Actuators

CT4XXXX0

V2.0

Programming manual

ingenium*

Bes

www.besknx.com

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1   General description

The range of BES actuators is composed by several devices, some of them with low voltage inputs (SELV) with common intern reference to connect conventional pushbuttons or switches and free potential relay outputs.

Depending on the device you are using, the actuators outputs can control on/off electrical circuits (1 output for each circuit), shutters/blinds (2 different outputs for each shutter/blind motor), fan coil circuits (3 different outputs to control the fan coil velocity) and valves (1 output for each valve controlled).

Due to their high cut capacity, these devices are also recommended to capacitive charges, joints and to control other electric devices.

The inputs can work in different modes, allowing devices to control binary outputs, dimmers or blinds, both independently or simultaneously. The data transmission is possible when there is a rising edge, a falling edge, a short push or a long push depending on the work mode. The 7SZ-K device can control up to 7 different ventilation grilles but shouldn´t be used for shutter/blind control.

They have an advanced arithmetic logical unit (ALU) which enables the use of complex logic operations, timer programming, counting programming, etc. using these internal results of operation or other internal variables.

1.1   Considerations about this manual

This manual explains how to program all the range of BES actuators, describing in the next chapter every technical details of each one of the devices and specifying, for that purpose, the references and the names of the devices.

VERY IMPORTANT:

This manual is applicable to the following actuators:

- ✓ CT422220
- ✓ CT432240
- ✓ CT431620
- ✓ CT431640
- ✓ CT430920
- ✓ CT430940
- ✓ CT430720
- ✓ CT416420
- ✓ CT416440
- ✓ CT416430
- ✓ CT423220
- ✓ CT422220
- ✓ CT454420*
- ✓ CT454020

*The equipment with reference CT454420, although it is in the next table with the technical information, is a special actuator whose outputs has only the functionality of controlling signalization LEDS through open-collector transistors.

2 Technical description

	2E2S-K CT422220	3E2S-K CT423220	4E-K CT454020	4E4S-K CT454420	6E4S-K(30A) CT416430	6E4S-K(16A) CT416440	9S-K CT430940	16S-K CT431640	22S-K CT432240	7SZ-K CT430720
Supply	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS	29 V$_{DC}$ KNX BUS
Consumption	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	
Disp. BUS equ.	2 (1 BUS device equals 5mA)									
Mounting	Universal register box				DIN rail					
Size	50x50x23 mm	50x50x23 mm	45x45x10 mm	45x45x10 mm	4 modules	4 modules	6 modules	9 modules	12 modules	4 modules
Connections	-KNX BUS connection -Screw terminal strip for outputs -Fast micro connector for inputs		- KNX BUS connection - Fast micro connector for inputs and outputs		- KNX BUS connection - Screw terminal strip for inputs and outputs		- KNX BUS connection - Screw terminal strip for inputs and outputs			
Manual Control	NO	NO	NO	NO	NO	YES	YES	YES	YES	NO
Inputs	2	3	4	4	6	6	0	0	0	0
Outputs	2	2	0	4	4	4	9	16	22	14 (7 pairs)
Operation for on/off circuits	≤ 2	≤2	0	≤4*	≤4	≤4	≤9	≤16	≤22	0
Op. for blinds	≤1	≤1	0	0	≤2	≤2	≤4	≤8	≤11	7 Vents (**NO Shutter/blind**)
Op. for Fan coil	0	0	0	0	≤1	≤1	≤2	≤4	≤5	0
Op. for valves	≤ 2	≤2	0	0	≤4	≤4	≤9	≤16	≤22	0
Cut-off capacity	16@230Vac	16@230Vac	NO	--	30@230Vac	16@230Vac	16@230Vac	16@230Vac	16@230Vac	

Temperature range	Operation: -10 ºC a 55 ºC / Storage: -30 ºC a 60 ºC / Transportation: -30 ºC a 60 ºC
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 Catalogue application ETS information

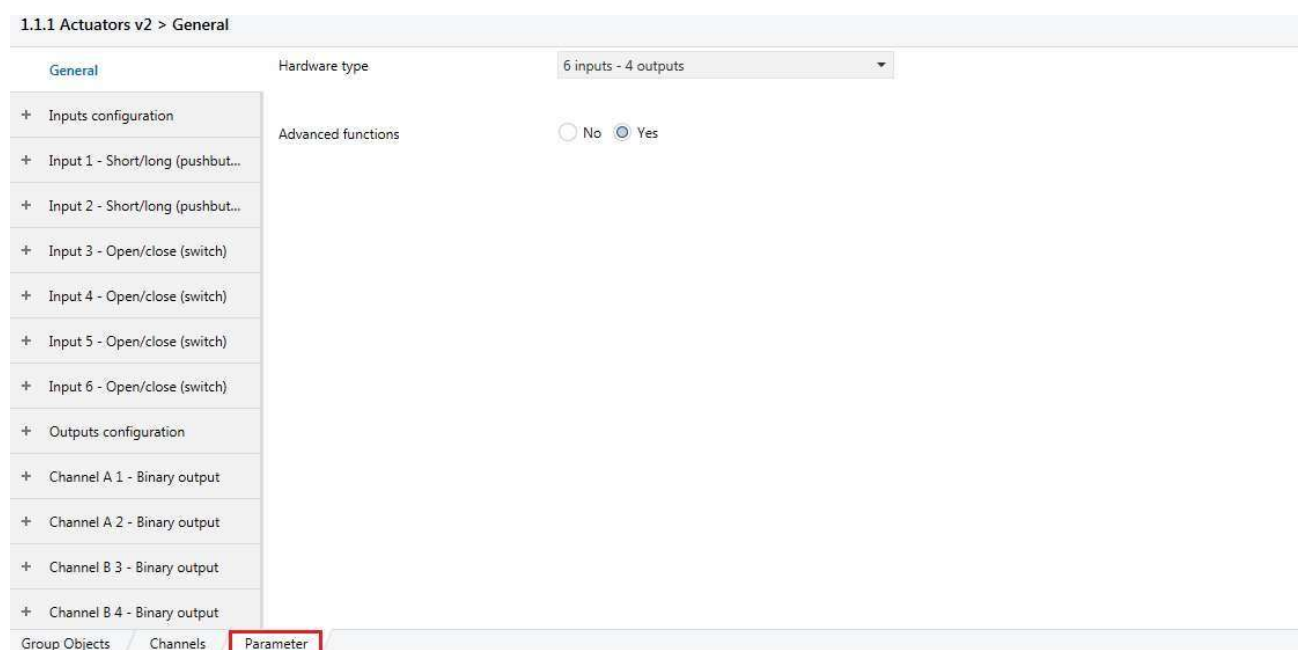Catalogue: Bes (manufacturer) / Actuadores_7.1 (name).

Catalogue version: 2.0

Maximum number of communication objects: 256.

Maximum number of assignments: 256.

Minimum ETS version: 4.1.8

The device functionality is settled in the parameter window..

## 3.2 Individual address assignment

This range of actuators has a programming button, which is placed in the front of the device, to establish the individual KNX direction.

A red LED close to the programming button illuminates when it is manually pressed or when the device is remotely forced to programming mode.

The LED switches off immediately if ETS has assigned correctly an individual direction, if programming button is pressed manually again or if it is directly switched off by diagnostic functions

3.3 Hardware type

The hardware type you desire to program is selected in the dropdown menu "Hardware type" inside the general parameters as it is shown in the next image.
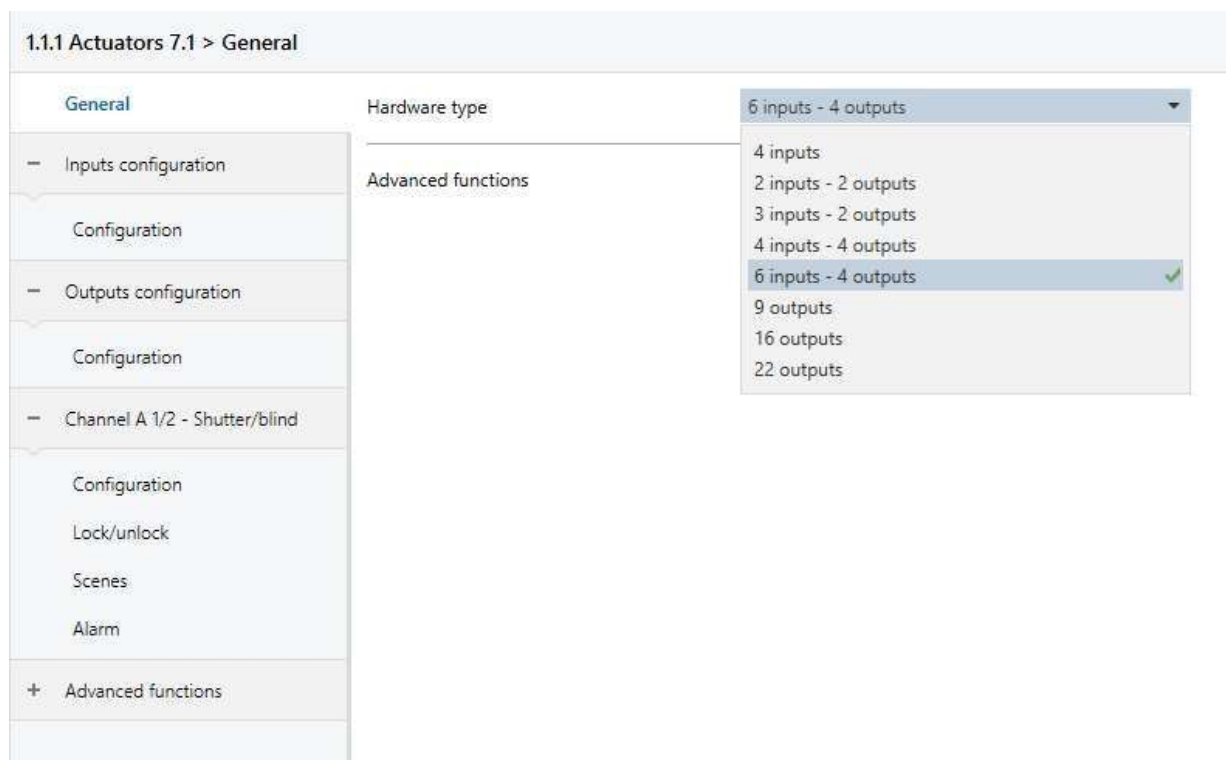
Depending on the selected hardware type, a dropdown menu will be available in the left part with all the available configuration for the selected device; appearing the number of inputs, outputs and other additional functions.

Each one of these inputs and outputs can be configured to work at different modes, both independently or simultaneously.

The outputs can be programed in binary mode, shutter/blind, fan-coil or valve depending on the functionality of each device (see table in chapter 2)

3.4   Inputs configuration

The inputs of the actuators can be configured in switching mode, pushbutton mode (short/long push) or, simply, can be disabled if they are not going to be used.
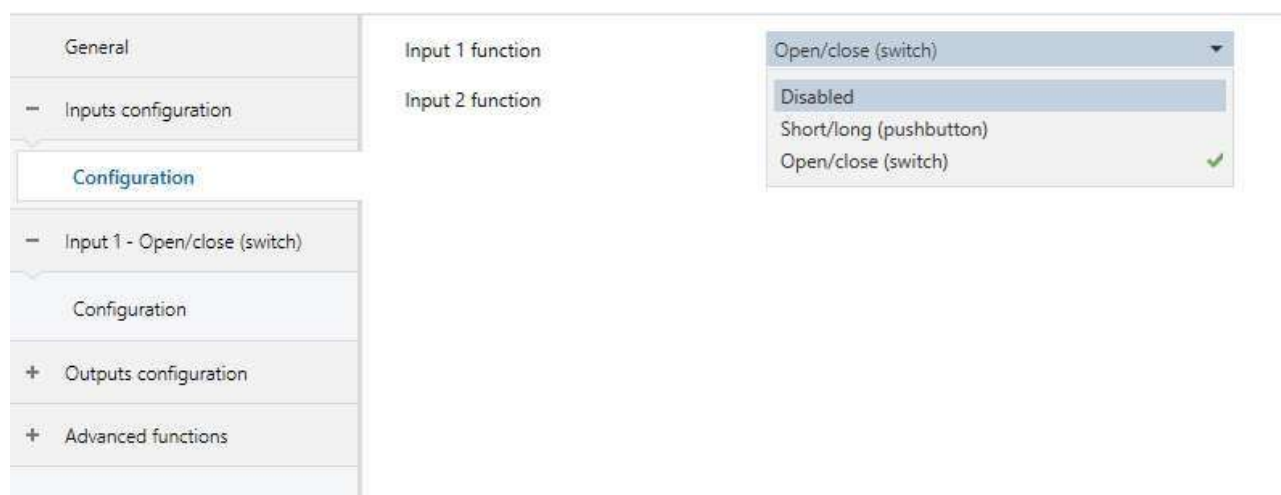
An explanation of the functionality for an input is featured bellow. It is applicable to all of the inputs in the selected device.

3.4.1 Input configured as switch

3.4.1.1 Communication objects

Object	Name - Function	Length	DPT	Flags				
				C	R	W	T	U
164	Button 1 – Close (object 1) - Switch on/off	1 bit	1.001	●		●	●	
165	Button 2 – Close (object 1) - Switch on/off	1 bit	1.001	●		●	●	

3.4.1.2 Parameter description for the switch

When the work mode of an input is defined as a "switch" you can configure the following parameters::

- **Number of objects**: An important consideration in the configuration of the inputs as a switch is the possibility of send to the bus two communication objects. If you select two objects, the following options can be chosen both in the object 1 and in the object 2. Moreover, it will appear a new communication object corresponding to the second object.

- **Input response**: You can choose between open, closed or changing between open and close. If you select the open/close option, you must choose one value to open and other value to close the relay.

Object 1

Input response   Close

| Open |
| Close | ✓ |
| Open / Close |
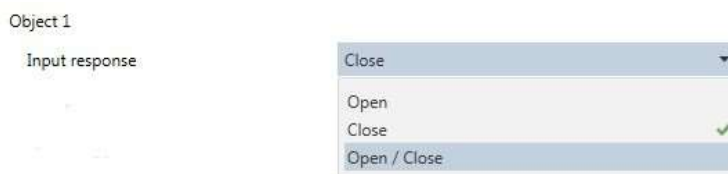
- **Action**: It is the action that the output is going to do. The options are on/off, send a value or execute a scene. If the action is to execute a scene a new menu will appear to write the number of the scene to execute and to select if the recording of a new value through the correspondent communication object is allowed.

Action   Switch on/off

| Switch on/off | ✓ |
| Send value |
| Scene |
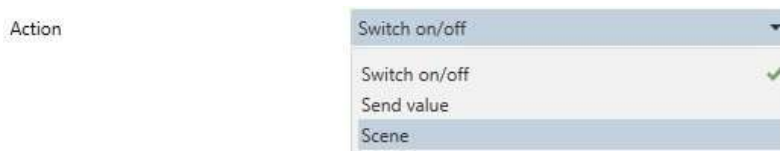
- **Close value**: It is the value when the output close. It can send always a 0, a 1 or switch.

Close value   Switch

| Send '0' |
| Send '1' |
| Switch | ✓ |

3.4.2   Input configured as pushbutton

3.4.2.1   Communication objects

| Object | Name \| Function | Length | DPT | Flags | | | | |
				C	R	W	T	U
164	Button 1 - Short press - Switch on/off	1 bit	1.001	●		●	●	
165	Button 1 - Long press - Switch on/off	1 bit	1.001	●		●	●	

It can be observed that it has two communication objects available, one to a short push and other for a long push.

3.4.2.2   Parameters description for the pushbutton

Both short press and long push have the same options available.so bellow there are described the ones for the shortpress.

- **No action**: No action will be taken at the output.

- **Switch on/off**: Press working as a switch.The available values are on, off and switch.

- **Send Value**: Press that sends a value between 1 and 255 through the bus.

- **Dimming**: Press working in dimmer mode. The associated values to the dimmers are: increase, decrease or increase/decrease alternatively.

- **Shutter/Blind**: Press working in shutter/blind mode. The values in the blind mode are two: move and stop. In the case you select the option "move" the values available to select are: up, down and up/down alternatively.

- **Scene:** Press to execute or record a scene. The values when the press is configured as a scene are: execute or record indicating the number of scene you want to act on.

Every options are available both short and long press. Press time must be configured to distinguish between short or long push.

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3.5   Outputs configuration

Depending on the selected output type, it will occupy one, two or four slots. In this case it also depends on whether the reference that is being used has or not this functionality. This means that, if the desired functionality is the control of a luminaire it will use only one slot (one output), if it is configured as shutter/blind it will use two slots (two outputs: the first one for the rising phase and the second one for the descent phase) and, if it is configured as fan coil, there will be three slots to use, one for each velocity.

Note that all detailed descriptions bellow refers to the entire range of actuators. See in chapter 2 if the device has the described functionality.
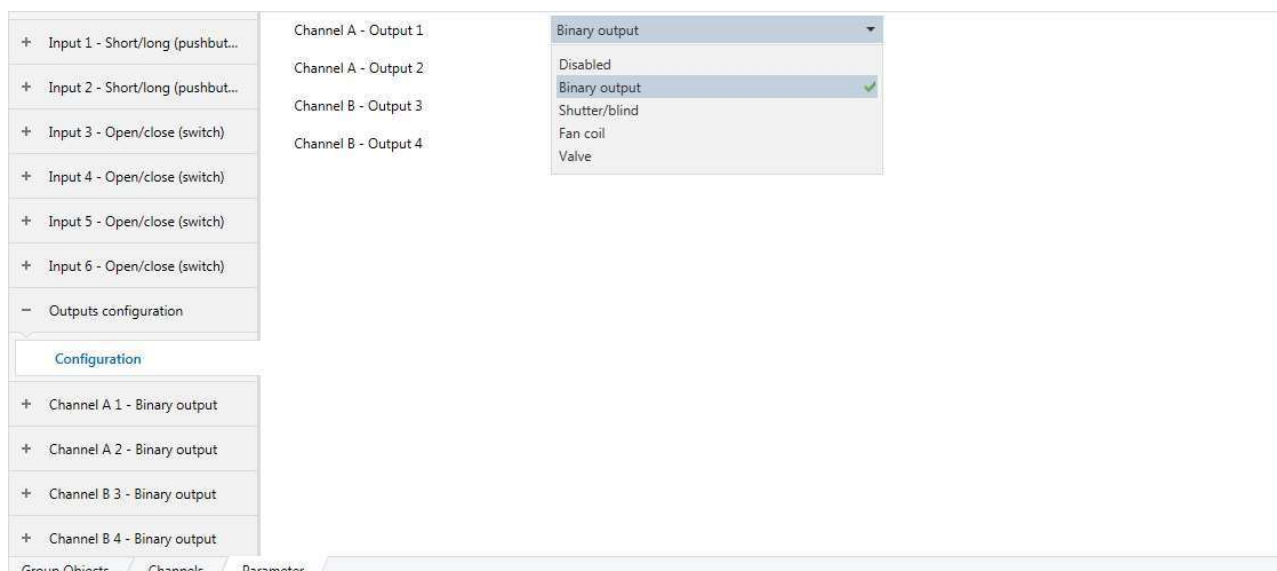
3.5.1   Output configured as binary output

3.5.1.1   Communication objects

Objet	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
0	Channel A 1 – Binary output - Switch on/off	1 bit	1.001	●		●		
1	Channel A 1 – Binary output - Switch on/off status	1 bit	1.001	●	●		●	
2	Channel A 1 – Lock/Unlock	1 bit	1.001	●		●		
3	Channel A 1 – Timer delay/staircase switch on/off	1 bit	1.001	●		●		

3.5.1.2   Description of the communication objects

Name	Object X: Binary output X | Switch on/off
Function	1 bit-Communication object to switch on or switch off an output
Description	When a "1" is received through this object the output switches on. When a "0" is received the output switches off.
	This is how the "normally open" mode works. The "normally closed" mode works in the opposite direction.
	In the configuration window of each output you can select the value that an output must have after a voltage recovery. You can choose between do not make changes, open the output or close the output.
Name	Object X: Binary output X | Switch on/off status
Function	1 bit-Communication object to read or notify the output value
Description	When the output is off and receives a switch on telegram it sends a "1" through this object.
	When the output is on and receives a switch off telegram it sends a "0" through this object.

3.5.1.3   Descripción de parámetros para salida binaria

When an output is configured as a binary individual output, the following parameters can be configured

- **Working mode**: It can be normally open or normally closed. In the normally open mode the output relay is controlled by the standard logic 1 = closed, 0= open. In the normally closed mode the relay is controlled by the inverse logic 1= open, 0 = closed.

- **Status after voltage recovery**: It selects the value that the output will take after a power loss. It is allowed to choose between open output, closed output or not to make changes.

- **Lock/unlock**: This option can be activated or deactivated. If it is activated a new dropdown menu will appear in the left part. In this menu you can choose the polarity and the behaviour of the actuator after his locking or unlocking. The available options when locked are: open the output, close the output or not to make changes. However, when it unlocked the options are: open the output, close the output, last value before the lock or update. In this last case the output will update with the last value received during the lock.
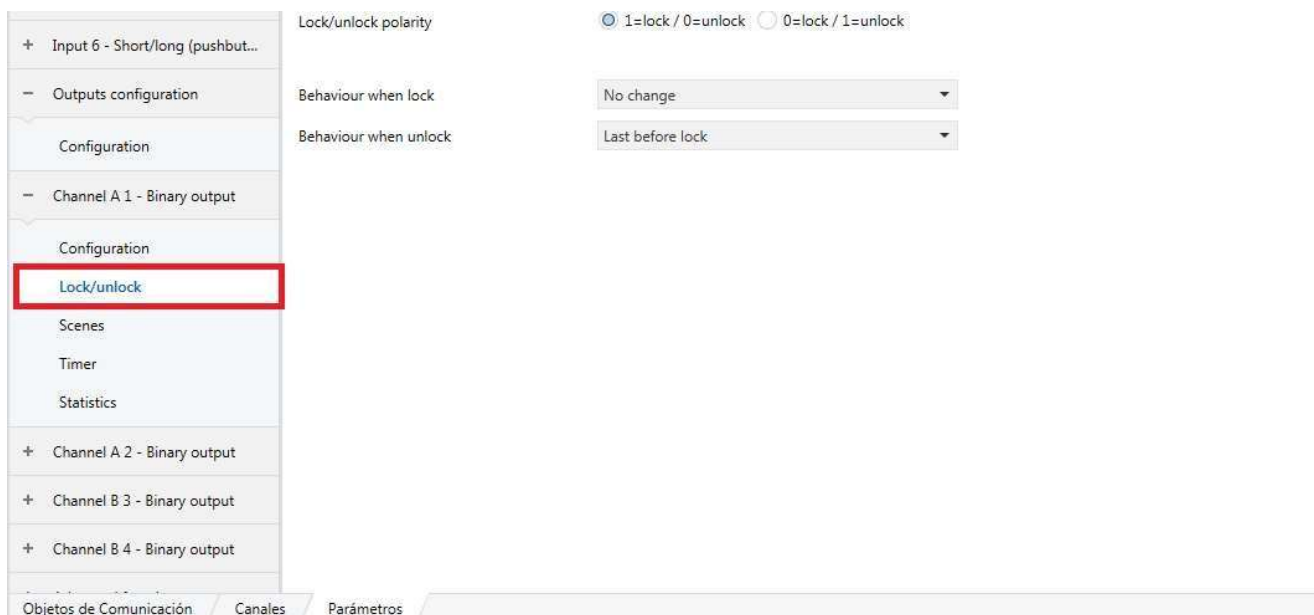
- **Scenes**: If this option is activated the scenes configuration menu will appear in the left part, just below the canal configuration menu. It allows to configure 16 scenes, select the learning mode and include delays
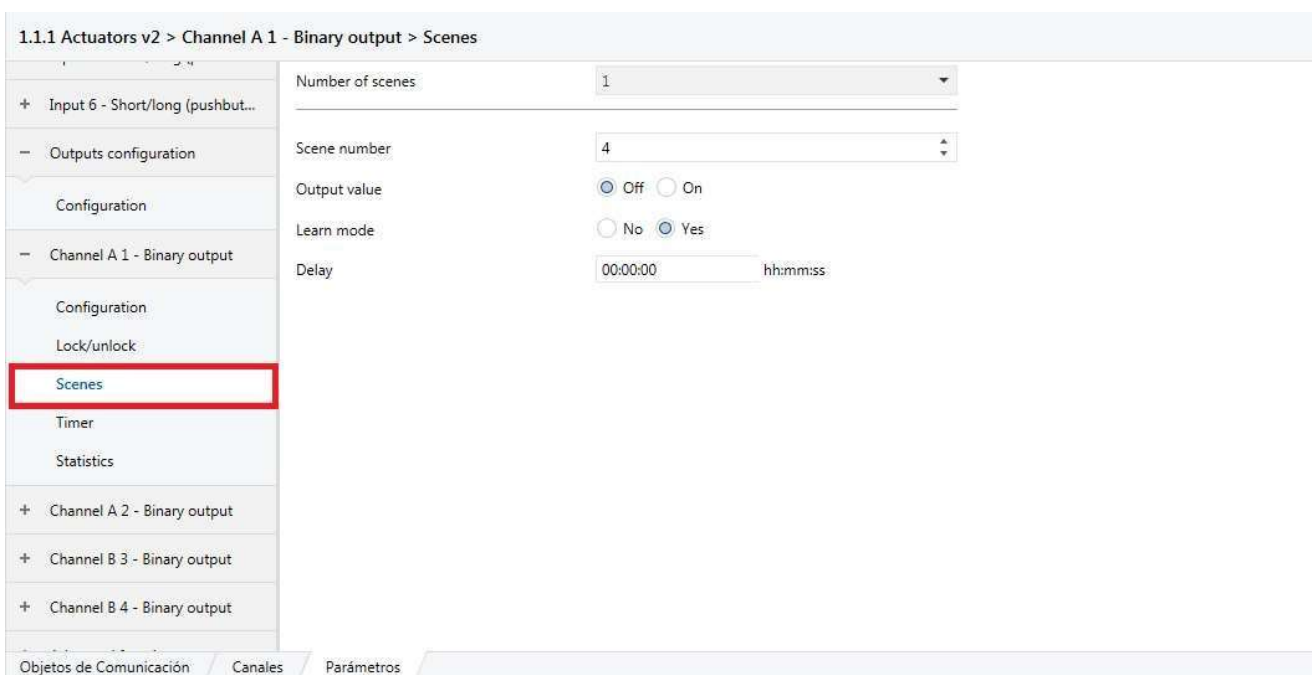
Objeto	Nombre | Función	Longitud	DPT	Flags			
254	Channel A 1 – Scene activate/learn	1 bit	1.001	●		●	

- **Timer**: The activation or deactivation of this option allows the selection of timers. The timings can be configured for the switch on or for the switch off and they can be instantaneous, with delay or staircase timings. If the locking option is activated it will NO affect this temporization object.

- **Statistics**: When this option is activated it will appear a dropdown menu in the left part. There you can select if you desire a notification of the running time (in hours) and also a maximum running time. In this way, if the time is exceeded, a telegram was sent through the correspondent communication object.

Número	Nombre	Función del Objeto	Descripción	Dirección de Grupo	Longitud	C	R	W	T	U	Tipo de Datos	Prioridad
0	Channel A 1 - Binary output	Switch on/off			1 bit	C	-	W	-	-	switch	Bajo
1	Channel A 1 - Binary output	Switch on/off status			1 bit	C	R	-	T	-	switch	Bajo
2	Channel A 1 - Binary output	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Bajo
3	Channel A 1 - Binary output	Timer delay/staircase switch on/off			1 bit	C	-	W	-	-	switch	Bajo
4	Channel A 1 - Binary output	Timer staircase value			2 bytes	C	R	W	-	-	time (s)	Bajo
5	Channel A 1 - Binary output	Statistics: running hours			2 bytes	C	R	W	T	-	time (h)	Bajo
6	Channel A 1 - Binary output	Statistics: alarm			1 bit	C	R	-	T	-	alarm	Bajo
7	Channel A 1 - Binary output	Statistics: alarm threshold			2 bytes	C	R	W	-	-	time (h)	Bajo
254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene control	Bajo

3.5.2   Outputs configured as shutter/blind

For the 7SZ-K device, the same communication objects and parameters that are described in this paragraph are used but, it must be taken into account that the device shouldn´t be used to control shutter/blinds, its function is vent control.

3.5.2.1   Communication objects

Object	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
0	Channel A 1/2 – Shutter/blind - Move up/down	1 bit	1.001	●		●		
1	Channel A 1/2 – Shutter/blind - Stop	1 bit	1.001	●	●		●	
2	Channel A 1 –Shutter/blind - Position	1 byte	5.001	●	●		●	
3	Channel A 1 – Shutter/blind - Position Status	1 byte	5.001	●	●		●	

3.5.2.2   Descripción de los objetos de comunicación

Name	Object X: Shutter/blind | Move up/down (0/1)
Function	1 bit-Communication object to move up or move down the shutter/blind
Description	When a "1" is received through this object the shutter/blind moves down. When a "0" is received the shutter/blind moves up. The odd outputs (Z1 and Z3) must be connected to the rising phases and the even outputs (Z2 and Z4) must be connected to the descent phases. This order can´t be changed.

Name	Objet X: Shutter/blind | Stop
Function	1 bit-Communication object to stop the shutter/blind movement
Description	When any value is received through this object the shutter/blind motor stops moving.

Name	Objet X: Shutter/blind | Position
Function	1 byte-Communication object to position the shutter/blind in a value directly
Description	When a value is sent through this object the shutter/blind moves to the received position, being 0 = completely closed and 255 = completely open

Name	Objet X: Shutter/blind | Position status
Function	1 byte-Communication object to read or notify the shutter/blind position

Description	When the shutter/blind motor stops, it sends a notification through this object with the actual position of the shutter/blind, being 0 = completely closed and 255 = completely open
	By default, the shutter/blind position is sent at the end of the movement. However, this option can be modified in the output canal configuration and demand notification each second.

3.5.2.3 Parameter description for shutter/blind

When the output is configured as shutter/blind, the following parameters can be configured.:

The shutter (without slats) is selected by default, so the slats parameters would not appear. In the bottom image the slats exclusive parameters were framed in red

- **Type**: It can be without slats or with slats.

- **Travel time**: up: In this parameter you must configure the time that the shutter/blind takes to rise completely.

- **Travel time down**: In this parameter you must configure the time that the shutter/blind takes to descent completely.

- **Slats total time**: total time for the slats turn.

- **Slats number of steps**: A number between 1 and 10 can be selected.

1.1.1 Actuators 7.1 > Channel A 1/2 - Shutter/blind > Configuration

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Parameter	Value	Unit
Type	○ Shutter (without slats) ◉ Blind (with slats)	
Travel time: up	00:00:30	hh:mm:ss
Travel time: down	00:00:30	hh:mm:ss
Slats: total time	02.0	ss.f
Slats: number of steps	5	
Direction change pause	00.5	ss.f
Additional time for adjustment	00.0	ss.f
Status feedback during movement	◉ No (only at end) ○ Yes (every second)	
Use movement direction feedback object	◉ No ○ Yes	
Status after voltage recovery	No change ▾	
Lock/unlock	○ Disable ◉ Enable	
Scenes	○ Disable ◉ Enable	
Alarm	○ Disable ◉ Enable	

Número	Nombre	Función del Objeto	Descripción	Dirección de Grupo	Longitud	C	R	W	T	U	Tipo de Datos	Prioridad
0	Channel A 1/2 - Shutter/blind	Move up/down (= 0/1)			1 bit	C	-	W	-	-	up/down	Bajo
1	Channel A 1/2 - Shutter/blind	Stop, step up/down (= 0/1)			1 bit	C	-	W	-	-	step	Bajo
2	Channel A 1/2 - Shutter/blind	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Bajo
3	Channel A 1/2 - Shutter/blind	Position			1 byte	C	-	W	-	-	percentage (0..100%)	Bajo
4	Channel A 1/2 - Shutter/blind	Position status			1 byte	C	R	-	T	-	percentage (0..100%)	Bajo
5	Channel A 1/2 - Shutter/blind	Slats position			1 byte	C	-	W	-	-	percentage (0..100%)	Bajo
6	Channel A 1/2 - Shutter/blind	Slats position status			1 byte	C	R	-	T	-	percentage (0..100%)	Bajo
7	Channel A 1/2 - Shutter/blind	Movement direction up/down (= 0/1)			1 bit	C	R	-	T	-	up/down	Bajo
8	Channel A 1/2 - Shutter/blind	Alarm			1 bit	C	-	W	-	-	alarm	Bajo
254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene control	Bajo

- **Direction change pause**: This parameter indicates the time between the relays that actuator has to wait before changing the direction when the shutter/blind is moving.

- **Additional time for adjustment**: This is the additional adjustment time to add to the shutter/blind time and assure the end switch and avoid mismatches.

- **Status feedback during movement**: you can choose between notify only at the end of the movement or notify each second.

- **Use movement direction feedback object**:: It notifies changes if the shutter/ blind is going up or down.

1.1.1 Actuators 7.1 > Channel A 1/2 - Shutter/blind > Configuration

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Type	○ Shutter (without slats) ⊙ Blind (with slats)
Travel time: up	00:00:30 hh:mm:ss
Travel time: down	00:00:30 hh:mm:ss
Slats: total time	02.0 ss.f
Slats: number of steps	5
Direction change pause	00.5 ss.f
Additional time for adjustment	00.0 ss.f
Status feedback during movement	⊙ No (only at end) ○ Yes (every second)
Use movement direction feedback object	○ No ⊙ Yes
Status after voltage recovery	No change ▼
Lock/unlock	○ Disable ⊙ Enable
Scenes	○ Disable ⊙ Enable
Alarm	○ Disable ⊙ Enable

	Number	Name	Object Function	Description	Group Addres	Length	C	R	W	T	U	Data Type	Priority
	0	Channel A 1/2 - Shutter/blind	Move up/down (= 0/1)			1 bit	C	-	W	-	-	up/down	Low
	1	Channel A 1/2 - Shutter/blind	Stop, step up/down (...			1 bit	C	-	W	-	-	step	Low
	2	Channel A 1/2 - Shutter/blind	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low
	3	Channel A 1/2 - Shutter/blind	Position			1 byte	C	-	W	-	-	percentag...	Low
	4	Channel A 1/2 - Shutter/blind	Position status			1 byte	C	R	-	T	-	percentag...	Low
	5	Channel A 1/2 - Shutter/blind	Slats position			1 byte	C	-	W	-	-	percentag...	Low
	6	Channel A 1/2 - Shutter/blind	Slats position status			1 byte	C	R	-	T	-	percentag...	Low
	7	Channel A 1/2 - Shutter/blind	Movement direction...			1 bit	C	R	-	T	-	up/down	Low
	8	Channel A 1/2 - Shutter/blind	Alarm			1 bit	C	-	W	-	-	alarm	Low
	254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene cont...	Low

- **Status after voltaje recovery**: You can stablish a percentage between 1 and 100 after a power loss of the device.

- **Lock/unlock**: If the lock is activated you can´t act on the shutter/blind.

General

– Inputs configuration

    Configuration

– Outputs configuration

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– Channel A 1/2 - Shutter/blind

    Configuration

    Lock/unlock

    Scenes

    Alarm

– Advanced functions

    Configuration

Lock/unlock polarity	● 1=lock / 0=unlock ○ 0=lock / 1=unlock
Behaviour when lock	No change
Behaviour when unlock	Last before lock

	Número	Nombre	Función del Objeto	Descripción	Dirección de Grupo	Longitud	C	R	W	T	U	Tipo de Datos	Prioridad
	0	Channel A 1/2 - Shutter/blind	Move up/down (= 0/1)			1 bit	C	-	W	-	-	up/down	Bajo
	1	Channel A 1/2 - Shutter/blind	Stop, step up/down (= 0/1)			1 bit	C	-	W	-	-	step	Bajo
	2	Channel A 1/2 - Shutter/blind	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Bajo
	3	Channel A 1/2 - Shutter/blind	Position			1 byte	C	-	W	-	-	percentage (0..100%)	Bajo
	4	Channel A 1/2 - Shutter/blind	Position status			1 byte	C	R	-	T	-	percentage (0..100%)	Bajo
	5	Channel A 1/2 - Shutter/blind	Slats position			1 byte	C	-	W	-	-	percentage (0..100%)	Bajo
	6	Channel A 1/2 - Shutter/blind	Slats position status			1 byte	C	R	-	T	-	percentage (0..100%)	Bajo
	7	Channel A 1/2 - Shutter/blind	Movement direction up/down (= 0/1)			1 bit	C	R	-	T	-	up/down	Bajo
	8	Channel A 1/2 - Shutter/blind	Alarm			1 bit	C	-	W	-	-	alarm	Bajo
	254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene control	Bajo

- **Scenes**: If this option is activated the scenes configuration menu will appear in the left part, just below the canal configuration menu. It allows to configure 16 scenes, to select the learning mode and to include delays.

Number of scenes		1		▾
Scene number		1		▴▾
Action		◉ Move to position ○ Move position and slats		
Position		0 %		▾
Learn mode		○ No ◉ Yes		
Delay		00:00:00	hh:mm:ss	

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Number *	Name	Object Function	Description	Group Addres	Length	C	R	W	T	U	Data Type	Priority
0	Channel A 1/2 - Shutter/blind	Move up/down (= 0/1)			1 bit	C	-	W	-	-	up/down	Low
1	Channel A 1/2 - Shutter/blind	Stop, step up/down (...			1 bit	C	-	W	-	-	step	Low
2	Channel A 1/2 - Shutter/blind	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low
3	Channel A 1/2 - Shutter/blind	Position			1 byte	C	-	W	-	-	percentag...	Low
4	Channel A 1/2 - Shutter/blind	Position status			1 byte	C	R	-	T	-	percentag...	Low
5	Channel A 1/2 - Shutter/blind	Slats position			1 byte	C	-	W	-	-	percentag...	Low
6	Channel A 1/2 - Shutter/blind	Slats position status			1 byte	C	R	-	T	-	percentag...	Low
8	Channel A 1/2 - Shutter/blind	Alarm			1 bit	C	-	W	-	-	alarm	Low
254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene cont...	Low

- **Alarm**: If it receives a "0" it starts to count the "monitoring period" or executes the action that is configured in the behaviour parameter. Each time it receives a "0", the time is preloaded again. In the case that it doesn´t received another "0" and the monitoring time is exceeded, it executes the alarm or the programmed alarm action. If it receives a "1", it executes the programmed alarm action.

Number	Name	Object Function	Description	Group Addres	Length	C	R	W	T	U	Data Type	Priority
0	Channel A 1/2 - Shutter/blind	Move up/down (= 0/1)			1 bit	C	-	W	-	-	up/down	Low
1	Channel A 1/2 - Shutter/blind	Stop, step up/down (...			1 bit	C	-	W	-	-	step	Low
2	Channel A 1/2 - Shutter/blind	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low
3	Channel A 1/2 - Shutter/blind	Position			1 byte	C	-	W	-	-	percentag...	Low
4	Channel A 1/2 - Shutter/blind	Position status			1 byte	C	R	-	T	-	percentag...	Low
5	Channel A 1/2 - Shutter/blind	Slats position			1 byte	C	-	W	-	-	percentag...	Low
6	Channel A 1/2 - Shutter/blind	Slats position status			1 byte	C	R	-	T	-	percentag...	Low
8	Channel A 1/2 - Shutter/blind	Alarm			1 bit	C	-	W	-	-	alarm	Low
254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene cont...	Low

3.5.3   Output configured as fan coil

3.5.3.1   Communication object

Objet	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
0	Channel A/B – Fan Coil - Fan Speed Control	1 byte	1.001	●		●		
1	Channel A/B – Fan Coil - Fan Speed Status	1 byte	1.001	●	●		●	
8	Channel A/B – Fan Coil - Fan Speed 1 Status	1 bit	1.001	●	●		●	
9	Channel A/B – Fan Coil - Fan Speed 2 Status	1 bit	1.001	●	●		●	
10	Channel A/B – Fan Coil - Fan Speed 3 Status	1 bit	1.001	●	●		●	
11	Channel A/B – Fan Coil - Fan On/Off Status	1 bit	1.001	●	●		●	
24	Channel B – Binary Output - Switch On/Off	1 bit	1.001	●		●		
25	Channel B – Binary Output - Switch On/Off Status	1 bit	1.001	●	●		●	

3.5.3.2 Description of the communication objects

Name	Objet X: Fan Coil | Fan speed X
Function	1 bit-Communication object to change fan coil to the corresponding speed
Description	When a "1" is received through this object the fan coil changes to the corresponding speed. The other speeds are deactivated and a "0" is sent through its notify communication objects. The fan coil speeds must be connected as follows: Z1=speed 1, Z2=speed 2 y Z3=speed 3. In case that a change in this configuration is needed, use a "personalised fan coil"
Name	Objet X: Fan Coil | Fan speed X status
Function	1 Bit-Communication object to read or notify the actual speed.
Description	When a speed is selected, the status is sent through this object. A "1" value telegram is sent in the case of the select speed and a "0" value telegram in the rest of the cases.
Name	Objet X: Fan Coil | Fan speed control
Function	1 byte-Communication object to select the speed directly
Description	When a value is received through this object the fan coil control compare it with the configured threshold level and activates the corresponding velocity.
Name	Objet X: Fan Coil | Fan speed status
Function	1 byte-Communication object to read or notify the speed of the fan coil
Description	With each change, the actual fan coil velocity is sent through this object
Name	Objet X: Fan Coil | Auto/manual (=0/1)
Function	1 bit-Communication object to select the fan coil mode
Description	When a "1" is received through this object, the fan coil changes to manual mode and when a "0" is received it changes to automatic mode.
Name	Objet X: Fan Coil | Auto/manual (=0/1) status
Function	1 bit-Communication object to read or notify the fan coil mode.
Description	When a mode is selected, the fan coil status is sent through this object. A "1" value telegram is sent in the case of manual mode and a "0" value telegram in the case of automatic mode.
Name	Objet X: Fan Coil | Fan on/off status
Function	1 bit-Communication object to read or notify the fan coil status.
Description	When the fan coil is off and it receives an "on" telegram, a "1" is sent through this object. When the fan coil is on and it receives an "off" telegram, a "0" is sent through this object.
Name	Objet X: Fan Coil | Fan speed off (1=set/0=nothing)
Function	1 bit-Communication object to select the fan coil off
Description	When a "1" is received through this object the fan coil switches off and when a "0" is received it doesn´t change his status

3.5.3.3 Parameter description for fan coil

When the output is configured as fan coil, the following parameters can be configured:

- **Fan coil control type**: It is possible to choose between direct type or sequential type. The direct type only activates the corresponding relay to the selected speed while sequential type activates the relay of the selected speed and the previous ones.

- **Fan speed threshold level 1**: (From 0 to 255). If the fan coil value control is smaller than this threshold value, the fan coil outputs are deactivated. If the control value is bigger, the output 1 (O1) is activated.

- **Fan speed threshold level 2**: (From 0 to 255). If the fan coil value control is smaller than this threshold value, the output 1 (O1) is activated. If the control value is bigger, the output 1 (O1) is deactivated and the output 2 (O2) is activated in case of direct control.

- **Fan speed threshold level 3**: (From 0 to 255). If the fan coil value control is smaller than this threshold value, the output 2 (O2) is activated. If the control value is bigger, the output 2 (O2) is deactivated and the output 3 (O3) is activated in case of direct control.

- **Hysteresis:** percentage that indicates a margin of threshold changing in velocity change or in the process of switching velocity on or off.

- **Manual function**

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
0	Channel A/B - Fan Coil	Fan speed control			1 byte	C	-	W	-	-	percentage (0..100%)	Low
1	Channel A/B - Fan Coil	Fan speed status			1 byte	C	R	-	T	-	percentage (0..100%)	Low
2	Channel A/B - Fan Coil	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low
3	Channel A/B - Fan Coil	Auto/manual (=0/1)			1 bit	C	-	W	-	-	switch	Low
4	Channel A/B - Fan Coil	Auto/manual status (=0/1)			1 bit	C	R	-	T	-	switch	Low
5	Channel A/B - Fan Coil	Fan speed 1 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
6	Channel A/B - Fan Coil	Fan speed 2 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
7	Channel A/B - Fan Coil	Fan speed 3 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
8	Channel A/B - Fan Coil	Fan speed 1 status			1 bit	C	R	-	T	-	switch	Low
9	Channel A/B - Fan Coil	Fan speed 2 status			1 bit	C	R	-	T	-	switch	Low
10	Channel A/B - Fan Coil	Fan speed 3 status			1 bit	C	R	-	T	-	switch	Low
11	Channel A/B - Fan Coil	Fan on/off status			1 bit	C	R	-	T	-	switch	Low
12	Channel A/B - Fan Coil	Fan speed off (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
24	Channel B 4 - Binary output	Switch on/off			1 bit	C	-	W	-	-	switch	Low
25	Channel B 4 - Binary output	Switch on/off status			1 bit	C	R	-	T	-	switch	Low
254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene control	Low

- **Status after voltaje recovery**: You can stablish a percentage between 1 and 100 after a power loss of the device.

- **Delays**: They can be configured when changing speeds, when the fan coils is switched off or when it is switched on.

- **Lock/unlock**: If the lock is activated you can´t act on the fan coil.

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
0	Channel A/B - Fan Coil	Fan speed control			1 byte	C	-	W	-	-	percentage (0..100%)	Low
1	Channel A/B - Fan Coil	Fan speed status			1 byte	C	R	-	T	-	percentage (0..100%)	Low
2	Channel A/B - Fan Coil	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low
3	Channel A/B - Fan Coil	Auto/manual (=0/1)			1 bit	C	-	W	-	-	switch	Low
4	Channel A/B - Fan Coil	Auto/manual status (=0/1)			1 bit	C	R	-	T	-	switch	Low
5	Channel A/B - Fan Coil	Fan speed 1 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
6	Channel A/B - Fan Coil	Fan speed 2 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
7	Channel A/B - Fan Coil	Fan speed 3 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
8	Channel A/B - Fan Coil	Fan speed 1 status			1 bit	C	R	-	T	-	switch	Low
9	Channel A/B - Fan Coil	Fan speed 2 status			1 bit	C	R	-	T	-	switch	Low
10	Channel A/B - Fan Coil	Fan speed 3 status			1 bit	C	R	-	T	-	switch	Low
11	Channel A/B - Fan Coil	Fan on/off status			1 bit	C	R	-	T	-	switch	Low
12	Channel A/B - Fan Coil	Fan speed off (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
24	Channel B 4 - Binary output	Switch on/off			1 bit	C	-	W	-	-	switch	Low
25	Channel B 4 - Binary output	Switch on/off status			1 bit	C	R	-	T	-	switch	Low
254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene control	Low

- **Scenes:**.If this option is activated the scenes configuration menu will appear in the left part, just below the canal configuration menu. It allows to configure 16 scenes, to select the learning mode and to include delays.

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
0	Channel A/B - Fan Coil	Fan speed control			1 byte	C	-	W	-	-	percentage (0..100%)	Low
1	Channel A/B - Fan Coil	Fan speed status			1 byte	C	R	-	T	-	percentage (0..100%)	Low
2	Channel A/B - Fan Coil	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low
3	Channel A/B - Fan Coil	Auto/manual (=0/1)			1 bit	C	-	W	-	-	switch	Low
4	Channel A/B - Fan Coil	Auto/manual status (=0/1)			1 bit	C	R	-	T	-	switch	Low
5	Channel A/B - Fan Coil	Fan speed 1 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
6	Channel A/B - Fan Coil	Fan speed 2 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
7	Channel A/B - Fan Coil	Fan speed 3 (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
8	Channel A/B - Fan Coil	Fan speed 1 status			1 bit	C	R	-	T	-	switch	Low
9	Channel A/B - Fan Coil	Fan speed 2 status			1 bit	C	R	-	T	-	switch	Low
10	Channel A/B - Fan Coil	Fan speed 3 status			1 bit	C	R	-	T	-	switch	Low
11	Channel A/B - Fan Coil	Fan on/off status			1 bit	C	R	-	T	-	switch	Low
12	Channel A/B - Fan Coil	Fan speed off (1=set/0=nothing)			1 bit	C	-	W	-	-	switch	Low
24	Channel B 4 - Binary output	Switch on/off			1 bit	C	-	W	-	-	switch	Low
25	Channel B 4 - Binary output	Switch on/off status			1 bit	C	R	-	T	-	switch	Low
254	General	Scene activate/learn			1 byte	C	-	W	-	-	scene control	Low

3.5.4   Output configured as a valve

3.5.4.1   Communication objects

Objet	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
0	Channel A1 – Valve - Open/close (=0/1)	1 bit	1.001	●		●		
1	Channel A1 – Valve - Open/close status	1 bit	1.001	●	●		●	

3.5.4.2 Description of the communication objects

Name	Objet X: Channel X - Valve | Open/close (=0/1)
Function	1 bit-Communication object to select the valve status.
Description	When a "1" is received through this object, the valve opens and when it receives a "0" the valve closes.
Name	Objet X: Valve | Open/close status
Function	1 bit-Communication object to read or notify the valve status.
Description	When each change the valve status is sent through this communication object.

3.5.4.3 Description of the valve parameters

When the output is configured as fan coil, the following parameters can be configured:

- **Working mode**: You must choose between normally open mode and normally closed mode. As one mode or another is chosen the polarity will be different, opening the valve with a "0" when the mode selected is normally open and with a "1" if the chosen mode is normally closed.

- **Type of control**: it can be on/off type or PWM. If the type PWM is chosen, a parameter to select a time period and a 1-byte communication object to write a percentage will appear. This percentage apply to the time period will be the valve open time and the rest of the time it will be closed.

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
0	Channel A 1 - Valve	PWM control value (% duty)			1 byte	C	-	W	-	-	percentage (0..100%)	Low
1	Channel A 1 - Valve	Open/close status			1 bit	C	R	-	T	-	open/close	Low
2	Channel A 1 - Valve	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low

- **Status after voltaje recovery**: You can stablish a percentage between 1 and 100 after a power loss of the device.

- **Lock/unlock:** If the lock is activated you can´t act on the valve.

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
0	Channel A 1 - Valve	PWM control value (% duty)			1 byte	C	-	W	-	-	percentage (0..100%)	Low
1	Channel A 1 - Valve	Open/close status			1 bit	C	R	-	T	-	open/close	Low
2	Channel A 1 - Valve	Lock/unlock (= 1/0)			1 bit	C	R	W	-	-	switch	Low

- **Valve protection**: When this option is activated the valve will make a protection cycle when the indicated time is exceeded. This way avoids valve damages.

3.6   Advanced functions

In case you enable advanced functions in the general menu, it will appear a new tab in the left menu:

In this menu you can choose what arithmetic-logic blocks or timer/counter blocks you want to enable.

Name	Logic Block X
Values	Enable / disable
Description	Allows to enable or disable each block of the logic unit

Name	timer / counter Block
Values	Enable / disable
Description	Allows to enable or disable each block of the timers / counters

3.6.1 Bloque Aritmético-Lógico (ALU)

Name	Operation
Values	AND, NAND, OR, NOR, XOR, XNOR, NOT, BUFFER, == , != , < , > , <= , >= , + , - , * , / .
Description	Allows to select the logic operation, arithmetic operation or comparative operation that you desire to do between the followings: Logic operations: - AND: Logical product - NAND: Logical product denied - OR: Logical sum - NOR: logical sum denied - XOR: exclusive logical sum - XNOR: exclusive logical sum denied - NOT: Negation - BUFFER: It stores at the output the input value Comparative operations: - == : equality - != : inequality - < : smaller than - > : bigger than - <= : smaller or equal to - >= : bigger or equal to Arithmetic operations: - + : sum - - : subtraction - * : multiplication - / : division
Name	Number of inputs
Values	From 2 to 4
Description	It allows to select the number of inputs. Depending on the operation to make you can choose two or more inputs.
Name	input 1
Values	Communication object / Constant

Description	Through this parameter the input 1 type is decided. It can be a constant value or it can receive a value through a communication object
Name	**Format**
Values	1 bit, 1 byte without sign (dpt 5.001), 1 byte without sign (dpt 5.010), 1 byte with sign (6.*), 2 bytes without sign (dpt 7,*), 2 bytes with sign (dpt 8,*), 2 bytes floating point (dpt 9,*).
Description	It allows to select through a drop-down menu the size and the format of the input 1. Depending on the type of operation it allows some formats or others.
Name	**Inputs 2/3/4**
Values	1 bit, 1 byte without sign (dpt 5.001), 1 byte without sign (dpt 5.010), 1 byte with sign (6.*), 2 bytes without sign (dpt 7,*), 2 bytes with sign (dpt 8,*), 2 bytes floating point (dpt 9,*).
Description	It allows to select through a drop-down menu the size and the format of the other inputs. Depending on the type of operation it allows some formats or others. This inputs can only receive values through communication objects.
Name	**Output**
Values	1 bit, 1 byte without sign (dpt 5.001), 1 byte without sign (dpt 5.010), 1 byte with sign (6.*), 2 bytes without sign (dpt 7,*), 2 bytes with sign (dpt 8,*), 2 bytes floating point (dpt 9,*).
Description	It allows to select through a drop-down menu the size and the format of the input object. Depending on the type of operation it allows some formats or others. It receives the values of his communication object.

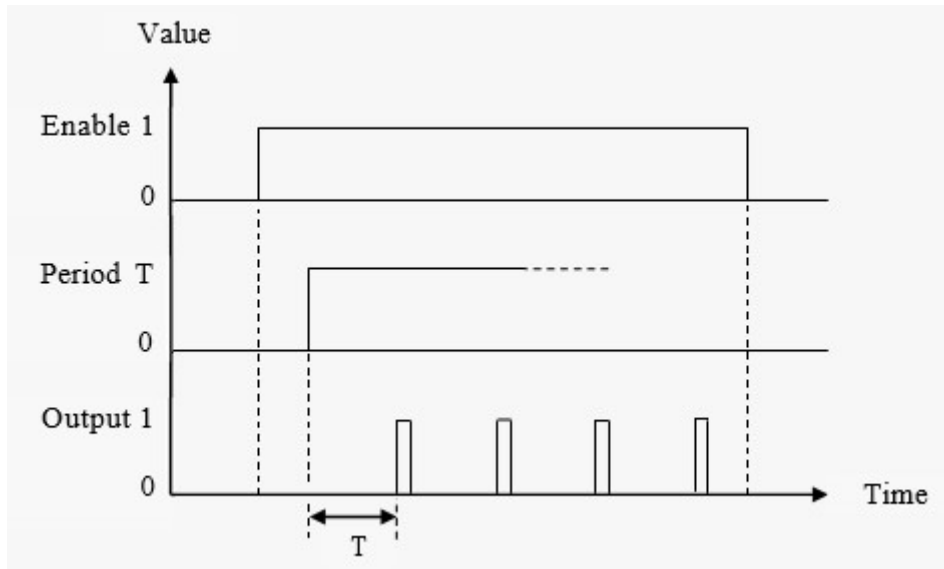### 3.6.2   Timer/Counter block

Name	Timer type
Values	PWM, Limit o Cycle
Description	PWM: It sends a signal modulated in pulse width according to the period and the work cycle.
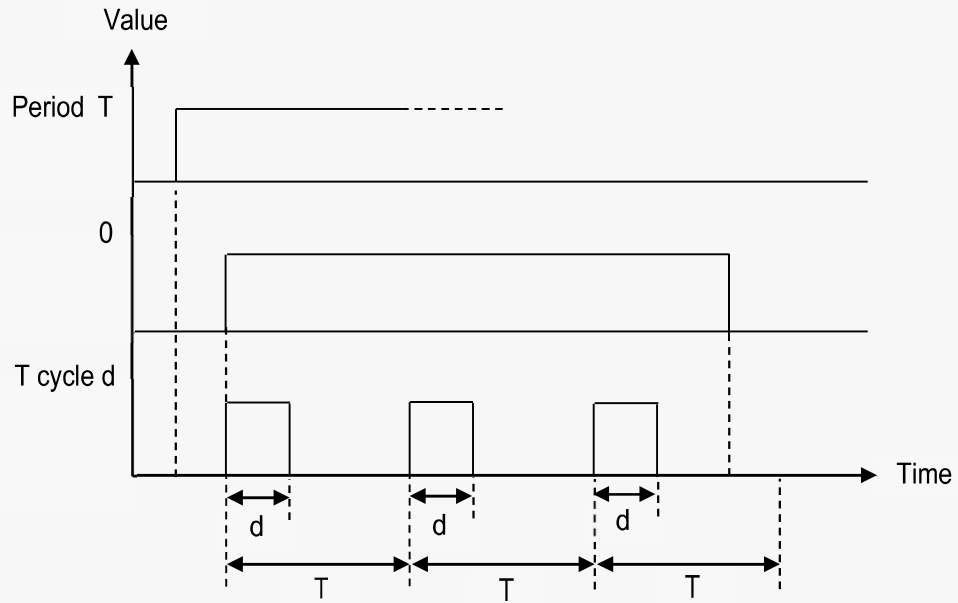
Límit: Sends a "1" bit telegram to the bus when a limit value is exceeded
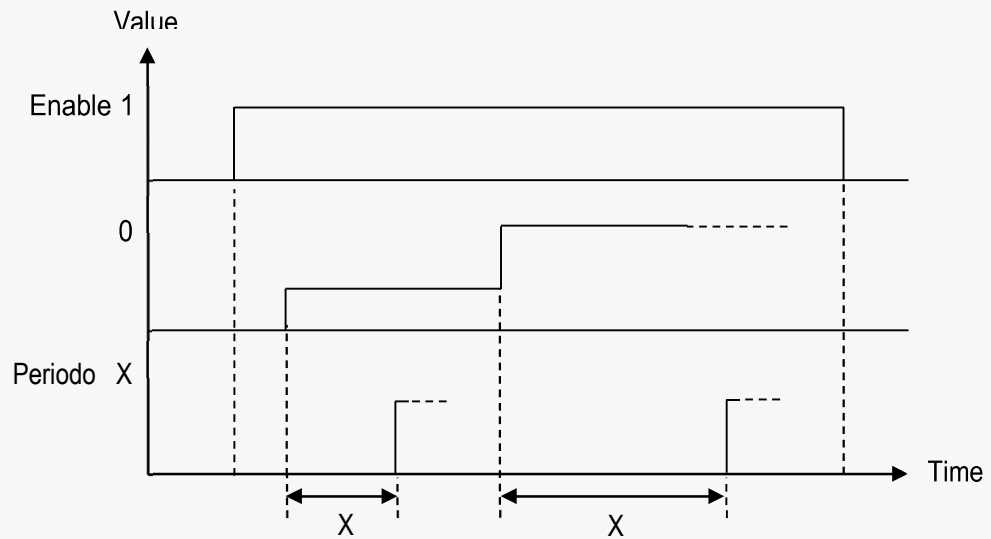
Cycle: Sends a "1" bit telegram to the bus each time the limit value is exceded cyclically

Name	Time period	
Values	Communication object / Constant value	
Description	It is the counter time of the timer. It can be configured as a constant value or as a value received through the bus with one of the followings formats of the communication object:	
	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 floating point (9.010): Value from 0 to 670760 s	
Name	Work cycle	
Values	1 byte (dpt 5.010), 2 bytes (7.004) or 2 bytes floating point (9.010)	
Description	Only visible if the type of timer selected is PWM. It is the time that the generated signal is in high level ("1") inside the period of time. The value is received by the bus with one of the following formats of communication objects:	
	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 floating point (9.010): Value from 0 to 670760 s	

Name	Event type
Values	Rising edge, falling edge, 1 o 0.
Description	It is the change that the counter must detect in the "event" object to increase his count

Name	Limit value
Values	From 0 to 65535
Description	Is the chosen value as a threshold for the counting.

Name	Output behavior
Values	Send "1" when it reaches the limit, send the count value (dpt 5.010), sent count value (dpt 7.001)
Description	This parameter allows to choose the format and the value of the counter output. The output can send "1" when it reaches the limit value of the count or send the count value each time it receives an event

4   Manual control

The actuators with manual control allow to act on the outputs through the capacitive pushbuttons placed on the top of its box. It has two arrows to move between the different LEDs associated with its correspondent output. The LED flashes pointing the output but when "on" is pressed the LED stop flashing for a few seconds indicating that the output relay is closed and then it continues flashing to know what output is acting (in case of pressing the "off" button, the LED will switch off for a few seconds). The on/off pushbuttons open and close the relays of the output.

5 Installation of the devices

5.1 2E2S-K Ref: CT422220
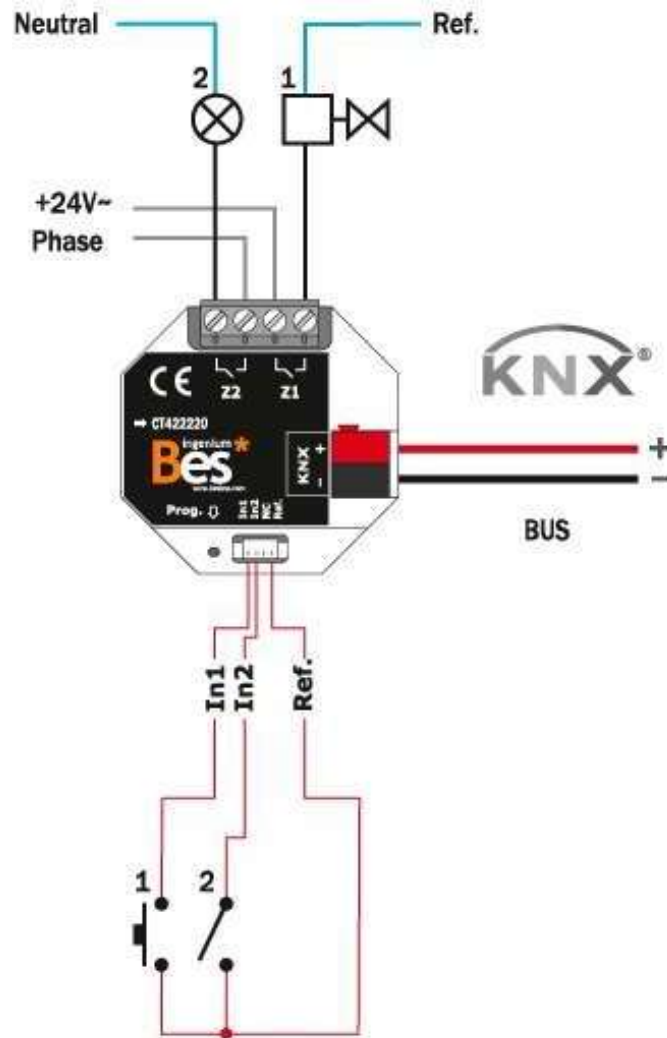
⚠️

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs
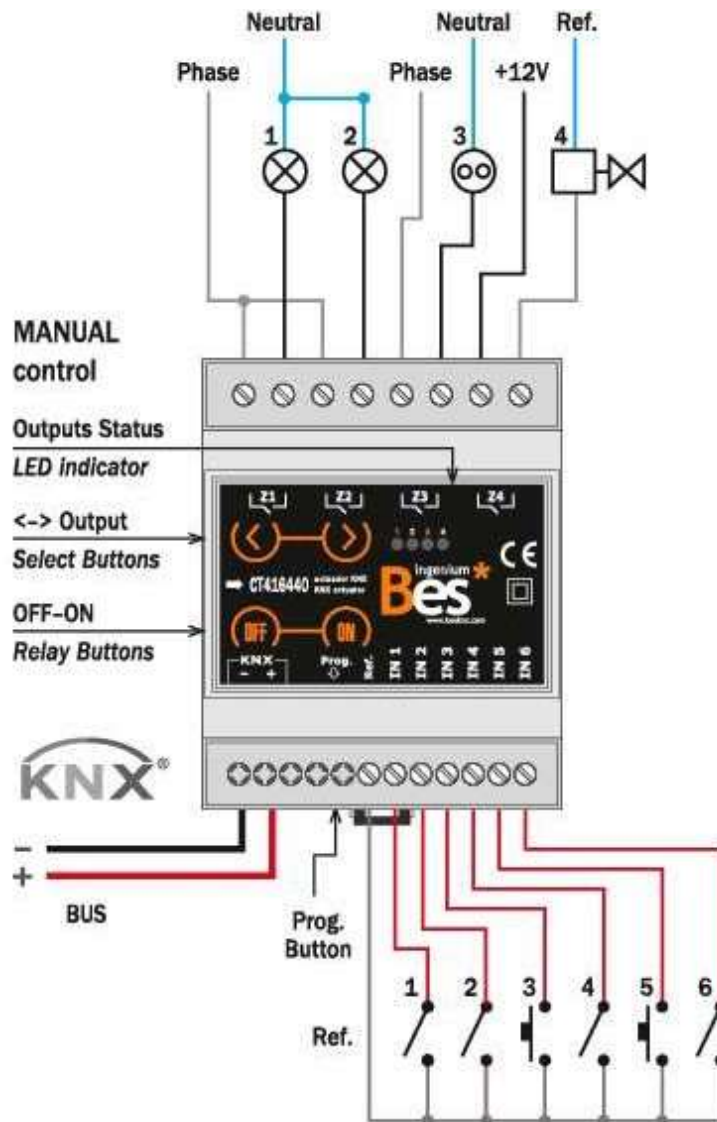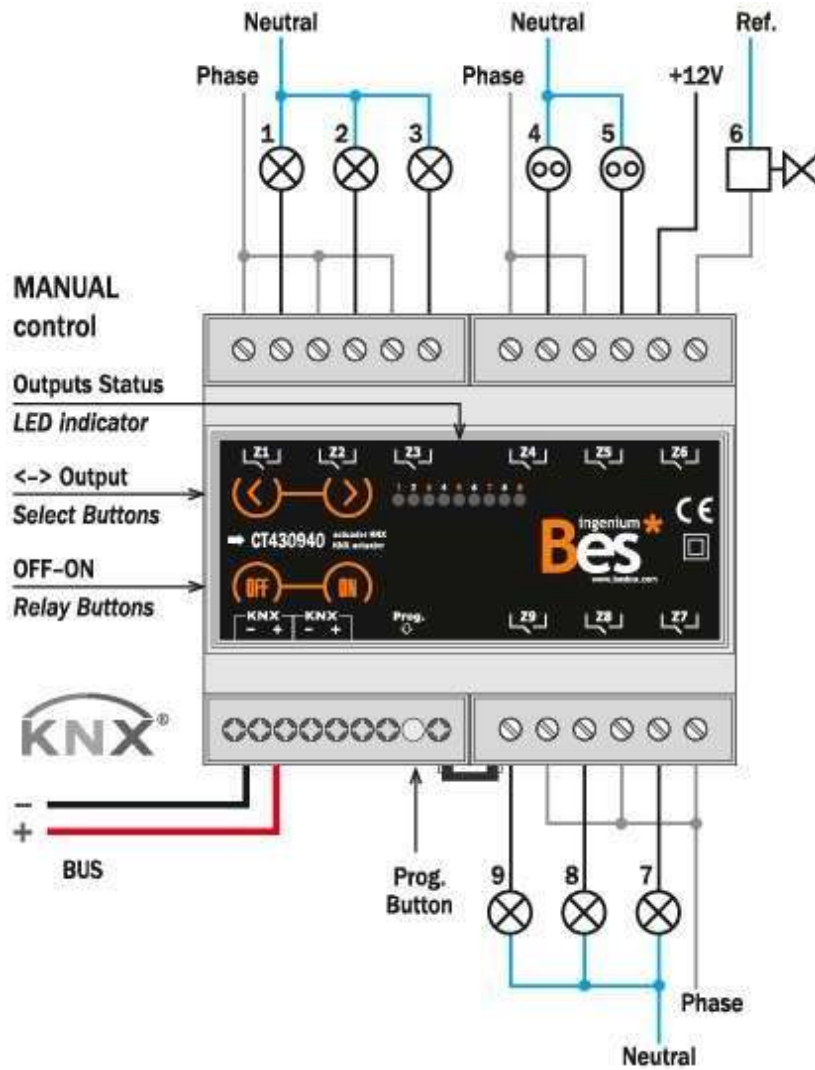
5.2   3E2S-K Ref: CT423220
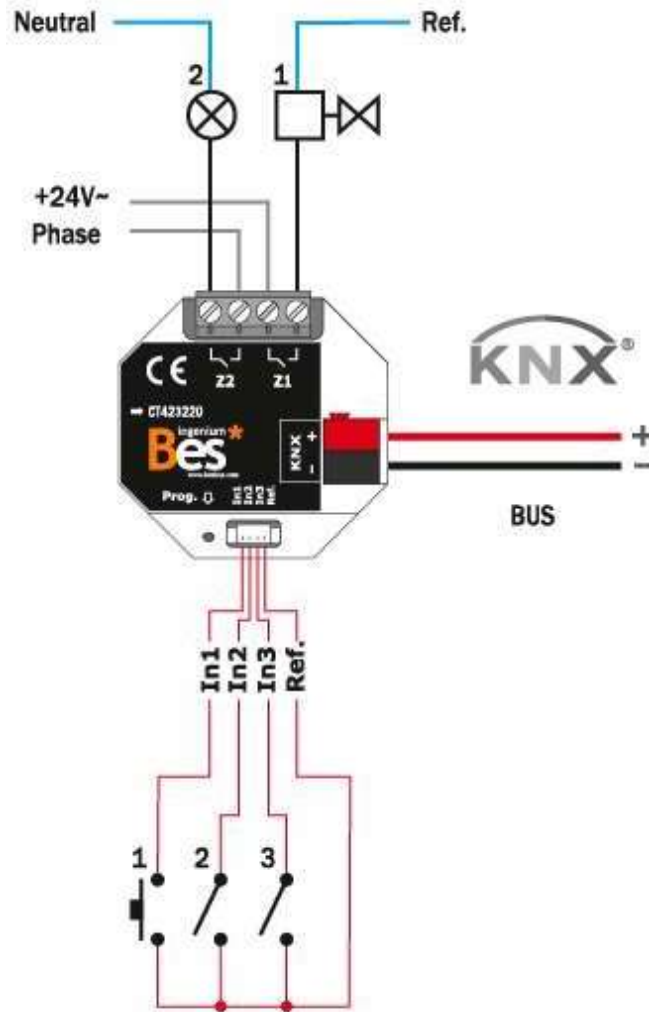
⚠️

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs

5.3 4E-K Ref: CT454020
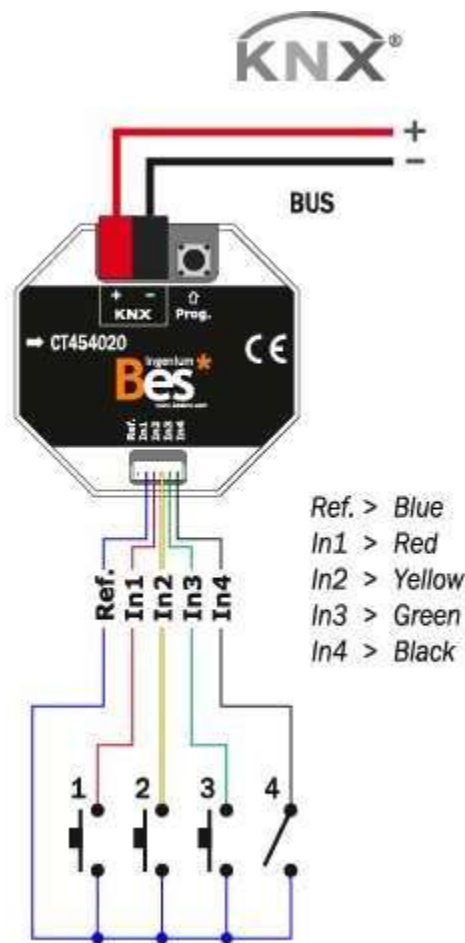
Ref. > Blue
In1 > Red
In2 > Yellow
In3 > Green
In4 > Black

⚠️

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs
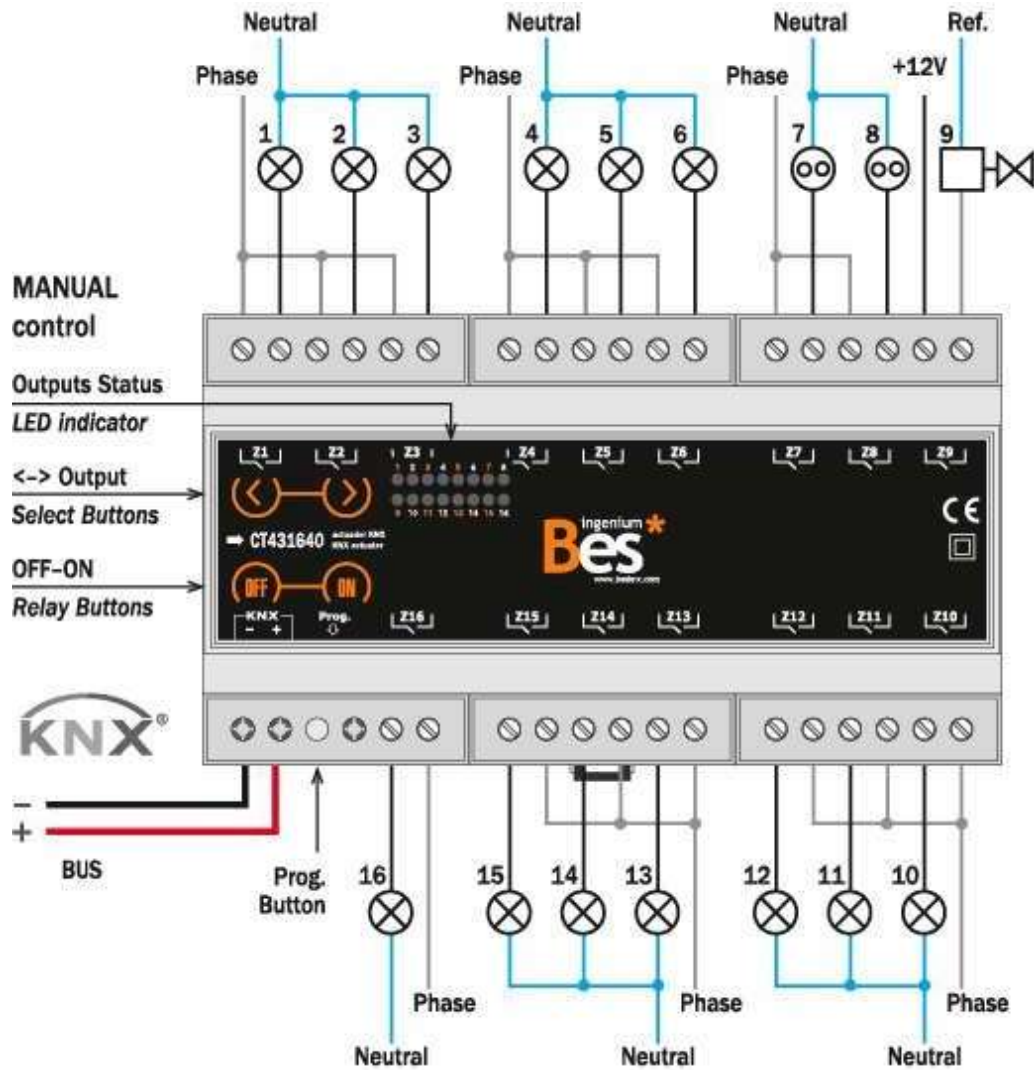
5.4   4E4S-K Ref: CT454420
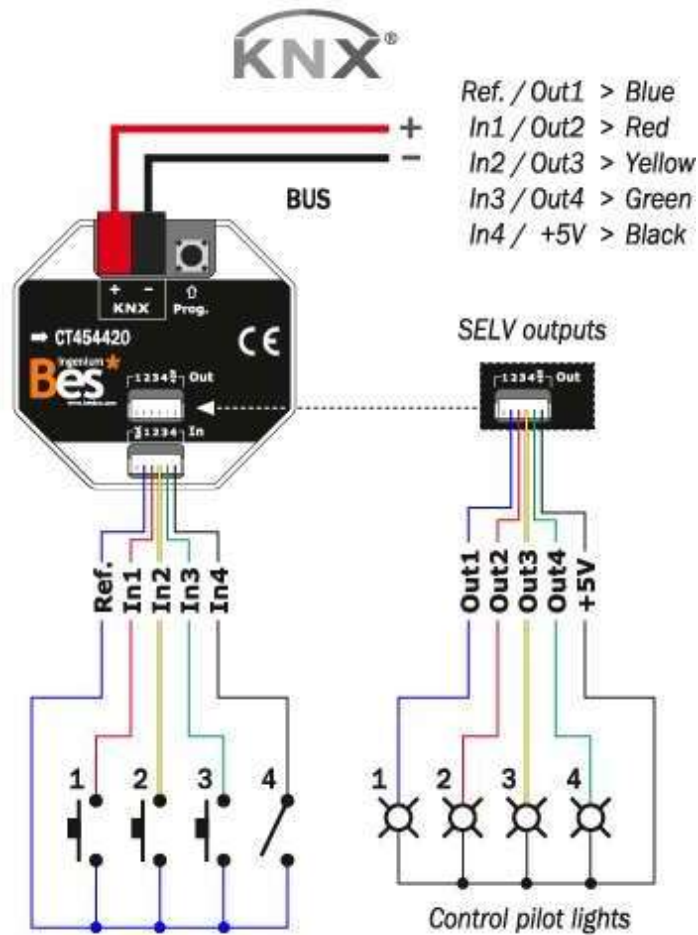
Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs
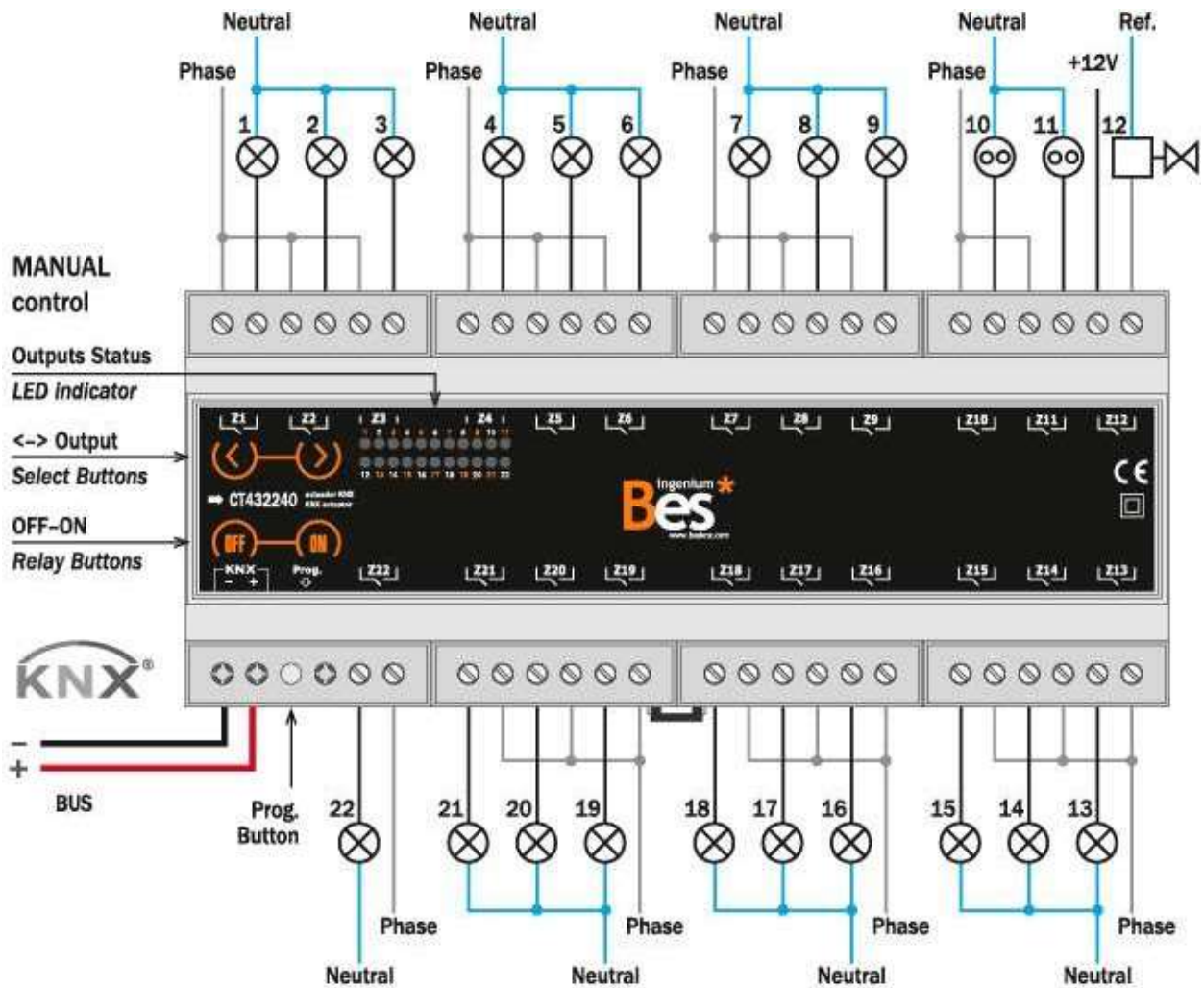
5.5   6E4S-K Ref: CT416430 y CT416440

⚠

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

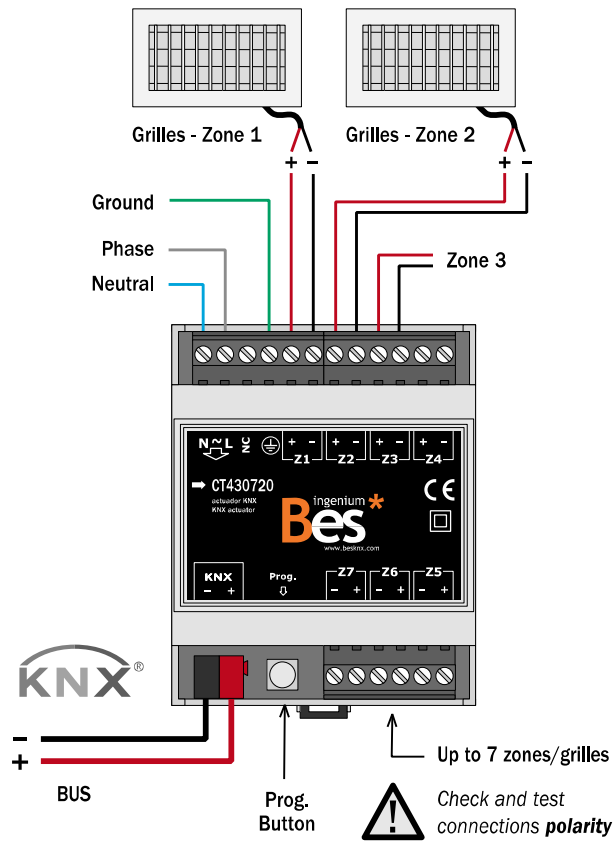Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs

5.6   9S-K Ref: CT430940

⚠️

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs

5.7   16S-K Ref: CT431640

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs

5.8　22-K Ref: CT432240

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs

5.9   7SZ-K Ref: CT430720

Feed low voltage lines (BUS and inputs) in ducts separate from the main power supply (230V) and outputs to ensure there is enough insulation and to avoid interference.

Do not connect mains voltage (230V) or any other external voltage at any point on the bus or inputs
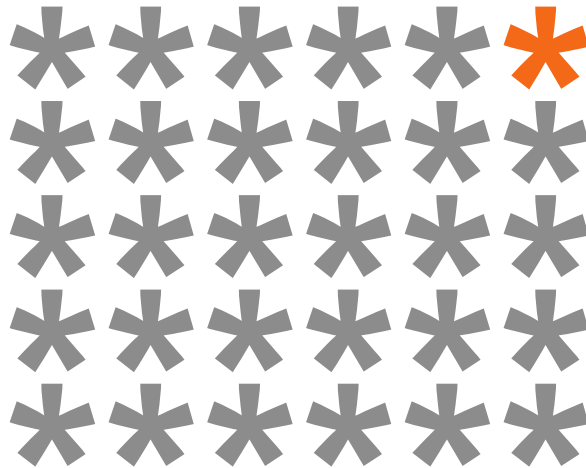
KNX products by ingenium

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www.besknx.com

Versión del manual: v2.0