Shutters

Shutter/Blind Control Module

CONTENTS

DOCUMENT UPDATES

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[2.0]_a	**Changes in the software library**: • New function: Switched Control	9
[1.0]_a	**Changes in the software library**: • "Auto: On/Off" Object Polarity default value: 0 = Off, 1 = On.	-
[0.3]_a	**Changes in the software library**: • Start and stop delays. • New status objects: movement status and movement direction. • Automatic control.	-
[0.2]_a	**Changes in the software library**: • Relay Status object. • Number of steps. • Recover position after shutter stops motion. • New action on alarm deactivation: "Specific Position.	-

1 INTRODUCTION

A variety of Zennio devices incorporate **binary relay outputs** configurable as independent shutters channels.

Every shutter channel is capable of controlling the motion of one blind in the domotic system, by means of three complementary functionalities:

- **Basic control** (simple up/down orders).

- **Precise position control** of the shutter and of the slats (if any).

- **Switched Control** (simple move/stop orders).

Each shutter channel (A, B, etc.) consists of two consecutive relay outputs (i.e., channel A is formed by outputs 1 and 2; channel B is formed by outputs 3 and 4; etc.). The first output of each channel will send electric signals to raise the shutter, whereas the second output will send the signal to lower the shutter. The cables from the motor of the shutter drive should be connected to the actuator in accordance to the above.

Channel	Outputs	Action
A	Output 1	Move up
A	Output 2	Move down
B	Output 3	Move up
B	Output 4	Move down
(…)	(…)	(…)

Table 1 Shutter Channel. Actions of the Outputs.

Please refer to the specific user manual and datasheet of each Zennio device in order to confirm whether this feature is available or not, and for specific of the connection and installation.

2 CONFIGURATION

2.1 GENERAL CONFIGURATION

Each shutter channel can be configured as "**Shutter (No Slats) / Awning**" or as "**Blinds (With Slats)**".

Besides the shutter type, it is possible to configure the following for the shutter channels:

- **Times**: times that define the motion of the shutter:

  ➢ The length of the **rising course**,

  ➢ The length of the **lowering course**,

  ➢ **Initial and final** delays, as required by certain shutter motors,

  ➢ The **safety reversion delay** to prevent mechanical and electrical issues due to a sudden direction change when the shutter was already in motion,

  ➢ The **end-of-stroke time** to be applied once the shutter gets to its limit (top or bottom).

  For blinds with **slats** it is also necessary to configure:

  ➢ The **spin-around** time for the entire slat course,

  ➢ The **number of steps** for the entire slat course.

  Regarding the slats, it is possible to set whether the actuator should *force* the slats to maintain their position after the shutter completes the motion or when stopping the motion. Note that due to the fact that both the shutter and the slats move together, maintaining the position of the slats may sometimes require performing a certain correction of the position of the shutter.

ETS PARAMETERISATION

Once a shutter channel has been enabled, a specific configuration screen is included in the left menu. This screen contains the following parameters.

Figure 1. Shutter Channel - Configuration

- **Target to Control** [*Shutter (No Slats) / Awning / Blinds (With Slats)*][1]: defines the shutter channel.

- **Motor Starting Delay** [*0…600*] [*x10ms*]: extra time the shutter needs to start moving once the relay gets closed (i.e., once the motor is powered).

- **Motor Stop Delay** [*0…600*] [*x10ms*]: extra time the shutter takes to stop moving once the relay gets opened (i.e., once the motor is no longer powered).

- **Raise Time** [*5…600…30000*] [*x0.1s*]: total time the shutter needs to move to the top (position = 0%) from the bottom (position = 100%).

- **Fall Time** [*5…600…30000*] [*x0.1s*]: total time the shutter needs for the inverse journey (0% to 100%).

  <u>Important</u>:

  ➢ *The Raise and Lower Time refer to how much time the shutter remains in motion during an entire course. However, if the Motor Starting Delay has been set to a value other than zero, the relay will remain closed for an extra time equal to such Starting Delay. On the other hand, if the Motor*

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[1] The default values of each parameter will be highlighted in blue in this document, as follows: [*default/rest of options*].

Stop Delay is other than zero, it will be subtracted from the total time the relay remains closed. This ensures, in the end, that the length of the actual shutter motion coincides with the configured Raise / Lower times with independence of how much time the motor is being powered.

➢ *For higher rise or fall times setting the periodic status notification during movement to high values is recommended, with the aim to notify only stable states.*

• **Reversion Pause Time** [1…5…255] [x0.1s]: sets the time the actuator will wait if it was already in motion and an order to switch the direction arrives.

Note: *If a shutter movement stop order is received before a change of sense, the safety time will not be applied. Therefore, to avoid damage to the motor, waiting a few seconds before forcing a movement order in the opposite sense is recommended.*

• **Additional Time** [0…600] [x0.1s]: sets an end-of-stroke time in order to guarantee the shutter gets to the top or to the bottom.

In case of configuring the shutter as "Blinds (With Slats)", other parameters show up:

• **Spin-Around Time** [1…20…255] [x0.1s]: total time the slats take for the entire travel between "totally open" (0%, with the light passing through) and "totally closed" (100%).

• **Number of Steps** [1…9]: number of steps required for a full slat spin-around. The time range available for this parameter depends on the Spin-Around Time, as the slat step time should not be lower than 100 ms. The maximum range is 1 to 9 steps, which corresponds to spin-around times greater than 900ms. The default value will be the maximum within the allowed range.

• **Recover Position After Shutter Completes Motion** [disabled/enabled]: sets whether to try (or not) to preserve the position of the slats when the shutter reaches the target position.

• **Recover Position After Shutter Stops Motion** [disabled/enabled]: sets whether to try (or not) to preserve the position of the slats after receiving an order to interrupt the shutter motion.

- **Stats Position when Shutter Reaches Bottom** [*1…100*] [*%*]: defines the position the slats should move to once the shutter itself gets to the bottom position (100%, completely down).

The following objects are visible by default for every shutter channel:

- **[Cx] Move**: 1-bit object for the reception from the KNX bus of the shutter move-up ("0") and move-down ("1") orders.

- **[Cx] Stop**: 1-bit object for the reception from the KNX bus of the shutter stop orders ("0" or "1"), which will interrupt any move-up or move-down order in execution. If the shutter has been configured as "Blinds (With Slats)", the name of the object will be "**[Cx] Stop/Step**" and it will implement exactly the same function (interrupt a move-up or move-down order in execution), plus the step control function: if the shutter is still, one "0" will be interpreted as a step-up order, and one "1" will be interpreted as a step-down order.

  Note: *successive step orders received before the end of the step movement will reset the step time counter.*

- **[Cx] Lock**: 1-bit object for externally locking ("1") or unlocking ("0") the shutter. When the lock trigger is received, the actuator will interrupt any action being performed and will ignore further orders received from the bus until the unlock trigger is received.

  Note: *lock orders are ignored if the shutter alarm is active (although the alarm state itself also implies that the shutter does not respond to external orders).*

2.2 FUNCTIONS

This screen lets the integrator enable/disable a variety of additional functions related to the shutter channel control.

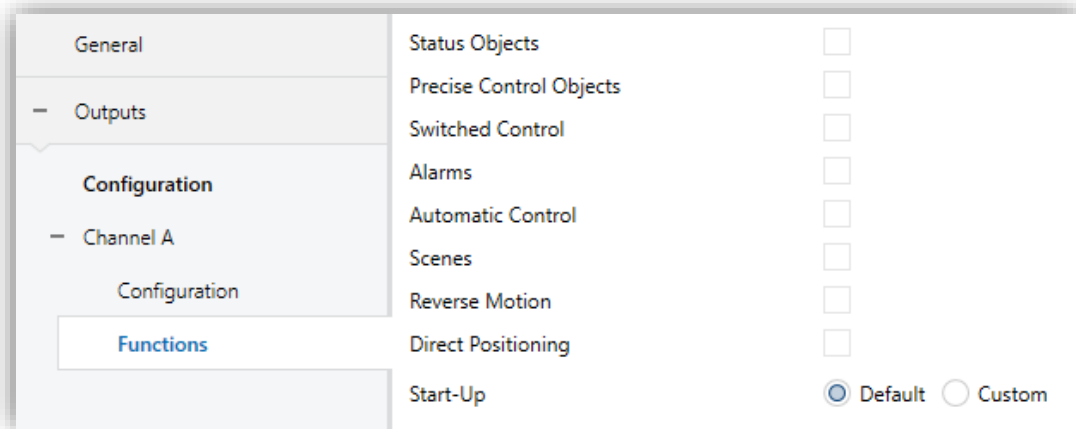**ETS PARAMETERISATION**

Figure 2. Shutter Channel - Functions

- **Status Objects** [*disabled/enabled*]: enables or disables the status objects for the position of the shutter and slats, the state of the relays, the direction of the shutter motion and for whether the shutter is in motion or not. See section 2.3.

- **Precise Control Objects** [*disabled/enabled*]: enables or disables two 1-byte objects ("**[Cx] Shutter Positioning**" and "**[Cx] Slats Positioning**") that will accept precise position orders (in terms of percentage) from the KNX bus for the shutter and the slats respectively.

- **Switched Control** [*disabled/enabled*]: enables the change of the shutter status when a "0" or "1" is indistinctly detected through the object "**[Cx] Switched Control**". Thus, if shutter is not moving, the opposite order to the last one performed will be executed ("Raise" or "Lower") or, if it is moving, it will stop.

- **Alarms** [*disabled/enabled*]: activates or deactivates the Alarms function, which should be configured from a specific parameter screen (see section 2.4).

- **Automatic Control** [*disabled/enabled*]: activates or deactivates the automatic control function, which must be configured from a specific parameter screen (see section 2.5).

- **Scenes** [*disabled/enabled*]: activates or deactivates the Scenes function, which should be configured from a specific parameter screen (see section 2.6).

- **Reverse Motion** [*disabled/enabled*]: enables or disables the "**[Cx] Move (Reversed)**" communication object, which is equivalent to "**[Cx] Move**" except for the fact that one "0" will move the shutter downwards and one "1" will move it upwards.

- **Direct Positioning** [*disabled/enabled*]: activates or deactivates the Direct Positioning function, which should be configured from a specific parameter screen (see section 2.7).

- **Start-Up** [*Default / Custom*]: sets whether to perform the default action or a custom action during the device start-up. The latter should be configured from a specific parameter screen (see section 2.8).

2.3 STATUS OBJECTS

The status objects inform about the position of the shutter and of the slats, and also about the state of the two relay outputs that make up the shutter channel. On the other side, it is also possible to know if the shutter is moving and the motion direction.

ETS PARAMETERISATION

After enabling **Status Objects** in the "Functions" screen (see section 2.2), a new tab will be incorporated into the tab tree on the left.
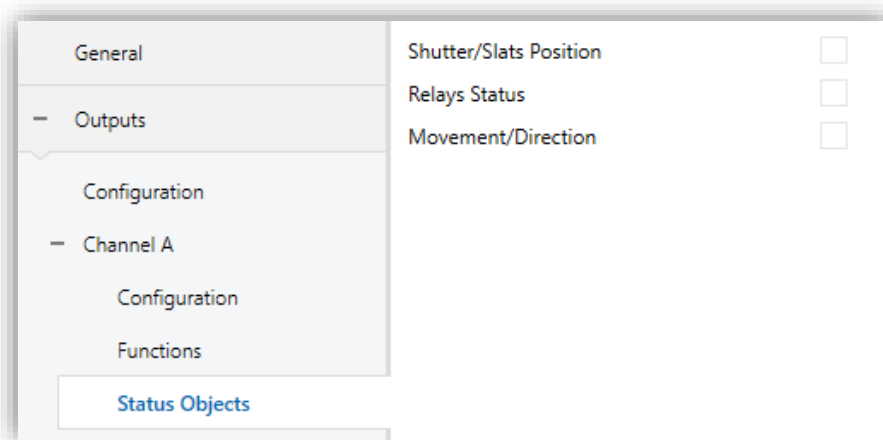

Figure 3. Shutter Channel – Status Objects.

The following objects types can be enabled:

- **Shutter/Slats Position** [*disabled/enabled*]: enables or disables two 1-byte objects ("**[Cx] Shutter Position (Status)**" and "**[Cx] Slats Position (Status)**") that will reflect, respectively, the instant position of the shutter and of the slats (if available) in terms of percentage. 0% means shutter totally up (or slats totally open, with the light passing through), while 100% means shutter totally down (or slats totally closed).

  - ➢ **Periodic Notification While Shutter Moving (0 = Disabled)** [*0…100*] [*s*]: sets whether the status objects should be sent (updated) periodically while the shutter or the slats are moving, or just at the end of the motion.

- **Relays Status** [*disabled/enabled*]: enables two 1-bit objects ("**[Cx] Rising Relay (Status)**" and "**[Cx] Lowering Relay (Status)**") which will reflect, respectively, the status of the rising relay and the lowering relay. '0' means

that the relay is open (no current passing through) and '1' means that the relay is closed (current passing through).

- **Movement/Direction** [*disabled/enabled*]: enables two one-bit objects ("**[Cx] Movement (Status)**" and "**[Cx] Movement Direction (Status)**") that will reflect respectively if the shutter is moving and the movement direction. In the first case, '0' indicates that the shutter is still, while '1' indicates that the shutter is moving. In case of the movement direction, '0' indicates an upward motion and '1' a downward motion.

2.4 ALARMS

The **Alarms** function enables the shutter (or the slats) be moved to a pre-defined position on the reception of an alarm trigger from the KNX bus. Two alarms (i.e., two independent trigger objects with independent target positions) are provided per shutter channel. It is possible to configure not only the position the shutter will be set to on the alarm **activation** but also on the **deactivation**.

Cyclically monitoring the alarm trigger is also possible by defining a certain time period. The actuator will check that the alarm or no-alarm state is received at least once before the period expires (note: this check does not take place if the object has never been received yet). In case the object stops being refreshed (i.e., the actuator does not receive an updated value anymore), the alarm action will be performed as well, for safety reasons.

Regarding the deactivation of the alarm, it is also possible to configure a **simple deactivation** or an **acknowledgement-demanding** deactivation.

- The first case triggers the deactivation action as soon as the alarm object recovers its normal value.

- The second one, on the other hand, requires that an external acknowledgement (through another object) is received after the alarm object has recovered its normal value.

Notes:

- ***Alarms always prevail over any other function*** *(e.g.: lock orders during the alarm state will be ignored; alarm orders during the lock state will not).*

- ***Alarm 1 has a higher priority than alarm 2****. If the channel is in "alarm 2" and alarm 1 gets triggered, it will execute the action of alarm 1 and will wait till alarm 1 gets deactivated (switching then back to "alarm 2", but without executing again the action of alarm 2). On the other hand, while one channel is in "alarm 1", triggering alarm 2 will have no effect: the channel will remain in "alarm 1" until alarm 1 gets deactivated (in that moment the channel will perform the action of alarm 2).*

ETS PARAMETERISATION

After enabling **Alarms** in the "Functions" screen (see section 2.2), a new tab will be incorporated into the tab tree on the left.
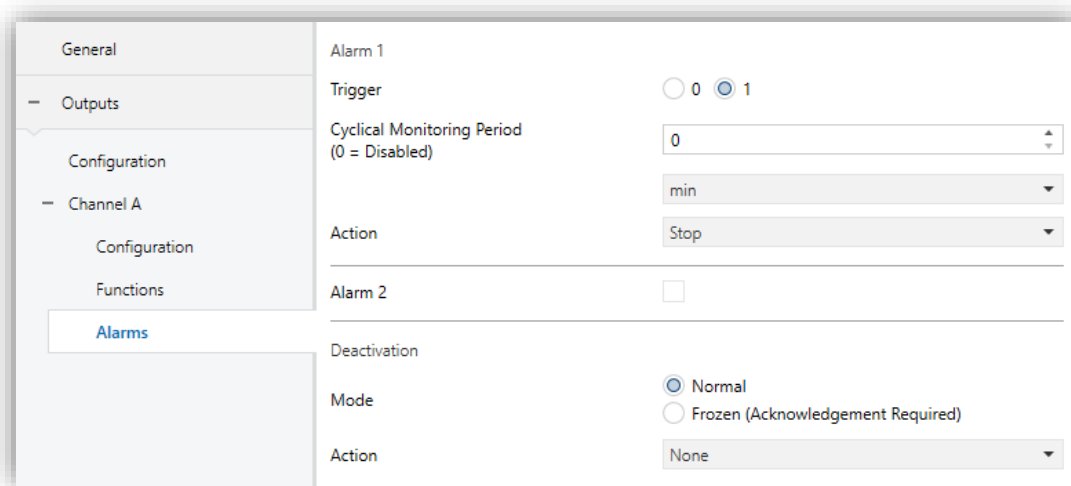

Figure 4. Shutter Channel – Alarms.

Alarm 1:

- **Trigger** [*0 / 1*]: sets the value that, when received from the KNX bus through object "**[Cx] Alarm**" (or "**[Cx] Alarm 2**" for alarm no. 2), will be interpreted by the actuator as an alarm trigger and will therefore initiate the action configured below.

- **Cyclical Monitoring Period (0 = Disabled)** [*[0…600][ds] / [0…3600][s] / [0…1440][min] / [0…24][h]*]: sets every how much time, at most, the alarm object should be updated from the bus <u>after an initial reception has already taken place</u>. if exceeded, and for safety reasons, the alarm action will be triggered as well. If this parameter is set to zero, the cyclical monitoring function will remain disabled.

- **Action** [*Stop / Up / Down / Specific Position*]: selecting the latter brings one or two more parameters:

  - ➤ **Shutter Position** [*0…100*] [*%*] and, if applicable, "**Slats Position**" [*0…100*] [*%*]: they define, in terms of percentage, a specific target position the shutter and the slats will move to when the alarm is triggered.

The parameters of **Alarm 2** [*disabled/enabled*], analogous to those of **Alarm 1**, are only displayed after checking the corresponding box.

Deactivation:

- **Mode** [*Normal / Frozen (Acknowledgement Needed)*]: the second option enables a new 1-bit object, "**[Cx] Unfreeze Alarm**", which should be used for externally unfreezing the alarm once "**[Cx] Alarm**" has received the no-alarm value (i.e., the inverse of the trigger value).

  Note: *the frozen should be sent necessarily after "**[Cx] Alarm**" has acquired the no-alarm value. Sending it while the trigger value is still active will have no effect.*

- **Action** [*None / Specific Position / Up / Down / Previous State (Before Alarm)*]: sets the state the output should acquire once the alarm has been deactivated (and acknowledged, if required). When selecting "Specific Position" the following parameters appear:

  - **Shutter Position** [*0…100*] [*%*] and, if applicable, **Slats Position** [*0…100*] [*%*]: they define, in terms of percentage, a specific target position the shutter and the slats will move to when the alarm is deactivated.

2.5 AUTOMATIC CONTROL

The automatic control enables the shutter be controlled through a **continuous automatic control** or through an **event-driven automatic control**, thus covering shutter systems of a more complex nature.

- **Continuous automatic control**: the control objects will be analogous to those in the normal (or manual) control.

- **Event driven automatic control**: the shutter position will depend on the value of certain binary objects, thus moving to positions previously configured in ETS. There will be two types:

  - ➢ **Simple control (solar protection)**: a sole one-bit object will be available and two actions will be configurable depending on its value (sunshine/shadow).

  - ➢ **Advanced control (solar protection and temperature management)**: two more objects in addition to the aforementioned one will appear, with six configurable actions in total (sunshine/shadow, cooling/heating, presence/no presence).

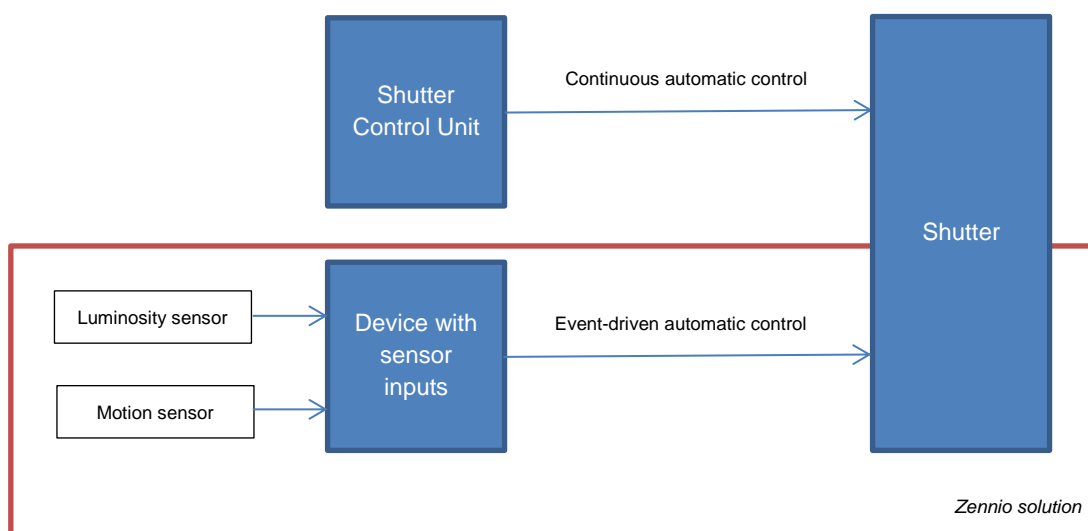The following figure shows a schema about the aforementioned functionality:

Figure 5. Automatic control schema.

PARAMETRIZACIÓN ETS

After enabling **Automatic Control** in the "Functions" screen (see section 2.2), a new tab will be incorporated into the tab tree on the left.
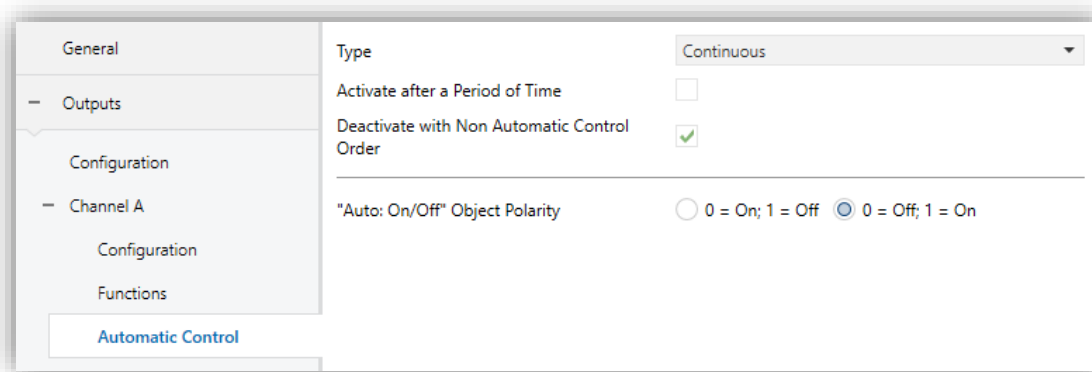

Figure 6. Shutter Channel – Automatic Control

- **Type** [*Continuous / Event Driven (Simple) / Event Driven (Advanced)*]: If set to "Continuous", the following objects (analogous to those of the normal shutter control) will be incorporated into the project: **"[Cx] Auto: Move"**, **"[Cx] Auto: Stop"**, **"[Cx] Auto: Shutter Positioning"** and **"[Cx] Auto: Slats Positioning"**. On the other hand, under an event-driver automatic control, the available objects will depend on whether it is a simple or an advanced automatic control, as explained later.

  With independence of the selected type, there will be two objects to activate the automatic control ("**[Cx] Auto: On/Off**") and to obtain the current status ("**[Cx] Auto: On/Off (Status)**").

- **Activate after a Period of Time** [*disabled/enabled*]: defines a **period** [*[0…3600][s] / [0…1440][min] / [0…24][h]*] with the automatic control deactivated, after which it will become automatically reactivated.

- **Deactivate with Non Automatic Control Order** [*disabled/enabled*]: if enabled, the automatic control will be deactivated when a non-automatic control order arrives or when the manual pushbuttons of the actuator are pressed. If the parameter is left disabled, non-automatic control objects will be ignored while the automatic control is active, and will be functional again after leaving such control.

- **"Auto On/Off" Object Polarity** [*0 = On; 1 = Off / 0 = Off; 1 = On*]: selects the actions associated to the values '0' and '1' of the "**[Cx] Auto On/Off**" object.

The following parameters only apply to the **type** "Event Driven" and will be shown or not depending on whether it is simple or advanced:

- ➢ **"Sunshine/Shadow" Object Polarity** (available in both simple and advanced) [*0 = Sunshine; 1 = Shadow / 0 = Shadow; 1 = Sunshine*]: selects the meaning associated to the values '0' and '1' of the "**[Cx] Sunshine/Shadow**" object.

- ➢ **"Heating/Cooling" Object Polarity** (available only in advanced) [*0 = Cooling; 1 = Heating / 0 = Heating; 1 = Cooling*]: selects the meaning associated to the values '0' and '1' of the "**[Cx] Heating/Cooling**" object.

- ➢ **"Presence/No Presence" Object Polarity** (available only in advanced): [*0 = No Presence; 1 = Presence / 0 = Presence; 1 = No Presence*]: selects the meaning associated to the values '0' and '1' of the "**[Cx] Presence/No Presence**" object.

On the other hand, in case of selecting an "Event Driven" automatic control, a new tab will be shown, named "Automatic Reactions":
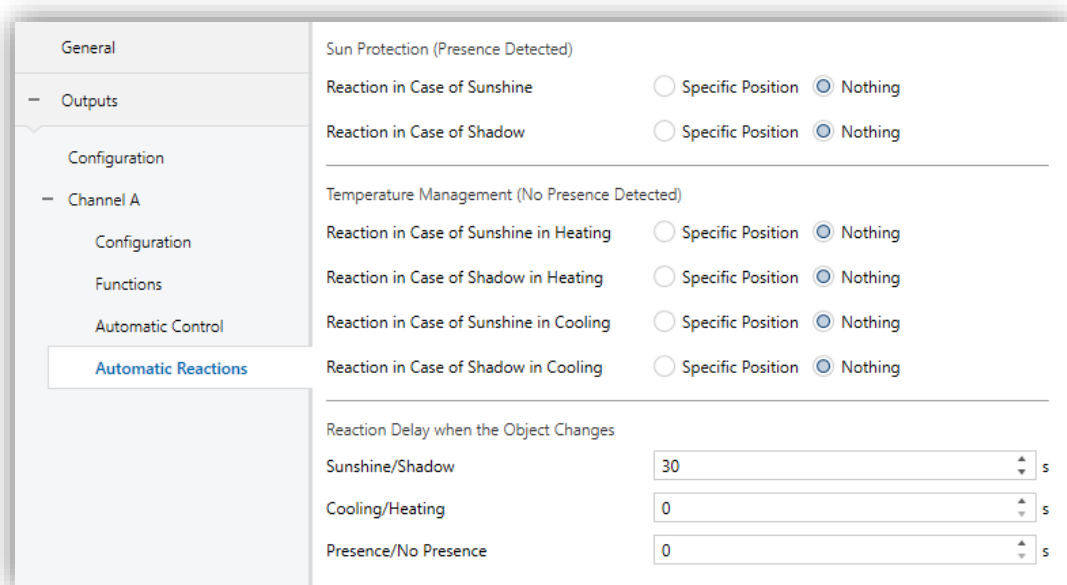

Figure 7. Shutter cannel – Event driven (advanced) automatic control

This window is divided into two different sections: the **reactions** to the different events depending on whether there is presence or not, and the **delays** for such reactions.

Simple Control

- **Reaction in Case of Sunshine** [*Specific Position / Nothing*]: defines the action to be performed over the shutter in the event of sunshine.

- **Reaction in Case of Shadow** [*Specific Position / Nothing*]: defines the action to be performed over the shutter in the event of shadow.

Advanced Control

Actions in Case of Presence

- **Sun Protection**:

  - ➢ **Reaction in Case of Sunshine** [*Specific Position / Nothing*].

  - ➢ **Reaction in Case of Shadow** [*Specific Position / Nothing*].

  These actions are analogous to those in the simple control, although in this case they will be performed only if the **presence event** is active.

Actions in Case of No Presence

- **Temperature Management**:

  - ➢ **Reaction in Case of Sunshine in Heating** [*Specific Position / Nothing*]: defines the action to be performed over the shutter in case the events of sunshine and heating are active.

  - ➢ **Reaction in Case of Shadow in Heating** [*Specific Position / Nothing*]: defines the action to be performed over the shutter in case the events of shadow and heating are active.

  - ➢ **Reaction in Case of Sunshine in Cooling** and **Reaction in Case of Shadow in Cooling** [*Specific Position / Nothing*]: analogous to the above two, for the Cooling event.

  These three actions will be performed only if the **no presence** event is active.

Finally, for both types of event-driven automatic control, it is possible to delay the execution of the above reactions:

- **Reaction Delay when the Object Changes**: sets a delay upon the reception of the events, prior to the execution of the corresponding reactions. The events that can be delayed, depending on the configured control type, are **sunshine/shadow** [*0…30…255*], **cooling/heating** [*0…255*] and **presence/no presence** [*0…255*].

  Note: *it is advisable to set a delay for the sunshine/shadow event which is enough to prevent excessive shutter operation due to successive luminosity changes.*

2.6 SCENES

The **Scenes** function enables the shutter (or the slats) be set to a certain position on the reception of a scene object.

ETS PARAMETERISATION

After enabling **Scenes** in the "Functions" screen (see section 2.2), a new tab will be incorporated into the tab tree on the left.
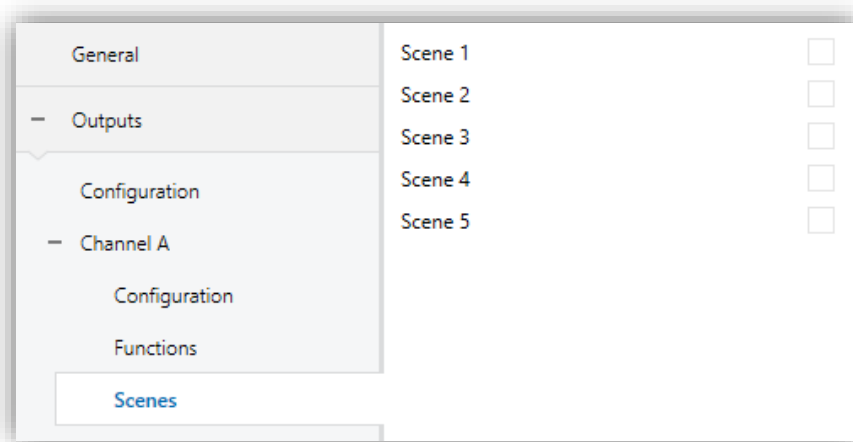

Figure 8. Shutter Channel - Scenes

Up to five scenes can be configured, marking the corresponding checkboxes (disabled, by default).

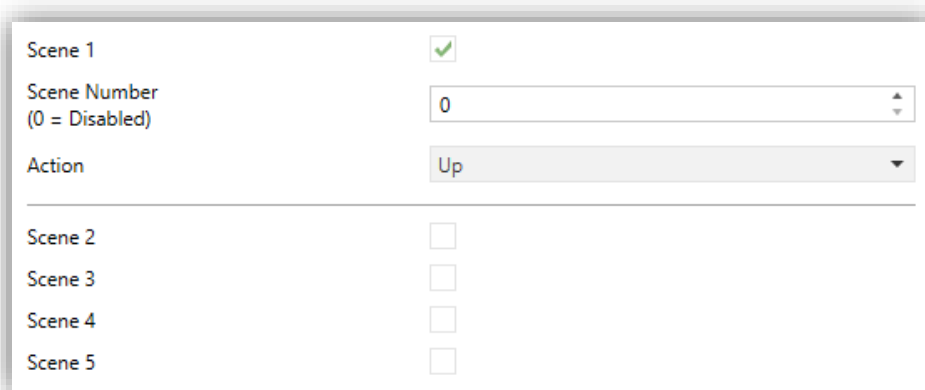For each enabled scene, the following parameters appear:

Figure 9. Shutter Channel – Scene.

- **Scene Number** [*0...64*]: sets the desired scene number, so that when that value is received (decreased by one, according to the KNX standard) through "**[Shutter] Scenes**", the action configured below will be triggered.

- **Action** [*Up / Down / Specific Position / Automatic*]: sets the state the output should acquire. The specific position option permits independently configuring a position for the shutter itself, for the slats, or for both.

Note: *in order to make the "Automatic" option available for the scene configuration it is necessary to have the automatic control function enabled in the "Functions" tab (see section 2.2).*

2.7 DIRECT POSITIONING

The **Direct Positioning** function permits moving the shutter (and the slats, if existing) to a pre-set, specific position by means of a 1-bit communication object. Two Direct Positioning functions are implemented per shutter channel, each with the option of *learning* new target positions in runtime (i.e., overwriting the one defined by parameter) by simply sending one "1" to the specific "save" object.

PARAMETRIZACIÓN ETS

After enabling **Direct Positioning** in the "Functions" screen (see section 2.2) a new tab is displayed in the left menu.
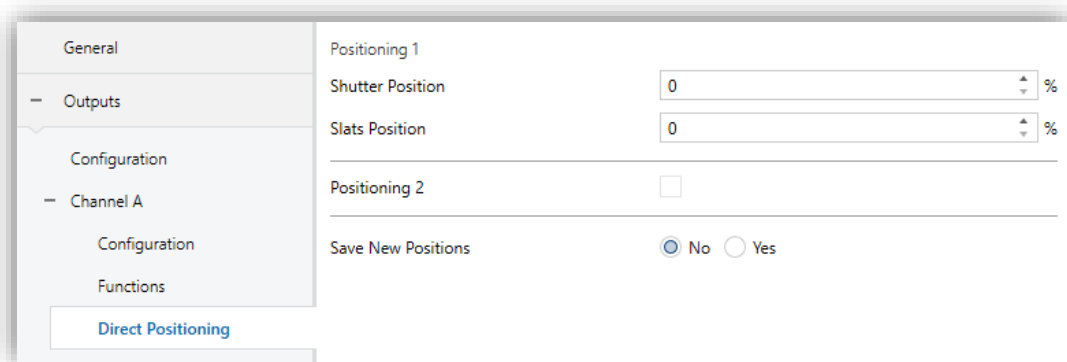

Figure 10. Shutter Channel - Direct Positioning

Positioning 1:

- **Shutter Position** [*0…100*] [%]: sets the position the shutter will move to when one "1" is received through "**[Cx] Direct Positioning 1**" (or through "**[Cx] Direct Positioning 2**" for no. 2).

- **Slats Position** (only for shutter channels with slats [*0…100*] [%]): analogous to the above parameter, but for the slats.

The parameters of **Positioning 2** [*disabled/enabled*], analogous to those of **Positioning 1**, are only displayed after checking the corresponding box.

- **Save New Positions** [*No / Yes*]: if enabled, one new 1-bit object (or two, if Direct Positioning no. 2 is also enabled) will be added to the project topology: "**[Cx] Direct Positioning 1 (Save)**" (and "**[Cx] Direct Positioning 2 (Save)**" for no. 2). When it receives one "1" from the KNX bus, the associated direct

position will be overwritten with the current position of the shutter (and of the slats, if existing). Further triggers of the direct positioning functions will therefore take the shutter/slats to this new position.

2.8 START-UP

The **Start-up** function brings the option to set the shutter to a particular position during the start-up of the actuator.

- <u>Default configuration</u>: this will leave the shutter as is. Please note that on the very first start-up (after an ETS download), the actuator will assume the shutter is fully raised (at 0%).

- <u>Custom configuration</u>: Current Position / Up / Down / Specific Position, both after an ETS download and a bus power failure. Optionally, the status objects can be sent to the bus during after a customisable delay.

PARAMETRIZACIÓN ETS

After selecting a "<u>Custom</u>" **Start-up** in the "Functions" screen (see section 2.2), a new tab will be incorporated into the tab tree on the left.
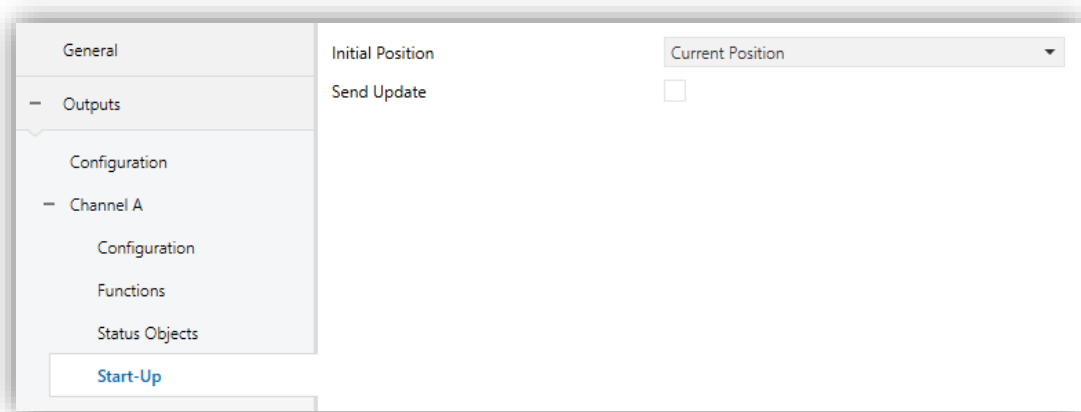

Figure 11. Shutter Channel - Start-Up.

This screen contains the following parameters:

- **Initial Position** [*Current Position / Up / Down / Specific Position*]: sets the position the shutter should acquire at the start-up of the actuator. The latter brings two more parameters:

  - ➢ **Shutter Position** [*0…100*] [%] and, if applicable, **Slats Position** [*0…100*] [%]: they define the specific position the shutter and the slats will move to when the actuator starts up.

- **Send Update** [*disabled/enabled*]: sets whether the status objects should be sent to the KNX bus (in order to inform other KNX devices) after the start-up of the actuator.

  ➢ **Delay** [*[0…600][ds] / [0…3600][s] / [0…1440][min] / [0…24][h]*]: delay in sending to ensure it takes place once the other devices are ready to receive it.

  Note: *this parameter is only visible when the* **Shutter/Slats Position** *status objects have been enabled (see section 2.3).*

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about Zennio devices:

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