	Blumotix s.r.l.	BX-DUNIV01
	Via Bedazzo 2, 48022 Lugo (RA) – Italy	User manual
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		Rev: 02 - 18/12/202x

BX-DUNIV01

2-channel universal dimmer

Rev.	Date	Description	Editor
02	18/12/202x	New release for hardware upgrade and functions	F. Melandri P. Zambelli

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Glossary

- CO: communication object
- Datapoint, dpt: type of data, data format; see KNX standard documentation
- LED: light emitting diode
- Msg: message

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1 Introduction

BX-DUNIV is a universal two-channel control device, operating on KNX protocol. The module can provide up to 300W, 230vac, for each channel; different types of load can be managed such as, for example, RLC, LED or CFL light sources.

BX-DUNIV can adjust up to low brightness, even modern type lighting such as fluorescent lamps and LEDs. It stabilizes the brightness of low-power sources and avoids undesirable effects such as buzzing, flashing or instability of various types.

2 General information

Each channel can be configured with a different adjustment curve to suit the type of load installed. Outputs can be controlled in two ways: "Front cut" or "Rear cut"; different ramp times can also be set depending on the KNX control datapoint. Scenarios, stair lights, channel block and other functions are provided to adapt the operation to the specific application.

The front panel allows the manual control of the outputs, during commissioning, and signals the status and any errors or malfunctions.

Provides indications on the lack of mains voltage and over-temperature problems through the LEDs of the front and via KNX bus.

BX-DUNIV is designed for residential and industrial applications; the IP20 case is suitable for mounting on DIN rails (35mm, EN60715), the device width is 4 modules (72 mm).

The power supply provided to the module is dedicated to the output power control; the KNX bus voltage instead, feeds the internal logic. The module is therefore able to operate even in the absence of mains voltage; in this case, the outputs will be disabled, but messages can still be issued on the bus to signal the abnormal condition.

3 Setup

The configuration is done through ETS software; the application allows the setting of parameters and the use of related communication objects. The parameters are differentiated according to whether they are general or channel specific.

3.1 General

This section contains general communication parameters and objects and includes functions related to all channels simultaneously.

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1.1.1 BX-DUNIV01 > General

General	Mains frequency	⦿ 50 Hz ◯ 60 Hz
+ Dimmer 1	Dimmer 1	◯ Disable ⦿ Enable
+ Dimmer 2	Dimmer 2	◯ Disable ⦿ Enable
	Mains alarm	◯ Disable ⦿ Enable
	Send mains alarm	◯ Disable ⦿ Enable
	Mains alarm value	◯ 0 = alarm; 1 = no alarm ⦿ 1 = alarm; 0 = no alarm
	Overtemperature protection	◯ Disable ⦿ Enable
	Send overtemperature warning	◯ Disable ⦿ Enable
	Overtemperature warning value	◯ 0 = alarm; 1 = no alarm ⦿ 1 = alarm; 0 = no alarm
	Send overtemperature alarm	◯ Disable ⦿ Enable
	Overtemperature alarm value	◯ 0 = alarm; 1 = no alarm ⦿ 1 = alarm; 0 = no alarm

3.1.1 Mains frequency

It allows the selection of the frequency of the voltage of the electrical network that feeds the device; it is necessary to specify it in order to adapt the behavior to the environment of the installation.

Mains frequency	◯ 50 Hz ⦿ 60 Hz

3.1.2 Single channel enabling: Dimmer 1, Dimmer 2

If the application only requires one channel, the other one can be disabled to simplify the device configuration. If a channel is disabled, all parameters and COs related to it will be hidden.

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+ Dimmer 2		Dimmer 1	⦿ Disable ◯ Enable
		Dimmer 2	◯ Disable ⦿ Enable

3.1.3 Mains alarm

If enabled, it manages the behavior of the device in case of a drop in the mains voltage and it also manages the following possible reset.

Mains alarm	◯ Disable ⦿ Enable
Send mains alarm	◯ Disable ⦿ Enable
Mains alarm value	◯ 0 = alarm; 1 = no alarm ⦿ 1 = alarm; 0 = no alarm

The condition of lack of mains voltage is visually indicated by the LEDs on the front of the device: the 2 LEDs related to C1 will flash alternately to the 2 LEDs related to C2, at a frequency of about 1 second.

The "Send mains alarm" parameter enables the presence of the dedicated CO 22 to send an alarm message on the KNX bus.

📬 22	All dimmers	Mains alarm	1 bit	C	R	-	T	-	alarm

The value of the message is specified by the parameter "Mains alarm value".

3.1.4 Overtemperature protection

The device is protected by an abnormal increase in internal temperature. A sensor measures the temperature inside the device. In order to avoid damage, this sensor first limits the power delivered on the outputs (warning); if the temperature continues to rise despite the limitation, the module completely interrupts the supply by turning off the outputs (alarm).

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Overtemperature protection	◯ Disable ◉ Enable
Send overtemperature warning	◯ Disable ◉ Enable
Overtemperature warning value	◉ 0 = alarm; 1 = no alarm ◯ 1 = alarm; 0 = no alarm
Send overtemperature alarm	◯ Disable ◉ Enable
Overtemperature alarm value	◉ 0 = alarm; 1 = no alarm ◯ 1 = alarm; 0 = no alarm

The intervention thresholds for protection against internal temperature shall be set at:

- Increase over 55° C → warning power limitation provided at 25%
- Descent below 52°C → removal of the limitation
- Increment over63°C → power outage
- Descent below58°C → alarm removal

The power limitation condition can trigger a warning msg (CO 23) enabled on the bus by using the "Send overtemperature warning" parameter.

▣ 23	All dimmers	Overtemperature warning	1 bit	C	R	-	T	-	alarm

The msg value is specified by the parameter "Overtemperature warning value".

The power failure condition can trigger the sending on the bus of an alarm msg (CO 24) enabled by the parameter "Send overtemperature alarm".

▣ 24	All dimmers	Overtemperature alarm	1 bit	C	R	-	T	-	alarm

The msg value is specified by the parameter "Overtemperature alarm value".

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3.1.5 General commands communication objects

These objects, when written by KNX bus, are routed to all channels of the device. The single channel will execute the command only if the specific parameter enables this behavior (paragraph 3.2.6).

18	All dimmers	Set ON-OFF	1 bit	C	-	W	-	-	switch
19	All dimmers	Set ON stairs light	1 bit	C	-	W	-	-	switch
20	All dimmers	Dimming	4 bit	C	-	W	-	-	dimming control
21	All dimmers	Set absolutely %	1 byte	C	-	W	-	-	percentage (0..100%)

CO 18 – Set ON-OFF

It controls ON or OFF switching of channels.

CO 19 – Set ON stairs light

If the channel is configured for the scale function, this CO allows to control the switching and the start of the timing.

CO 20 – Dimming

Brightness control with 4-bit datapoint.

CO 20 – Set absolutely %

Set all channels to the percentage value specified in msg.
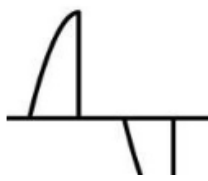
3.2 Dimmer X

This section contains parameters and communication objects specific to the single channel.

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1.1.1 BX-DUNIV01 > Dimmer 2 > General

General	Dimming value at command ON	◉ Previous value ○ 100%
− Dimmer 2		
General	Minimum cut OFF value (%)	0
Scene	Maximum cut OFF value (%)	100
Lock function	Dimming time for 1 bit GO (dpt 1.001) command ON (sec)	3
Stairs light	Dimming time for 1 bit GO (dpt 1.001) command OFF (sec)	5
	Dimming time for 1 byte GO and scene (dpt 5.001, 18.001) command (sec)	7
	Dimming time for 4 bit GO (dpt 3.007) command (sec)	10
	Stairs light function	○ Disable ◉ Enable
	Scene function	○ Disable ◉ Enable
	General commands	○ Disable ◉ Enable
	Percent command and status GOs	○ Disable ◉ Enable
	Lock function	○ Disable ◉ Enable
	Reset behavior	○ OFF ◉ Last value
	Mains resume behavior	○ OFF ◉ Last value
	Phase cut type	○ Leading edge ◉ Trailing edge
	Trailing edge	

3.2.1 Dimming value at command ON

It allows to select the output behavior on ignition.

Dimming value at command ON   ◉ Previous value ○ 100%

Ignition means the use of the communication object with a 1-bit datpoint.

🔁 1	Dimmer 2	Set ON-OFF	1 bit	C	-	W	-	-	switch

Starting from an off-output condition, when the message corresponding to this CO is set to value 1, the module commands the ignition of the load. The brightness level reached by the output with this command depends on the parameter:

"100%" → it sets the maximum level

"Previous value" → it sets the level that the output had before being turned off

3.2.2 Minimum/Maximum cut OFF value (%)

These parameters set the physical limits of output adjustment.
During an adjustment decrease, when the module reaches the minimum limit set in the parameter, the output will be turned off without operating the adjustment below that value.
During an adjustment increment, when the output reaches the maximum limit set in the parameter, the brightness will be stopped at the set value without increasing further.

Minimum cut OFF value (%)	0
Maximum cut OFF value (%)	100

These parameters are useful to properly manage some models of lighting fixtures that may present anomalies if the regulation of the supplied energy goes below or above certain limits; this prevents flashing phenomena or unwanted ignition, flickering and other light instabilities.
After setting these parameters, the adjustment values will be normalized with respect to the two new limits, with the new 0% that will correspond to the minimum physical adjustment and the new 100% that will correspond to the maximum physical adjustment.

3.2.3 Dimming ramp intervals

With the times set in these fields, we mean the interval needed to adjust the output from the minimum to the maximum value. In the configuration, these ramp times were differentiated according to the control that triggered the adjustment.

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We have 4 different control options corresponding to the adjustment ranges shown in the figure:Comando ON, dpt 1 bit (CO 0, 1, 12, 13, 14, 15)

- Command OFF, dpt 1 bit (CO 0, 1, 14, 15)
- Percentage/scenario adjustment, dpt 1 byte (CO 4, 5, 6, 7, 14, 15)
- Dimming adjustment, dpt 4 bit (CO 2, 3)

Dimming time for 1 bit GO (dpt 1.001) command ON (sec)	3
Dimming time for 1 bit GO (dpt 1.001) command OFF (sec)	5
Dimming time for 1 byte GO and scene (dpt 5.001, 18.001) command (sec)	7
Dimming time for 4 bit GO (dpt 3.007) command (sec)	10

As already mentioned, the set time is intended to operate the adjustment of the entire range. If the required adjustment range is smaller, the time taken will be proportionally shorter.

For example, with the values shown in the figure: assuming that the output is at 50%, by selecting a scenario (using CO 6, 7) with 100% final level the device will operate the adjustment in 3.5 seconds (7 seconds from 0% to 100%).

See description of command communication objects (paragraph 3.2.12).

3.2.4 Stairs light function

It enables time management of the output. This function is often used in the management of stairs lights.

Stairs light function	○ Disable ◉ Enable

By enabling management, a communication object dedicated to the timed command is also made available.

13	Dimmer 2	Set ON stairs light	1 bit	C	-	W	-	-	switch

Setting this CO to value 1, the output is turned on, starting the timing; the specific parameters of the management are available on a dedicated page.

The parameter "Stairs light delay" is the time interval after which the output is turned off.

The parameter "Restart stairs light", if set to "Enable", allows the reset of the timer by an additional command via CO. If during the timed power on of the output, 1 is written again on the CO of "Set ON stairs light", the countdown of the shutdown will start again from the value of the parameter "Stairs light delay".

3.2.5 Scene function

This parameter, if set to "Enable", allows the management of scenarios as per KNX standard.

It is now available a command CO that selects the KNX scenario number to activate. It is also available a parameters page for the settings dedicated to this management.

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The device handles up to 8 scenarios for each channel; each scenario includes a parameter "Scene number X" with the number of the KNX scenario to which the device must react (1-64); a parameter "Scene value" with the level to be set on the output (0%-100%) and "Store scene value" that enables the current output level to be stored in the module instead of the one set in the parameter; this can happen if the dedicated CO is written with a special value (bit7=1 and scenario number on which to store the current level. See KNX standard documentation for details).

On the scenario activation command, the level transition will take place using as ramp time the parameter shown in paragraph 3.2.3 "Dimming ramp intervals".

3.2.6 General commands

Enables the channel to react to general command communication objects written from the bus (paragraph 3.1.5).

If the parameter is set to "Disable", writing general command COs will be ignored.

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3.2.7 Percent command and status GOs

Percent command and status GOs　　　◯ Disable　◉ Enable

When set to "Enable", it makes two additional communication objects available for the channel (both with 1 byte format).

- Command CO: it sets the output to the level specified by the bus written value
- CO status: it returns from the device of the assumed value from the output

5	Dimmer 2	Set absolutely %	1 byte	C - W - -	percentage (0..100%)
11	Dimmer 2	Stat dim value %	1 byte	C R - T -	percentage (0..100%)

On the percentage command, the level transition will be done using as ramp time the parameter shown in paragraph 3.2.3 "Dimming ramp intervals".

3.2.8 Lock function

This parameter, if set to "Enable", adds the blocking function to the channel management.

Lock function　　　◯ Disable　◉ Enable

The block allows to temporarily inhibit the execution of commands directed to the channel. It is activated by writing the dedicated communication object. The block state is returned by another specific CO.

15	Dimmer 2	Set lock	1 bit	C - W - -	boolean
17	Dimmer 2	Lock status	1 bit	C R - T -	boolean

The management behavior can be adapted using the parameters on the "Lock function" page.

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1.1.1 BX-DUNIV01 > Dimmer 2 > Lock function

General		
Dimmer 2	Lock message type	○ 0 = lock; 1 = unlock ● 1 = lock; 0 = unlock
General	Lock mode	OFF ▼
Scene	Unlock mode	Custom value ▼
Lock function	Light value (%)	80 ▲▼
Stairs light		

The "Lock message type" parameter indicates which value should be written to the CO of "Set lock" to activate the lock. Writing the opposite value, you get the unlocking, that is the restoration of the normal functionality of the channel.

The "Lock mode" parameter specifies the behavior of the channel at the moment of activation of the lock; they can be:

- "OFF": l'uscita viene spenta
- "No change": nessuna azione
- "Custom value": imposta un valore specificato dal parametro "Light value"

Il parametro "Unlock mode" specifica il comportamento del canale nel momento della disattivazione del blocco; possono essere:

- "OFF": output is turned off
- "No change": no action
- "Custom value": it sets a value specified by the "Light value" parameter
- "Last value": it restores the value that the output had at the time of blocking

3.2.9 Reset behaviour

Reset behavior	○ OFF ● Last value

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It specifies the output behavior when the device is powered on or after the ETS application is downloaded.

The output can remain off by setting "OFF" or assume the level it had before the device shut down by setting in this parameter "Last value".

3.2.10 Mains resume behaviour

This parameter is only made visible if the mains voltage drop alarm is enabled in the general parameters (paragraph 3.1.3).

Mains resume behavior   ○ OFF ◉ Last value

It is necessary to configure the output behavior to reset the mains voltage after a drop of the same.
The output can remain off by setting "OFF" or assume the level it had before switching off the device by setting "Last value".

3.2.11 Phase cut type

It indicates how the power output is managed and, in particular, how the regulation is operated by cutting the half-wave of the mains voltage.
This parameter allows you to choose between "Leading edge" and "Trailing edge", and the choice, which the user must do, depends on the type of load connected to the output.

Phase cut type   ◉ Leading edge ○ Trailing edge

Leading edge

The front cut adjustment (leading edge) occurs when the dimmer partializes the initial part of the half-wave, so the electric current is disabled in the front of the AC input waveform immediately after zero crossing. This method is generally more suitable for

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the regulation of electromechanical transformers for BT lamps, CFL and LED lamps 230 V.

The rear shear adjustment (trailing edge) occurs when the dimmer biases the end of the half-wave, so the electric current is switched off at the end of the AC input waveform just before the zero crossing step. Such a method is in general more suitable for the regulation of electronic transformers for halogen lamps or low-voltage, incandescent, halogen LEDs.

3.2.12 Command and status communication objects

Below is a summary of the CO for each channel. Some of these have already been described in the function-specific sections.

1	Dimmer 2	Set ON-OFF	1 bit	C	-	W	-	-	switch
3	Dimmer 2	Dimming	4 bit	C	-	W	-	-	dimming control
5	Dimmer 2	Set absolutely %	1 byte	C	-	W	-	-	percentage (0..100%)
7	Dimmer 2	Scene	1 byte	C	-	W	-	-	scene control
9	Dimmer 2	Status ON-OFF	1 bit	C	R	-	T	-	switch
11	Dimmer 2	Stat dim value %	1 byte	C	R	-	T	-	percentage (0..100%)
13	Dimmer 2	Set ON stairs light	1 bit	C	-	W	-	-	switch
15	Dimmer 2	Set lock	1 bit	C	-	W	-	-	boolean
17	Dimmer 2	Lock status	1 bit	C	R	-	T	-	boolean

CO Set ON-OFF (0, 1)

It manages channel ON or OFF switching. dpt object format 1 bit, switch (see also section 3.2.1). Adjustment range specified by "Dimming ramp intervals" (paragraph 3.2.3).

CO Status ON-OFF (8, 9)

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It represents the current ON or OFF switching state of the channel. This message is output by the device as a result of writing the corresponding setting command (0, 1). 1 bit dpt object format, switch.

CO Dimming (2, 3)

Command to adjust the output level increment or decrease. 4-bit dpt object format, dimming control. Adjustment range specified by "Dimming ramp intervals" (paragraph 3.2.3).

CO Set absolutely % (4, 5)

Setting command of the absolute percentage value to be implemented on the output (see also section 3.2.7). Format of the dpt object 1 byte, percentage (0...100%). Adjustment range specified by "Dimming ramp intervals" (paragraph 3.2.3).

CO Stat dim value % (10, 11)

It represents the current level of output in percent (see also section 3.2.7). This message is issued by the device at the end of the adjustment ramp as a result of any command given to the channel. Format of the dpt object 1 byte, percentage (0...100%).

CO Scene (6, 7)

KNX scenario selection or storage command. (see also paragraph 3.2.5). dpt object format 1 byte, scene control. Adjustment range specified by "Dimming ramp intervals" (paragraph 3.2.3).

CO Set ON stairs light (12, 13)

Timed output ignition command (see also section 3.2.4). dpt object format 1 bit, switch. Ignition interval specified by "Dimming ramp intervals" (paragraph 3.2.3).

CO Set/Status lock (14, 15 / 16, 17)

Communication objects for command and status of channel block function (see also section 3.2.8). dpt object format 1 bit, boolean. Ignition interval specified by "Dimming ramp intervals" (paragraph 3.2.3).