stakohome® INNOVATION

On/Off actuator

BES-CT422220

Programming manual

ingenium Bes

www.besknx.cz

Index

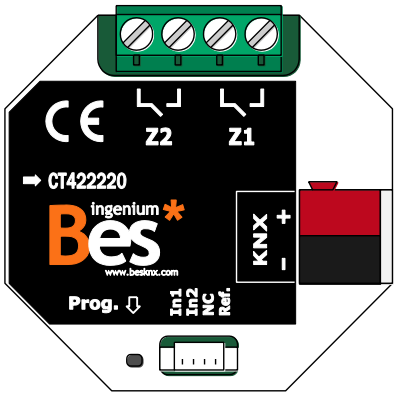
1 General description

This device is an actuator composed of 2 potential-free relay outputs (dry contact) and 2 low voltage inputs (SELV) to connect conventional pushbuttons or switches.

Its 2 outputs allow controlling 2 on/off electrical circuits or 1 blind (2 outputs for one blind motor: up phase and down phase). Due to its high cut off capacity, this device is also recommended for capacitive loads, sockets, and electrical appliances control. The inputs can operate in different modes allowing to control binary outputs, dimmers or blinds separately or simultaneously. It is possible to configure the device response when there is a rising edge, falling edge, long or short pulsation depending on the working mode.

It incorporates an advanced Arithmetic and Logic Unit (UAL) that allows performing complex logic operation, timers programming, counters, etc. using internal results of operations or other external variables.

The cut off capacity of the relays is 16A @ 230Vac (potential free relay output). If necessary, insert a contactor to control higher power circuits.



General characteristics:

- Digital low voltage inputs (SELV).
- Potential free relay outputs with a 16A @ 230Vac cut-off capacity.
- Each output can work independently or simultaneously in different modes (binary, blinds…).
- Programmable inputs to work with switches or push-buttons.
- Easy and visual ALU (Arithmetic and Logic Unit) with timers, counters and any logic and arithmetic operation implementation.

2 Technical description

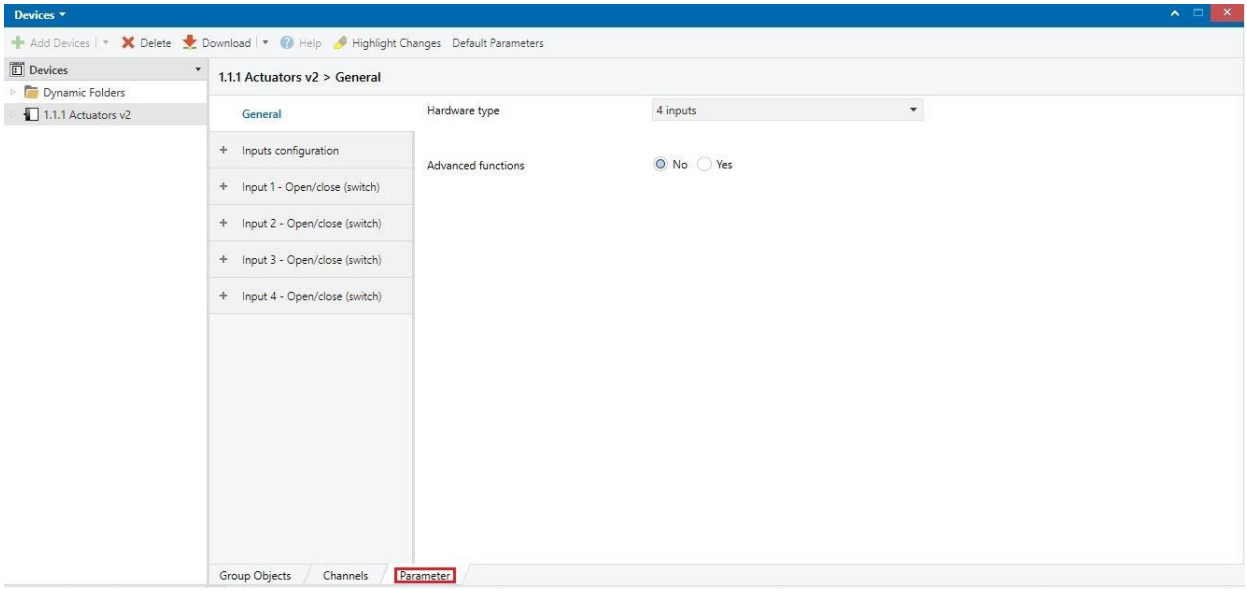
Power supply	29Vdc from KNX BUS
KNX current consumption	9mA from KNX BUS
Mounting	Built-in on universal distribution box
Size	50x50x23mm
Connections	BUS connection terminal KNX Screw terminals for outputs Quick micro-connector for inputs
Inputs	2 low voltage inputs (SELV)
Inputs current activation	Minimum 15mA
Inputs cable distance	30 meters maximum (from the mechanism to the input)
Outputs	2 potential free relay outputs.
Outputs cut-off capacity	16A @ 230Vac
Environment temperature range	Operation: -10ºC/55ºC Storage: -30ºC/60ºC Transportation: -30ºC/60ºC
Regulation	According to the directives of electromagnetic compatibility and low voltage: EN 50090-2-2 / UNE-EN 61000-6-3:2007 / UNE-EN 61000-6-1:2007 / UNE-EN 61010-1.

3 Programming

3.1 Application program information

- Application program: Ingenium / Actuators v2 (manufacturer / program name).
- Catalogue version: v1.0
- Maximum number of communication objects: 256.
- Maximum number of assignments: 256.

The parameters of the device are configured in the ETS into the parameters menu.



3.2 Individual address assignment

The CT422220 actuator has a programming button for the KNX individual address assignment which is located on the front of the device.

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

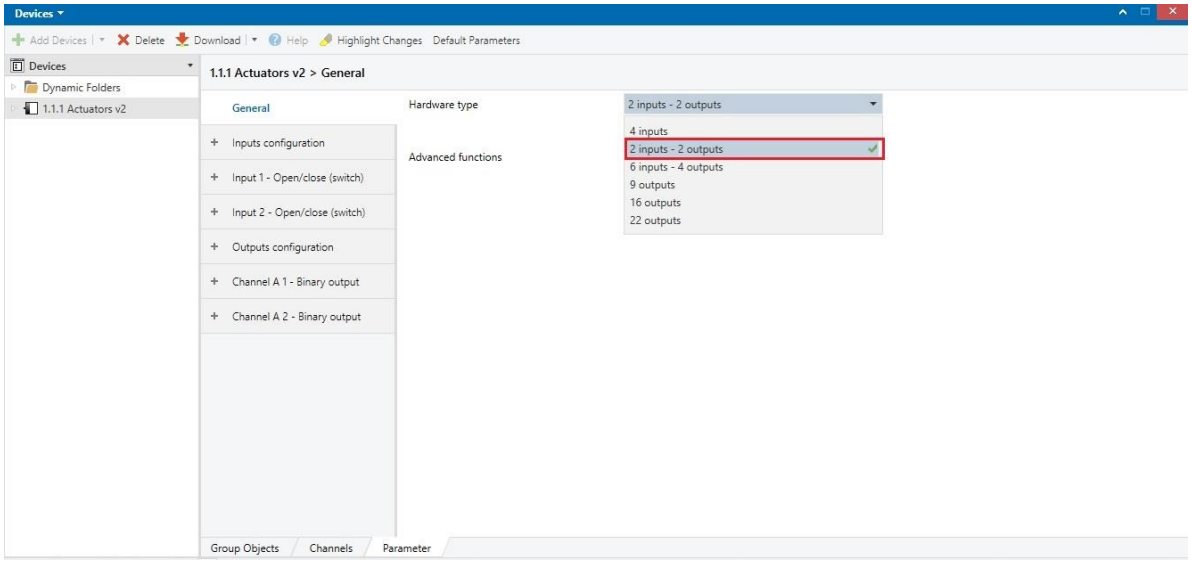
The LED is automatically turned off if the ETS has assigned an individual address correctly or if the programming button is pressed again manually.

3.3 Type of device

The parameters of the device are configured in the ETS into the parameter menu.

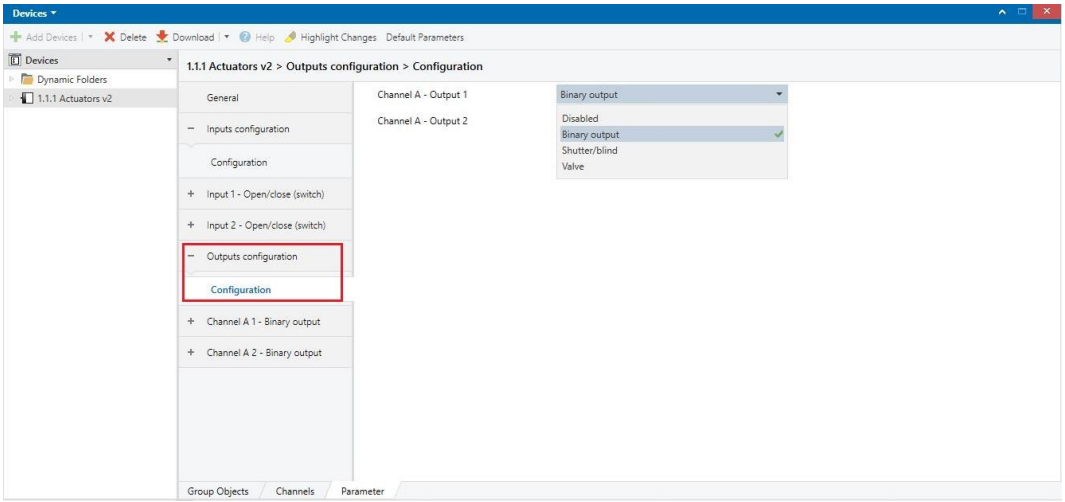
There are several tabs at the left side to configure different parameters depending on the type of device selected. In this case, the device that must be selected is the type “2 inputs - 2 outputs”.

Use the selector at the top of the main window to select the type of device to program.

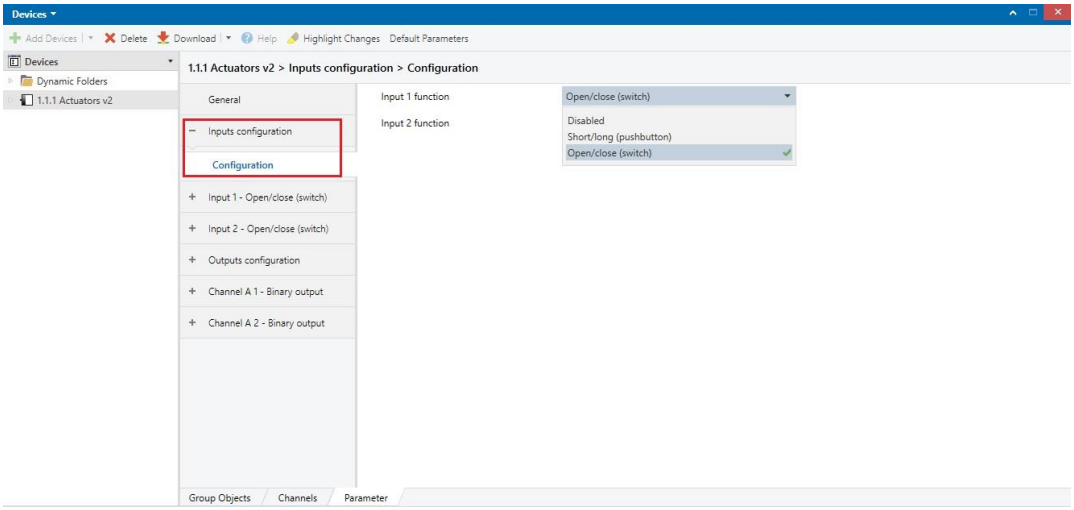


After that, a number of inputs and outputs appear depending on the model of the device selected. Each of these inputs and outputs can be configured to work in different modes independently and simultaneously. To do so it has to be selected in the left side the tab “Inputs configuration” for the inputs and the tab “Outputs configuration” for the outputs.

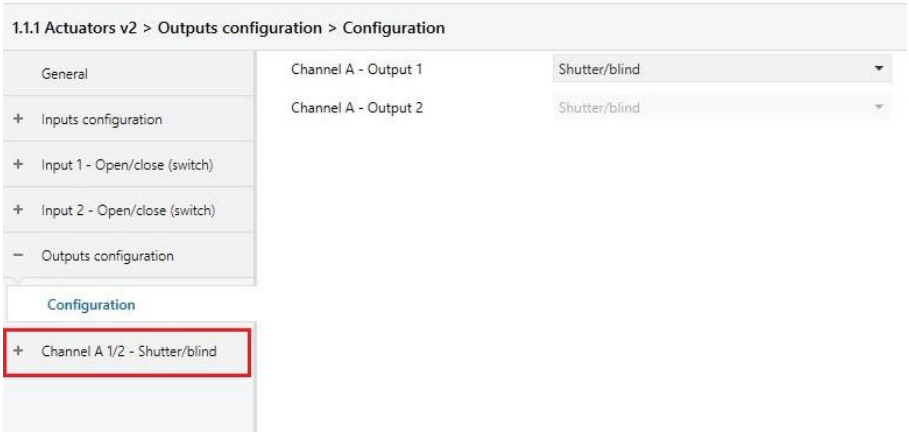
Outputs can be disabled or programmed in binary, blinds or thermo-valve modes.



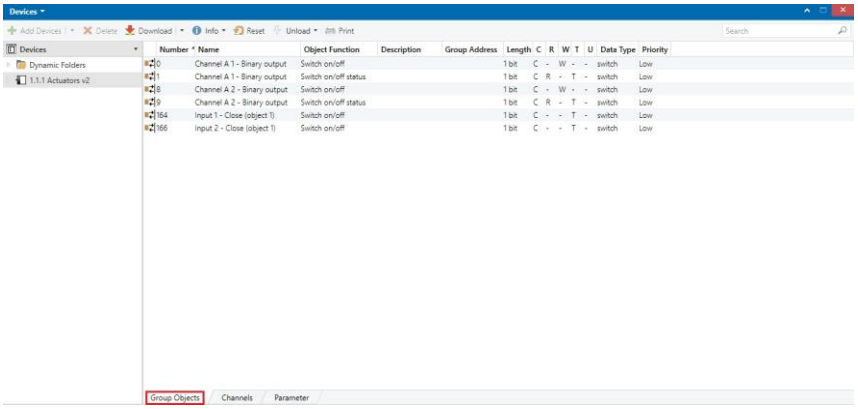
In the case of inputs, they can be disabled too or programmed in switch or pushbutton modes.



Depending on the type of output selected, more than one slot is occupied, for example, when selecting blinds outputs two outputs are reserved (odd output for the move up phase and even output for move down phase). As can be seen in the following image, once selected blind output instead of having 2 channel output only appears 1 channel output combining the previous ones where all the blind parameters can be configured.



Once the types of inputs or outputs are selected, the communication objects associated to them will appear in the group objects menu.



Default communication objects and names are explained next.

3.4 Output objects

3.4.1 Binary outputs table

Object	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	●	●		●	
8	Channel A 2 - Binary output | Switch on/off	1 bit	1.001	●		●		
9	Channel A 2 - Binary output | Switch on/off status	1 bit	1.001	●	●		●	

3.4.2 Binary outputs description

Name	Object X: Channel X Binary output | Switch on/off
Function	1-bit communication object for switching on and off an output.
Description	When a “1” is received through this object the output is switched. When a “0” is received through this object the output is switched off. This is the normally open behaviour that depends on the parameter “mode. The normally close behaviour is the opposite. By default, the status of an output is memorized when there is a power supply failure
Name	**Object X: Channel X Binary output | Switch on/off status**
Function	1-bit communication object for feedback signalling of state of the output.
Description	When the output is off and receives a switch on telegram a “1” is sent through this object. When the output is on and receives a switch off telegram “0” is sent through this object.

3.4.3 Blind outputs table

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

3.4.4 Blind outputs description

Name	Object X: Channel X - Shutter/blind | Move up/down (=0/1)
Function	1-bit communication object for moving up or down the blind.
Description	When a "1" is received through this object the blind moves down. When a "0" is received through this object the blind moves up. Odd outputs (Z1 and Z3) must be connected to the up phase of the motor. Even outputs (Z2 and Z4) must be connected to the down phase of the motor. This order cannot be altered.
Name	**Object X: Channel X - Shutter/blind | Stop**
Function	1-bit communication object for stop the blind movement.
Description	When any value is received through this object the blind motor stops moving.
Name	**Object X: Channel X - Shutter/blind | Position**
Function	1-byte communication object for direct positioning of the blind.
Description	When a value is sent to this object the blind moves to the received position
Name	**Object X: Channel X - Shutter/blind | Position status**
Function	1-byte communication object for feedback signalling of the position of the blind.
Description	When the blind motor stops the current position is sent through this object as feedback being 0 = completely closed and 255 = completely open. By default, the position of the blind is only sent when the motor stops. If the parameter "Status feedback during movement" is activated, the position of the blind is sent every second while it is moving

3.4.5 Thermo-valve outputs table

Object	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
0	Channel A 1 - Valve| Open/close (=0/1)	1 bit	1.001	●		●		
1	Channel A 1 - Valve| Open/close status	1 bit	1.001	●	●		●	
8	Channel A 2 - Valve| PWM control value (%duty)	1 byte	5.010	●		●		
9	Channel A 2 - Valve| Open/close status	1 bit	1.001	●	●		●	

3.4.6 Thermo-valve outputs description

Name	Object X: Channel X - Valve | Open/close (=0/1)
Function	1-bit communication object for switching on and off a valve.
Description	When a “1” is received through this object the valve is switched. When a “0” is received through this object the valve is switched off. This is the normally open behaviour that depends on the parameter “mode. The normally close behaviour is the opposite. By default, the status of an output is memorized when there is a power supply failure
Name	**Object X: Channel X - Valve | PWM control value (%duty)**
Function	1-byte communication object for setting the duty cycle of the thermo-valve pwm output.
Description	The duty cycle of the pwm signal that controls the thermo-valve output is written by sending a value to this object.
Name	**Object X: Channel X - Valve | Open/close status**
Function	1-bit communication object for feedback signalling of state of the valve.
Description	When the valve is open and receives a switch on telegram a “1” is sent through this object. When the valve is close and receives a switch off telegram “0” is sent through this object.

3.5 Inputs objects

3.5.1 Switch inputs table

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

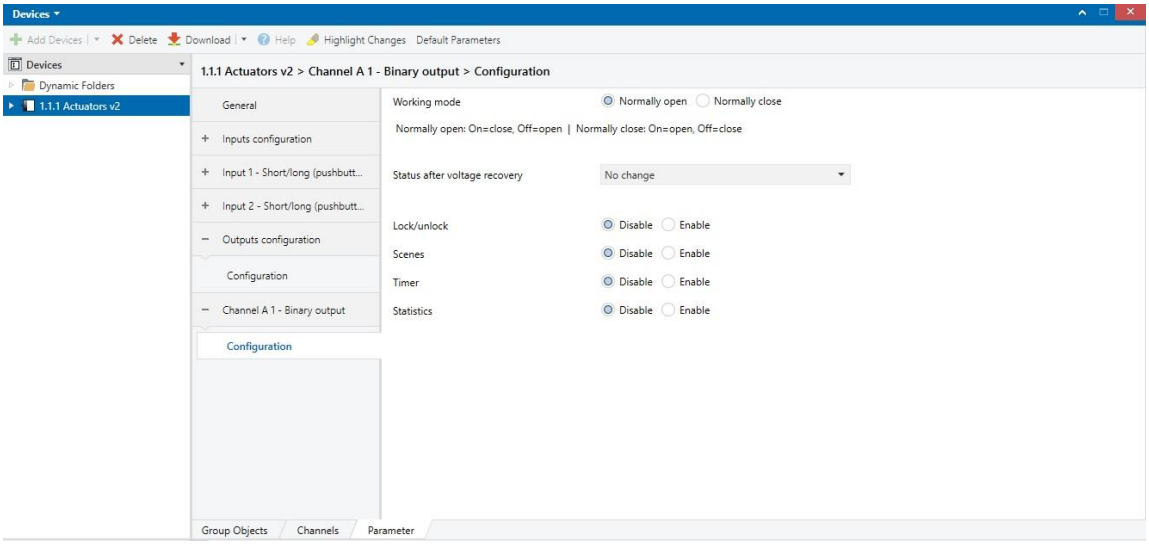
3.5.2 Pushbutton inputs table

Object	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
164	Input 1 - Short press | Switch on/off	1 bit	1.001	●		●	●	
166	Input 1 - Long press | Switch on/off	1 bit	1.001	●		●	●	
164	Input 2 - Short press | Switch on/off	1 bit	1.001	●		●	●	
166	Input 2 - Long press | Switch on/off	1 bit	1.001	●		●	●	

3.6 Outputs parameters

3.6.1 Binary outputs parameters

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

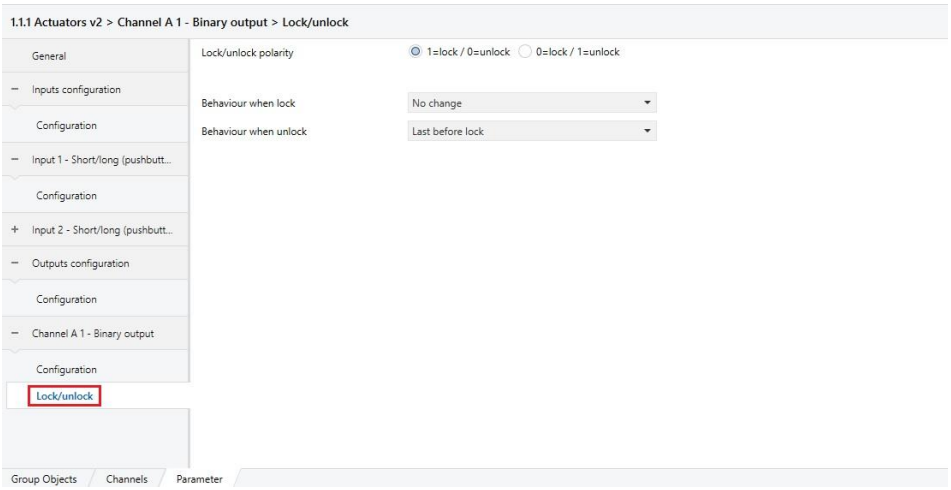


Working mode: Normally open or normally closed. In normally open mode the output relay is controlled with the standard logic: 1 = close, 0 = open. In normally closed mode the output relay is controlled with the inverse logic: 1 = open, 0 = close.

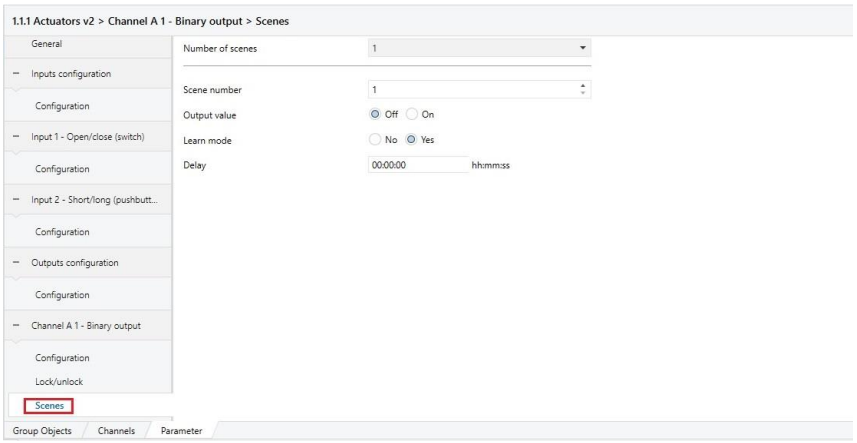
Status after voltage recovery: It can be controlled the status of the output after a voltage recovery. The available options are:

- "No change": The output will remain in the position that it had before the voltage loss.
- "Open output": The output will be open after a voltage recovery.
- "Closed output": The output will be closed after a voltage recovery.

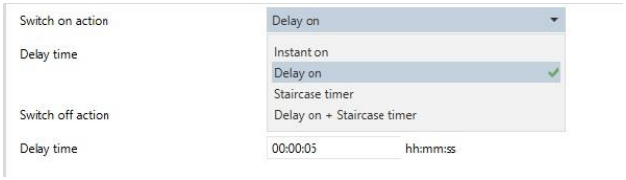
Lock/unlock: It allows to have a new tab in the left side to configure the behaviour when the channel is locked (disabled) or unlocked (enabled).

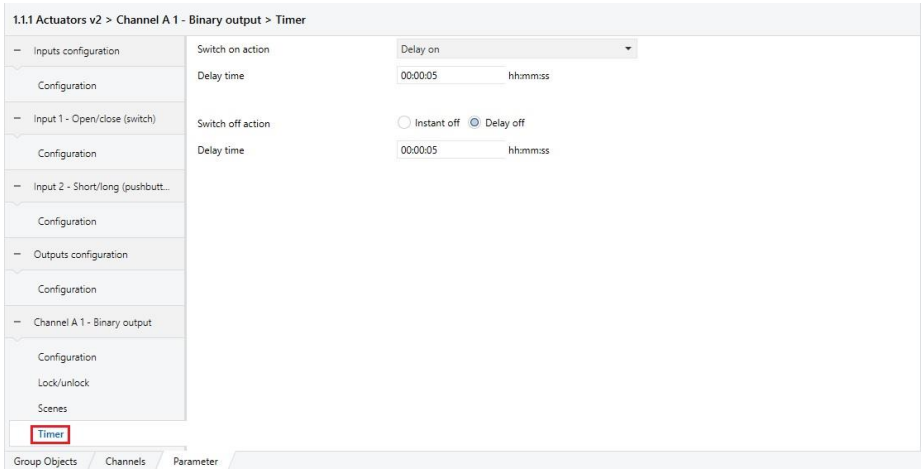


Scenes: It allows to have a new tab in the left side to record and run up to 16 scenes.

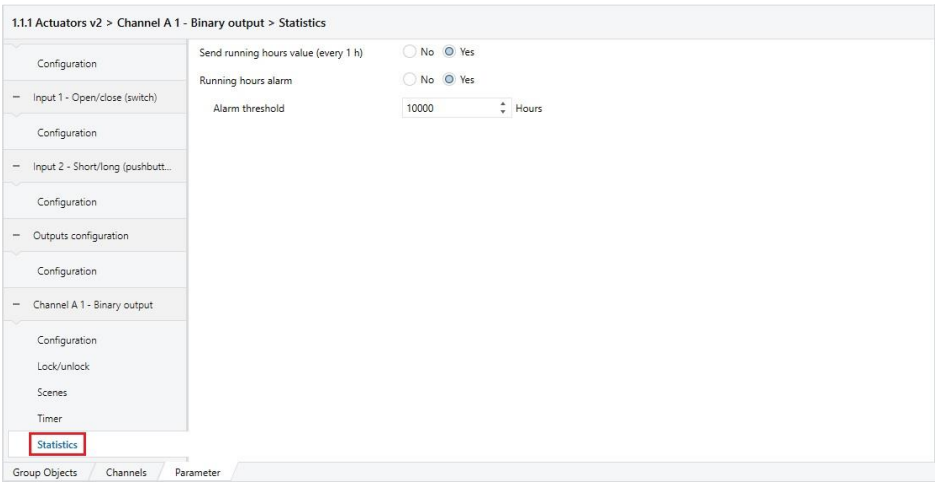


Timer: It allows to have a new tab in the left side to control the timing to activate or deactivate the output after switch on or switch off.



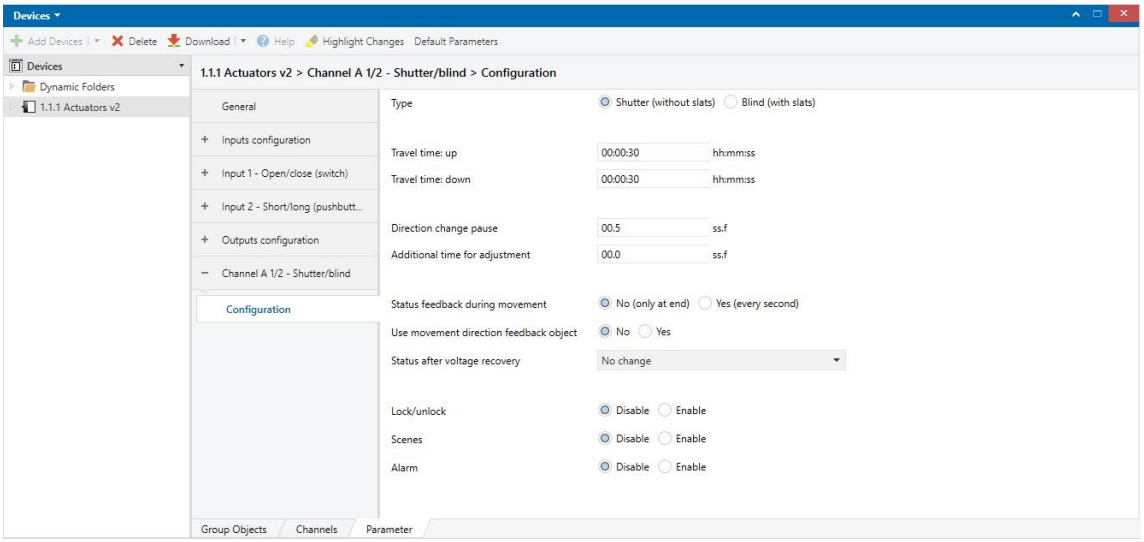


Statistics: It allows to have a new tab in the left side to count and inform about the time interval during which an output is closed and also to notify when it has been kept closed for a certain number of hours.



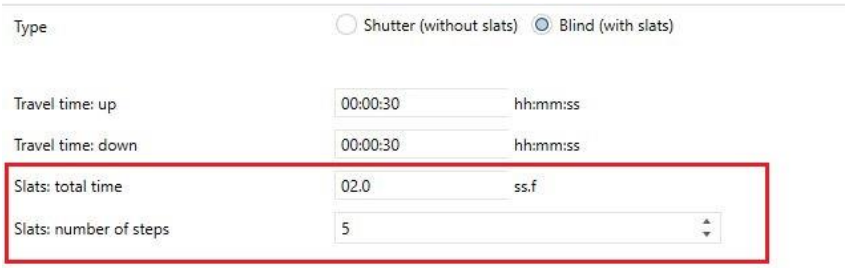
3.6.2 Blind outputs parameters

When outputs are configured as blind outputs the following parameters can be configured:



Type: It allows to select the type of Shutter/Blind. With or without slats. If it is selected with slats will appear two more options:

- **Slats total time:** In this parameter it must be configured the measured time that the slats takes to open or close completely.
- **Slats number of steps:** In this parameter it must be configured the number of steps that the slats takes to open or close completely.



Travel time up: In this parameter it must be configured the measured time that the blind takes to raise up completely.

Travel time down: In this parameter it must be configured the measured time that the blind takes to raise down completely.

Direction change pause: This parameter is a value (in ss.f) for a dead time that the device waits before changing the direction of the blind while it is moving.

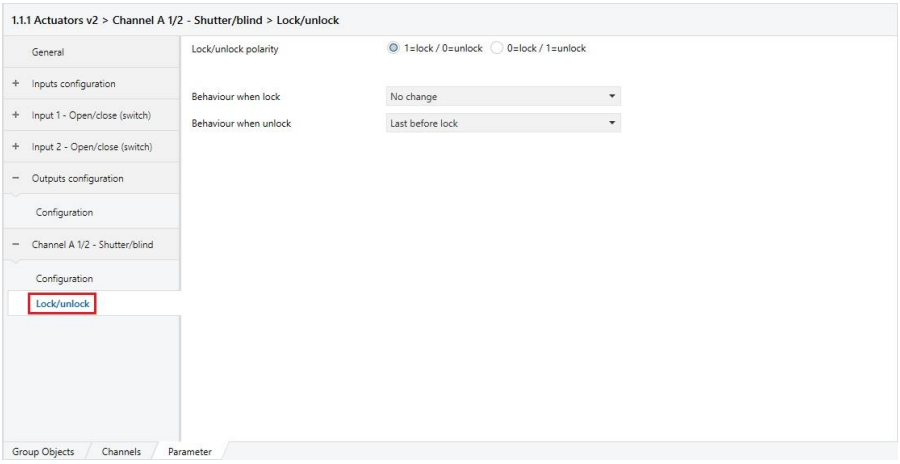
Additional time for adjustment: Defines an additional time in ss.f for complete blind position adjustment when it gets the upper or lower limit. The corresponding output remains closed an extra time measured in ss.f.

Status feedback during movement: This parameter allows to receive a feedback signalling of the current position of the blind just at the end of the movement or at every second.

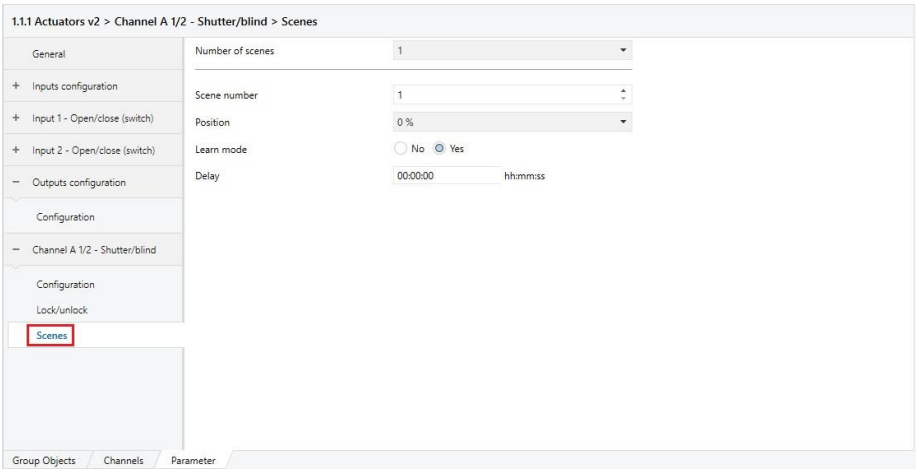
Use movement direction feedback object: This parameter allows to receive a feedback signalling of the current moving direction of the blind or not.

Status after voltage recovery: It can be controlled the position of the blind after a voltage recovery with a percentage between 0 and 100.

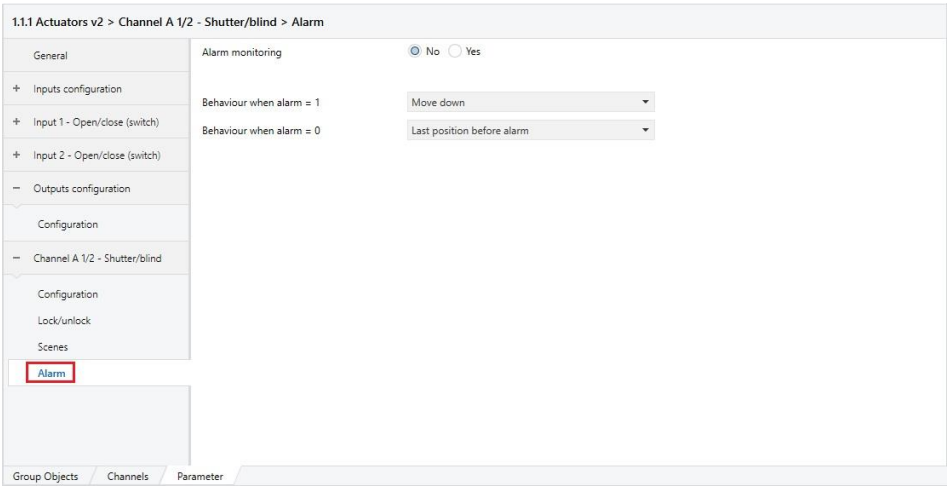
Lock/unlock: It allows to have a new tab in the left side to configure the behaviour when the channel is locked (disabled) or unlocked (enabled).



Scenes: It allows to have a new tab in the left side to record and run up to 16 scenes.

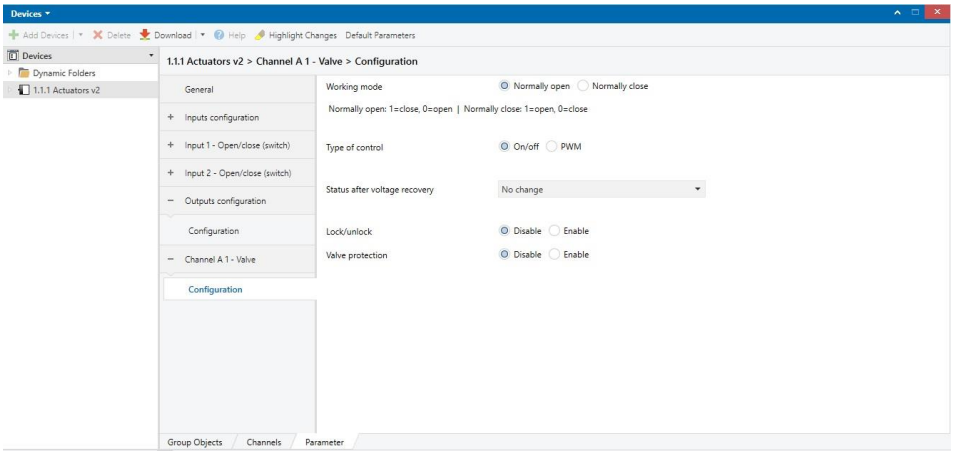


Alarm: It allows to have a new tab in the left side to configure the alarm behaviour. If it receives “0”, it starts counting the monitoring period, or executes the action set in the “behaviour when alarm = 0” parameter. Each time it receives a “0”, the time is preloaded again. If no other “0” is received and the monitoring time has elapsed, an alarm or programmed alarm action is executed. If it receives “1”, it begins to execute the configured alarm actions.



3.6.3 Thermo-valve outputs parameters

When outputs are configured as thermo-valve outputs the following parameters can be configured:



Working mode: Normally open or normally closed. In normally open mode the output relay is controlled with the standard logic: 1 = close, 0 = open. In normally closed mode the output relay is controlled with the inverse logic: 1 = open, 0 = close.

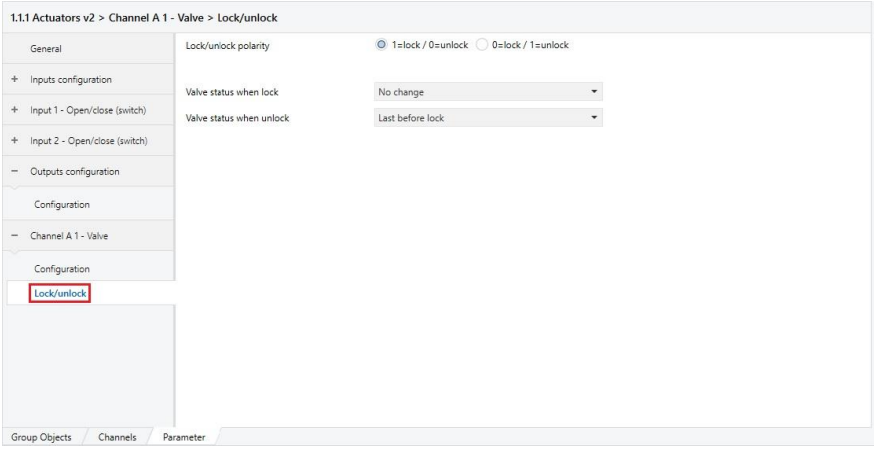
Type of control: It can be selected the type of control for the valve. The available options are:

- "On/off": It is controlled the opening and closing of the valve.
- "PWM:": It is established a period of time in which the valve is open a certain percentage of this time introduced through the correspondent communication object and closed the remaining percentage of time until reach 100% of the total time established.

Status after voltage recovery: It can be controlled the status of the output after a voltage recovery. The available options are:

- "No change": The output will remain in the position that it had before the voltage loss.
- "Open output": The output will be open after a voltage recovery.
- "Closed output": The output will be closed after a voltage recovery.

Lock/unlock: It allows to have a new tab in the left side to configure the behaviour when the channel is locked (disabled) or unlocked (enabled).

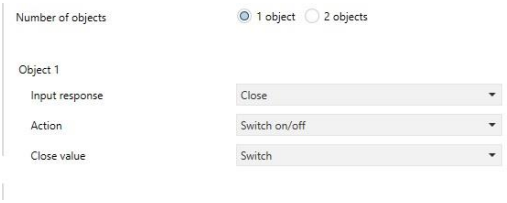


Valve protection: When this function is activated, the device automatically closes the output for 5 seconds, according to the time established for the protection cycle.

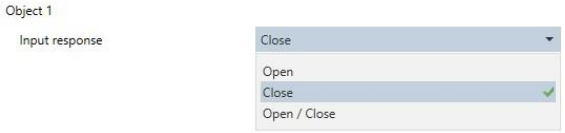
3.7 Inputs parameters

3.7.1 Switch inputs parameters

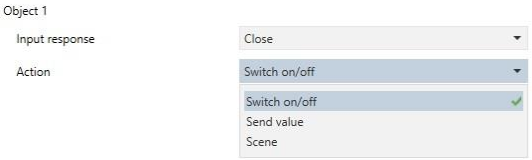
When an input is set as switch the following parameters can be configured:



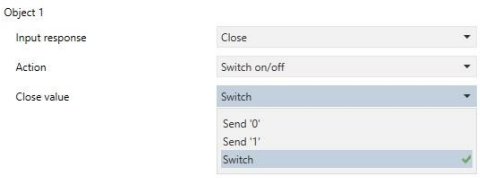
Input response: It can be selected when the input executes the associated action. When it is close, open or any of them.



Action: It can be selected the behaviour of the input when it is triggered. The available options are “Switch on/off”, “Send value” and “Scene”.

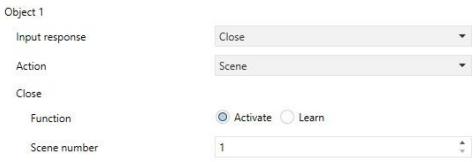


Close/open value: Depending on the behaviour of the input selected in the previous field different options appear. In the switch on/off mode it can be configured to send always a “1” logic (true), a “0” logic (false) or switching between “1” and “0”.

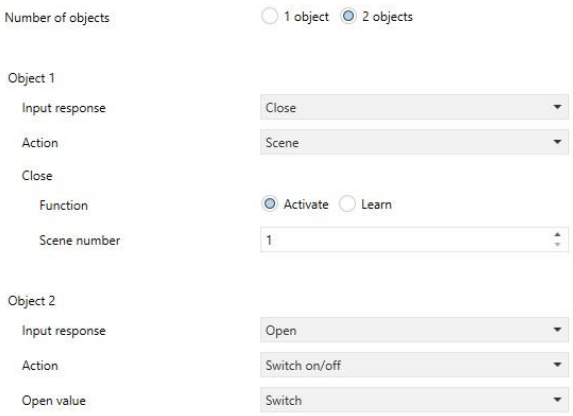


In the send value mode it send a value between 0 and 255 being 0 equivalent to 0% and 255 equivalent to 100%.

In the scene mode it can be selected to execute a scene (“activate”) or to record a scene (“learn”). And the number of scene between 0 and 64 that is desired to execute or record.

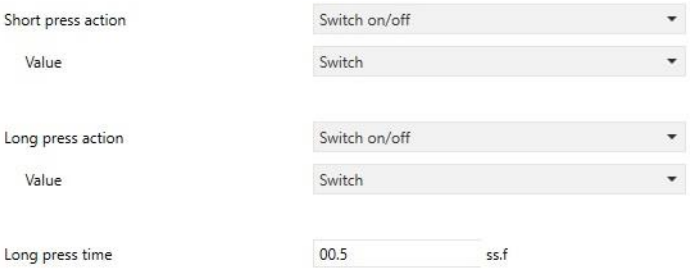


Number of objects: Each input can have 1 or 2 communication objects. If it is selected “2 objects” in this option another communication object for this input will appear and all the parameters previously explained must be programmed in the same way for the new communication object.

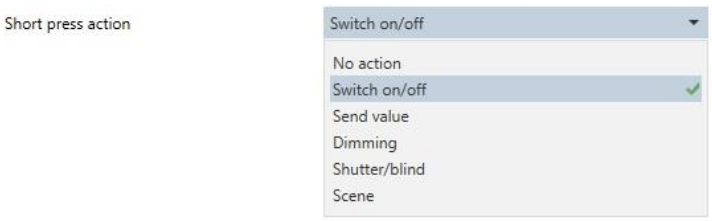


3.7.2 Pushbutton inputs parameters

When an input is set as pushbutton the following parameters can be configured:

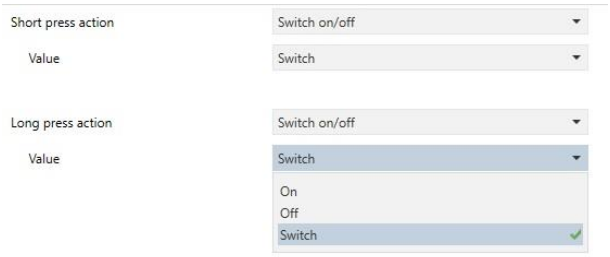


Short/Long press action: It can be selected the behaviour of the input when there is a short/long press action. The available options are “No action”, “Switch on/off”, “Send value”, “Dimming”, “Shutter/blind” and “Scene”.



Value: Depending on the behaviour of the short/long press selected in the previous field different options appear. If it is selected “No action” when the input (short/long) is triggered, no action is executed at the output.

In the switch on/off mode it can be configured to send always a “1” logic (On), a “0” logic (Off) or switching between “On” and “Off”.



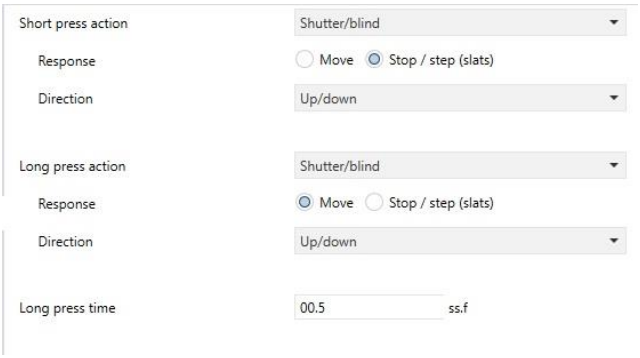
In the send value mode it send a value between 0 and 255 being 0 equivalent to 0% and 255 equivalent to 100%.

If it is selected dimming mode 2 new options appear:

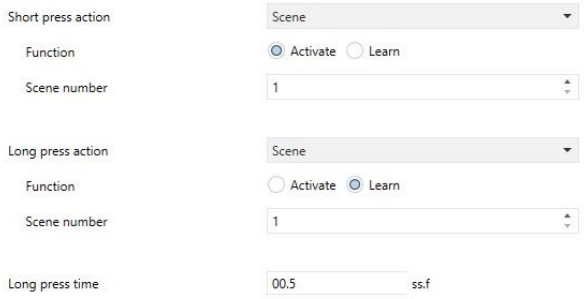
- “Response”: The available options inside this field are “Increase”, “Decrease” or “Increase/Decrease”. If it is selected “Increase” the input reaction will be to increase the bright., if it is selected “Decrease” the input reaction will be to decrease the bright and if it is selected “Increase/Decrease” the input reaction will be to alternate between brighter and darker.
- “Step”: It is the dimmering interval sent with every short/long press.

If it is selected shutter/blind mode 2 new options appear:

- "Response": The available options inside this field are "Move" for moving up or down the blind and "Stop/step(slats)" for stopping the blind movement and in the following pressing actions step the slats if there.
- "Direction": The available options inside this field are "up" for moving up the blind, "down" for moving down the blind and "Up/down" for working in switching operation mode, i.e., move up and down the blind with the same input.



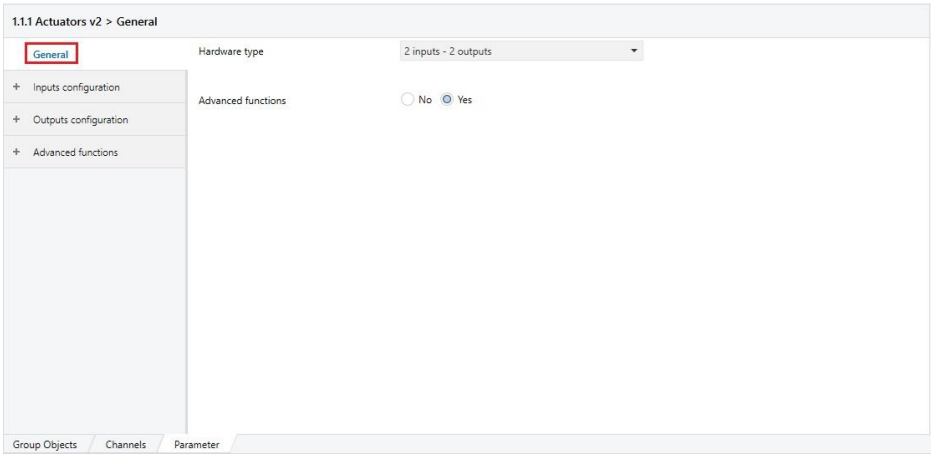
In the scene mode it can be selected to execute a scene ("activate") or to record a scene ("learn"). And the number of scene between 0 and 64 that is desired to execute or record.

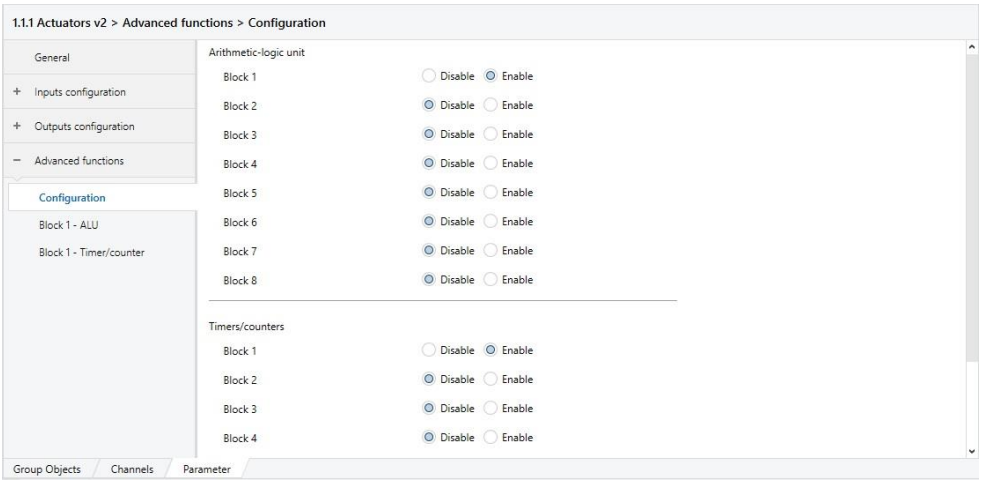


Long press time: It is the time in ss.f that the device uses to difference between a short pulsation and a long pulsation.

3.8 Advanced functions

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

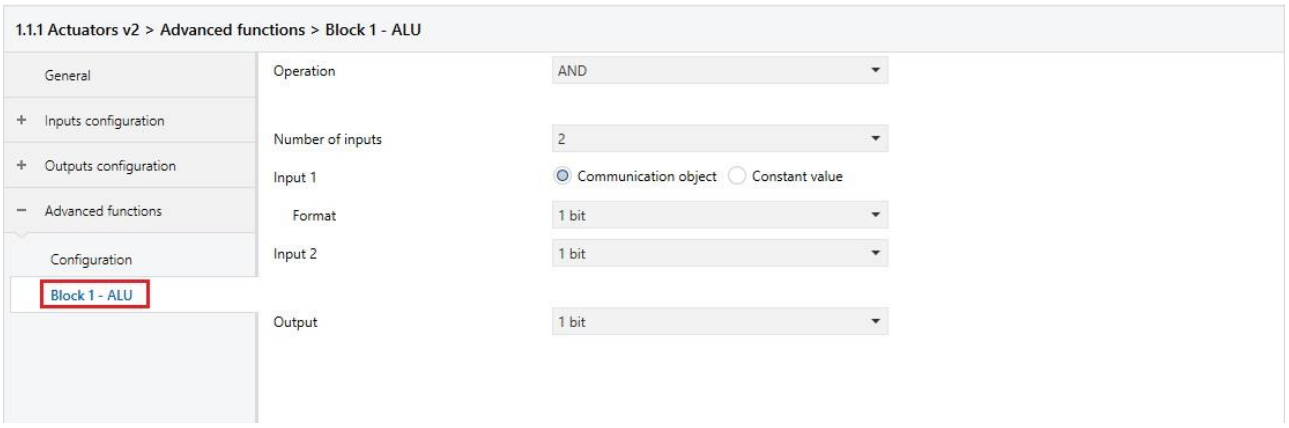




In this configuration menu it is possible to select what Arithmetic and logic or timers / counters blocks are enabled.

Name	Arithmetic-logic block X
Values	Enable / Disable
Description	Allows to enable or disable each arithmetic and logic block.
Name	**Timer / counter block**
Values	Enable / Disable
Description	Allows to enable or disable the each timer / counter blocks.

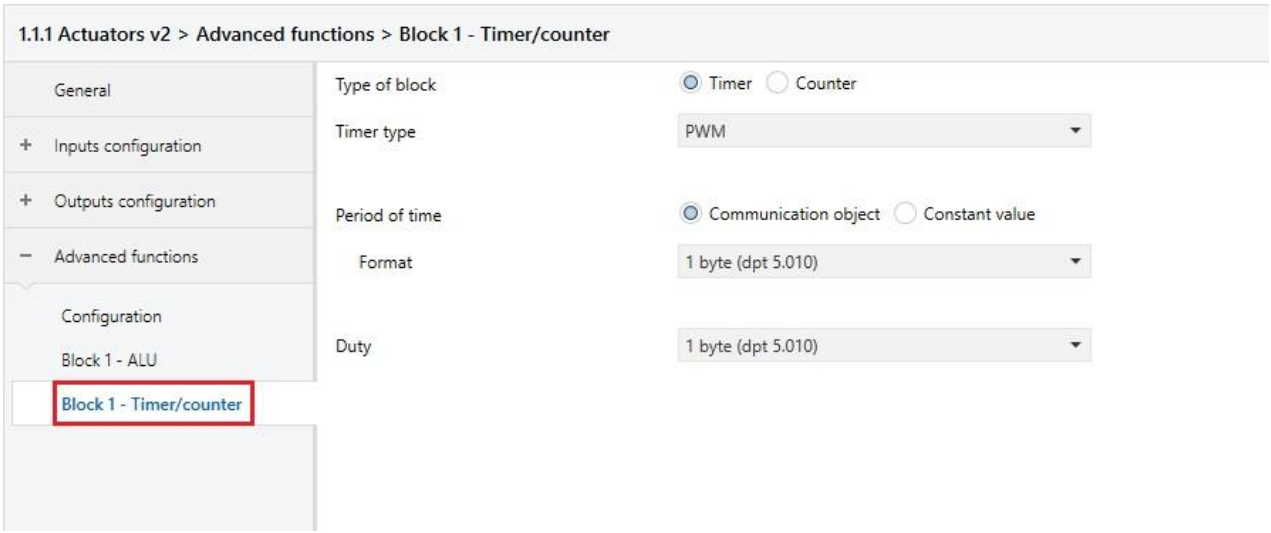
3.8.1 Arithmetic and Logic block (ALU)

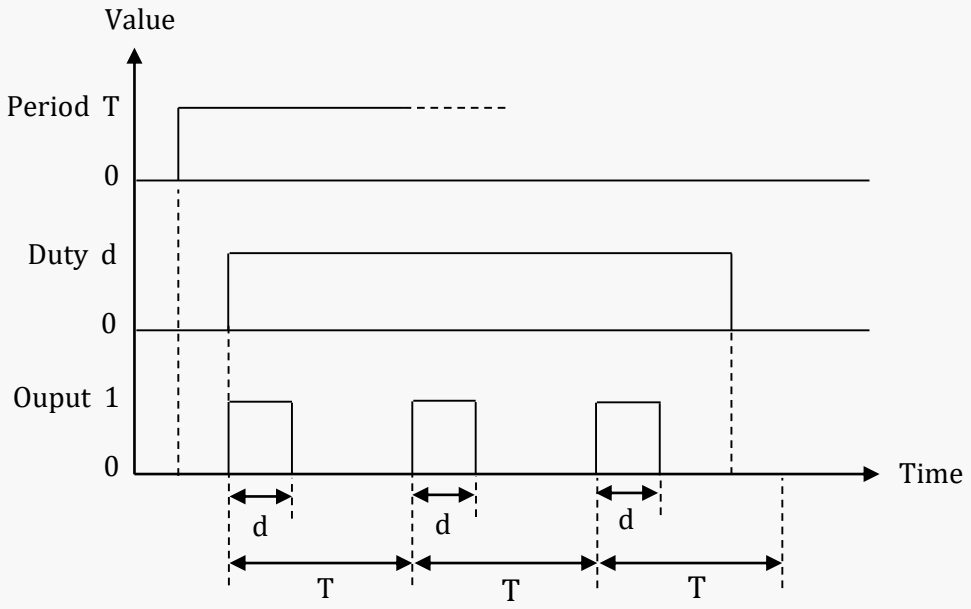


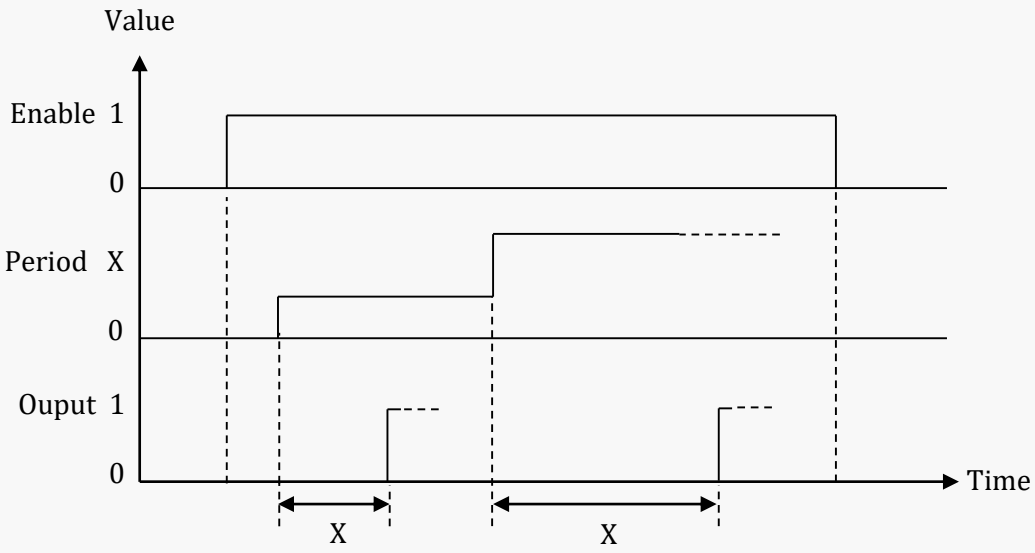
Name	Operation
Values	AND, NAND, OR, NOR, XOR, XNOR, NOT, BUFFER, == , != , <, > , <= , >= , + , - , *, / .
Description	It allows to select the arithmetic or logic operation of the block: Logic operations: - AND: Logic product

	- NAND: Negative logic product - OR: Logic addition - NOR: Negative logic addition - XOR: Exclusive logic addition - XNOR: Negative exclusive logic addition - NOT: Negation - BUFFER: Saves the input value in the output. Comparison operation: - == : equality - != : inequality - < : smaller than - > : greater than - <= : smaller or equal than - >= : greater or equal than Arithmetic operations: - + : addition - - : subtraction - * : multiplication - / : division
Name	**Number of inputs**
Values	From 2 to 4
Description	This parameter defines the number of inputs of the block. Depending on the type of operation it is allowed two or more inputs.
Name	**Input 1**
Values	Communication object / Constant value
Description	This parameter allows to select the type of the input 1, that can be a constant value or a value received from a communication object.
Name	**Format**
Values	1 bit, 1 byte unsigned (dpt 5.001), 1 byte unsigned (dpt 5.010), 1 byte signed (6.*), 2 bytes unsigned (dpt 7,*), 2 bytes unsigned (dpt 8,*), 2 bytes float (dpt 9,*).
Description	This parameter allows to select the size and format of the input 1. Depending on the type of operation different formats are allowed.
Name	**Input 2/3/4**
Values	1 bit, 1 byte unsigned (dpt 5.001), 1 byte unsigned (dpt 5.010), 1 byte signed (6.*), 2 bytes unsigned (dpt 7,*), 2 bytes unsigned (dpt 8,*), 2 bytes float (dpt 9,*).
Description	This parameter allows to select the size and format of the other inputs communication objects. Depending on the type of operation different formats are allowed.
Name	**Output**
Values	1 bit, 1 byte unsigned (dpt 5.001), 1 byte unsigned (dpt 5.010), 1 byte signed (6.*), 2 bytes unsigned (dpt 7,*), 2 bytes unsigned (dpt 8,*), 2 bytes float (dpt 9,*).
Description	This parameter allows to select the size and format of the output communication object. Depending on the type of operation different formats are allowed.

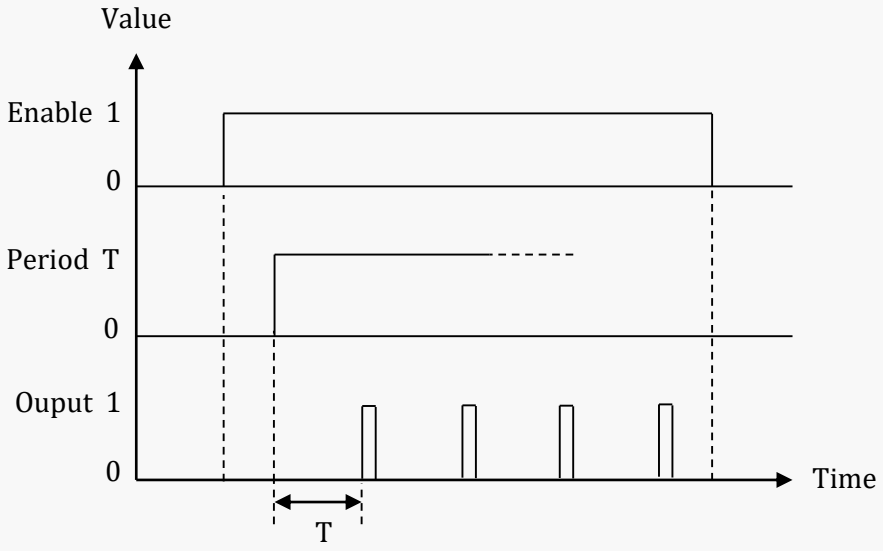
3.8.2 Timer / counter block



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



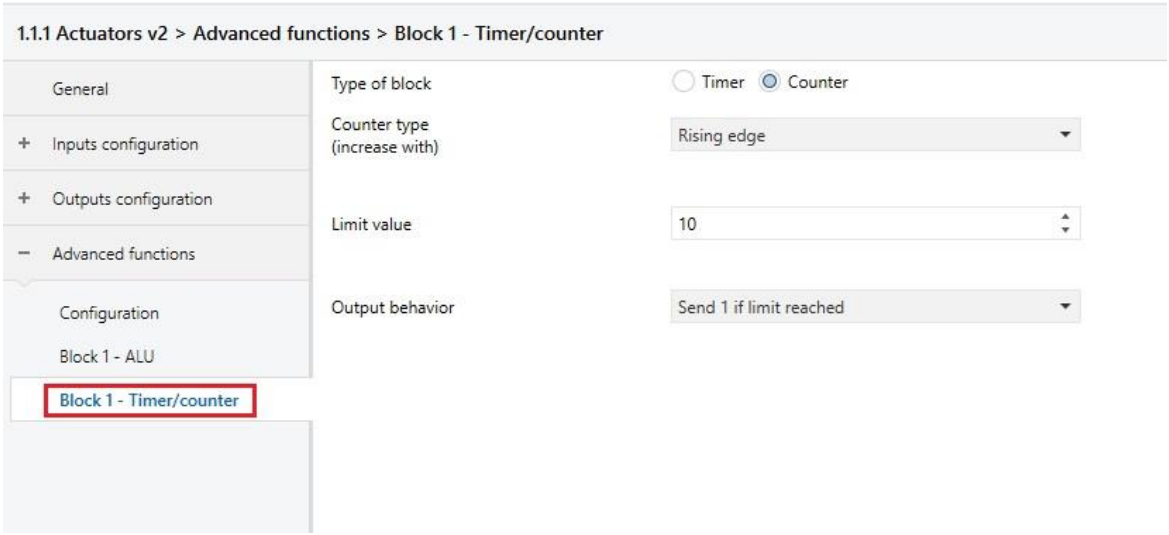
Cyclic: It sends a bit telegram '1' to the bus each time the limit value is exceeded cyclically.



Name	Period of time
Values	Communication object / Constant value
Description	It is the count time of the timer. It can be configured as a constant value or a value received through the bus with one of the following communication object formats:

	1 byte (dpt 5.010): Value from 0 to 255 (x 100 ms) 2 bytes (7.004): Value from 0 to 6553500 ms 2 bytes float (9.010): Value from 0 to 670760 s

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

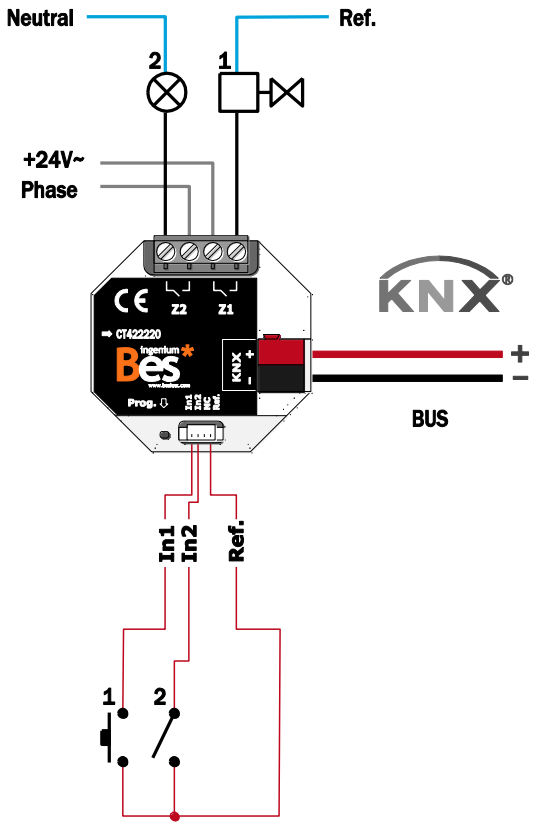


Name	Counter type
Values	Rising edge, falling edge, 1 or 0
Description	It is the change that the counter may detect in its “event” object to increase the count.

Name	Limit value
Values	From 0 to 65535
Description	It is the number of events over which the counter sends the finish telegram.

Name	Output behaviour
Values	Send 1 when limit reached, Send counter value (5.010), Send counter value (7.001)
Description	This parameter allows to select the format and behaviour of the counter output. It can be send a 1 when the count limit is reached or it can send the count value each time an event is detected.

4 Installation



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

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

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Manual version: v1.0