PRODUCT MANUAL

MAXinBOX 16

16 Output Actuator

ZN1IO-MB16

Program version: 2.2

Manual edition: b

INDEX

DOCUMENT UPDATES

Version	Modifications	Page(s)
2.2_b	Revision of texts and styles.	-
2.2_a	Changes since version 2.1 of the application program: • Improvement in the compatibility of version 3.1 with some device batch numbers	-
	General improvement of this English version of the manual – texts and minor issues	-

2.1_a	Changes since version 2.0 of the application program:
	• Improvement in the behaviour of the shutter channel.
	  • On activations of the additional time when the shutter status is already 100%.
	  • On joint activations of the additional time of various shutter channels whose status is already 100%.
	• Optimization of the number of statuses referred to the individual outputs that are sent at the start-up.
		-

1. INTRODUCTION

1.1. MAXINBOX 16 ACTUATOR

MAXinBOX 16 is a KNX actuator that combines in one device the following features:

- **16 multifunction binary outputs** (relay outputs), up to 16 A each, configured as:
  - Up to 8 shutter channels (with or without slats).
  - Up to 16 individual outputs.
- One **10x multi-operational logical function** module, which can be enabled or disabled independently through a specific communication object.
- **Manual operation** over the outputs.

The outputs and the logical function module work independently and can interact with each other as if they were two autonomous devices connected to the KNX bus.

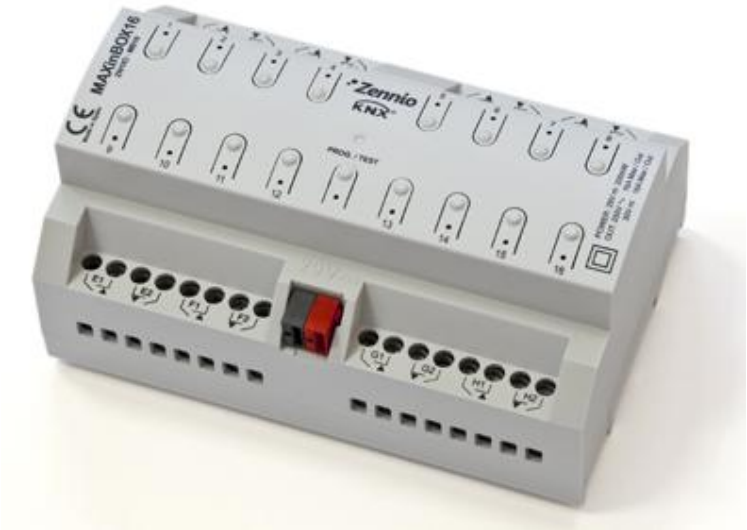


Figure 1.1. MAXinBOX 16 Actuator

1.2. INSTALLATION

MAXinBOX 16 connects to the KNX bus through the included KNX connector.

Once the device is provided with power supply from the KNX bus, both the physical address and the associated application program can be downloaded.

This actuator does not need any additional external power supply since it is powered through the KNX bus.

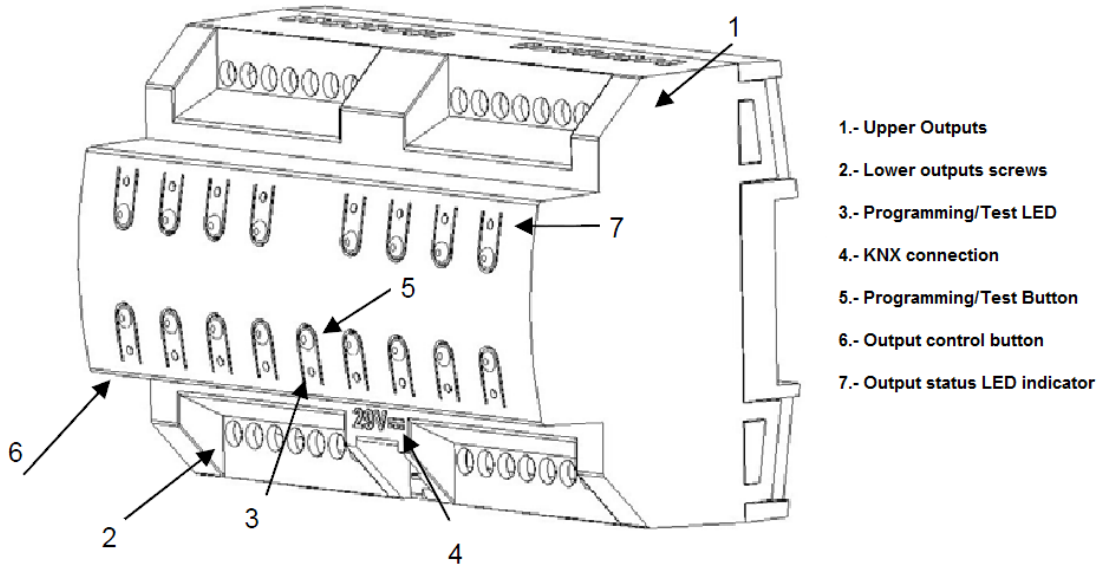


Figure 1.2. MAXinBOX 16. Element scheme

The functionality of the main elements of the actuator is described below:

- **Prog/Test push button (3):** a short press on this button sets the actuator into the programming mode, while the associated LED lights turn red. (**Note:** *If this button is held while plugging the device into the KNX bus, MAXinBOX 16 goes into secure mode. The LED blinks red every 0.5 seconds).*

  A long push on this button (at least 3 seconds, until the red light associated to Prog/Test changes its colour) enables the manual control over the actuator (this control will be explained in detail in section 2.3). When the button is released, the LED will light in green, indicating the activation of this control. To stop the manual control of the actuator, just push the Prog/Test button once (the LED will be switched off).

While MAXinBOX 16 is initializing, after a download or a bus power failure, the LED blinks blue. During the time the actuator takes to initialize, every order received will be taken into account and will be executed once the initialization is completed.

- **Push buttons 1-16; output control (6):** they allow acting over every output of the actuator, once the manual control has been configured. Each button has a luminous indicator that lights in green when the associated output is ON.

To obtain more detailed information about the technical features of MAXinBOX 16, as well as security and installation information, please read the actuator **Datasheet**, included in the original package of the device and also available at: http://www.zennio.com.

2. CONFIGURATION

2.1. INDIVIDUAL OUTPUTS

MAXinBOX 16 includes **16 relay outputs** that allow the control of different loads autonomously. Each output can be enabled or disabled **independently**.

Every individual output can be configured as **normally open** (the output turns ON when its relay closes) or **normally closed** (the output turns ON when its relay opens).

Besides the type, MAXinBOX 16 allows the configuration of the following functionalities of the individual outputs:

- **Timers.** This section is meant to control the outputs by means of a timer, i.e., by setting times for the ON and OFF of the output.

- **Scenes.** Allows running and/or saving a specific action over the output/s where this function is enabled. The status of the outputs will vary depending on the action set by the parameterized scene.

- **Alarm.** Allows changing the output status where this function is enabled. It is possible to configure the status that, on alarm activation and on alarm deactivation, the output will turn to.

  Note: *The alarm has a higher priority over the rest of the functionalities*.

- **Start-up configuration** Default or custom.

All these configuration options are explained in detail in section 3. ETS Parameterization.

2.2. SHUTTER CHANNELS

MAXinBOX 16 allows controlling **up to 8** different shutter drives or similar controls through its channels.

These channels allow the control fo the movements of the shutter movements in a domotic environment:

- **Basic control**: move the shutter up/down.
- **Precise control**: precise positioning of the shutter and the slats (for blinds with slats)

Each channel (A to H) is formed by two consecutive individual outputs; i.e., Channel A is made up of individual outputs 1 and 2; Channel C is made up of individual outputs 5 and 6; etc. The first output of the channel sends the order to **raise** the shutter, whereas the second one sends the order to **lower** the shutter. Therefore, the motor cables of the shutters, in charge of carrying out these actions, should be properly connected to each output of the channel to perform the required action.

Table 1.1 shows the action carried out by the outputs of each channel:

Channel	Outputs	Action
A	1	Raise
	2	Lower
B	3	Raise
	4	Lower
C	5	Raise
	6	Lower
D	7	Raise
	8	Lower
E	9	Raise
	10	Lower
F	11	Raise
	12	Lower
G	13	Raise
	14	Lower
H	15	Raise
	16	Lower

Table 1.1. Shutter channels: actions of the outputs

Each channel can be configured as **Shutter (No Slats)** or as **Blind (with Slats)**.

Besides the type of shutter, MAXinBOX 16 allows the configuration of the following functionalities of the shutter channels:

- **Times.** Allows configuring the main times associated to the movement of a shutter: raising time and lowering time. It is as well possible to define a security time so that a certain pause is made in the movement when the direction changes and an additional time when the shutter gets its limit (top or bottom). For blinds with slats, it is also possible to configure further times, referred to the length of the movement of the slats step.

- **Status objects.** They report the current position of the shutter.

- **Precise control.** Allows moving the shutter to concrete positions (in percentage: 0-100%, defined by parameter). Moreover, for blinds with slats, it is also possible to establish a desired position for the slats (value between 0 and 100%).

- **Scenes.** Allows running and/or saving specific actions over the channel/s where this function is enabled.

- **Alarms.** Two alarms available for each shutter channel. They execute, on the reception of a specific external event, an action defined by parameter.

- **Reverse movement.** Makes it possible to control shutters in an inverse direction, compared to the usual way.

- **Direct positioning.** Function to move a shutter to a predefined specific position via a 1-bit communication object.

- **Start-up configuration.** Default or custom.

All these configuration options are explained in detail in section 3. ETS Parameterization.

2.3. MANUAL CONTROL

MAXinBOX 16 allows manually controlling the status of its 16 outputs, by means of the buttons placed on the upper side of the device. There is one button associated to each of the outputs (please see figure 1.2. Element scheme).

There are two methods to carry out this manual control, named **“Test Mode ON”** and **“Test Mode OFF”**.

It is possible to lock the manual control, by means of a 1-bit communication object, that will be explained in the “ETS Parameterization” section.

The different behaviours, related to the chosen configuration to carry out the manual control, are explained below.

2.3.1. TEST MODE OFF

In this mode, each button of the actuator works as a communication object, thus, when pushing a button, MAXinBOX 16 behaves as if it had received an order from the communication object that enables the outputs (“[OX] ON/OFF” for individual outputs and “[CX] Move”, “[CX] Stop” or “[CX] Stop/Step” for shutter channels).

Test Mode OFF is thought to be used at any moment during the lifetime of the actuator.

Depending on the configuration of each output (individual output or shutter channel), Test Mode OFF will perform different tasks:

- **Individual output.** A short or a long press over a button will make MAXinBOX 16 work as if it had received a “0/1” value through the communication object “[OX] ON/OFF”, thus switching the last status of the associated output: if the output was OFF, when pressing the button it will receive a “1” value and will turn ON, and vice versa.

- **Shutter channel.** When pushing a button, MAXinBOX 16 will act as if it had received the order to move or stop the shutter through the corresponding object, depending on the press type (short or long press):

  - A long press will make the shutter move (unless it has already reached its lowest or highest position), the same way as if the actuator had received the order through the “[CX] Move” communication object.

    If no other actions are carried out over the channel buttons after sending a movement order, the corresponding LED will light in green until the shutter reaches to its lowest or highest position.

  - A short press will stop the shutter (if it was in motion), the same way as if the actuator had received a “1” through the “[CX] Stop” object. If the shutter is stopped, a short press will not cause any action, unless the shutter has slats, in which case a short press will

cause a movement of one step up or down (as if the actuator had received the order through the “[CX] Stop/Step” object).

As with individual outputs, it is possible to act over several shutter channels at the same time.

- **Individual output or shutter channel disabled.** Any press over the corresponding buttons will be ignored. The status of the outputs remains unchanged.

The behaviour of the actuator when a button is pressed, with regard to lock states, timers, alarms, scenes, sending of status objects, etc., is the same as if it had received the order through the corresponding communication object.

Once enabled the Test Mode OFF through the parameter “Manual Control” (see section 3.2), MAXinBOX 16 will be always in this mode, by default.

2.3.2. TEST MODE ON

Under this mode, each button acts directly over the corresponding relay without noticing the communication objects about these actions. In fact, while MAXinBOX 16 is in the “Test Mode ON” mode, any order received through a communication object will not have an effect over the outputs (either individual or shutter channel).

Test Mode ON is thought to be used during the installation of the actuator.

Depending on the configuration of the outputs (individual output or shutter channel), Test Mode ON will perform different tasks:

- **Individual output.** A short or a long press over a button will switch the corresponding relay, changing the status of the associated output (from ON to OFF or vice versa).

- **Shutter channel.** Acting over shutters under this mode is carried out as follows: the relay will close when pressing the corresponding button and will continue closed meanwhile the button is pressed, making the shutter move. The relay will open, making the shutter stop, as the button is released again.

  During the time the button is being pressed, neither the time parameterization of the shutters nor its position will be taken into account, so the shutter will not stop moving (the relay will not open) until the button is released, regardless of the duration of the press.

For security reasons, simultaneously pressing both buttons of a shutter channel is not possible, i.e., if one of this buttons is pressed, a press over the other will make the shutter in motion stop.

- **Individual output or shutter channel disabled.** These outputs will be considered as individual outputs and, even if they are disabled by parameter, a short press over the button will enable the associated output, switching its state (from ON to OFF and vice versa).

While under “Test Mode ON” mode, alarms, lock states, timers, or any other order sent from the KNX bus to the actuator will not affect its outputs.

Once enabled “Test Mode ON” through the “Manual Control” parameter (see section 3.2), a long press over the Prog/Test button (3 seconds minimum, until the LED changes its colour to green) will be needed to place MAXinBOX 16 under this mode. To leave “Test Mode ON” just press once the Prog/Test button.

Note: *In the factory status of the actuator, before downloading its application program, all the channels of MAXinBOX 16 are configured as shutter channels, for safety reasons.*

Important: *Starting with batch number **12AAJ, MAXinBOX 16’s Test mode ON is not activated by default**.*

3. ETS PARAMETERIZATION

To begin with the parameterization process of the MAXinBOX 16 actuator, it is necessary, once the ETS program has been opened, to import the database of the product (version 2.2 of the application program).

Next, the device should be added to the project where desired. And then, one right-click on the device will permit selecting "Edit parameters", in order to start the configuration.

In the following sections there is a detailed explanation about each of the different functionalities of MAXinBOX 16 in ETS.

3.1. DEFAULT CONFIGURATION

This section shows the default configuration the device parameterization starts from.

When entering the parameter edition of MAXinBOX 16 for the first time, the following window will be shown:

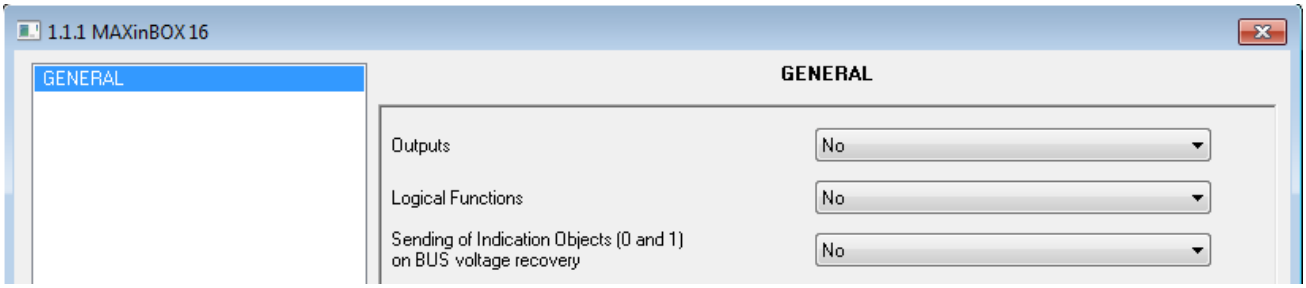


Figure 3.1. Configuration screen by default

As seen in figure 3.1, the outputs and the logical functions are disabled by default, so there will be no communication objects available until the user enables the different functionalities of the actuator.

If the parameter "Sending of Indication objects on bus voltage recovery" is enabled, two new 1-bit communication objects will appear ("Reset 0" and "Reset 1"), which allow sending to the KNX bus the values "0" and "1" after a bus power failure, in order to recover the communication with the rest of the devices in the installation. This sending may be immediate or after a configured delay (in seconds).

3.2. OUTPUTS

When selecting “Yes” in the Outputs parameter, the access to the configuration of the outputs will appear in the menu on the left side. It looks as follows:

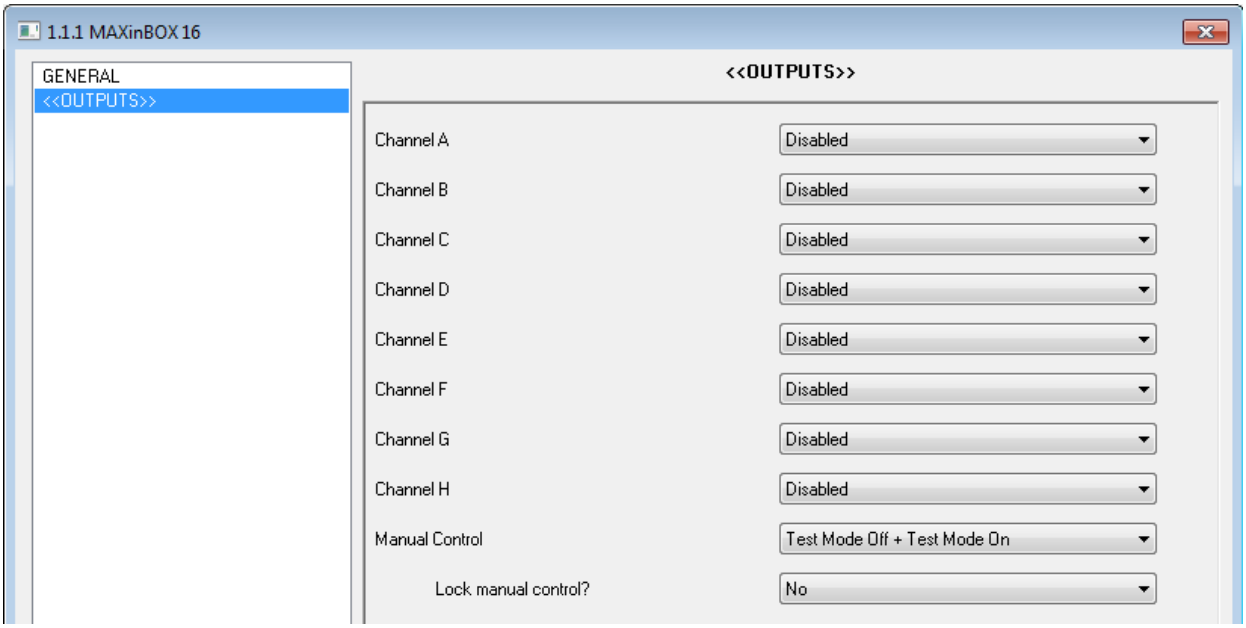


Figure 3.2. Outputs configuration

Outputs are grouped (in pairs) by channels, up to 8 (A to H), disabled by default. When selecting one of them, a drop-down box is shown to configure each channel as **individual outputs** or as a **shutter channel.**

Figure 3.3. Possible configurations of the Channels

From this window, users can also set the **control type** over the outputs (through the “Manual Control” parameter). It is possible to choose among the following options:

- **Disabled.** The manual control over the outputs is not enabled.

- **Only with Test Mode OFF.** Simple manual control. The buttons of the actuator behave as communication objects.

- **Only with Test Mode ON.** Only manual actuation over the outputs (pressing the buttons) is enabled.

- **Test Mode OFF + Test Mode ON.** Default value of the Manual Control parameter. It allows a complete manual control, i.e., the outputs may be controlled both as Test Mode ON and as Test Mode OFF.

MAXinBOX 16 allows choosing by parameter whether to **lock** or not the manual control, in the box "Lock Manual Control?". If the user decides to lock this control (selecting "Yes"), one 1-bit communication object ("Manual Control Locking") will be enabled and two boxes will appear to configure two additional parameters:

- **Value**: indicates the value ("0" or "1") that the 1-bit communication object will use to lock/unlock the manual control. Two options can be chosen: ["0" Unlock; "1" Lock] or ["1" Unlock; "0" Lock].

- **Initialization**: allows initializing the actuator after a bus power failure with its manual control locked or unlocked, or maintaining the last value (if this option is chosen, after a parameter download, the manual control will be unlocked).

While the manual mode is locked, presses over the associated buttons will be ignored.

If MAXinBOX 16 receives through the corresponding object a value that locks the manual control while under Test Mode ON, this mode will be deactivated and the manual control will be locked.

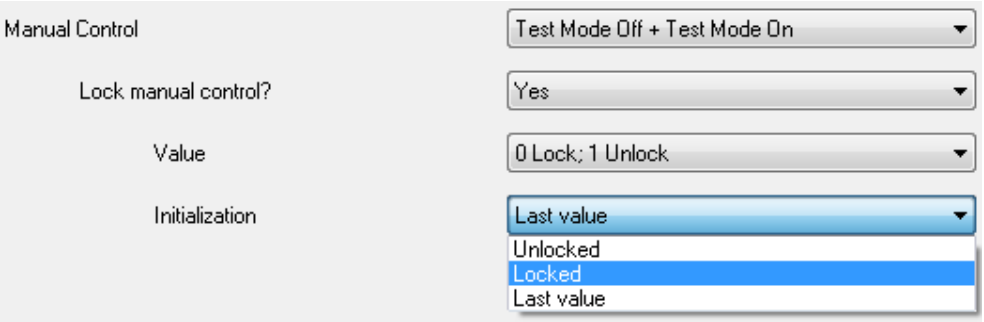


Figure 3.4. Manual control type and lock

Next, each of the parameters that can be configured according to the output type chosen is explained.

3.2.1. INDIVIDUAL OUTPUTS

Figure 3.5 shows an ETS example of a channel parameterization: channel A is parameterized as “individual outputs”, output 1 and 2.

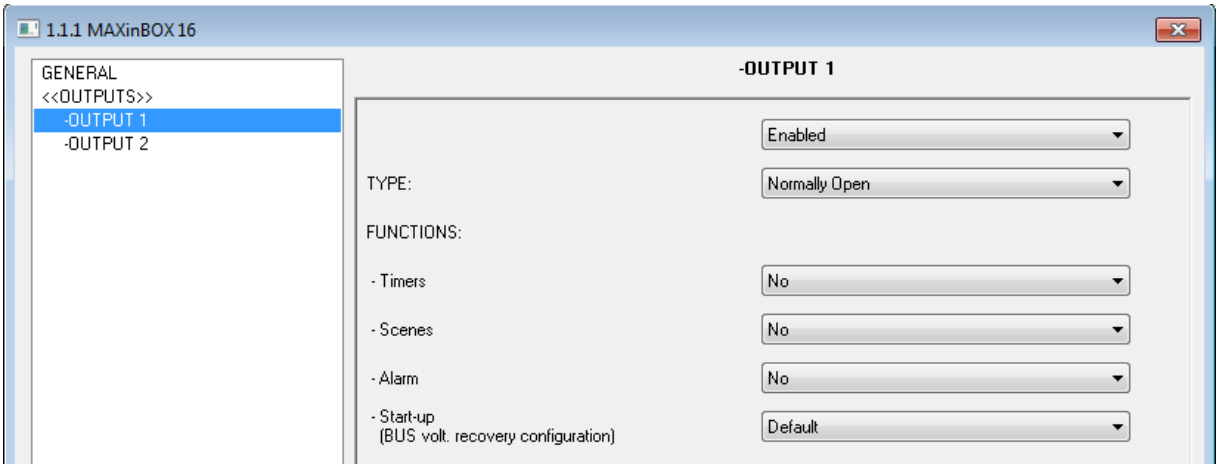


Figure 3.5. Channel A configured as individual outputs

Once the output is enabled, the following 1-bit communication objects will automatically appear in the topology window of ETS:

- **[OX] ON/OFF**: allows activating (ON) or deactivating (OFF) the corresponding output, by sending the value "1" or "0", depending on the parameterized output type.

- **[OX] Status**: shows the current status of the output (activated or deactivated).

- **[OX] Lock**: allows locking/unlocking the output (disable/enable its control) by sending the values "1" or "0" to the object, respectively.

Note: *Only the Alarm function has a higher priority than the lock function; e.g., if an alarm signal arrives when locked, the corresponding output will be placed as corresponding to the alarm. When the alarm is deactivated, the output returns to the lock status.*

The first thing that must be parameterized is the type of each output of the channel:

- **Normally open**: the output will be activated (ON) when its relay closes; in this moment, the LED associated to the output will light green. The output will be deactivated (OFF) when its relay opens, and the LED will be switched off.

- **Normally closed**: the output will be activated (ON) when its relay opens and the associated LED will be switched off. The output will be deactivated (OFF) when its relay closes, making the LED light green.

Below, the associated functions of every output:

- **Timers:** allow timing the outputs, through a simple timer and/or a flashing sequence.

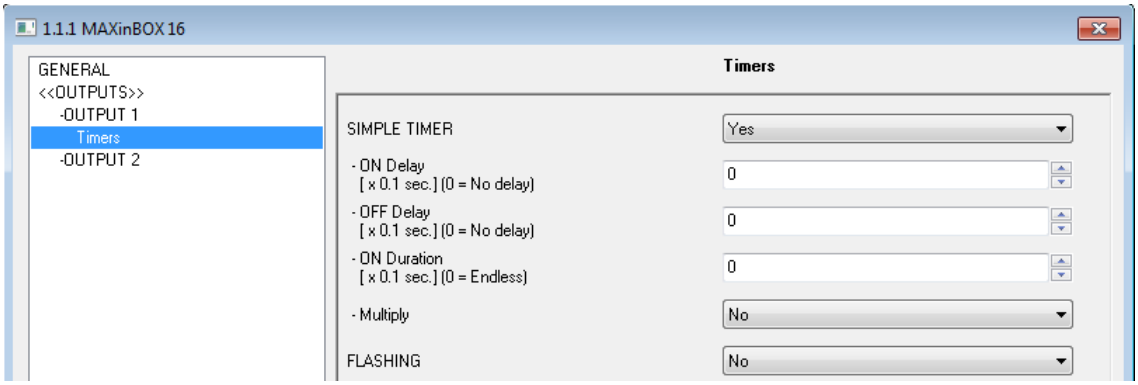


Figure 3.6. Timers screen: Simple timer

➢ **Simple timer** Allows setting the outputs on or off, by means of a timer when an ON ("1") or OFF ("0") order is received through the "[OX] Timer" object.

- **On Delay:** time that should pass since the ON order is sent (through the "[OX] Timer" object) and the ON response in the output takes place. If no delay is needed, please set 0 in this field.

- **OFF Delay:** time that should pass since the OFF order is sent (through the "[OX] Timer" object) and the OFF response in the output takes place. If no delay is needed, please set 0 in this field.

- **On Duration:** time the output remains ON before recovering the OFF status. A 0 set in this field means the output will remain always ON, no timing is applied in the output.

These parameters are used in the timer as follows:

- When MAXinBOX 16 receives a "1" value through the "[OX] Timer" communication object, an ON order is sent to the output, respecting the On Delay and the On Duration (if a value different from 0 has been parameterized in these fields).

- When MAXinBOX 16 receives a "0" value through the "[OX] Timer" communication object, an OFF order is sent to the output, respecting the Off Delay (if a value different from 0 has been parameterized in this field).

  - **Multiply:** it allows progressively increasing (multiply), in execution time, the On Duration or the On/Off delays; i.e., when enabling this function, MAXinBOX 16 multiplies the defined duration/delay as many times as the value "1" or "0" is received through the "[OX] Timer" object. Two situations are distinguished:

    - **No multiply:** if during a temporized ON, MAXinBOX 16 receives a "1" through the "[OX] Timer" object, it starts to count again the time set in the On Duration field.

    - **Multiply:** if during a temporized ON and while the parameterized time is not over, MAXinBOX 16 keeps receiving the value “1” through the “[OX] Timer” object several more times, the parameterized duration will be multiplied by “n”, being “n” the total number of times it has been received.

➢ **Flashing** (See figure 3.7). This function is meant for making the output run the sequence ON-OFF-ON-OFF… when needed. ON and OFF durations can be parameterized, as well as the number of repeats in the sequence (for an endless sequence, set 0 in this field: the sequence will repeat indefinitely, until a “0” is received through the “[OX] Flashing” communication object).

The status of the output after the last repetition (ON or OFF) can also be defined.

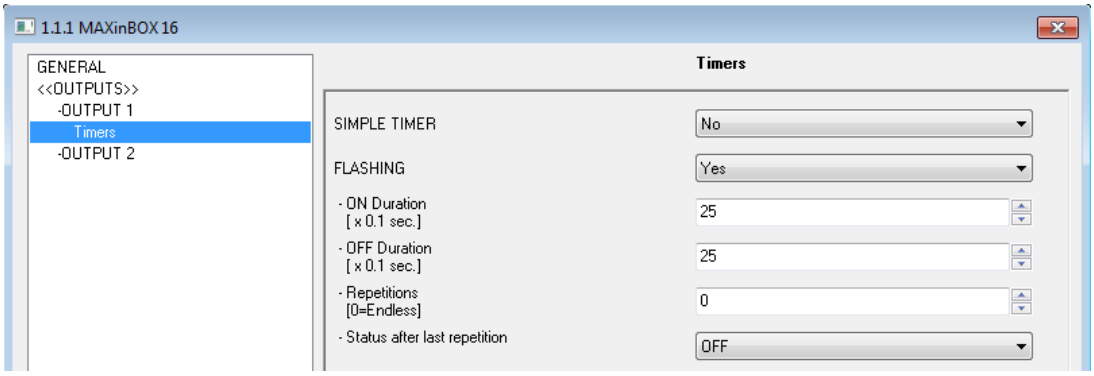


Figure 3.7. Timers screen: Flashing

It is **important** to know that MAXinBOX 16 allows parameterizing both a simple timer and a flashing sequence for the same output.

Scenes: Scenes consist of a synchronized activation of some devices in the domotic installation, so that different predefined atmospheres are generated.

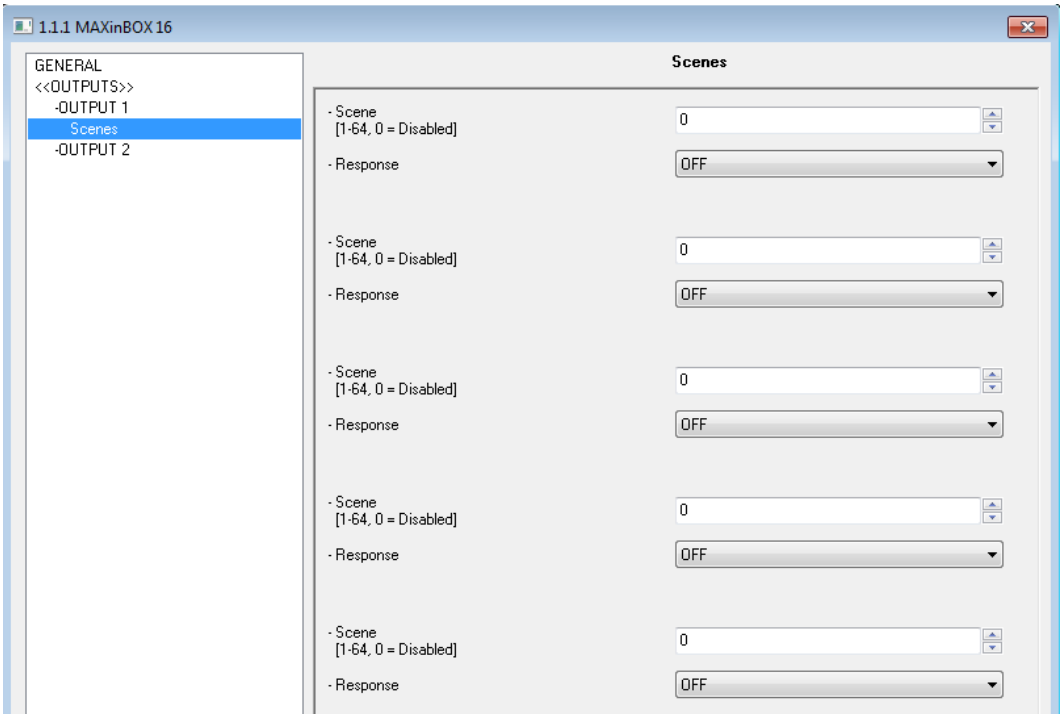


Figure 3.8. Scenes

There is a 1-byte communication object associated with Scenes for the individual outputs: “Scenes (Individual Outputs)”, which is shown when the “Outputs” box in ETS is enabled, even if the outputs themselves are disabled.

In the case of individual outputs, scenes allow linking a numerical value (between 1 and 64, where 0 means that the scene is disabled) to an output status (OFF or ON). Thus, when the predefined numerical value for a scene is received through the Scenes object, the parameterized action for the output will be carried out: OFF or ON; so it will be possible to create different environments in the installation.

Besides running scenes, it is possible to **learn** (modify) scenes, taking into account that the valid numerical values for learning scenes are those in the range 128-191.

MAXinBOX 16 allows running and/or learning **up to 5 different scenes** for each output.

Alarm: it is possible to configure one alarm for each output. Once activated, this alarm will have a higher priority over any other orders that the actuator receives, i.e., any order received while the alarm is activated will be ignored until the alarm deactivation.

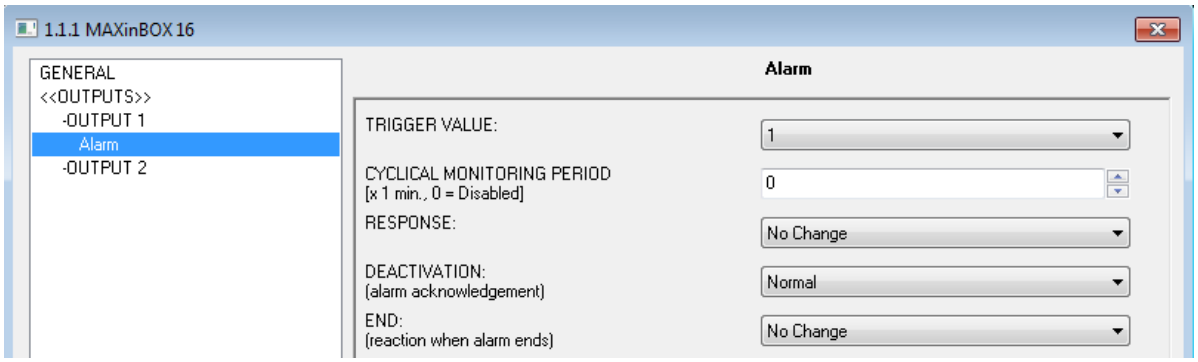


Figure 3.9. Alarm

In the Alarm section for individual outputs the following parameters can be configured:

- **Trigger value:** sets the value that will trigger the alarm status. It can be "1" or "0". The alarm status will be activated when the value set in this field is sent to the "[OX] Alarm" object. It will be deactivated when the opposite value to the one set in this field is sent to the corresponding communication object.

Cyclical monitoring period (minutes): parameterizes the maximum admissible time between No Alarm orders ("[OX] Alarm" = opposite value to the trigger value). If this limit is reached and no further No Alarm messages have been received, MAXinBOX 16 activates the alarm, which will execute the parameterized action (it is possible that no change is required in the output status). If no new alarm activations are desired, the opposite value to the trigger value will be required to periodically arrive to the Alarm object (before the cyclical monitoring period ends). The cyclical monitoring can be disabled by setting a 0 in this filed.

To better understand this behaviour, please read the following application example:

✓ *Example:*

Suppose that a cyclical monitoring time of 2 minutes is configured. The trigger value is "1" and the reaction of the actuator when the alarm is activated is to switch the output on, while the reaction when the alarm is deactivated is to switch the output off. Assume that the output is switched off and that the alarm gets activated ("[OX] Alarm=1"), so the output is switched on. While the alarm is not deactivated, any action over the output will be ignored. After a while (t2), the alarm is deactivated ("[OX] Alarm=0"), thus switching the status of the output (from ON to OFF). Before the parameterized cyclical monitoring period (2 minutes) ends, a new alarm deactivation order arrives, so this timer begins the count again. After 2 minutes without any

action performed over the alarm object, the alarm will be automatically activated, switching the output status (OFF to ON). As before, any action over the output will be ignored until the alarm is deactivated. See figure 3.10.

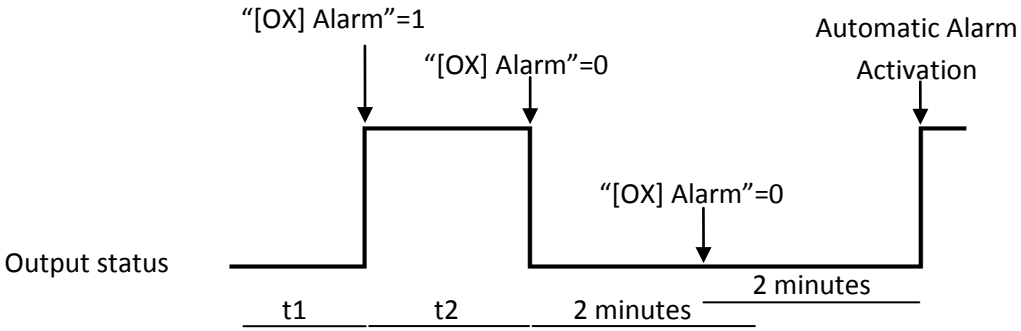


Figure 3.10. Cyclical monitoring example

➢ **Response:** sets the response of the actuator channel output when the alarm is activated:

- No change
- ON
- OFF
- Flashing: 3 drop-down boxes are shown to configure the ON Duration, the OFF Duration and the number of repeats of the flashing sequence.

➢ **Deactivation:** there are two different methods to deactivate an active alarm:

- Normal: depending on what the parameterized "Trigger Value" is, the alarm will be deactivated when the actuator receives the inverse value through the alarm object.
- Frozen: with this method, a normal deactivation will be required, but the alarm will still not be deactivated until the actuator receives, besides, a "1" through the "[OX] Unfreeze Alarm" object. This method makes the channel output remain locked even when the alarm situation is over, being in this case necessary that the output is manually unfrozen from another point in the installation.

➢ **End (reaction when alarm ends):** this parameter sets the output response to one of these statuses when the alarm finishes:

- No change
- ON
- OFF
- Last (output returns to the status before alarm)

Start-up configuration: this function is intended to define the behaviour (ON/OFF) of the channel outputs after a bus power failure, or after programming the device with ETS. A default or custom configuration can be selected.

When the default configuration is chosen, after a partial or complete download from ETS, the output status will be OFF; and after a bus power failure, the status of the output will be exactly the same as it had before the failure (ON or OFF).

When a custom configuration is chosen, ETS will show the following window:

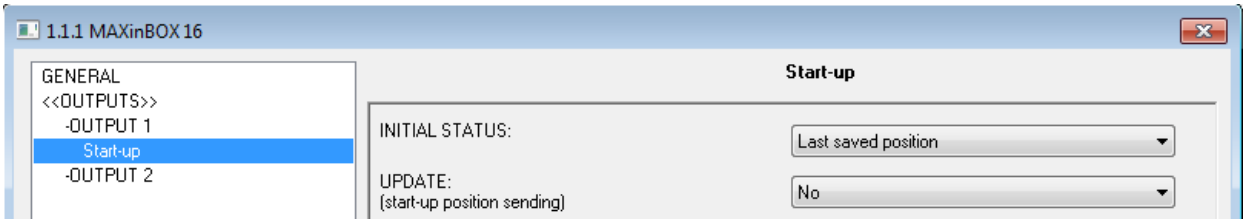


Figure 3.11. Custom Start-up configuration

Where the following parameters can be configured:

➢ **Initial Status:** this field defines the exact initial position for the channel output after a bus power failure or after a download. The following statuses can be chosen: last saved position (status of the output before the bus power failure), ON or OFF.

➢ **Update:** by enabling this field ("Yes"), the bus will be informed about the output initial status after power failures or after a download, through the corresponding communication object. This is useful for feedback or update purposes. Besides, a delay for this sending can be defined. If the value 0 is set, the status is sent immediately.

Note: *The initial status is always sent through the object "[OX] Status".*

3.2.2. SHUTTER CHANNEL

MAXinBOX 16 also allows configuring its outputs as shutter channels, being able to control **up to 8 different shutters** in an installation.

When a channel is configured in ETS as a shutter channel, a 1-bit communication object ("[CX] Lock") is displayed associated to each enabled channel, making it possible to lock the channel outputs (disabling the control over them, both the ON/OFF orders and the timed control) by sending a "1" is sent through the object. Moreover, if the shutter is in motion at the moment of being locked, the movement will be interrupted and any control over it will be cancelled. The channel outputs are unlocked by sending a "0" through their locking objects.

Note: *Only the Alarm function has a higher priority than the lock function; i.e., if while locked an alarm signal arrives, the corresponding shutter will be taken to the alarm position. When the alarm is deactivated, the output returns to the lock status.*

The first parameter to configure is the type of shutter:

- **Shutter (No slats):** these are the typical rotary shutters, with a simple raising/lowering movement. When selecting this kind of shutter, 2 communication objects will be enabled: "[CX] Move" and "[CX] Stop" to raise/lower and to stop the shutter movement.

  Moreover, the following Note appears: *"Slats positions will be ignored for Shutter types".* This note means that all the parameters that will appear in the enabled functions referred to the position (%) of the slats are not taken into account for this kind of shutters.

- **Blind (with slats):** special shutters with a secondary movement managed by the same drive. MAXinBOX 16 allows controlling both movements, slats rotation (for getting more or less incident light from outside) and the raising/lowering movement. When selecting this kind of shutter, 2 communication objects will be enabled: "[CX] Move" (to send the orders of raising/lowering the blind) and "[CX] Stop/Step". This way, if the device receives a "0" or a "1" via this last object when the blind is in motion, it shall stop; while if the blind is not in motion, receiving a "0" through this communication object will make the slats pull up, and a "1" will make the slats pull down. This up/down step functionality is useful to slightly correct both the slats and the blind position.

  To obtain more detailed information about the blinds with slats and the ETS configuration, please read **Annex I. Slats precise control.**

The next figures show the windows that appear when configuring an output channel as Shutter (no slats) and as Blind (with slats).

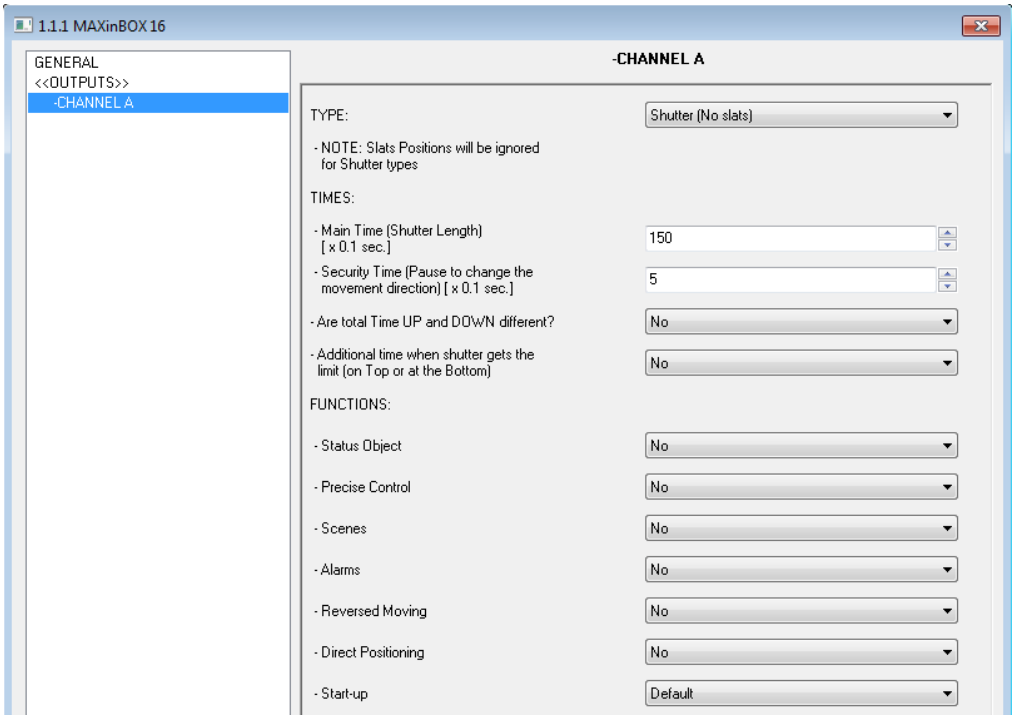


Figure 3.12. Channel A configured as Shutter (no slats)

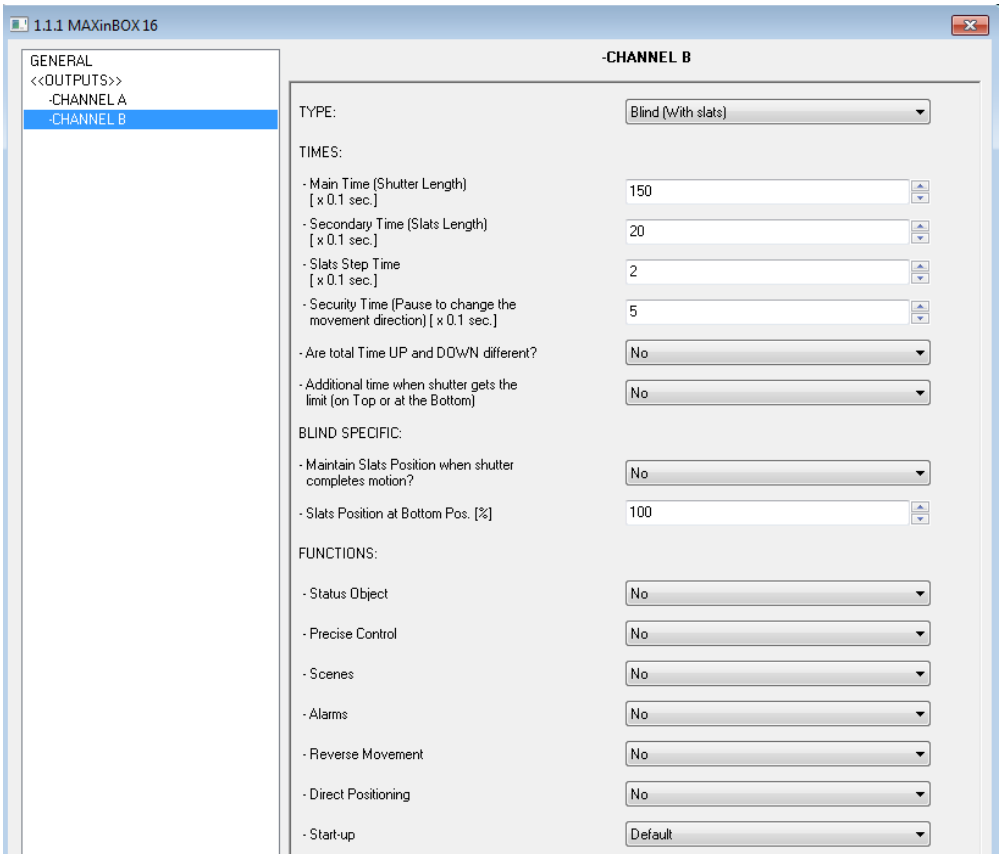


Figure 3.13. Channel B configured as Blind (with slats)

Besides the type of the shutters, the user must configure their specific functions, common to both types of shutters:

- **Times:** defines the different times (in tenths of a second) associated to the shutter movement, such as:

  - **Main time (Shutter length):** this is the time the shutter needs to cover its length completely. This field applies to both times (rising time or lowering time), but if these are not equal, this field will refer to the Lowering time (considered as the "master" time), while the Rising time should be set in the "Total Time Up" field, enabled for this purpose (when selecting "Yes" in the field "Are total Time Up and Down different?").

    This variable will not need to be periodically calibrated, since MAXinBOX 16 continously stores the exact shutter position (even when power failure occurs).

  - **Security time (pause to change the movement direction):** this time is applied by the actuator to protect the drive when the movement direction of the shutter is changed. If the device receives the order to move the shutter up/down while this is being moved down/up, MAXinBOX 16 will stop it for a while (security time) to later invert the movement. It is recommended to set this field to the default value in this field: 5 tenths of a second.

  - **Are total time Up and Down different?:** whenever the shutter rising and lowering times are different (e.g. heavy shutters) this field should be dropped down to set the rising shutter time, as mentioned before. The lowering time must be set in the "Main time" field.

  - **Additional time when the shutter gets the limit**: this parameter guarantees the shutter always reaches its lowest or highest level, by setting an extra time for the drive to keep moving once the rising/lowering times have expired, preventing small mismatches. This parameter appears disabled by default, but it is recommended to set a value on it, to ensure the proper movement of the shutter.

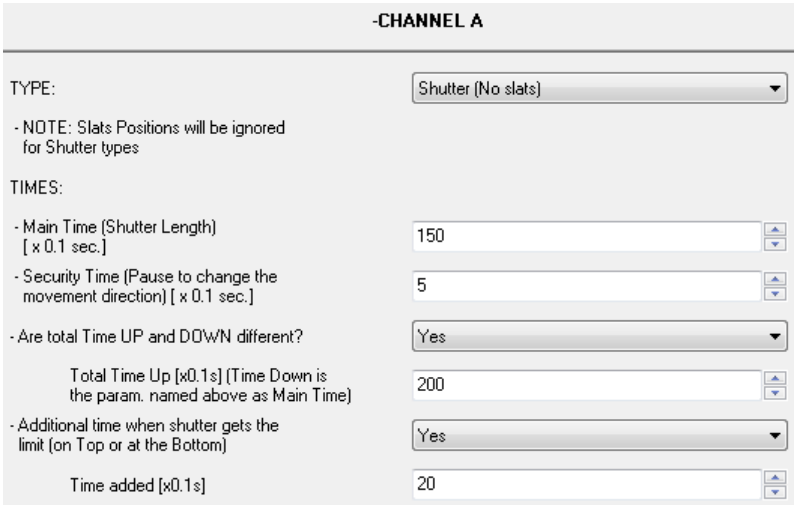
If the type of the shutter is "Blind with slats" (see figure 3.13), some more parameterizable times and specific parameters appear. All of them are explained in detail in Annex I of this manual.

Note: *After programming the device with ETS, MAXinBOX 16 considers the shutter is completely raised, so any raising order will be ignored.*

Below is an example of a possible shutter configuration.

✓ *Example:*

Shutter in Channel A (No slats) takes 15 seconds to be lowered and 20 seconds to be raised. An additional time of 2 seconds is added when the shutter gets to its end. The MAXinBOX 16 parameterization should remain as follows:



The following parameters add functionality or special features to both types of shutter (with or without slats):

- **Status objects:** this function provides a 1-byte communication object, "[CX] Current Shutter Position", to indicate the exact current position of the shutter, in percentage (%), at any time. This object turns 0 when the shutter is completely up (0%) and 255 when it is completely down (100%). The rest of the values represent intermediate positions.

  It can be chosen by parameter whether the shutter position is sent every second or not (enabling or not the “Send current shutter position every second while moving?” parameter which appears when the “Status Object” parameter is enabled).

  For Blinds with slats there is also another 1-byte object, "[CX] Current Slats Position", which will turn 0 (0%) when the slats are completely "up" and the value 255 (100%) when the slats are completely "down".

- **Precise control:** this function makes possible to move the shutter to any position on its length, via the 1-byte communication object "[CX] Shutter Positioning", in percentage (%). Every time MAXinBOX 16 gets a new value through this object (e.g. 50%), the shutter is moved to the corresponding position (the middle in the example).

For blinds with slats there is also another 1-byte object, "[CX] Slats Positioning", through which establishing the desired position (in percentage) for the slats.

- **Scenes:** this function makes it possible to use scenes for controlling the shutters. It allows choosing a precise position where to locate the shutter depending on the scene number received by MAXinBOX 16 through the “Scenes (Shutter Channels)” 1-byte object.

Besides running scenes, it is possible to **learn** (modify) scenes, taking into account that the valid numerical values for learning scenes are those in the range 128-191 (values 0-63 are reserved for running scenes).

Up to 5 scenes can be run and/or lernt, for each shutter channel.

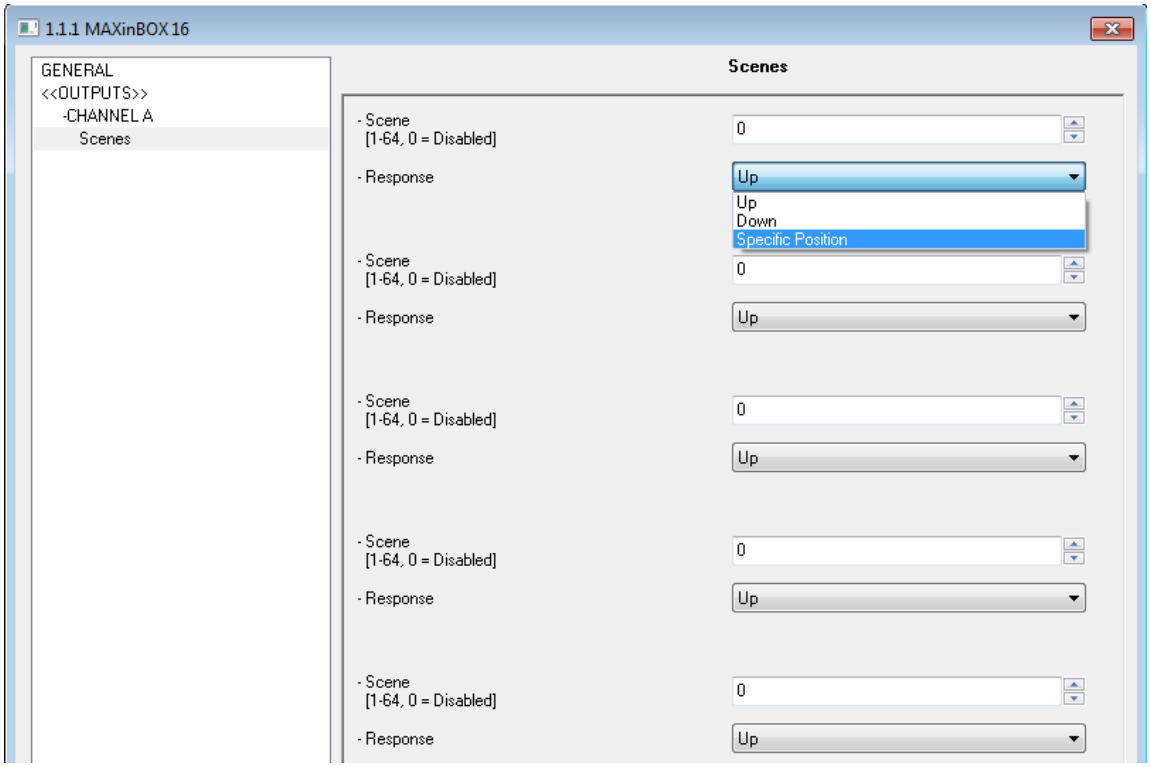


Figure 3.14. Scenes

The “Scene” parameter indicates the number of the scene which the shutter will react to. If this value is 0, the corresponding scene is disabled.

“Response” indicates the precise position where to locate the shutter when the corresponding scene number is called from the bus. The shutter can be positioned up, down, or in a specific position of its length (in percentage terms, from 0% to 100%). In case of choosing the latter, the "Shutter specific position?" parameter is enabled, where to set a specific position for the

shutter (configured by the "Select Shutter Position [%]" parameter, when selecting "Yes") or if the shutter stay in its current position.

For blinds with slats it is also possible to configure a specific position for the slats (via the "Select Slats Position [%]" parameter) when receiving the configured scene number, or staying in their current position.

Please see the following example of scenes configuration.

✓ *Example:*

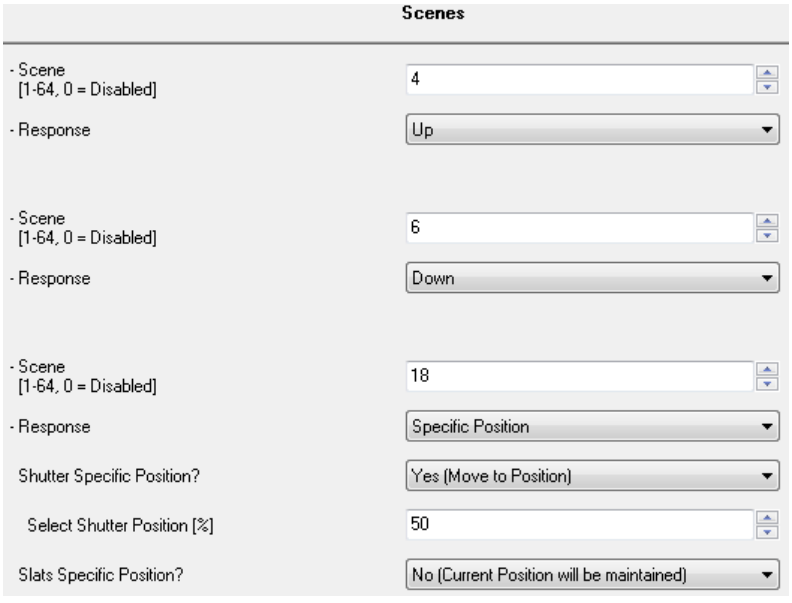
Consider a facility where 3 scenes will be used (4, 6 and 18) in MAXinBOX 16 to move a blind with slats to concrete positions:

- Scene 4 → shutter up

- Scene 6 → shutter down

- Scene 18 → shutter in the middle of its length (50%). The slats stay in their current position.

The channel parameterization will be as follows.



Alarms: MAXinBOX 16 allows configuring up to 2 alarms for each shutter channel. This function is designed for cases in which the actuator must react to an alarm situation. When

two alarms are configured, MAXinBOX 16 can carry out different actions in reaction to two external events.

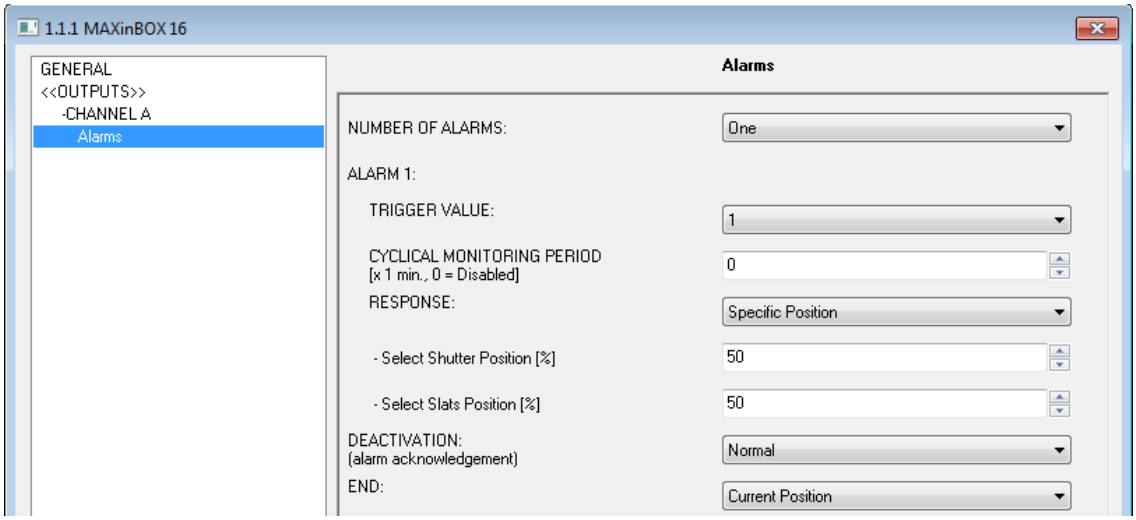


Figure 3.15. Alarms

The following parameters are configurable:

- **Number of alarms:** sets whether to use one or two alarms. Both of them can be independently managed through their corresponding communication objects ("[CX] Alarm" for Alarm 1 and "[CX] Alarm 2" for the second one).

  Alarm 1 has a **higher priority** than Alarm 2. This means that if Alarm 2 is active for a certain channel and Alarm 1 occurs, the shutter will change to the Alarm 1 status and shall not come back to Alarm 2 until Alarm 1 goes off. Whereas if the channel is in Alarm 1 status and Alarm 2 occurs, Alarm 1 prevails.

- **Trigger value:** sets the value ("1" or "0") of the "[CX] Alarm" (or "[CX] Alarm2") object that will trigger the alarm status.

  Cyclical monitoring period (minutes): parameterizes the maximum admissible time between No Alarm orders ("[OX] Alarm" = opposite value to the trigger value). If this limit is reached and no further No Alarm messages have been received, MAXinBOX 16 activates the alarm, which will execute the parameterized action (it is possible that no change is required in the output status). If no new alarm activations are desired, the opposite value to the trigger value will be required to periodically arrive to the Alarm object (before the cyclical monitoring period ends). The cyclical monitoring can be disabled by setting a 0 in this filed.

To better understand this behaviour, please read the following application example:

✓ *Example:*

Suppose that a cyclical monitoring time of 3 minutes is configured for Alarm 1. The trigger value is "1" and the reaction of the actuator when the alarm is activated is to raise the shutter while the reaction when the alarm is deactivated is lowering it back. Assume that the shutter is down and that the alarm gets activated ("[CX] Alarm 1" = 1), so the shutter will be raised. While the alarm is not deactivated, any action over the channel outputs will be ignored. After a while (t2), the alarm gets deactivated ("[CX] Alarm=0"), thus lowering the shutter. Before the cyclical monitoring period (3 minutes) ends, a new alarm deactivation order arrives, so this timer starts the count again. After 3 minutes without any action performed over the alarm object, it is automatically activated, raising the shutter. Like before, any action over the output will be ignored until the alarm is deactivated. See figure 3.16.

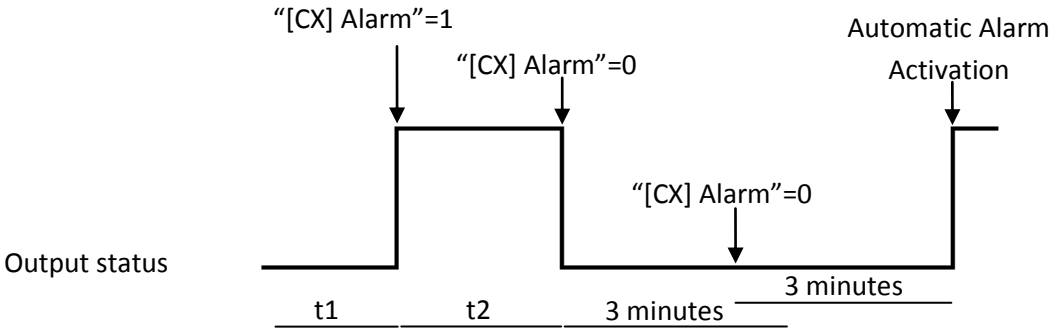


Figure 3.16. Cyclical monitoring example

➢ **Response:** set the response of the actuator channel output when the alarm is activated:

- Stop
- Up
- Down
- Specific position

When the latter is selected, a new drop-down box is shown to set a value for this specific position, between 0% (completely up) and 100% (completely down).

For blinds with slats the option "Select Slats position [%]" is also enabled, where to set a value between 0% (totally open or "up") and 100% (totally closed or "down").

- **Deactivation:** there are two different methods to deactivate an active alarm:
  - Normal: depending on what the parameterized “Trigger Value” is, the alarm will be deactivated when the actuator receives a “0” or a “1” through the alarm object.
  - Frozen: with this method, a normal deactivation will be required, but the alarm will still not be deactivated until the actuator receives, besides, a “1” through the “[CX] Unfreeze Alarm” object. This method makes the shutter channel remain locked even when the alarm situation is over, being in this case necessary that the output is manually unfrozen from another point in the installation.
- **End:** this parameter sets the channel response after the alarm finishes:
  - Current position
  - Up
  - Down
  - Last position (before the alarm)

Reverse movement: this function makes it possible to control shutters in an inverse direction, compared to the usual way. For example, MAXinBOX 16 raises the shutter when it receives the value "0" through the "[CX] Move" object, but by enabling this function, it is also possible to raise the shutter by sending one “1” to MAXinBOX 16 through the "[CX] Reverse Movement" object.

This control is compatible with the usual control. Normal control is achieved through the “[CX] Move” object, while “[CX] Reverse Movement” implements the inverse control.

This option becomes useful when a general OFF order is sent through the system, e.g., to turn the lights off and lower the shutters. In this case, that “0” should be sent to the light ON/OFF objects and to the shutter’s “Reverse movement”.

Direct positioning: this function allows moving the shutter to a predefined position via two 1-bit communication objects (“[CX] Direct Positioning” and “[CX] Direct Positioning 2”).

When value “1” is received through one of these objects, the shutter will be moved to the parameterized position. When a “0” is received, no action is performed.

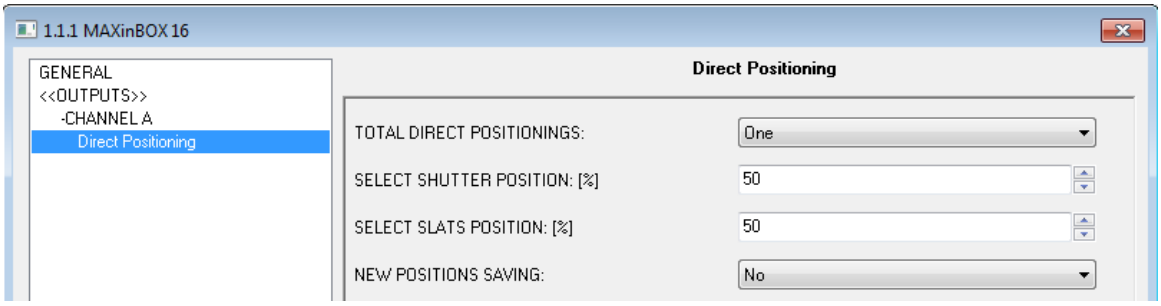


Figure 3.17. Direct positioning

It is possible to configure the following parameters:

- **Total direct positionings:** enables one or two direct positions.

- **Select shutter position [%]:** indicates the exact position to move the shutter to (Remember: 0%=Top; 100%=Bottom).

  For blinds with slats, parameter **Select Slats position [%]** will also appear, which permits establishing the position to move the slats to when receiving the value "1" through the corresponding positioning object.

  If two direct positionings are configured, there will be two boxes here: Select Shutter Position 1 and Select Shutter Position 2 (as well as the "Select Slats position 1" and "Select Slats position 2" parameters for blinds with slats).

- **New positions saving:** sets whether to allow (“Yes”) or not the save of new positions saving. After enabling this option, one or two new communication objects appear (depending on the number of positionings): “[CX] Save Position” and “[CX] Save Position 2”. To save a new position it is necessary to send a “1” to these objects when the shutter is in the desired position.

  Note: *To save a new position, the shutter must be stopped.*

Start-up configuration: this function is meant to define the behaviour of the shutter channel outputs after a bus power failure or after programming the device with ETS. A default or custom configuration can be selected.

When the default configuration is chosen, after a partial or complete download from ETS, MAXinBOX 16 interprets that the shutter is completely up (0%), independently of its real status. For blinds with slats, MAXinBOX 16 assumes that they are completely opened (0%), no matter what their real status is.
After a bus power failure, the position of the shutter will be the one it had before the bus failure (and so the slats).

When a custom configuration is chosen, ETS will show the following window:

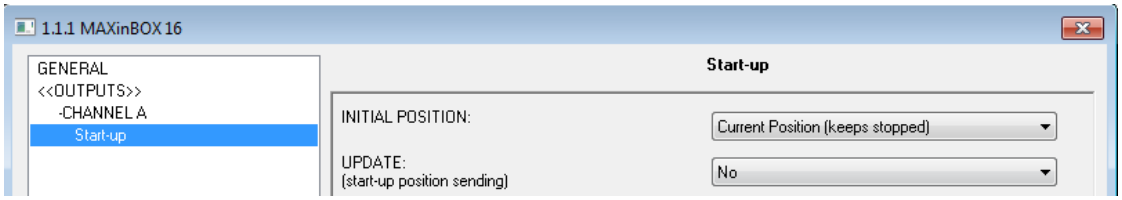


Figure 3.18. Custom Start-up configuration

Here it is possible to configure the following parameters:

- **Initial position:** this field defines the exact initial position where the shutter should be taken to after a bus power failure or after programming the device. The following statuses can be chosen: Current position (keeps stopped), up, down, or specific position (which moves the shutter to the position established in the parameter "Select Shutter Position [%]", shown when choosing this option, and the slats in the position set in “Select Slats Position [%]”).

- **Update:** by enabling this field (“Yes”), the shutter position will be sent to the bus, by means of the corresponding communication object, to inform the rest of the devices in the system. Besides, a delay for this sending can be defined. If the value 0 is set, the status is immediately sent.

Note: *The initial status is always sent through the “[CX] Current Shutter position” object (and through "[CX] Current Slats position", for blinds with slats).*

3.3. LOGICAL FUNCTIONS

This section in MAXinBOX 16 is meant to perform binary logic operations with incoming data from the KNX bus, and to send the result through other communication objects specifically enabled in the actuator for this operation.

Up to 10 different (and independent of each other) logical functions can be enabled, which can carry out **up to 4 operations** each. To use any of them, it is necessary to enable it in the following ETS window, which appears when selecting “Yes” in the Logical Functions box of the MAXinBOX 16 General window.

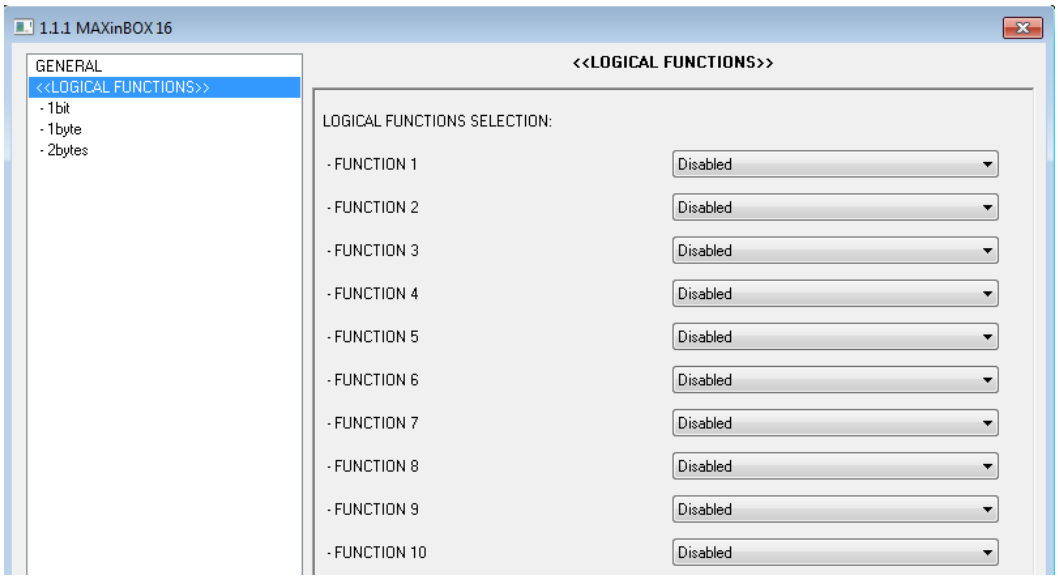


Figure 3.19. Logical functions

To obtain detailed information about the use and the ETS parameterization of the logical functions, please consult the specific documentation "**Logical Functions X10**”, available at http://www.zennio.com.

ANNEX I. SLATS PRECISE CONTROL

Zennio actuators allow controlling the movement of shutters, blinds or similar which may fit on of the following types:

- **Shutter (No slats)**
- **Blind (with slats)**

Depending on the type of shutter, the MAXinBOX 16 application program will show different options.

In this concrete section, the parameters of the Blinds with slats will be explained.

As an introduction, it is important to keep in mind the shutter positioning criteria of the actuator:

- The shutter is in the “top” (up) position (**0%**, in percentage) when it is completely **open**.
- The shutter is in the “bottom” (down) position (**100%**, in percentage) when it is completely **closed**.

And the slats positioning criteria:

- The slats are in the “top” position (up) or open (**0%**, in percentage) when they are in a position such that they can only move downward.
- The slats are in the “bottom” position (down) or closed (**100%**, in percentage) when they are in a position such that they can only move upward.

Figure 4.1 shows a scheme of the positions the slats may adopt.

It is necessary to take into account that actuators control shutter drives with no feedback from them, which on the other hand adjust the position of their slats by means of the shutter-moving mechanism itself. This means that **a slats movement will provoke a change in the blind position**.

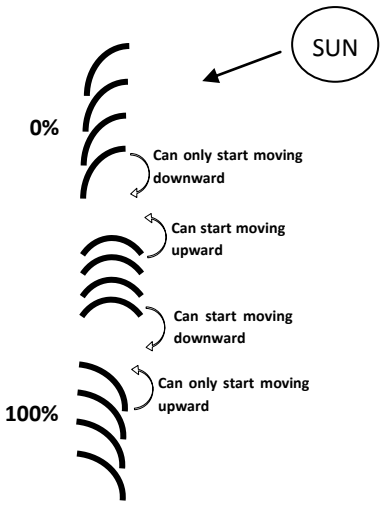


Figure 4.1. "Top" and "Bottom" slat positions

Next, the configuration window in ETS for Blinds with slats is shown, in order to explain in detail every available option:

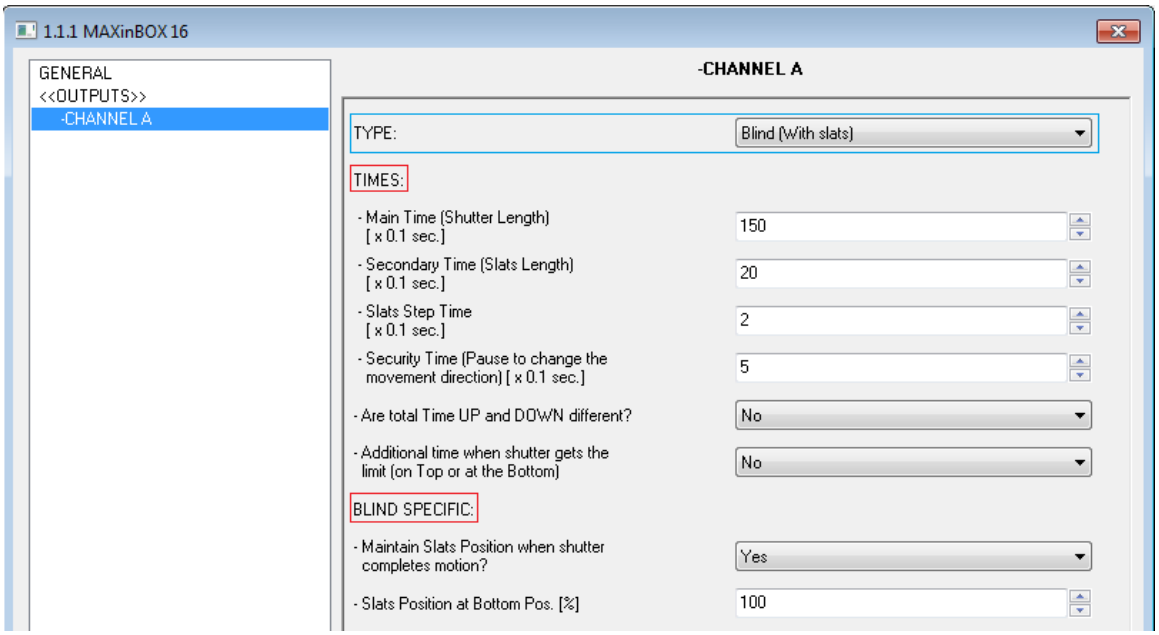


Figure 4.2. Blinds with slats configuration window (ETS)

As seen in figure 4.2, for this type of shutters several parameterizable times are provided On the one hand, times and parameters referred to the movement of the blind are: **Main Time** (shutter length), **Security time**, **Are total time up and down different?** and **Additional time when shutter gets the limit**. All of them were already explained in section 3.2.2 of this manual.

On the other hand, times and parameters referred to the movement of the slats are:

- **Secondary time (slats length):** it is the time, in tenths of a second, the slat takes to complete a full cycle from 0% (completely "up") to 100% (completely "down"), or vice versa. This time must be "manually" measured.

- **Slats Step Time:** this is the time, in tenths of a second, the slat takes to carry out a rotation step when it receives the step up/down order ("[CX] Stop/Step"=0 or 1, respectively), while the blind is stopped. These step orders allow gradually rotate the slats, modifying their position (%), which may be very useful to prevent glare as the sun changes its position, for example.

  Important: *If one wants to control the slats step of all the enabled shutter channels through the same group address, the time configured in this parameter must be* ***greater or equal than N+1 tenths of a second****, where N is the number of the enabled channels of the type "blind (with slats) enabled".*

Note: *times referred to the slats movement must be shorter than that configured for the blind movement (usual configuration).*

Besides defining these times, it will be necessary to configure the following options, which are specific for blinds with slats:

- **Maintain slats position when shutter completes motion?:** this option allows choosing whether the slats may recover their position after the blind reaches the desired position, or not.

✓ *Example:*

Suppose the parameter "Maintain slats positioning when shutter completes motion?" has been enabled. The initial position of the slats is 50% and the initial position of the blind is 0% (up). An order to lower the blind is received, thus making the blind start moving downwards, and so do the slats, until the blind reaches the 100% position. At this point, the blind has completed its motion. Then, MAXinBOX 16 will correct the slats position, moving them up until they reach the position they had before (50%, in this example), thus making the blind move slightly up, until the slats are in the 50% position.

If the parameter "Maintain slats positioning when shutter completes motion?" was disabled, when the blind reaches the 100% position (down), the slats will stay in the position derived from the movement of the blind.

- **Slats position at Bottom pos. [%]:** it allows establishing the desired slats position (in percentage) when the blind is completely down (i.e., its position is equal to 100%).

  This means that, when the blind completes its downward movement and reaches position 100%, the slats will correct their position to the one established by parameter.

Besides these configuration options, it is necessary to set the "**Slats specific position**" parameter for a few functions –if enabled– of the blind channel, where concrete positions can be parameterized. These functions are:

- **Scenes.** Response: Specific position. The position percentages of the blind and slats can be configured independently.
- **Alarms.** Response: Specific position. Similar to above.
- **Direct positioning.** Configuration of positions 1 or 2 (depending on the parameterized number), in percentage, of the blind and the slats independently.
- **Start-up configuration** Initial position: Specific position. The position percentages of the blind and the slats can be configured independently.

To obtain more detailed information about configuration and options of the functions of the shutter channels, please read the section 3.2.2 of this manual.

ANNEX II. COMMUNICATION OBJECTS

SECTION	NUMBER	SIZE	IN/OUT	FLAGS	VALUES			NAME	DESCRIPTION
					RANGE	1st TIME	RESET		
GENERAL	0	1 byte	I/O	W	0-63 (run) 128-191 (learn)	Irrelevant	Irrelevant	**Scenes (Individual Outputs)**	Run and learn scenes
	1	1 byte	I/O	W	0-63 (run) 128-191 (learn)	Irrelevant	Irrelevant	**Scenes (Shutter Channels)**	Run and learn scenes
LOGICAL FUNCTIONS	2-33	1 bit	I	W	0/1	0	Last	**[LF] (1 bit) Data Entry 1** … **[LF] (1 bit) Data Entry 32**	Binary Data Entry (0/1) … Binary Data Entry (0/1)
	34-49	1 byte	I	W	0-255	0	Last	**[LF] (1 byte) Data Entry 1** … **[LF] (1 byte) Data Entry 16**	1 byte data entry (0-255) … 1 byte data entry (0-255)
	50-65	2 bytes	I	W	0-FFFF	0	Last	**[LF] (2 bytes) Data Entry 1** … **[LF] (2 bytes) Data Entry 16**	2 byte data entry (0-FFFF) … 2 byte data entry (0-FFFF)
	66-75	1 bit	O	RT	0/1	0	Last	**[LF] Function 1 RESULT (1 bit)** … **[LF] Function 10 RESULT (1 bit)**	Function 1 Result (1 bit) … Function 10 Result
	76-85	1 byte	O	RT	0-255	0	Last	**[LF] Function 1 RESULT (1 byte)** … **[LF] Function 10 RESULT (1 byte)**	Function 1 Result (1 byte) … Function 10 Result (1 byte)

SECTION	NUMBER	SIZE	IN/OUT	FLAGS	VALUES			NAME	DESCRIPTION
					RANGE	1st TIME	RESET		
LOGICAL FUNCTIONS	86-95	2 bytes	O	**RT**	0-FFFF	0	Last	**[LF] Function 1 RESULT (2 bytes)** **…** **[LF] Function 10 RESULT (2 bytes)**	Function 1 Result (2 bytes) … Function 10 Result (2 bytes)
					0ºC-120ºC	25ºC	Last	**[LF] Function 1 RESULT (2 bytes)** **…** **[LF] Function 10 RESULT (2 bytes)**	Function 1 Result (2 bytes) … Function 10 Result (2 bytes)
INDIVIDUAL OUTPUTS	96-111	1 bit	I	**W**	0/1	Irrelevant	Irrelevant	**[OX] ON/OFF**	N.O. (0=Open; 1=Close relay) N.C. (0=Close; 1=Open relay)
	112-127	1 bit	O	**RT**	0/1	Parameteriz.	Parameteriz.	**[OX] Status**	0=Output Off; 1=Output On
	128-143	1 bit	I	**W**	0/1	0	Last	**[OX] Lock**	1=Lock; 0=Unlock
	144-159	1 bit	I	**W**	0/1	Irrelevant	Irrelevant	**[OX] Timer**	0=to turn Off; 1=to turn ON
	160-175	1 bit	I	**W**	0/1	Irrelevant	Irrelevant	**[OX] Flashing**	1=Start flashing; 0=End flash
	176-191	1 bit	I	**W**	0/1	Parameteriz.	Last	**[OX] Alarm**	1=Alarm; 0=No alarm 0=Alarm; 1=No alarm
	208-223	1 bit	I	**W**	0/1	Irrelevant	Irrelevant	**[OX] Unfreeze Alarm**	Alarm=0 + Unf.=1 → End Alarm

SECTION	NUMBER	SIZE	IN/OUT	FLAGS	VALUES			NAME	DESCRIPTION
					RANGE	1st TIME	RESET		
SHUTTER CHANNELS	96-111 (**even**)	1 bit	I	W	0/1	Parameteriz.	Last	**[CX] Alarm**	1=Alarm; 0=No alarm 0=Alarm; 1=No alarm
	96-111 (**odd**)	1 bit	I	W	0/1	Parameteriz.	Last	**[CX] Alarm 2**	1=Alarm; 0=No alarm 0=Alarm; 1=No alarm
	128-143 (**even**)	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Save Position**	1=Save position; 0=No action
	128-143 (**odd**)	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Save Position 2**	1=Save position 2; 0=No action
	144-159 (**even**)	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Move**	0=Up; 1=Down
	144-159 (**odd**)	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Reverse movement**	0=Down; 1=Up
	160-175 (**even**)	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Direct positioning**	1=Go to position; 0=No action
	160-175 (**odd**)	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Direct positioning 2**	1=Go to position 2; 0=No action
	176-191 (**even**)	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Stop/Step**	0=Stop/Step Up; 1=Stop/Step Down
								[CX] Stop	0 or 1 = Stop shutter
	176-191 (**odd**)	1 bit	I	W	0/1	0	Last	**[CX] Lock**	1=Lock; 0=Unlock
	192-199	1 byte	O	RT	0-255	0	Calculate	**[CX] Current slats position**	0=0%=Open; 255=100%=Closed.
	200-207	1 byte	I	W	0-255	0	Last	**[CX] Slats positioning**	0=0%=Open; 255=100%=Closed.
	224-231	1 byte	I	W	0-255	Irrelevant	Irrelevant	**[CX] Current shutter position**	0=0%=Top; 255=100%=Bottom.
	232-239	1 byte	I	W	0-255	0	Last	**[CX] Shutter positioning**	0=0%=Top; 255=100%=Bottom.
	240-247	1 bit	I	W	0/1	Irrelevant	Irrelevant	**[CX] Unfreeze Alarm**	Alarm=0 + Unf.=1 → End Alarm

SECTION	NUMBER	SIZE	IN/OUT	FLAGS	VALUES			NAME	DESCRIPTION
					RANGE	1st TIME	RESET		
RESET	248	1 bit	O	T	0	0	0	Reset 0	Voltage recovery -> Sending of 0
	249	1 bit	O	T	1	1	1	Reset 1	Voltage recovery -> Sending of 1
MANUAL CONTROL LOCKING	250	1 bit	O	RW	0/1	Parameteriz.	Parameteriz.	Manual control locking	1=Lock; 0=Unlock 0=Lock; 1=Unlock

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