

Proportional actuator

RK3x500

V1.0

PROGRAMMING MANUAL



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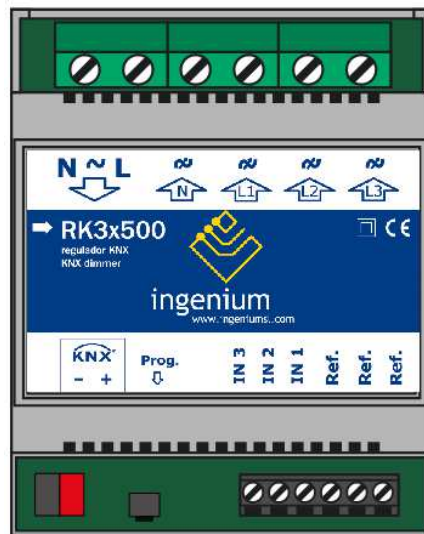
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1 GENERAL DESCRIPTION

The RK3x500 is a three channel proportional actuator (triac output) that allows to regulate halogens or incandescent lighting 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) can be configured by programming.



Characteristics:

- 3 Regulation channels.
- Applicable power per channel depending on the load:
 - Incandescent or halogen loads 230V.....500 W
 - Low voltage loads with a conventional transformer incorporated.....300 W
 - Low voltage loads with an electronic transformer incorporated.....160 W
- 3 low voltage input (SELV) for pushbuttons (non-programmable).
- 8 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 200 regulation points.

2 TECHNICAL INFORMATION

Voltage Supply - 230 Vac

Max. Power consumption - 0,5W @ 230 Vac

KNX Supply - 29 Vdc from KNX BUS

BUS current consumption - 5 mA.

Connections - BUS connection terminal KNX.

Mounting - DIN rail.

Size - 4 DIN modules.

Temperature range - Running: -10°C a 55°C / Storage: -30°C a 60°C / Transport: -30°C a 60°C.

Regulation - According to the directives of electro magnetic 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 COMMUNICATION OBJECTS

Number of communication objects: 23.

Number of assignments: 25.

Object	Name / Function	Length	DPT	Flags				
				C	R	W	T	U
0	CH1 - On/Off	1 bit	1.001	•		•	•	
1	CH1 - Dimmer	4 bit	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 bit	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 bit	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	RGB - On/Off	1 bit	1.001	•		•	•	
16	RGB - Dimmer	4 bit	3.007	•		•	•	
17	RGB - Value	1 byte	5.001	•		•	•	
18	RGB - Bright	1 byte	5.001	•		•	•	
19	RGB - On/Off state	1 bit	1.001	•	•		•	•
20	RGB - Value state	1 byte	5.001	•	•		•	•
21	RK3x500 - Enable	1 bit	1.001	•	•	•	•	
22	Scene	1 byte	5.001	•		•	•	

3.2 OBJECTS DESCRIPTION

Object 0: CH1 - On/Off

1 bit communication object to switch on and off the regulation channel 1. When a “1” is received through this object the dimmer is switched on and the brightness level goes up to the last regulation value. When a “0” is received the dimmer is switched off.

Object 1: CH1 - Dimmer

4 bits communication object for dimming control with pushbuttons. 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. Breaks telegrams to this object will stop the brightness at the current level.

Object 2: CH1 - Value

1 byte communication object for precise control by setting a new brightness level directly. The brightness level will go up or down slowly according to the ramp speed configured.

Object 3: CH1 - On/Off state

1bit communication object for feedback signalling of the on / off state of the dimmer. When the dimmer is off and receives a switch on telegram or a brightness value, a “1” is sent through this object. When the dimmer is on and it receives a switch off telegram or a brightness value of 0% a “0” is sent through this object.

Object 4: CH1 - Value state

1byte communication object for feedback signalling of the current brightness level of the dimmer. When it receives a new brightness value or an increase/decrease telegram the final brightness value is sent through this object.

Object 5: CH2 - On/Off

1 bit communication object to switch on and off the regulation channel 2. When a “1” is received through this object the dimmer is switched on and the brightness level goes up to the last regulation value. When a “0” is received the dimmer is switched off.

Object 6: CH2 - Dimmer

4 bits communication object for dimming control with pushbuttons. 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. Breaks telegrams to this object will stop the brightness at the current level.

Object 7: CH2 - Value

1 byte communication object for precise control by setting a new brightness level directly. The brightness level will go up or down slowly according to the ramp speed configured.

Object 8: CH2 - On/Off state

1bit communication object for feedback signalling of the on / off state of the dimmer. When the dimmer is off and receives a switch on telegram or a brightness value, a “1” is sent through this object. When the dimmer is on and it receives a switch off telegram or a brightness value of 0% a “0” is sent through this object.

Object 9: CH2 - Value state

1byte communication object for feedback signalling of the current brightness level of the dimmer. When it receives a new brightness value or an increase/decrease telegram the final brightness value is sent through this object.

Object 10: CH3 - On/Off

1 bit communication object to switch on and off the regulation channel 3. When a “1” is received through this object the dimmer is switched on and the brightness level goes up to the last regulation value. When a “0” is received the dimmer is switched off.

Object 11: CH3 - Dimmer

4 bits communication object for dimming control with pushbuttons. 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. Breaks telegrams to this object will stop the brightness at the current level.

Object 12: CH3 - Value

1 byte communication object for precise control by setting a new brightness level directly. The brightness level will go up or down slowly according to the ramp speed configured.

Object 13: CH3 - On/Off state

1bit communication object for feedback signalling of the on / off state of the dimmer. When the dimmer is off and receives a switch on telegram or a brightness value, a “1” is sent through this object. When the dimmer is on and it receives a switch off telegram or a brightness value of 0% a “0” is sent through this object.

Object 14: CH3 - Value state

1byte communication object for feedback signalling of the current brightness level of the dimmer. When it receives a new brightness value or an increase/decrease telegram the final brightness value is sent through this object.

Object 15: RGB – On/Off

1 bit communication object to switch on and off the 3 regulation channels at the same time. When a “1” is received through this object the dimmer is switched on and the brightness levels of the channels go up to the last regulation value. When a “0” is received all channels of the dimmer are switched off simultaneously.

Object 16: RGB - Dimmer

4 bits communication object for dimming control with pushbuttons. Depending on the dimming steps set in the pushbutton, telegrams will make the color change according to the ramp speed configured and going over the whole color palette: Off-Red-Green-Blue-White. Breaks telegrams to this object will stop at the current color.

Object 17: RGB - Value

1 byte communication object for precise control by setting a new color value directly. The color level will go up or down slowly according to the ramp speed configured.

Object 18: RGB - Bright

1 byte communication object for setting a new bright value directly. The color selected does not change, only the bright (or intensity of the light) will go up or down.

Object 19: RGB - On/Off state

1bit communication object for feedback signalling of the on / off state of the RGB mode. When the dimmer is off and receives a switch on telegram or a RGB value, a “1” is sent through this object. When the dimmer is on and it receives a switch off telegram or a RGB value of 0% a “0” is sent through this object.

Object 20: RGB - Value state

1byte communication object for feedback signalling of the current color value of the dimmer. When it receives a new RGB value or an increase/decrease telegram the final RGB color value is sent through this object.

Object 21: RK3x300 - Enable

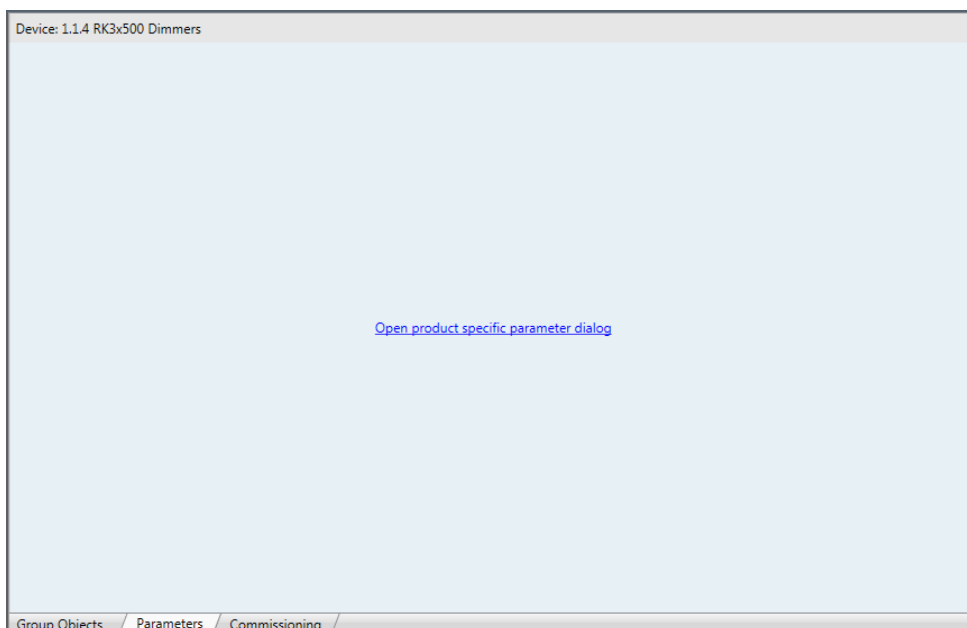
1 bit communication object to enable or disable the device control through the KNX BUS. When a “0” is received through this object the device cannot be controlled by BUS telegrams (inputs are not disabled). When a “1” is received the device is enabled.

Object 22: RGB - Scene

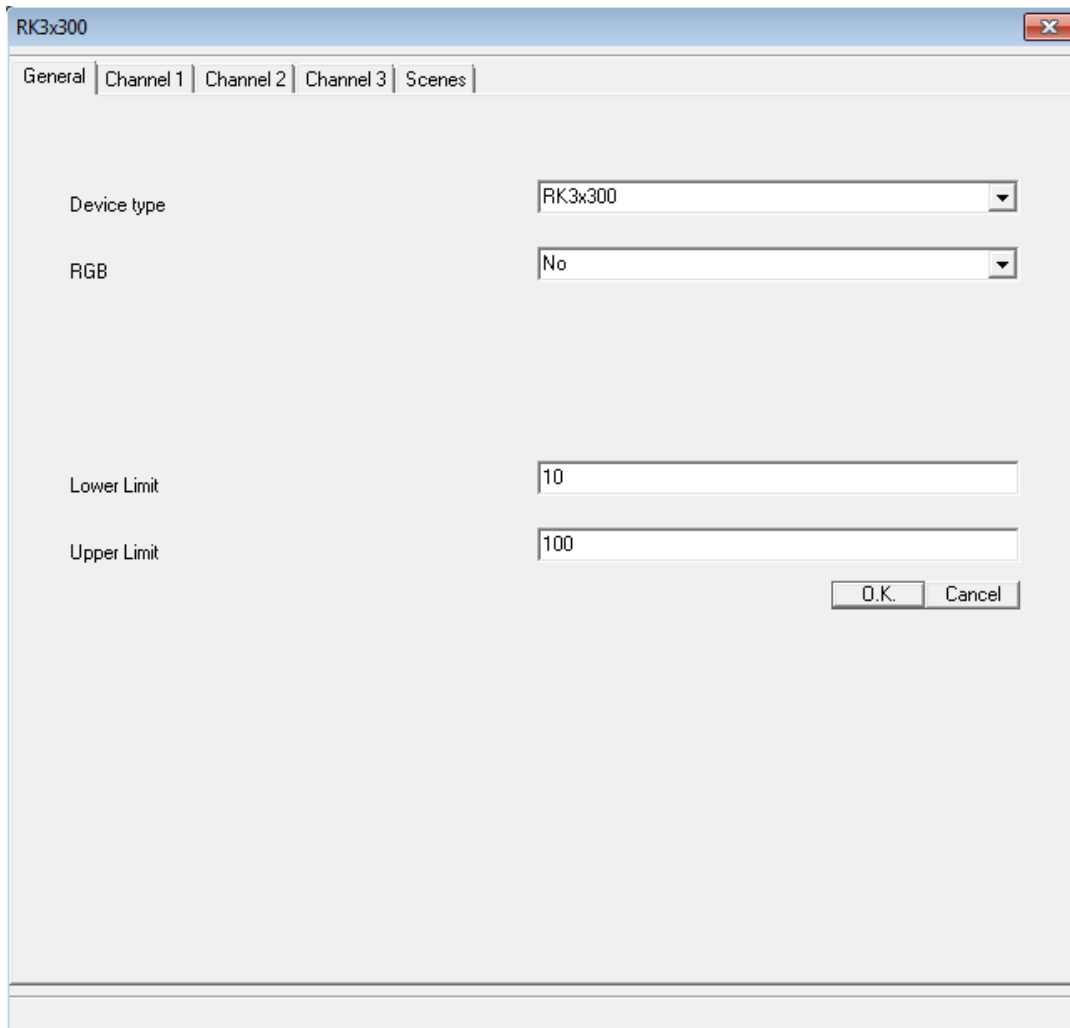
1byte communication object for internal scenes execution. Scenes can be programmed in the parameters window of the device. There are up to 8 scenes available.

3.3 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 RK3x500.



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

3.3.1 GENERAL

Device type	
Values	RK1000/2000, RK2x500, RK3x500, RGBL-K, DALI_virtual_dimmer, DMX_virtual_dimmer
Description	Allows to select the corresponding 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 device that must be selected is RK3x500.

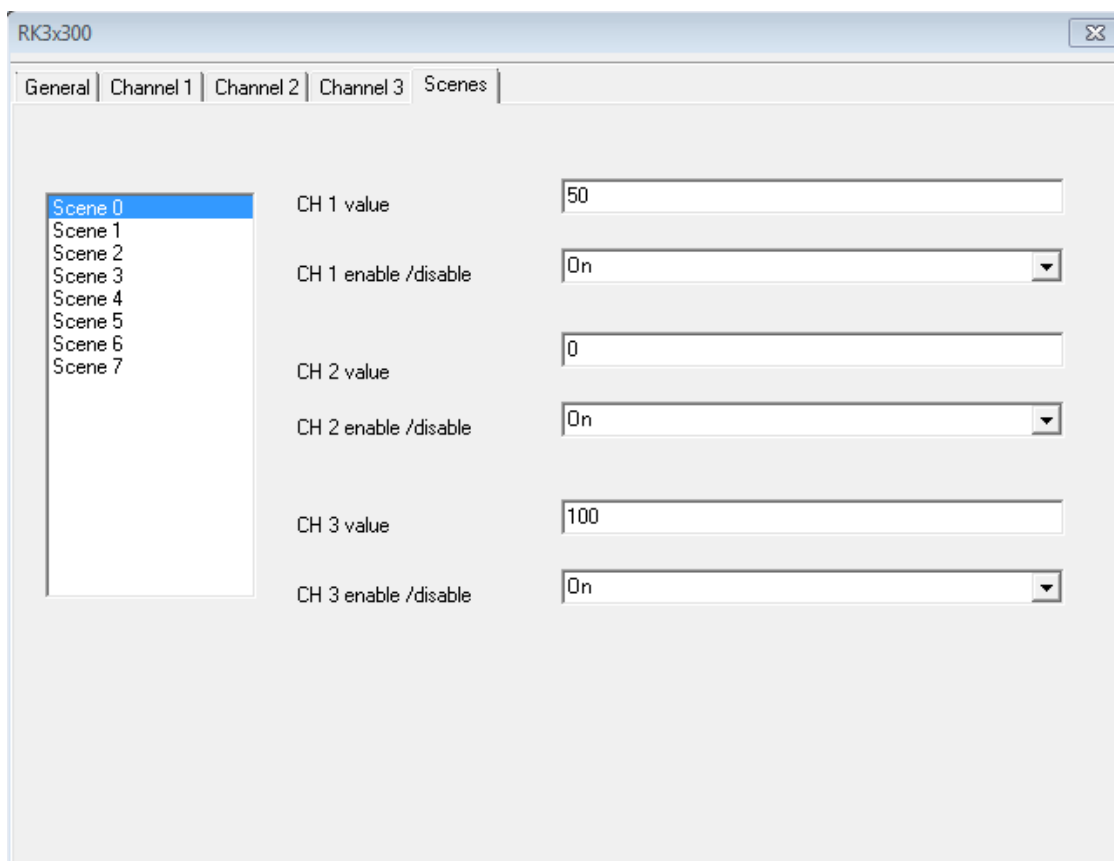
RGB mode	
Values	Yes/No
Description	Select if the RGB mode is enabled or not. In case of being enabled the RGB specific communication objects will be shown. These objects allow set a color directly by controlling the three channels simultaneously among other things.
RGB ramp speed (sec)	
Values	From 0 to 255
Description	Hidden if RGB mode = No. It is the color change speed in RGB mode when using RGB value or RGB dimmer communication objects measured in seconds. Typical value = 10 (seconds).
Lower limit	
Values	From 0 to 100
Description	Is the minimum regulation value (in percentage %) that any channel of the dimmer can reach. 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).
Upper limit	
Values	From 0 to 100
Description	Is the maximum regulation value (in percentage %) that any channel of the dimmer can reach. 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).

3.3.2 CHANNEL 1/2/3

Ramp speed (sec)	
Values	From 0 to 255
Description	It is the brightness change rate measured in seconds. The brightness changes gradually when using Channel X value or dimmering communication objects. Typical value = 10 (seconds).

3.3.3 SCENES 0 TO 7

The RK3x500 allows to configure up to 8 scenes that can be executed from bus commands with the corresponding communication object (number 22). The presets of the three channels when calling a scene are configured in the following parameters tab:



The screenshot shows a software window titled 'RK3x300' with a tabbed interface. The 'Scenes' tab is active. On the left, a list contains 'Scene 0' through 'Scene 7', with 'Scene 0' highlighted. To the right, there are six configuration fields for the selected scene:

- CH 1 value: 50
- CH 1 enable /disable: On
- CH 2 value: 0
- CH 2 enable /disable: On
- CH 3 value: 100
- CH 3 enable /disable: On

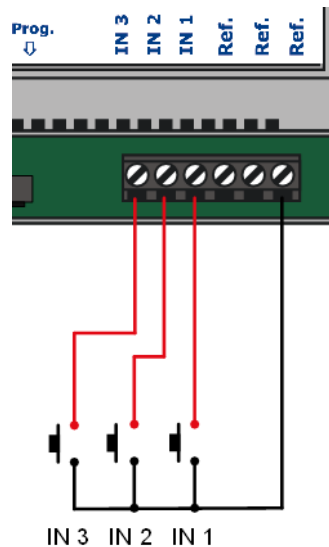
Channel 1/2/3 Value	
Values	From 0 to 100
Description	Is the value memorized in the scene for the brightness level of the channel. The brightness level will go up or down slowly according to the ramp speed configured if the scene is executed.
Channel 1/2/3 Enable	
Values	Yes/No
Description	Select if the channel is enabled (included in the scene) or not. In case of being enabled the channel will set the brightness configured in the value parameter when the scene is called.

3.4 INPUTS

3.4.1 CONNECTION

The RK3x500 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:



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.

3.4.2 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

4.1 INDIVIDUAL CHANNEL CONTROL WITH SCENES

4.1.1 DEVICES

RK3x500: Three channel proportional actuator.

KNX 3 gang pushbutton

KNX 1 gang switch.















4.1.2 DESCRIPTION

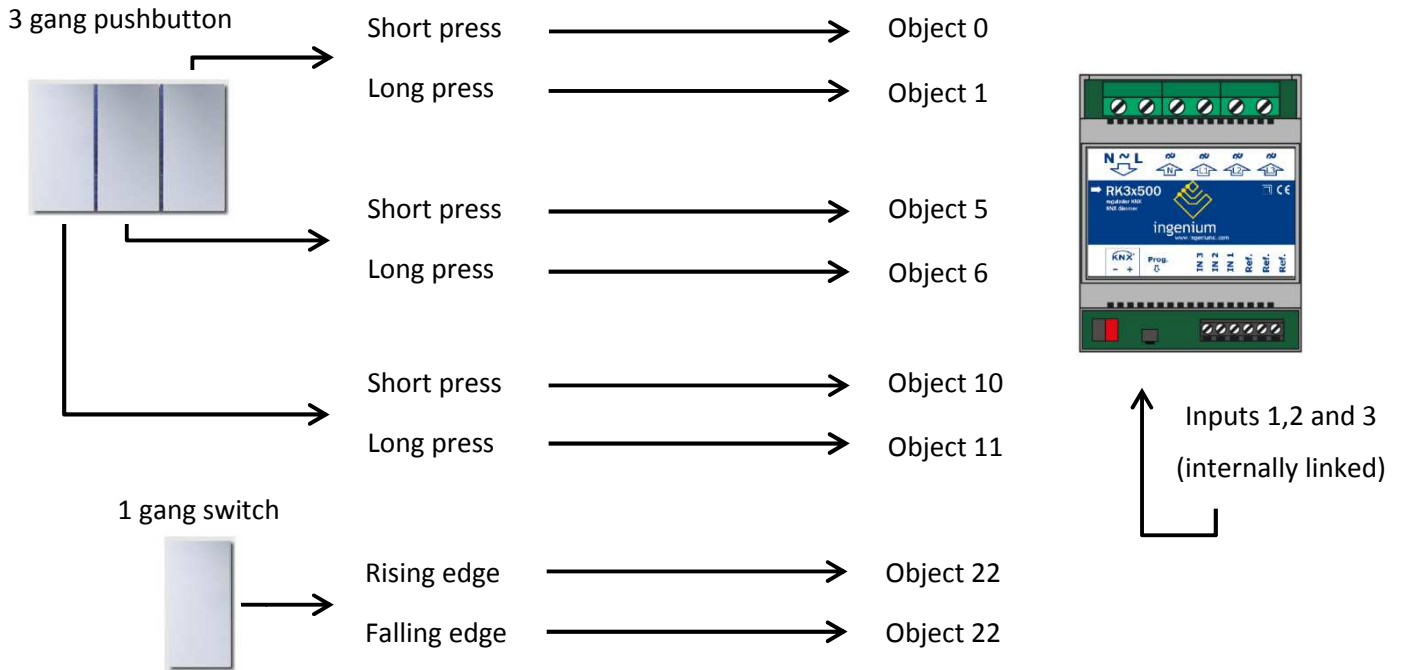
The RK3x500 regulates 3 light circuits of the room that are connected to the output 1 (L1), output 2 (L2) and the output 3 (L3) and these lights should be controlled from different pushbuttons situated in two zones of the room.

The lights can be controlled from universal pushbuttons connected to the inputs of the RK3x500 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

RK3x500 –		Object 0	->		Object X Short press – KNX pushbutton gang 1
RK3x500 –		Object 1	->		Object Y Long press – KNX pushbutton gang 1
RK3x500 –		Object 5	->		Object X Short press – KNX pushbutton gang 2
RK3x500 –		Object 6	->		Object Y Long press – KNX pushbutton gang 2
RK3x500 –		Object 10	->		Object X Short press – KNX pushbutton gang 3
RK3x500 –		Object 11	->		Object Y Long press – KNX pushbutton gang 3
RK3x500 –		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.

Parameter name		Recommended setting
General	Device type	RK3x500
	RGB Mode	No
	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 0 (All off)	Ch1 Value (% Brightness)	0
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	0
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	0
	Ch3 Enable/Disable	Yes

Scenes – Scene 1 (All on)	Ch1 Value (% Brightness)	100
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	100
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	100
	Ch3 Enable/Disable	Yes
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 RK3x500 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 RK3x500 in order to change the three channels directly and instantly.

Remember that the inputs of the RK3x500 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).

4.2 RGB CONTROL WITH COLOR SCENES

4.2.1 DEVICES

RK3x500: Three channel proportional actuator.

KNX 1 gang pushbutton: For three-channel color control


KNX 3 gang switch: For scenes recalling.

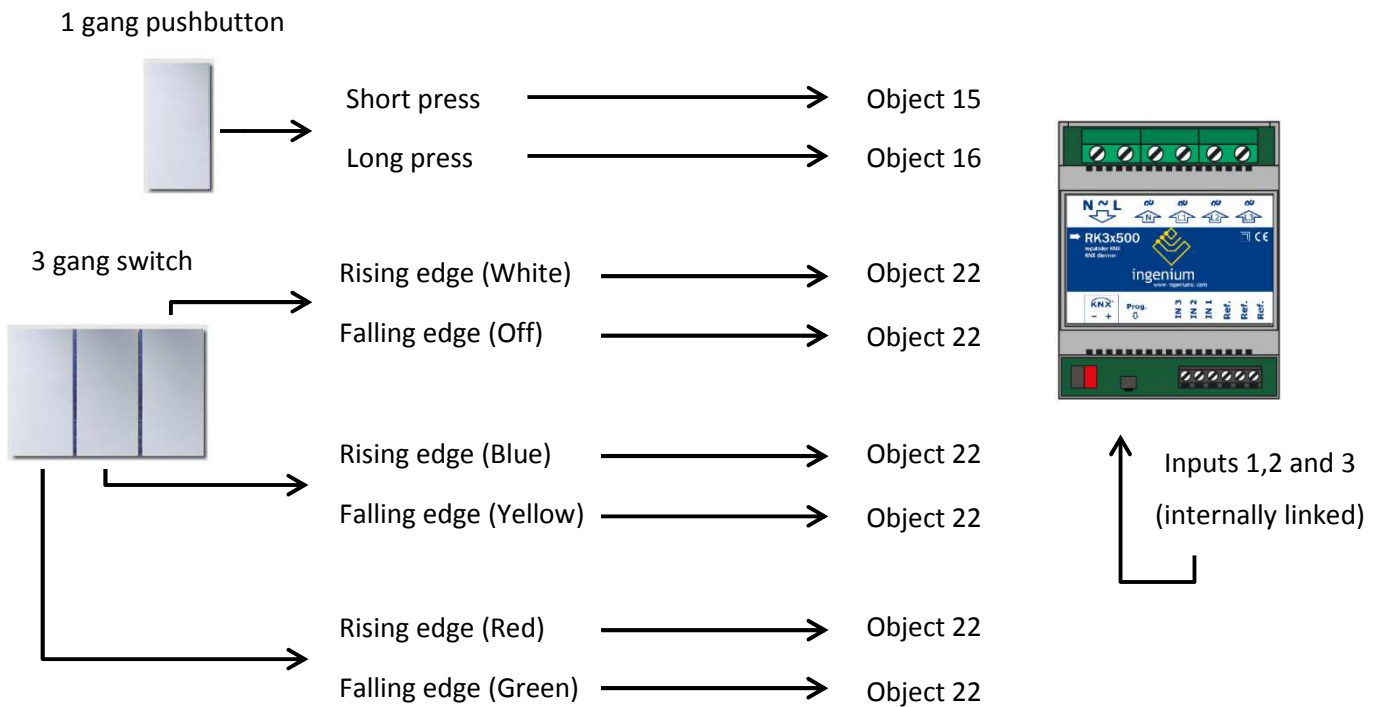
4.2.2 DESCRIPTION

The RK3x500 regulates 3 color light circuits (Red, Green and Blue) of the room that are connected to the output 1 (L1), output 2 (L2) and the output 3 (L3) respectively. The three lights should be controlled from a pushbuttons simultaneously (going over the whole color palette) and also from another three switches to recall color scenes directly (Red, Green, Blue, Yellow, White and Off).

The lights can be controlled from universal pushbuttons connected to the inputs of the RK3x500 and at the same time from any KNX pushbutton connected to the EIB/KNX BUS anywhere.

4.2.3 OBJECTS LINKS

RK3x500	–		Object 15	->		Object X Short press – KNX pushbutton
RK3x500	–		Object 16	->		Object Y Long press – KNX pushbutton
RK3x500	–		Object 22	->		Object X Rising edge – KNX Switch gang 1
RK3x500	–		Object 22	->		Object Y Falling edge – KNX Switch gang 1
RK3x500	–		Object 22	->		Object X Rising edge – KNX Switch gang 2
RK3x500	–		Object 22	->		Object Y Falling edge – KNX Switch gang 2
RK3x500	–		Object 22	->		Object X Rising edge – KNX Switch gang 3
RK3x500	–		Object 22	->		Object Y Falling edge – KNX Switch gang 3



4.2.4 PARAMETER SETTINGS

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

Parameter name		Recommended setting
General	Device type	RK3x500
	RGB Mode	Yes
	RGB Ramp time (seconds)	15
Scenes - Scene 0 (White)	Ch1 Value (% Brightness)	100
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	100
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	100
	Ch3 Enable/Disable	Yes
Scenes – Scene 1 (Off)	Ch1 Value (% Brightness)	0
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	0
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	0
	Ch3 Enable/Disable	Yes

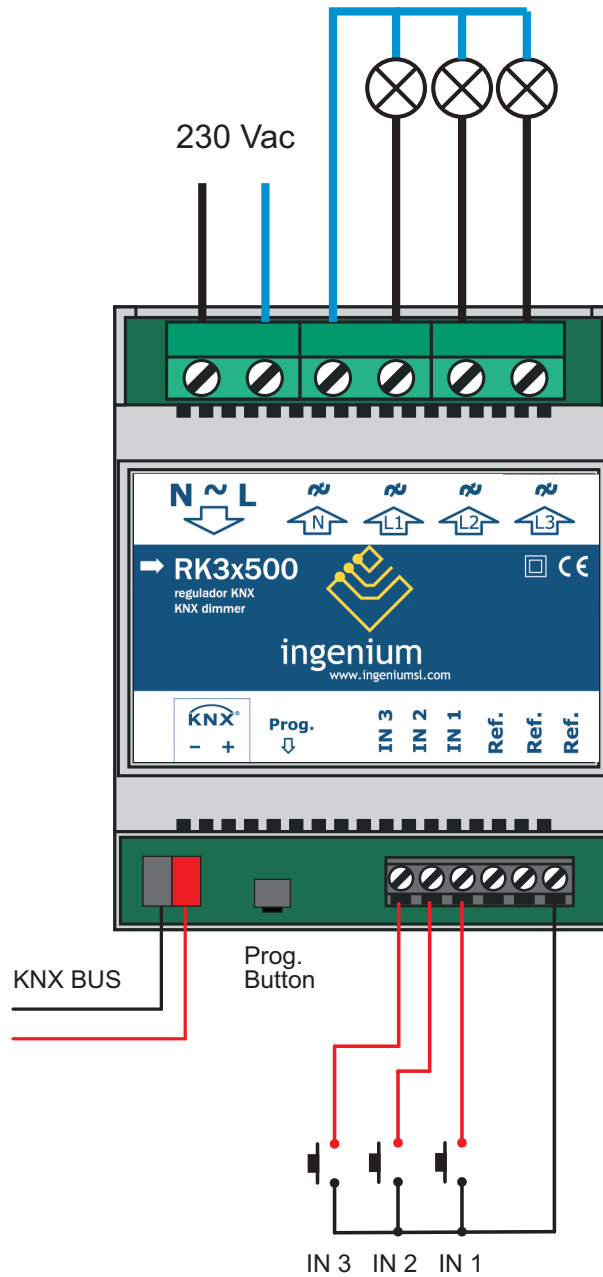
Scenes - Scene 2 (Blue)	Ch1 Value (% Brightness)	0
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	0
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	100
	Ch3 Enable/Disable	Yes
Scenes – Scene 3 (Yellow)	Ch1 Value (% Brightness)	100
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	50
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	0
	Ch3 Enable/Disable	Yes
Scenes - Scene 4 (Red)	Ch1 Value (% Brightness)	100
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	0
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	0
	Ch3 Enable/Disable	Yes
Scenes – Scene 5 (Green)	Ch1 Value (% Brightness)	0
	Ch1 Enable/Disable	Yes
	Ch2 Value (% Brightness)	100
	Ch2 Enable/Disable	Yes
	Ch3 Value (% Brightness)	0
	Ch3 Enable/Disable	Yes
KNX Pushbutton	Short press	Switch - 0/1
	Long press	Increase/Decrease - 100%
KNX Switch	Gang 2 rising edge	Byte value sent = 4
	Gang 2 falling edge	Byte value sent = 5
	Gang 3 rising edge	Byte value sent = 2
	Gang 3 falling edge	Byte value sent = 3
	Gang 4 rising edge	Byte value sent = 0
	Gang 4 falling edge	Byte value sent = 1

The 1xgang KNX pushbutton to control the three colors simultaneously behavior is the typical short-press/long-press working principle: a short press switches on and off the three lights at the last dimming level meanwhile long press makes the RK3x500 go over the whole color palette: off-red-green-blue-white (changing direction with increases or decreases orders). Take into account that the ramp speed must be a high value, if not; it will be difficult to stop the dimming at the color desired.

The 3xgang KNX Switch will work sending bytes values to recall the scenes memorized in the RK3x500 in order to change to a color directly and instantly.

Remember that the inputs of the RK3x500 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





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