Individual Binary Outputs

Relay Control Module

User Manual Version : [0.1]_b

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1 INTRODUCTION

A variety of Zennio devices incorporate **binary relay outputs** (often referred to as "**individual outputs**" in their corresponding application programmes) which allow an independent control of different loads.

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 documentation on the connection and installation of the output loads.

2 CONFIGURATION

2.1 GENERAL CONFIGURATION

Each output can be enabled or disabled in parameters independently, to perform different functions.

The output type can be configured as **normally open** (i.e., switching on the output makes the relay close) or **normally closed** (i.e., switching on the output makes the relay open).

Besides the type, several functions can be configured, as described next.

ETS PARAMETERISATION

The application program will typically provide one checkbox per output so it is possible to enable or disable them independently. Please, refer to the specific manual of the application program to identify where to find these checkboxes.

Figure 1 Enabling each output independently.

A specific parameter screen per individual output will be included in the menu on the left after such output has been enabled. This screen contains the following parameters:

Figure 2 Individual Output – Configuration.

- **Type**: sets whether the output type is "Normally Open" (default) or "Normally Closed" depending on the *natural* state of the relay.

- **Timers**: activates or deactivates the Timers function, which should be configured from a specific parameter screen (see section 2.2).

- **Scenes**: activates or deactivates the Scenes function, which should be configured from a specific parameter screen (see section 2.3).

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

- **Lock Action**: sets whether to leave the relay as is ("No Change", default option), to switch it off ("Off") or to switch it on ("On") in the event of a lock order through object "**[Ox] Lock**" (1 = lock; 0 = unlock). Once the unlock order is received, the relay returns to the state it had before locking.

- **Shutdown Action**: sets whether to leave the relay as is ("No Change", default option), to switch it off ("Off") or to switch it on ("On") in the event of a shutdown of the device due for example to a bus power failure.

- **Start-Up**: sets whether to perform the default action ("Default") or a custom action ("Custom") over the output during the device start-up. The latter should be configured from a specific parameter screen (see below).

After setting an output to Individual Output, three more objects are shown by default:

- **[Outputs] Scenes** (or "[O] Scenes"): one-byte object intended for the reception of scene values (0-63 for running scenes 1-64, and 128-191 for saving scenes 1-64) from the KNX bus. It becomes available after enabling the first individual output, as it is a sole object for every other individual output enabled in the actuator.

- **[Ox] On/Off**: one-bit object for the reception of on/off orders from the bus. One "1" will make the output switch-on and one "0" will make it switch off. Depending on whether the output has been set to Normally Closed or to Normally Open, switching the output on will consist in opening or closing the relay (and the opposite action for the switch-off).

- **[Ox] On/Off Status**: one-bit object which will report the current state of the individual output. It can be read anytime and will respond with a "1" or a "0" depending on whether the output is on or off, respectively.

2.2 TIMERS

The Timers permit performing timed actions over the outputs.

On the first hand, the **Flashing** function consists in performing a continuous, timed on/off sequence when a specific trigger object is received.

On the other hand, the **Simple Timer** function consists in performing a single, timed switch-on / switch-off when one "1" (or one "0") is received through a specific object ("**[Ox] Timer**"). Depending on whether the order is a switch-on or a switch-off, a certain delay ("**On Delay**" or "**Off Delay**") will apply. These delays are parameterisable. Moreover, in case it is a switch-on, an "**On Duration**" must be defined. This is the time the output will remain on once the On Delay has expired and therefore the output has finally switched on.

Note: *the simple timer is cancelled as soon as a switch order is received through the general "[Ox] On/Off" object. The output will switch to the state specified in the order.*

Figure 3 summarises the actions and delays to be taken into account depending on the state of the output and the orders received through the "**[Ox] Timer**" object.

State of the Output	Received value	Actions
Off	0	Nothing
Off	1	The output switches on after the "On Delay". After the "On Duration", it switches back off.
On	0	The output switches off after the "Off delay".
On	1	The output switches off after the "On Duration".

Figure 3 Actions depending on the state of the output and the order received

On the other hand, depending on whether the **Multiplication** function is enabled or not, it will be possible to progressively multiply the pre-set On Delay, Off Delay or On Duration (depending on which of them is currently counting) as many times as the switch-on or switch-off orders are received through "**[Ox] Timer**". Different situations are distinguished:

- **Without Multiplication**:

  - If the On delay count is already running, it will be re-started every time a new "1" is received through "**[OX] Timer**".

  - If the output has already been activated and the On Duration time is counting, it will be re-started whenever a new "1" is received.

  - If the Off delay count is already running, it will be re-started every time a new "0" is received.

- **With Multiplication**:

  - If the On delay count is already running and the value "1" is received several times through the "**[OX] Timer**" object, then the effective delay time will be "n" times the parameterised time, being "n" the number of times the value "1" is received (**five times** at most; further receptions will be ignored until the next trigger of the simple timer function).

  - While the On Duration time is counting after the switch-on of the output, if one "1" is received several times, then the effective duration will be "n" times the parameterised time, being "n" the number of times the value is received (as above, **five** at most).

  - If the Off delay count is already running and the value "0" is received several times, then the effective delay time will be "n" times the parameterised time, being "n" the number of times the value "0" is received (as above, **five** at most).

  Note: *multiplication is especially useful when no ON / OFF delays have been defined. Nevertheless, if defined, these delay times do also admit multiplication as already explained and as the following example shows.*
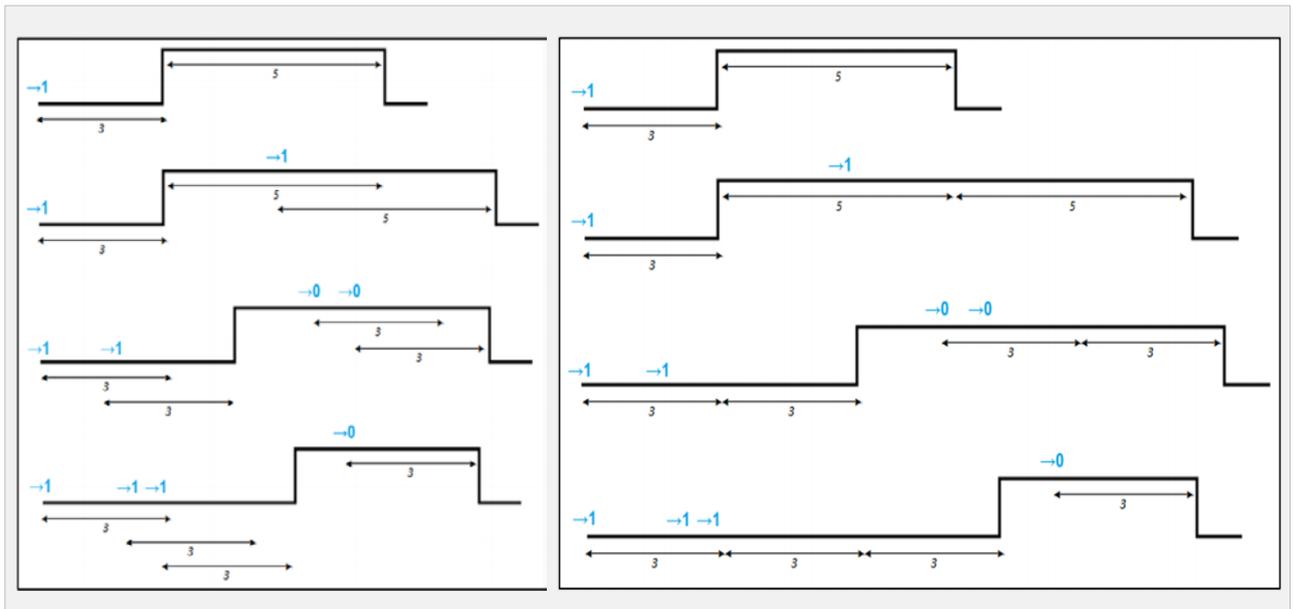
Figure 4 No multiplication (left) and Multiplication (right).

The example shows how the multiplication works, assuming On and Off delays of 3 seconds, and an On duration of 5 seconds. "→0" and "→1" represent the arrivals of the values "0" and "1" through "**[OX] Timer**".

ETS PARAMETERISATION

After enabling "**Timers**" in the Configuration screen (see section 2.1), a new tab will be incorporated into the tab tree on the left.
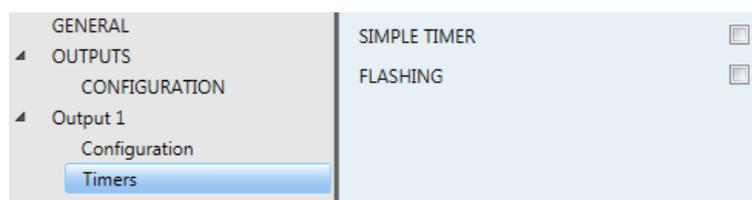

Figure 5 Individual Output – Timers.

The Timers tab contains the following parameters:

- **Simple Timer**: enables or disables the simple timer function, i.e., the execution of a timed switch-on or switch-off after the reception of one "1" or one "0" through "**[Ox] Simple Timer**", according to the following parameters:

Figure 6 Individual Output – Simple Timer.

➢ **ON Delay**: sets whether the "on" action should be executed immediately ("0"; default option) after receiving one "1" through object "**[Ox] Timer**", or if it should be delayed by a certain time (0 to 600 tenths of a second; 0 to 3600 seconds; 0 to 1440 minutes; 0 to 24 hours).

➢ **OFF Delay**: analogous to the above parameter, but referred only to the switch-off order performed when one "0" arrives through "**[Ox] Timer**".

➢ **ON Duration**: sets how much time the output will remain on once the "ON delay" time count ends and the output gets actually switched on (0 to 600 tenths of a second; 0 to 3600 seconds; 0 to 1440 minutes; 0 to 24 hours). If set to zero, the output will not switch off after a certain time.

➢ **Warning Time**: sets an anticipation time (0 to 600 tenths of a second; 0 to 3600 seconds; 0 to 1440 minutes; 0 to 24 hours) prior to the switch-off action so that the output starts intermitting (two seconds time) to notify that the timer action is about to end. Moreover, the "**[Ox] Warning Time (Status)**" object will acquire the value "1" while this intermittence is running (and "0" at any other time). If set to zero, no warning intermittence will take place. Note that this time needs to be lower than the ON Duration time and greater than or equal to 2 seconds.

➢ **Multiplication**: enables or disables the multiplication function.

- **Flashing**: when enabled, object "**[Ox] Flashing**" will show up in the project. One "1" through this object triggers the intermittence of the output, while one "0" will stop it. This intermittence will be subject to the following parameters:

  ➢ **ON Duration**: length of each "on" stage (5 to 600 tenths of a second; 1 to 3600 seconds; 1 to 1440 minutes; 1 to 24 hours).

  ➢ **OFF Duration**: length of each "off" stage (5 to 600 tenths of a second; 1 to 3600 seconds; 1 to 1440 minutes; 1 to 24 hours).

  ➢ **Repetitions**: number of times (0-255) the on-off sequence will take place. If set to "0", the intermittence will only stop when one "0" is received through "**[Ox] Flashing**".
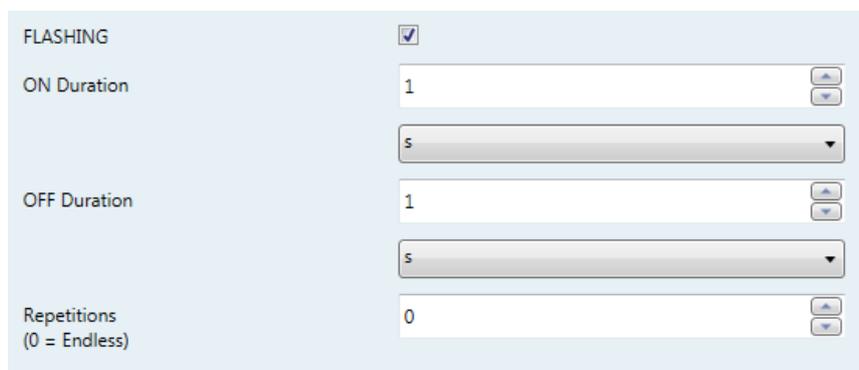
FLASHING	✔
ON Duration	1
	s
OFF Duration	1
	s
Repetitions (0 = Endless)	0

Figure 7 Individual Output – Flashing

2.3 SCENES

The Scenes function allows running a switch-on or a switch-off of the output on the reception of a scene object.

ETS PARAMETERISATION

After enabling "**Scenes**" in the Configuration screen (see section 2.1), a new tab will be incorporated into the tab tree on the left.
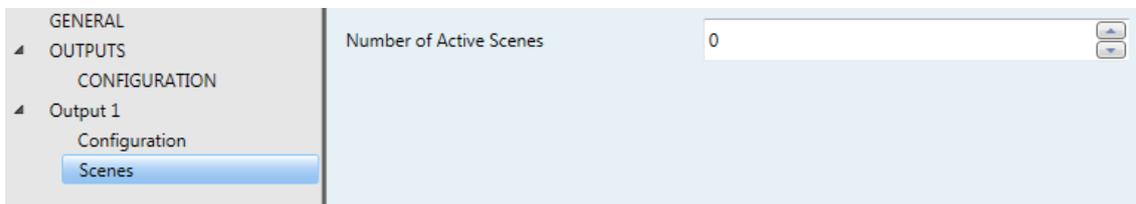

Figure 8 Individual outputs. Scenes

Up to five scenes can be configured. The number of scenes must be entered into **Number of Active Scenes** ("<u>0</u>", by default).

<u>Note</u>: *after typing the value, it is necessary to move the user focus to another part of the window in order to have it refreshed with the required parameters*.

Depending on the above number, the following two parameters will be shown multiple times (one per scene):

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

- **Action**: "<u>Off</u>" (default) or "<u>On</u>", depending on the state the output should acquire when the scene is triggered.

2.4 ALARMS

The Alarms function allows changing the state of the output on the reception of an alarm trigger from the KNX bus. It is possible to configure the state the output will be switched to, both on the alarm activation and on the alarm 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 doesn't take place unless the object has been received at least once). 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.

Note: *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).*

ETS PARAMETERISATION

After enabling "**Alarms**" in the Configuration screen (see section 2.1), a new tab will be incorporated into the tab tree on the left.

The specific Alarm configuration screen contains the following parameters:

Figure 9 Individual Outputs – Alarms.

- **Trigger**: sets the value ("0" –default– or "1") that when received from the KNX bus through object "**[Ox] Alarm**" will be interpreted by the actuator as an alarm trigger and will therefore initiate the action configured below.

- **Cyclical Monitoring Period**: sets every how much time, at most, the alarm object should be updated from the bus after an initial reception has already taken place. If exceeded, and for safety reasons, the alarm action will be triggered as well. If this parameter is set to zero (default option), the cyclical monitoring function will remain disabled. Permitted values are 5 to 600 tenths of a second; 1 to 3600 seconds; 1 to 1440 minutes; and 1 to 24 hours.

- **Action**: "No Change" (default), "Off", "On" or "Flashing". Selecting the latter brings some more parameters:

  ➢ "**ON Duration**", "**OFF Duration**" and "**Number of Repetitions**": all of them are analogous to those in the Flashing function, within Timers (see preceding parameters).

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

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

- **Deactivation – Action**: sets the state the output should acquire once the alarm has been deactivated (and acknowledged, if required). It may be: "<u>No Change</u>" (default), "<u>Off</u>", "<u>On</u>" or "<u>Last (Before Alarm)</u>".

2.5 START-UP

The Start-up function brings the option to set the output to a particular state at the start-up of the actuator.

- Default configuration: off after an ETS download, and unchanged after a bus power failure.

- Custom configuration: Off / On / Last, after either an ETS download or a bus power failure (last will be off on the very first start-up). The status object can also be sent to the bus (with a customisable delay).

ETS PARAMETERISATION

After selecting a "Custom" **Start-up** in the Configuration screen (see section 2.1), a new tab will be incorporated into the tab tree on the left.
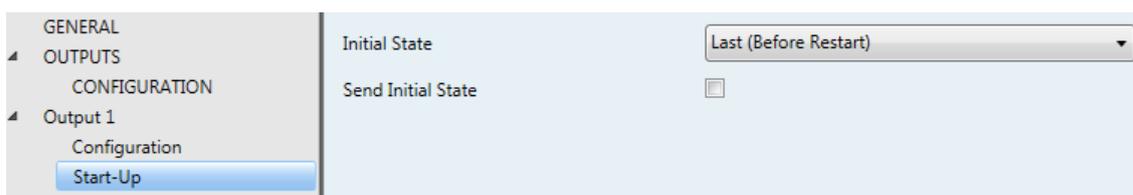

Figure 10 Individual Outputs - Start-Up

Contains the following parameters:

- **Initial State**: sets the state the output should acquire at the start-up of the actuator. It can be: "Last (Before Restart)" (default; during the very first start-up, the output will remain off), "Off" or "On".

- **Send Initial State**: sets whether the status object of the output should be sent to the KNX bus (in order to update other KNX devices) after the start-up of the actuator. It is possible to impose a delay (0 to 600 tenths of a second; 0 to 3600 seconds; 0 to 1440 minutes; 0 to 24 hours) to ensure that this value is sent once the other devices are ready to receive it.

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