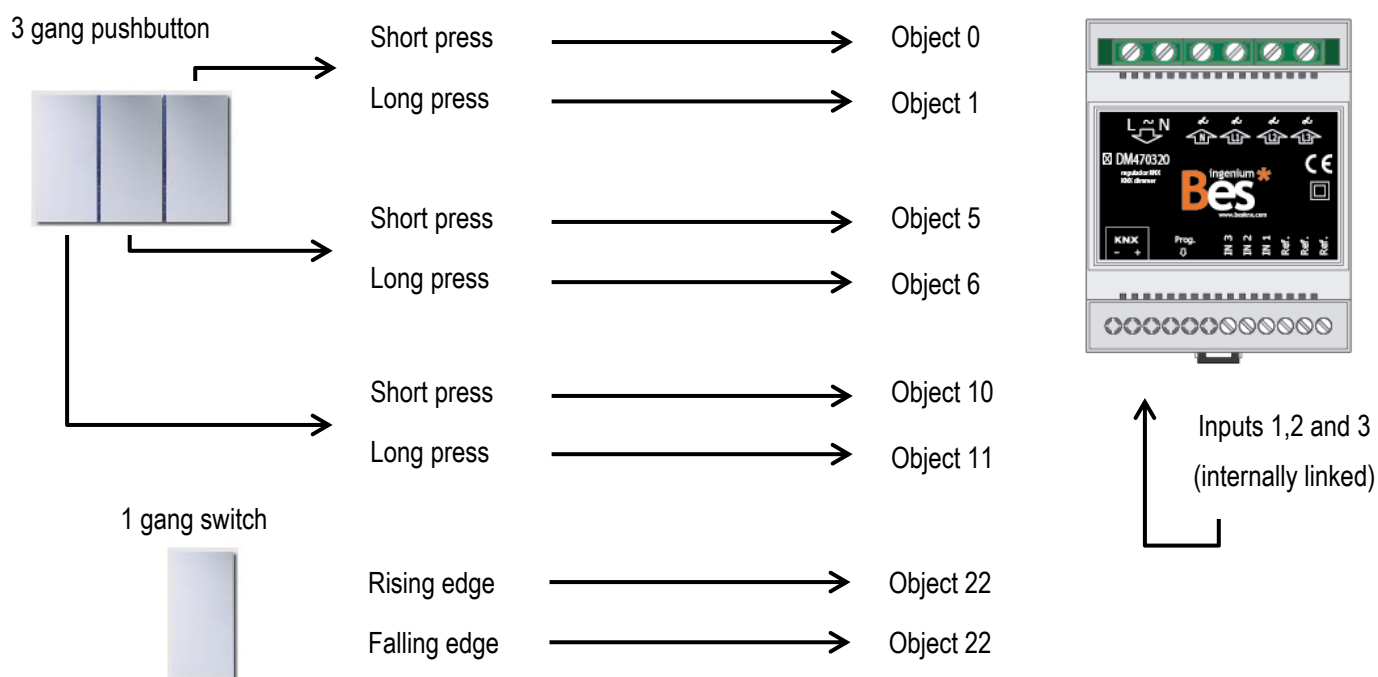
The lights can be controlled from universal pushbuttons connected to the inputs of the device and at the same time from any KNX 3 gang pushbutton connected to the EIB/KNX BUS anywhere.

Another KNX switch will also call two scenes of the dimmer for “All Off” and “All On” of the three channels simultaneously.

#### 4.1.3 Objects links

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Ref. DM470320 – 	Object 0		Object X Short press – KNX pushbutton gang 1
Ref. DM470320 – 	Object 1		Object Y Long press – KNX pushbutton gang 1
Ref. DM470320 – 	Object 5		Object X Short press – KNX pushbutton gang 2
Ref. DM470320 – 	Object 6		Object Y Long press – KNX pushbutton gang 2
Ref. DM470320 – 	Object 10		Object X Short press – KNX pushbutton gang 3
Ref. DM470320 – 	Object 11		Object Y Long press – KNX pushbutton gang 3
Ref. SM470320 – 	Object 22		Object X Switch – KNX 1 gang switch



#### 4.1.4 Parameter settings

The following parameter setting is generally recommended for this example. The ideal parameters may change depending on the application or installation.

Nombre del parámetro		Configuración recomendada
General	Device type	Dimmer 3CH
	Lower limit (% Brightness)	0
	Upper limit (% Brightness)	100
Channel 1	Ramp time (seconds)	10
Channel 2	Ramp time (seconds)	10
Channel 3	Ramp time (seconds)	10
Scenes - Scene 1 (All off)	Ch1 Value (% Brightness)	0
	Ch2 Value (% Brightness)	0
	Ch3 Value (% Brightness)	0



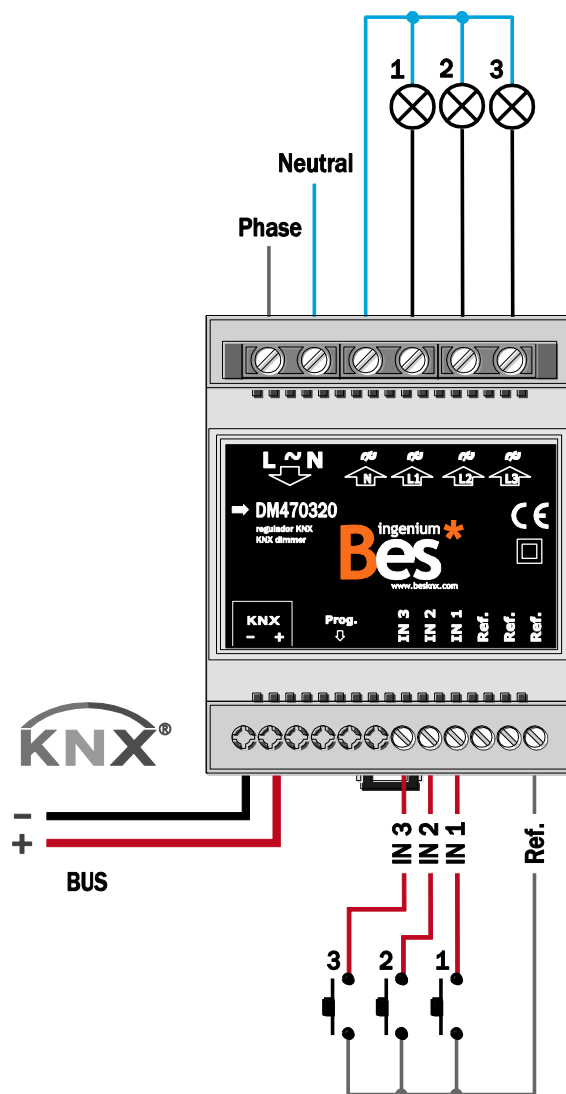
Scenes – Scene 2 (All on)	Ch1 Value (% Brightness)	100
	Ch2 Value (% Brightness)	100
	Ch3 Value (% Brightness)	100
KNX Pushbutton	Gang 1 Short press	Switch - 0/1
	Gang 1 Long press	Increase/Decrease - 100%
	Gang 2 Short press	Switch - 0/1
	Gang 2 Long press	Increase/Decrease - 100%
	Gang 3 Short press	Switch - 0/1
	Gang 3 Long press	Increase/Decrease - 100%
KNX Switch	Gang 1 rising edge	Byte value sent = 0
	Gang 1 falling edge	Byte value sent = 1

The 3xgang KNX pushbutton to control the three channels individually behavior is the typical short-press/long-press working principle: a short press switches on and off the light at the last dimming level meanwhile long press makes the DM470320 increase or decrease the brightness level according to the ramp speed and interval configured. Take into account that the ramp speed must be a high value, if not; it will be difficult to stop the dimming at the brightness desired.

The 1xgang KNX Switch will work sending bytes values to recall the scenes memorized in the dimmer in order to change the three channels directly and instantly.

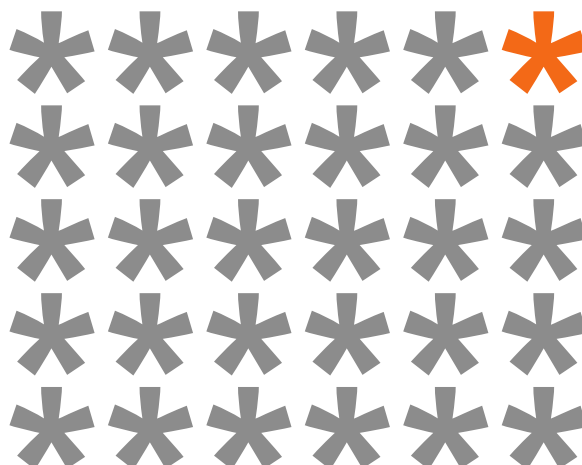
Remember that the inputs of the dimmer are non-programmable and internally associated to their corresponding output. Any channel can be individually controlled by any universal pushbutton (also with short-press/long-press principle).

## 5 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 (230 V) or any other external voltages to any point of the BUS or inputs.



KNX products by ingenium



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