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TOUCH YOUR WORLD

Technical Manual
Multifunction Actuators
BX-RIO8
BX-RIO16

Rev.	Data	Description	Redaction
01	11/12/2023	1st Version	A. Fato

Summary

1 Introduction

BX-RO24 is a 24-channel multifunction actuator for DIN rail mounting for independent switching of loads via make contacts. The 230 Vac switching output can be managed by the buttons placed on the front. A green LED indicates the channel status. It is equipped with 16 A bistable relays with contacts connected directly on the terminals, without phase sharing. The screw terminals are capable of receiving cable sections up to 5 mm2. The relays used support an inrush current of up to 320 A in the first 2 ms, therefore they are particularly suitable for driving inductive loads typical of fluorescent or neon lamps.

The device provides the switching functions complete with status notification, block command, forcing, timing, delays, scenarios and further functions for opening and closing rolling shutters, regulating blinds, controlling valves with PWM algorithm and

piloting several Fancoil devices (2 or 4 tubes). It also has a set of logic functions consisting of 16 freely configurable inputs for each channel (OR, AND, XOR and GATE between the various channels). The outputs are individually parameterizable with ETS.

Up to 16 digital I/O ports are also available (8 for the BX-RIO8 version), they are useful for receiving digital input signals or controlling LED outputs.

The versatility of this device makes it particularly suitable for distributed planning since all the actuations of an entire home and service sector can be implemented with a single module. Of the above mentioned functions it is possible to find an innumerable combination between them, so as to optimize all the possible outputs.

2 Applications

2.1 Functions associated with channels

Operation time setting
- Setting of the time required for roller blind or Venetian blind motor control

Slat adjustment
- Slat adjustment time in case of Venetian blind

Block function
- Parameterization of the activation value of load block. Behaviour with block enabled and with block disabled

Forcing function
- It forces a specific action for the target contact

Scenarios
- Configuration of up to 8 scenarios

Alarms
- Weather alarm enabling (wind, rain, ice). Setting of execution priority among the various alarms and load position in case of alarm and alarm reset

Interlock function
- Up to 8 interlocked channels per group

Fancoils
- Specific functions for fancoil control

Independent outputs
- Timing, flashing, and logic functions can be associated with the specific channel

Electrovalves
- Each output can work with PWM in order to control electrovalves

Digital I/O
- 16 ports (8 for the BX-RIO8 version) configurable as digital input or output

3 Global structure

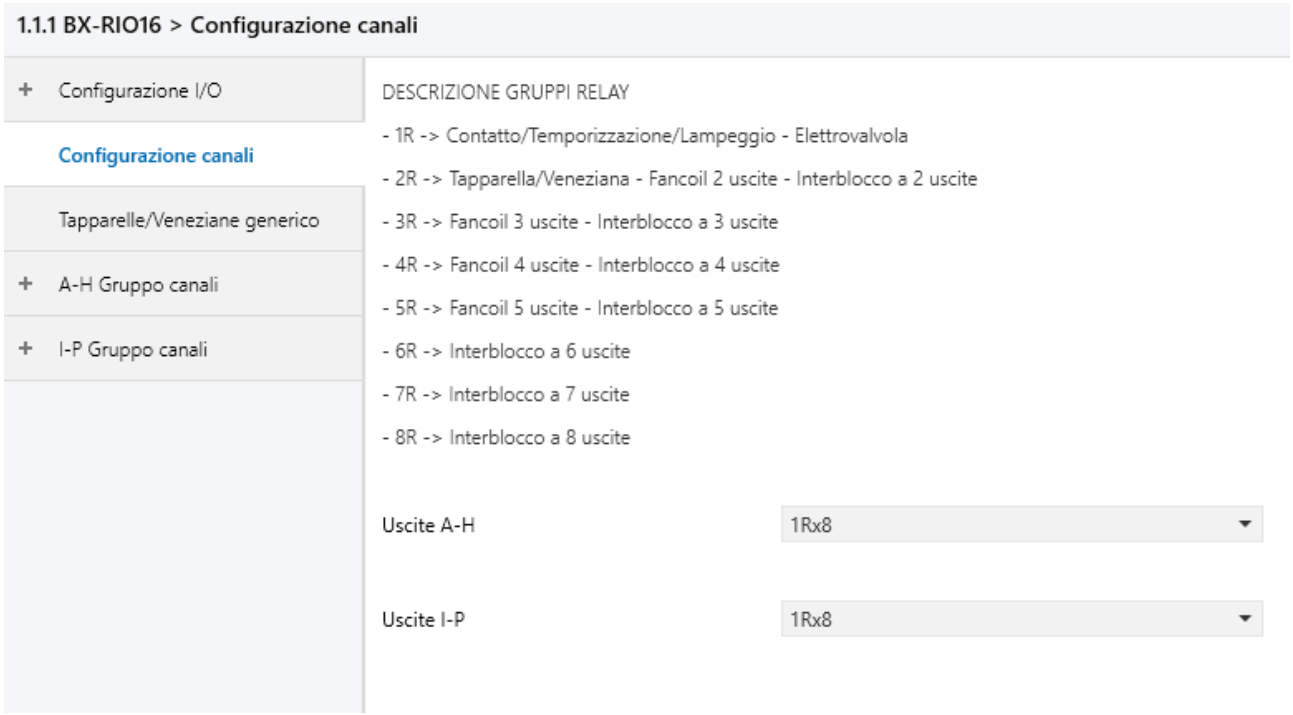
3.1 Channel Configuration

The channel configuration menu shows the configurable channel groups.
Each group consists of 8 configurable channels. The legend at the top of the page specifies the configuration options available. Each group follows the following format;

aRxb

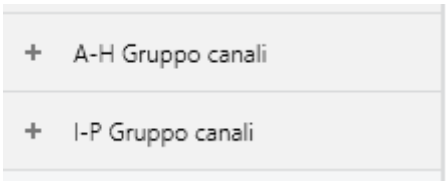
Where "a" is the number of channels belonging to a subgroup and "b" is the number of that specific subgroup within the main group of 8 channels.

E.g. A-H 1Rx8 means 8 sub-groups of 1 channel within the main group A-H.



3.2 X-Y: Channels group

According to the settings done in the “Channel configuration” page, specific pages for each group X-Y of channels will appear.



In these pages it is possible to configure the specific function for each subgroup of channels.

The following chapters will explain each possible function which can be associated with a subgroup of channels and its parameters.

4 Shutter/Blinds

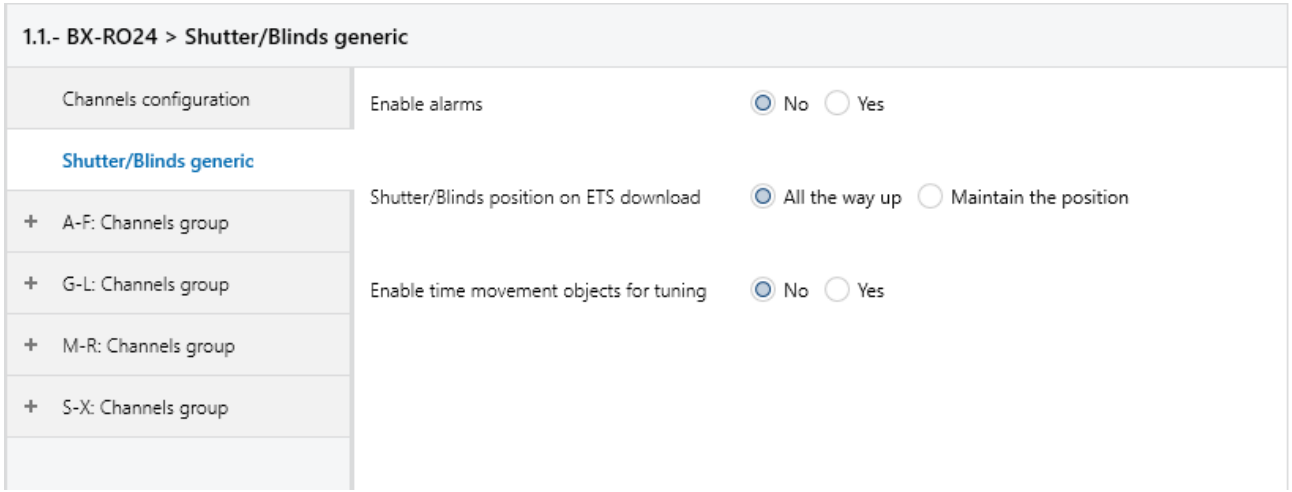
The Shutter/Blinds function is dedicated to control the up/down movement of the Shutter motor.

It is possible to associate up to 4 roller shutters/blinds to a main group of 8 channels. Up to 4 roller shutters/blinds functions are available on the BX-R IO8, while up to 8 roller shutters/blinds can be set in the BX-RIO16.

Here follows the list and description of the Shutter/Blinds parameters.

4.1 Shutter/Blinds generic

In this page the user is allowed to configure generic parameters for all the Shutter/Blinds channels.



4.1.1 Enable Alarms

Enable alarms parameter is used to enable weather alarms for channels associated to Shutter/Blinds functions.

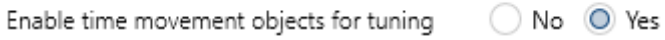
4.1.2 Shutter/Blinds position on ETS download

Within this parameter it is possible to decide the slat positions and how to program them once the ETS application has been downloaded.

By selecting "All the way up", at each download of the application program, the position will be reset to 0%.
If "Maintain the position" is selected, each time the application program is downloaded, the device will keep the position values of the roller blinds and slats prior to the download.

4.1.3 Enable time movement objects for tuning

With this parameter, a communication object is available for each channel, which has the function of facilitating the detection of the running time of the roller shutter and also of the slats. These commands are useful during the start-up phase of the system, when it is necessary to measure up/down movement times, slat rotation and any dead times defined by the specific mechanics of the window. With the help of these commands, it will be easier to determine the values of the functional parameters to be set.
Via the ETS bus monitor it is possible to give a movement command expressed in time (milliseconds). Positive values represent a movement command in the down direction (towards 100%), while negative values set a movement in the up direction (towards 0%). Movements made in response to these commands are not considered in the position calculation, so after commanding a movement with these communication objects, the physical position will have to be realigned with the position maintained by the module (see calibration commands).
This command has the same priority as a movement command; it will not be executed if the channel is in Block or Weather Alarm condition

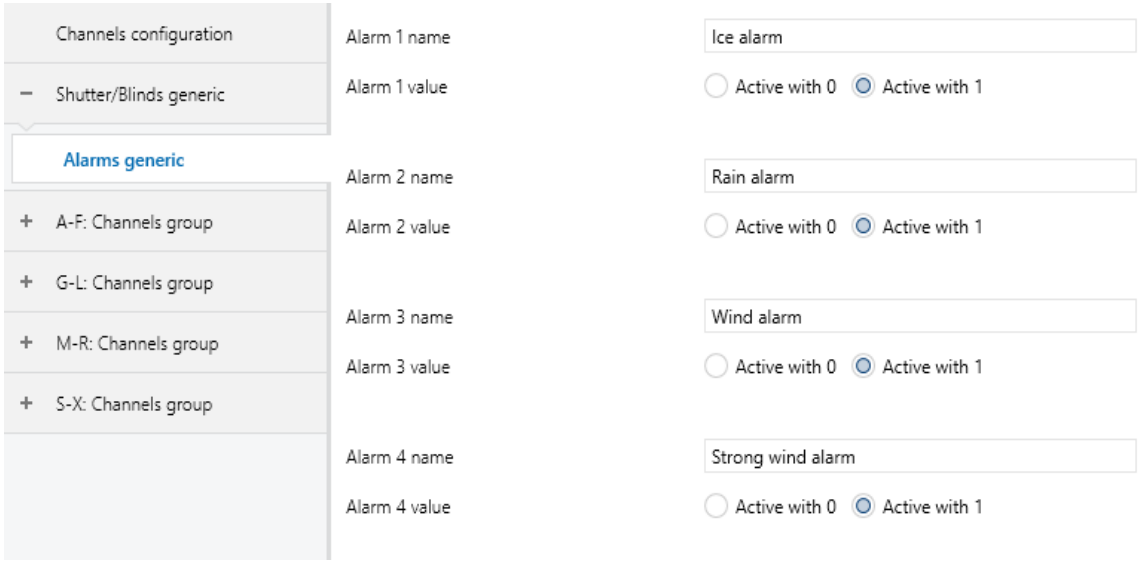


By selecting Enable, the communication object will appear for the respective channels and for movement tests.

1161	A-B: Shutter/Blinds	Calibration movement	2 bytes

4.2 Alarms generic

By enabling the Alarm functions from “Shutter/Blinds generic”, the following sub-menu will appear.



Four different alarm levels are available with the possibility of managing them individually. This function was created to prevent damage to the load connected to the individual device channel (e.g. roller blinds, Venetian blinds, shutters); alarm signals are normally a consequence of atmospheric events detected and sent on the bus by other devices connected to the system.

The alarm priorities are as follows:

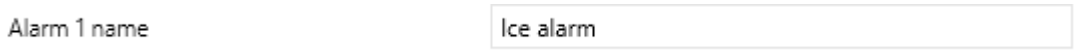
Alarm 4 takes priority over 3
Alarm 3 takes priority over 2
Alarm 2 takes priority over 1
Alarm 1

The behaviour of disabling a lower priority alarm is actually implemented only if a higher priority alarm is not active.

It is possible to 'rename the alarm' within the respective field. The communication object will take the new name entered. The priority alarm logic will not change.

4.2.1 Name (Alarm 1-2-3-4)

It is possible to edit the text inside “Alarm 1 name”.



The communication object will take the newly assigned name.

The communication objects made available are shown below:

800	Ice alarm	Alarm 1	1 bit	C	-	W	-	-	1-bit, alarm
801	Rain alarm	Alarm 2	1 bit	C	-	W	-	-	1-bit, alarm
802	Wind alarm	Alarm 3	1 bit	C	-	W	-	-	1-bit, alarm
803	Strong wind alarm	Alarm 4	1 bit	C	-	W	-	-	1-bit, alarm
804	Ice alarm	Alarm 1 status	1 bit	C	R	-	T	-	1-bit, switch
805	Rain alarm	Alarm 2 status	1 bit	C	R	-	T	-	1-bit, switch
806	Wind alarm	Alarm 3 status	1 bit	C	R	-	T	-	1-bit, switch
807	Strong wind alarm	Alarm 4 status	1 bit	C	R	-	T	-	1-bit, switch

By using the individual communication objects, it will be possible to interface with weather sensors (rain sensor, wind sensor, etc.), allowing preventive movements of the load to be automated in order to preserve the functioning.

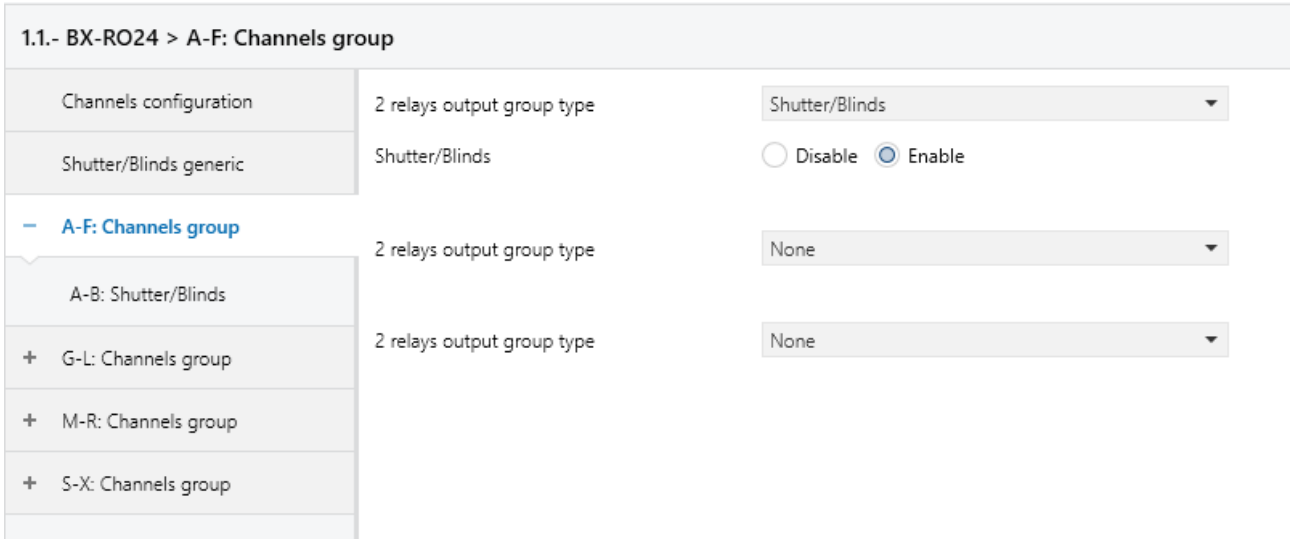
4.2.2 Activation value (Alarm 1-2-3-4)

The “Alarm n value” item allows defining the enabling value of the communication object associated with alarm x.
The settable values are:
Active with 0 - the relative alarm is active with value 0.
Active with 1 - the relative alarm is active with value 1, which is the default value.

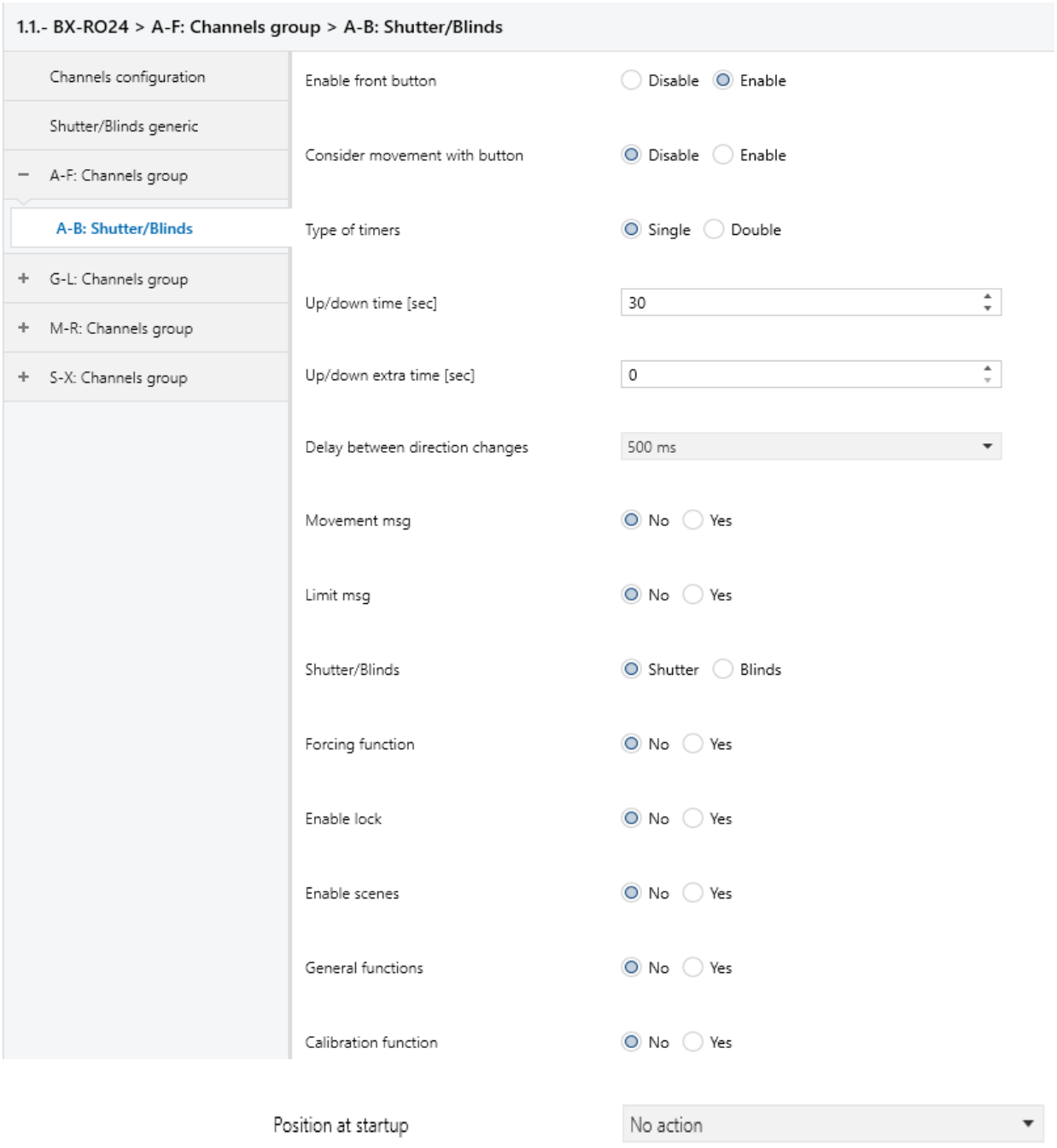
The behaviour in case of KNX bus control of individual alarms, such as the possibility to disable and enable individual channels, can be found within the parameters of each channel.

4.3 X-Y: Shutter/Blinds

Enabling a subgroup of two relays as Shutter/Blinds will show a new subpage for Shutter/Blinds specific configurations for that channel.



The menu for Shutter/Blinds is composed by the following parameters:



4.3.1 Enable front button

A button is located on the front of the device, which can be used to directly control the load related to the relay of each channel. The command given using these buttons is separate from the commands received via the KNX Bus. The local buttons can be disabled or not. The available settings are:

The local keys work with the KNX bus powered.

4.3.2 Consider movement with button

By enabling this parameter, it is possible to consider the command given to the local keys according to the settings dedicated to the individual channel and to the runtime. Available settings are:

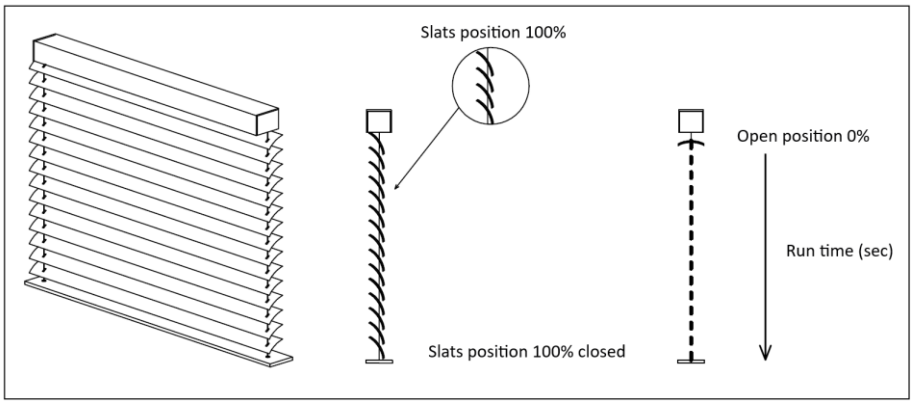
By leaving the setting on “disable”, the commands given by the local keys will not be considered by the device with respect to runtime. The alignment between the physical position and the logical position saved in the module's memory will be lost and it will then be necessary to recalibrate.

4.3.3 Type of timers

The user can decide to enable two timers instead of one. By doing this, it is possible to differentiate times for up and down Shutter/Blinds directions.

4.3.4 Up time [sec] – Down time [sec]

This parameter makes it possible to establish, within the device, the calculation of the position as a percentage, in order to be able to perform, on the proportion of total time base, its movement in proportion to the time measured in the actual field. With the blind/shutter raised, the value will be 0%, while if it is lowered, the value will be 100% and vice versa. If required, different up and down times can be set. The settings themselves will give the proportion to the command from fully closed to fully open. The value to be indicated refers to the actual Roller blind/Venetian blind runtime.



4.3.5 Up extra time [sec] – Down extra time [sec]

This parameter allows an additional control time value to be set for the channel relay. Over time, the Roller blind/Venetian blind could undergo a change in the movement run both upwards and downwards; a slowing of the movement due to wear of the mechanical parts or even particular weather conditions such as wind can change the mechanical behaviour. To ensure that the limit switch is always reached, it is possible to set a value (seconds) of overrun which is added to the run time.

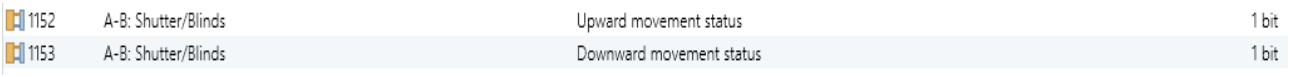
4.3.6 Delay in direction change from up to down - Delay in direction change from down to up

This parameter allows setting a delay time (milliseconds) between the switching of the up and down relays. It will be necessary to have the manual with the technical specifications of the Roller blind/Venetian blind to be controlled. The delay time must then be indicated so as not to damage the Roller blind/Venetian blind motor during reversal. This parameter sets the time interval between the interruption of the command in one direction and the start of the command in the other direction.

4.3.7 Movement msg

Enabling this parameter allows to receive from the device a value which is determined during the movement of the Roller blind/Venetian blind.

If enabled, it will send a telegram with value 0 or 1 (see parameter description below). This communication object has a 1-bit value and will be sent when the relay changes status/switching either up or down with values of 0 open and 1 closed or vice versa. Below are the available communication objects:



Two distinct Movement communication objects are available, so that both up (Movement up) and down (Movement down) can be distinctly identified.

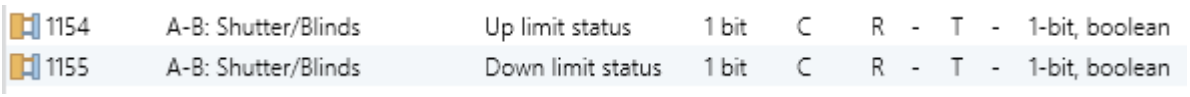
The above values can be "reversed" as per the "Movement up/down telegram type" parameter. This can facilitate KNX bus transmissions for statuses with different and easily customisable values.

4.3.8 Limit msg

Enabling this parameter allows to receive a value which is determined and sent only when the Roller blind/Venetian blind has reached the upper or lower limit switch. If enabled, it will send a telegram with value 0 or 1. This communication object has a value of 1 bit.

The values of the 1-bit communication objects can be defined inside the “Up/down limit msg” parameter. This will facilitate KNX bus transmissions for statuses with different and easily customisable values.

The available communication objects are shown below:



Two distinct objects are available, so as to be able to identify both the reaching of the upper and the lower limit switch.

4.3.9 Shutter/Blinds

Enabling this parameter makes it possible to determine the presence of a blind and to add further criteria and communication objects to the device within the blind menu. Some of these 'values' will take on different commands/statuses. See relevant shutter/blinds chapter.

4.3.10 Forcing Function

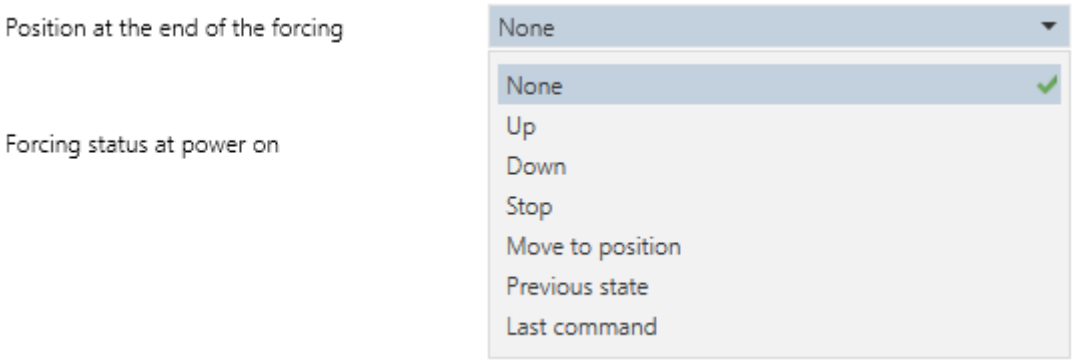
This parameter enables a two-bit group object for that channel, which is dedicated to forcing commands. This allows to force a priority movement upward or downward.

1157	A-B: Shutter/Blinds	Forcing function command	2 bit	C	-	W	-	-	1-bit controlled, direction control 1

A subpage called “Forcing function” will appear under the specific channel.

Here, it is possible to configure the channel behaviour when a forcing command comes from the bus.

4.3.11 Position at the end of the forcing



This parameter specifies the behaviour of the channel at the end of the forcing command.

4.3.12 Forcing status at power on

When this parameter is set to “Previous state”, the last state of the forcing command is maintained at the power on of the device.

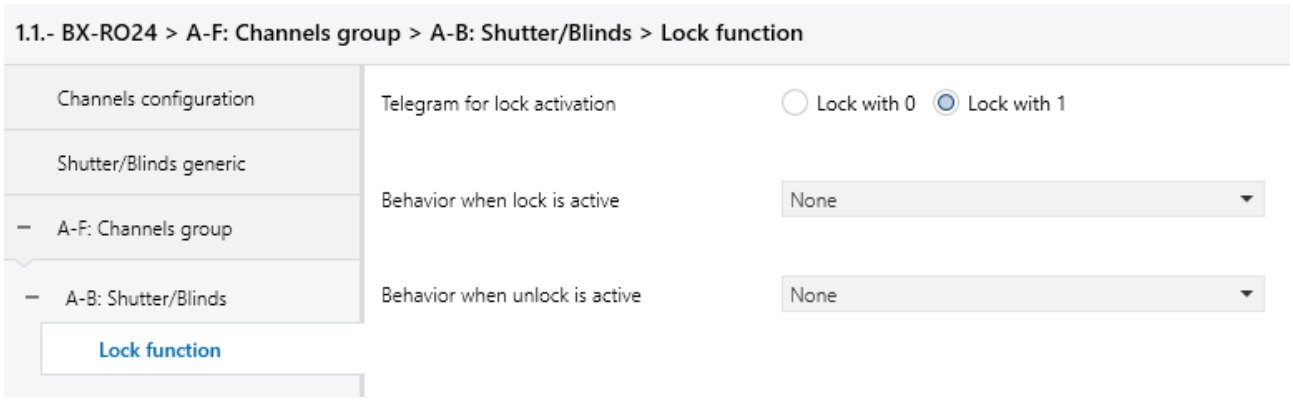
4.3.13 Enable lock

By enabling the lock function, two communication objects become visible – the first, command and the second, status. These feature on each individual actuator channel. The available communication objects are shown below:

1158	A-B: Shutter/Blinds	Lock command	1 bit	C	-	W	-	-	1-bit, switch
1159	A-B: Shutter/Blinds	Lock status	1 bit	C	R	-	T	-	1-bit, switch

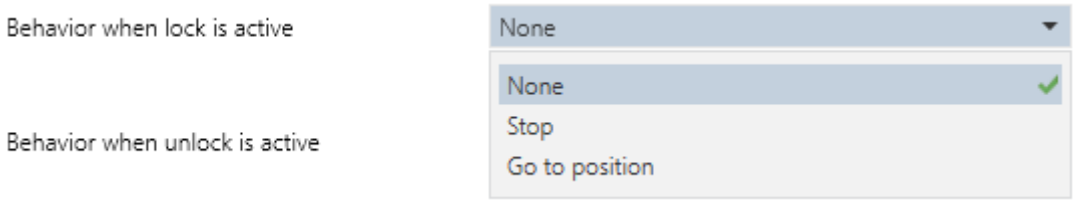
By writing a value via the KNX bus to the communication object 'Lock command', the lock function can be enabled or disabled. With this parameter it is possible to set and block the device in a certain condition. This condition is maintained until it is disabled. In this condition the device will not execute any commands received via the bus.

Following the lock command, the device will respond with the corresponding 'Lock status' communication object.



4.3.14 Behaviour when lock is active

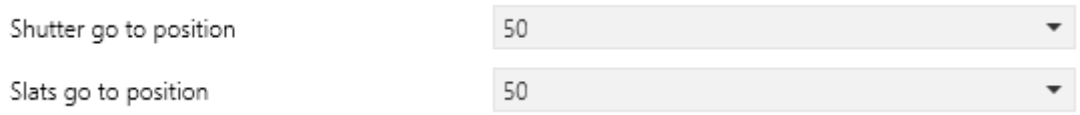
This parameter allows to set the channel during the block of a certain condition. The available settings are:



None - When the block is enabled, this setting results in no action on the channel.

Stop - When the block is enabled, this setting causes channel stop

Go to position - By selecting this parameter, a new setting appears – if the blind function is enabled.



This setting can be made according to the roller blind/Venetian blind % position value to be achieved. If the device is also used in Venetian blind configuration, when the device is in roller blind configuration, the position of the slats can also be defined. If this is not used, the set value will not be considered.

4.3.15 Enable scenes

By enabling this parameter, the roller blind menu will be applied in the window dedicated to the scenarios. See chapter about Scenarios.

4.3.16 General Functions

By enabling this parameter, the channel will be part of the general controls. General controls have the same group object for all channels in the device. This allows greater simplicity during configuration on the ETS software for the general controls to be sent to those channels enabled in this function. The communication objects to be used are as follows:

796	All shutters/blinds	Up/Down command	1 bit	C	-	W	-	-	1-bit, up/down
797	All shutters/blinds	Shutter percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)
798	All shutters/blinds	Stop/Step	1 bit	C	-	W	-	-	1-bit, step
799	All shutters/blinds	Slats percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)

General up/down commands, shutter percentage command, stop/step commands, slats percentage command can be sent via the KNX bus to the device (if the device is also used in the Venetian blind configuration).

4.3.17 Calibration function

This parameter makes a communication object available for each channel, which has the function of realigning the physical position of the frame with the logical position held in memory by the actuator module. The calibration command object triggers an up or down movement with an activation time equal to the sum of all times set in the parameters for the direction chosen by the command. The set times for run, overrun, slats (if any) and any dead times are considered.

This command ensures that the mechanical position and the logical position maintained by the actuator module are consistent.

Calibration function ○ No ◉ Yes

If the Enable value is selected, the single communication objects will appear for the respective channels. The available communication objects are shown below:

1160	A-B: Shutter/Blinds	Calibration function	1 bit	C	-	W	-	-	1-bit, up/down

4.3.18 Behaviour at end of calibration

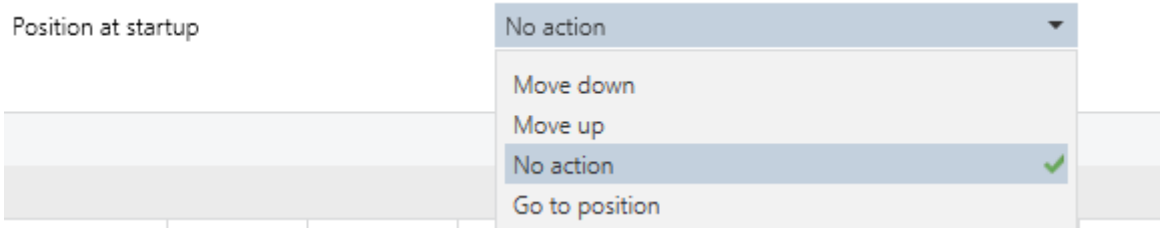
With this parameter, after enabling the Calibration Function, the position of the slats at the end of the calibration test can be defined.

"Maintain the position" means the Roller blind/Venetian blind will stay fully up or down depending on the command given on the communication object (Up/down calibration movements).

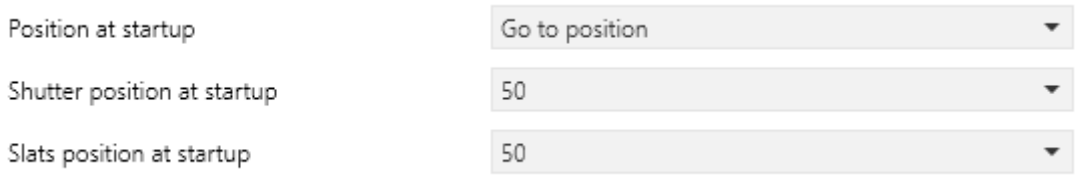
"Go to previous position" means that after being moved fully up or down, the Roller blind/Venetian blind, will then return to the position it started from.

4.3.19 Position at Startup

This parameter makes it possible to determine, when the device is switched on again, in which state the roller shutter/blind should be positioned. The cases that lead to a possible reactivation are; in the event of a power failure from the KNX bus, in the event of a fault on the bus network and due to a possible system restart. As with switching, you can define the desired state after the device initialization is complete. The available choice is shown below.



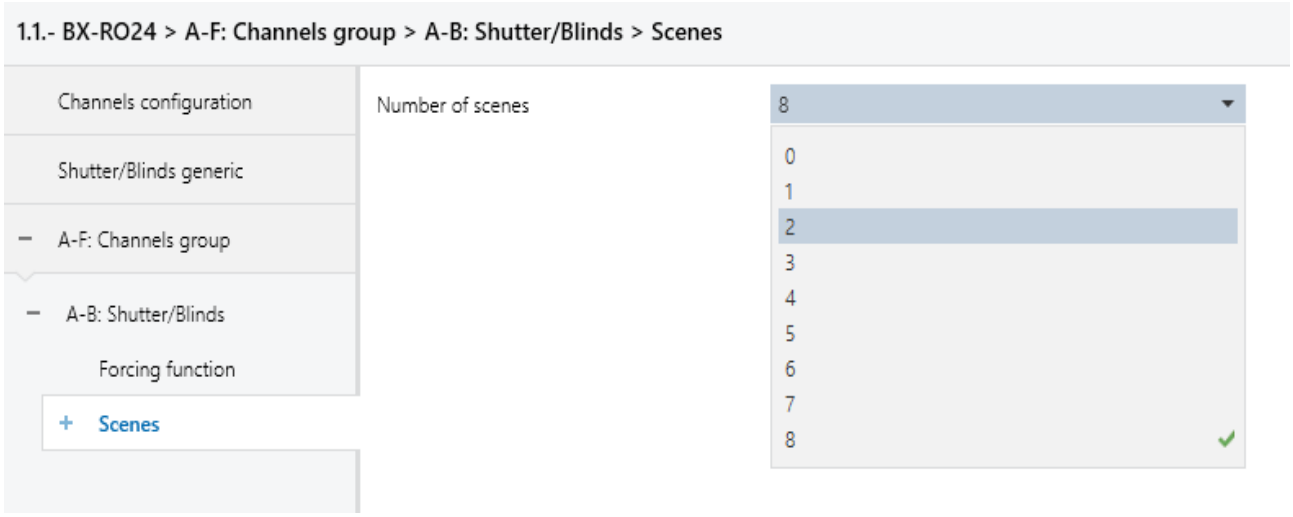
By selecting "Go to position", a % value can be set of the desired roller blind/Venetian blind position. If the device is also used in the Venetian blind configuration, when programming the device in roller blind, the position of the slats can also be defined. If this is not used, the set value will not be considered.



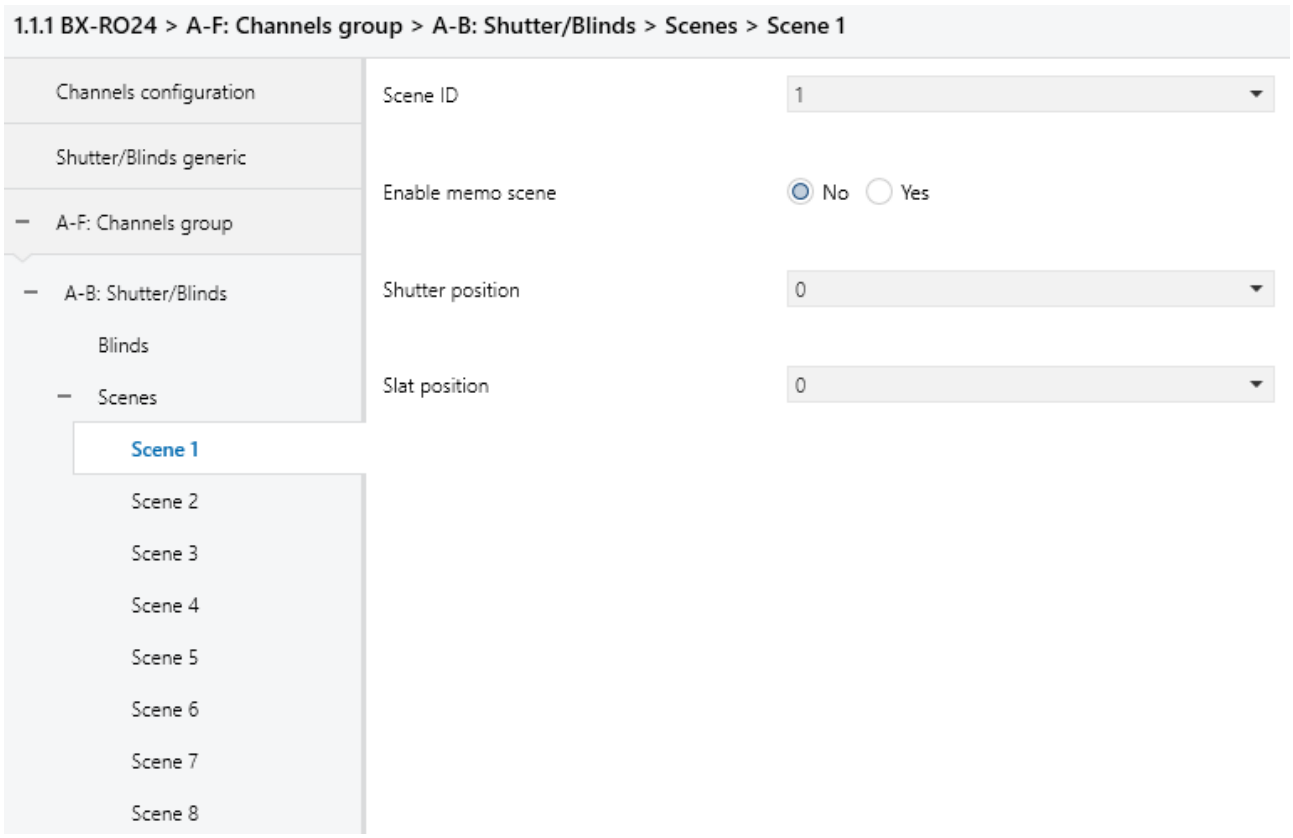
4.4 Scenarios

Enabling this parameter will extend the roller blind menu in the “Scene” window. The operating principle of the scenario is based on the recall of a status, which can be pre-set with % values or stored on the enable scenario memo X. The device is programmed to store and execute a maximum of 8 scenarios. The parameters are visible and settable, so that their status can be determined - whether fixed or stored. Available settings are:

4.4.1 Number of scenes



It specifies the number of scenes to enable for that specific channel, a correspondent number of subpages called “Scene x” will appear under “Scenes”.



4.4.2 Scene ID

This parameter defines the number of the scenario to be associated with that action. The value can be set from 1 to 64.

The following communication objects are available for each channel to use to recall the scenario with a value of 1 byte.

4.4.3 Enable memo scene

to enable the storage function; you can send a command on the bus to ask the devices to store their current location as a new value to be assigned to that scenario. The current value will replace the one set in the configuration parameters. This option allows the end customer to configure the scenarios independently without having to program the system.

Learning the scenario includes storing the position of the slats (if Venetian blind mode in enables). Therefore, scenario execution must also include reproduction of the previously stored slats position.

4.4.4 Shutter position

This parameter defines the position towards which the Roller blind will be commanded when entering the scenario enable command. The parameter can be set in an interval between 0% and 100%, with minimum increments of 5%. The predefined settings are:

10 % _"default" value scenario 1	30 % _"default" value scenario 3	50 % _"default" value scenario 5	70 % _"default" value scenario 7
20 % _"default" value scenario 2	40 % _"default" value scenario 4	60 % _"default" value scenario 6	80 % _"default" value scenario 8

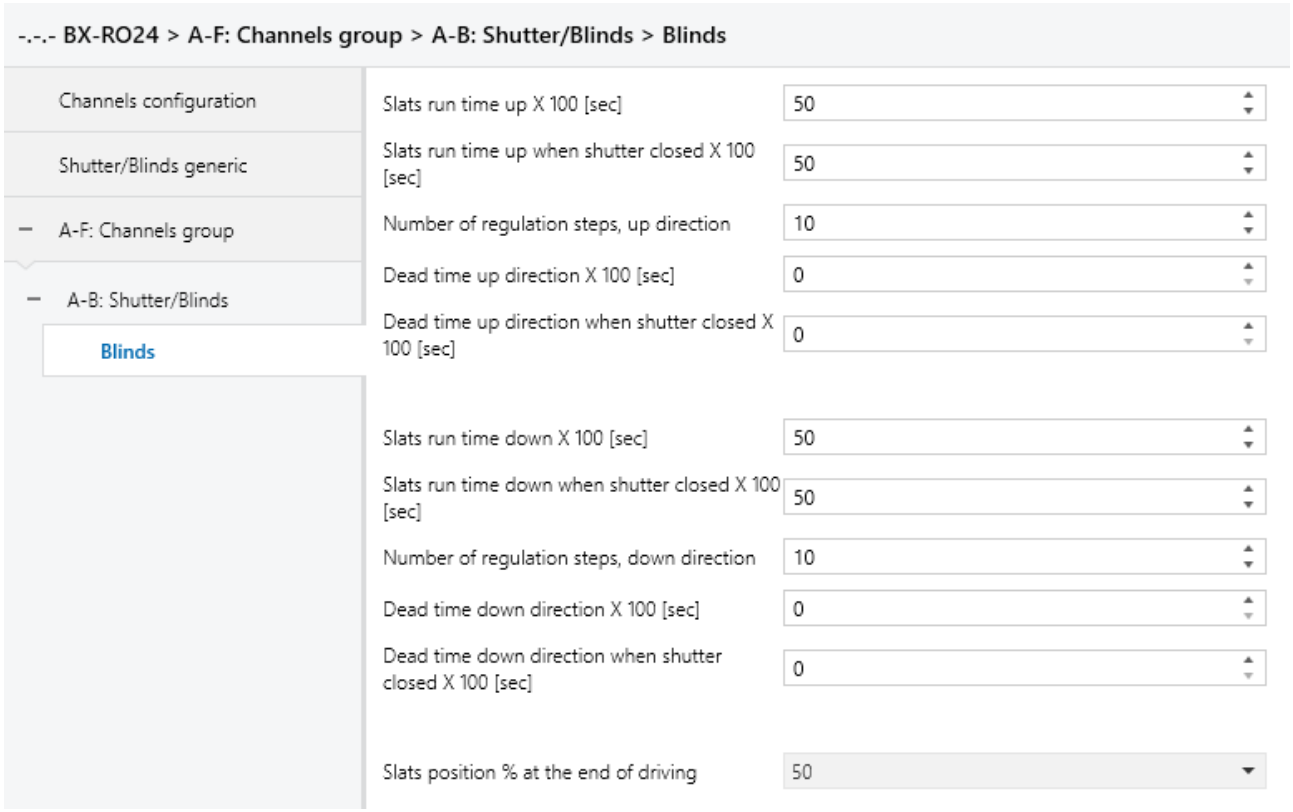
4.4.5 Slat position

Same as previous paragraph (4.4.4) but referred to the position of the Venetian blind slats.

10 % _"default" value scenario 1 slat	30 % _"default" value scenario 3 slats	50 % _"default" value scenario 5 slats	70 % _"default" value scenario 7 slats
20 % _"default" value scenario 2 slats	40 % _"default" value scenario 4 slats	60 % _"default" value scenario 6 slats	80 % _"default" value scenario 8 slats

4.5 Venetian blind

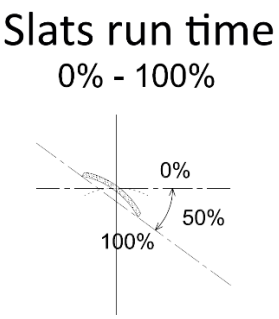
The Venetian blind menu contains all the parameters which will enable the device to control the Venetian blinds with the various operation times of the slats and of the load connected to the related channels. The following settings are available:



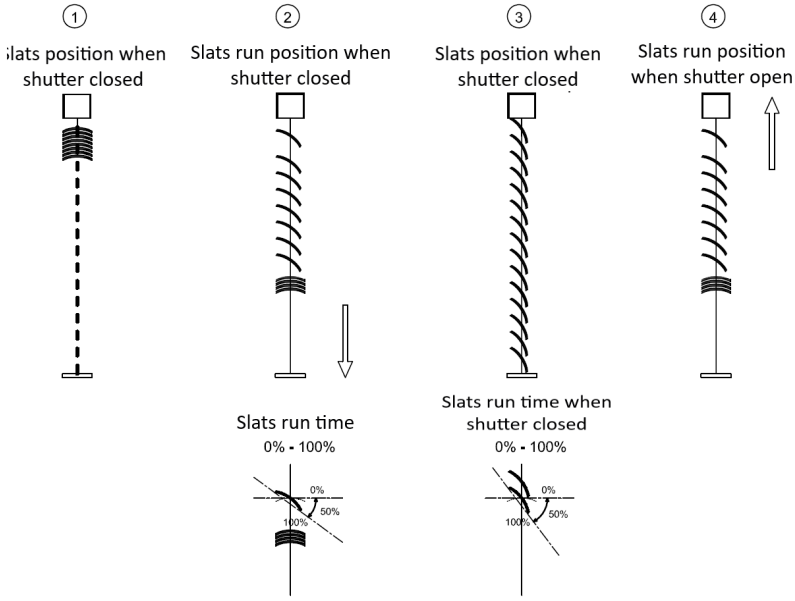
4.5.1. Slats run time X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

This parameter allows the total time of slat movement to be set to the running position (as shown in the image below) in the upward movement phase. Hence, it is defined that the slat movement has to be identified with a different value from the one defined as "Shutter/Blinds run time". Therefore, a second measurement to be identified in the field is that of the rotation time taken between the 0% to 100% position of the slat itself. Once this value has been identified, it must be entered in the 'slats run time' parameter. This time can be very fast and is expressed in milliseconds.



It should be noted hereunder how, as regards some types of Venetian blinds, the position of the slats during the down time ② is different from the position at the end of run ③, as is shown in the illustration.



Inside this parameter, the value ② must be entered.

4.5.2 Slats run time up when shutter closed X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

This parameter allows to set the total slat movement time on % closed position ③ (as shown in the illustration).

4.5.3 Number of regulation steps, up direction

This parameter allows to set the number of steps calculated by dividing the total rotation time by the number of steps required.

4.5.4 Dead time up direction X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

This parameter allows to set what are known as 'dead' times. These are periods in which the motor is controlled by the actuator but mechanically does not produce any movement. These times can be considered if the manufacturer of the automation specifically requires them, or by testing the device and taking the times directly in the "movement" phase.”.

Venetian blind position	Slats position	Send command	t	Start of movement
Roller blind not closed “picture 1”	Rotation of slats from fully closed (100%) to fully open (0%)	Up =>	Dead Time	Start of roller blind upward movement

4.5.5 Dead time up direction when shutter closed X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

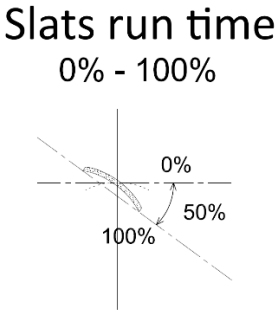
This parameter is similar to the previous one, but it allows to distinguee the case in which the blind is closed. In this situation some shutters have a different dead time.

Venetian blind position	Slats position	Send command	t	Start of movement
Roller blind closed "picture 3"	Rotation of slats from fully closed (100%) to fully open (0%)	Up =>	Dead Time	Start of roller blind upward movement

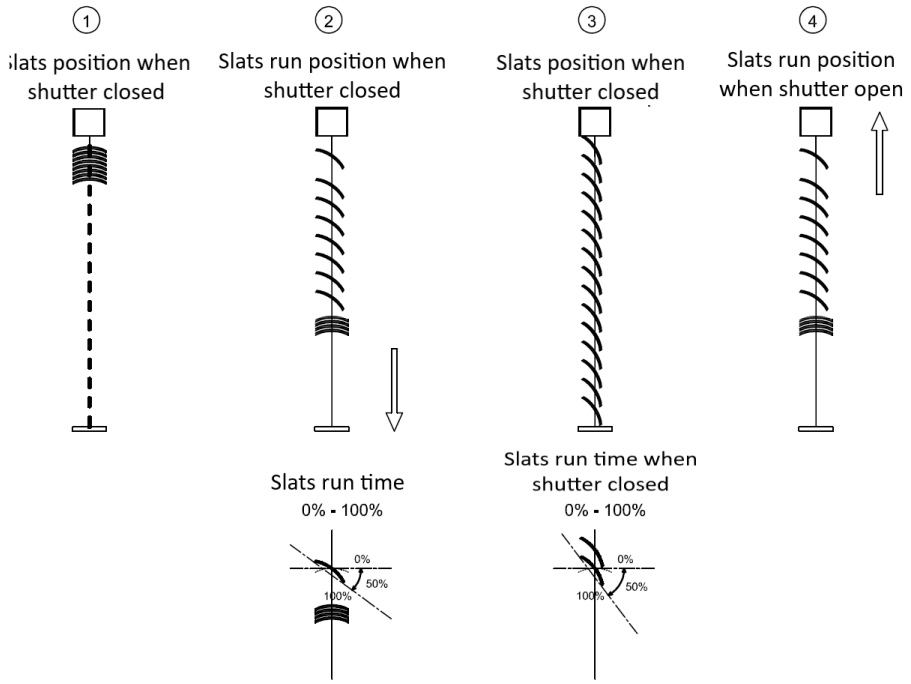
4.5.6. Slats run time down X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

This parameter allows to set the total time of slat movement on the running position (as shown in the illustration below) when moving down. The slat movement has to be identified with a separate value from that defined as "Shutter /Blinds run time". Therefore, a second measurement to be identified in the field is the time taken between the 100% to 0% position of the slat itself. Once this value has been identified, it must be entered in the 'slats run time' parameter. This time can be very fast and the scale value is in msec. The factory setting is 5000msec.



Hereunder, it should be noted that with regard to some types of Venetian blinds, the position of the slats during the down phase ② is different from the position at the end of run ③, as can be seen in the illustration.



Within this parameter, the value ② must be entered.

4.5.7 Slats run time down when shutter closed X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

This parameter allows to set the total slats movement time on 100% closed position ③ (as in the illustration). This slats movement has to be identified with a value distinct from that defined as “total run time” and in open position.

4.5.8 Number of regulation steps, down direction

This parameter allows to set the number of steps calculated by dividing the total rotation time with respect to the number of required steps.

4.5.9 Dead time down direction X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

This parameter allows to set the 'dead' times. These are periods in which the motor is controlled by the actuator, but mechanically does not produce any movement. These times can be considered if the manufacturer of the automation specifically requires them or by testing the device and taking times directly in the "movement" phase.”.

Venetian blind position	Slats position	Send command	t	Start of movement
Roller blind not open “picture 1”	Rotation of slats from fully closed (100%) to fully open (0%)	Up =>	Dead Time	Start of roller blind upward movement

4.5.10 Dead time down direction when shutter is closed X 100 [sec]

X 100 means that the value has to be expressed in hundreds of ms.

This parameter is similar to the previous one, but it allows to distinguee the case in which the blind is closed. In this situation, some shutters have a different dead time.

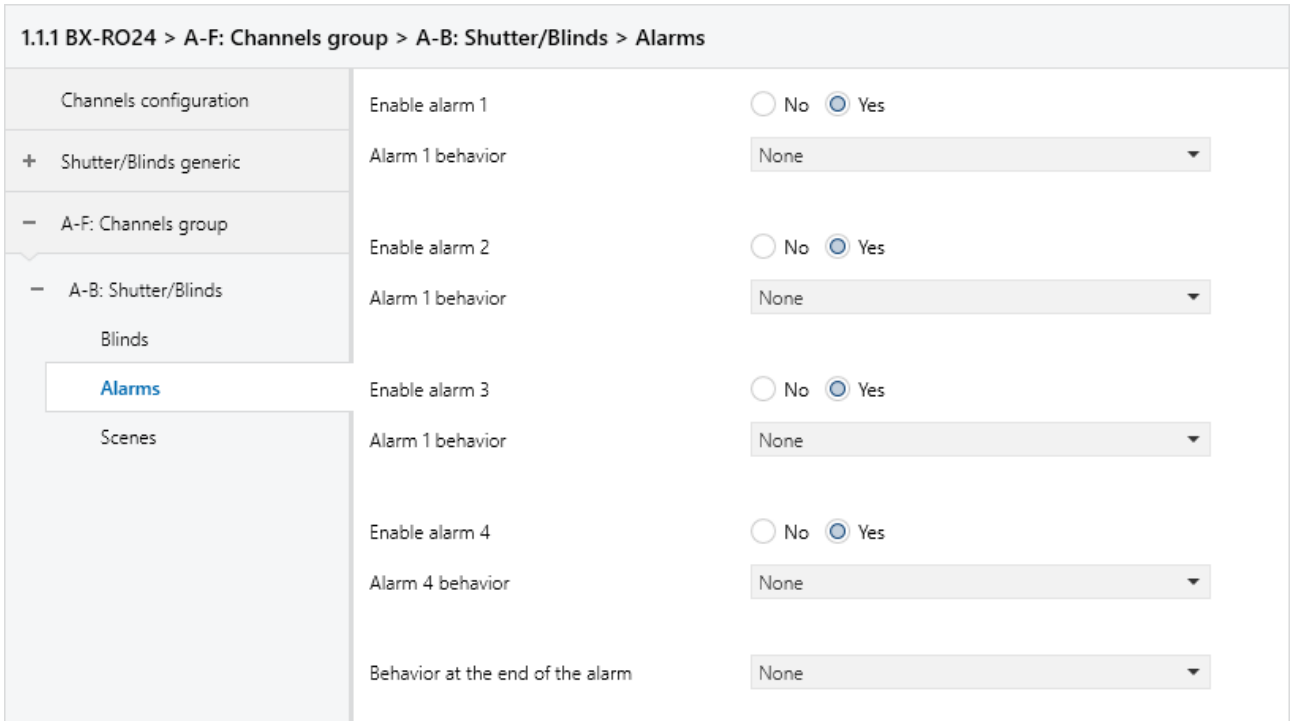
Venetian blind position	Slats position	Send command	t	Start of movement
Roller blind open “picture 3”	Rotation of slats from fully closed (100%) to fully open (0%)	Up =>	Dead Time	Start of roller blind upward movement

4.5.11 Slat position % at the end of driving

This parameter allows to set the position of the slats at the end of movement (value in %).

4.6 Alarms

Enabling the “Alarm” function from the general menu will enable a sub-menu on each individual actuator channel configured as “Shutter/Blinds”.
Four different alarm levels with different priorities and dedicated communication objects are identified (see General Alarms chapter). It is possible to manage individual alarm and the alarm behaviour per channel. Available settings are:

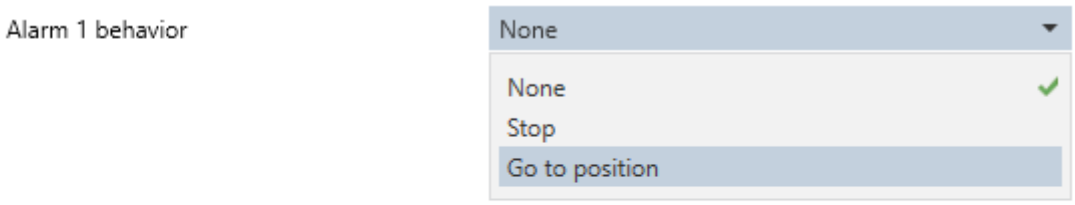


4.6.1 Enable alarm x

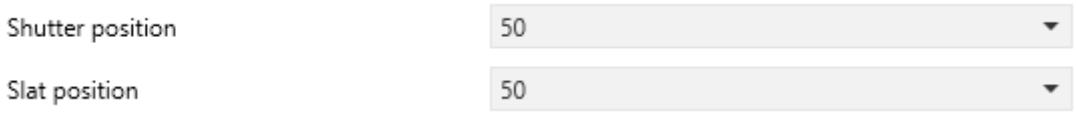
This parameter allows to enable or disable or the association of the individual channel to the alarm of reference. If disabled, in case of recall of that alarm channel, the channel will not be associated with that alarm.

4.6.2 Alarm x behavior

When receiving the alarm via KNX bus, this parameter allows to establish an activation value of the alarm X on the respective communication object. It will therefore be possible to define the status to set the shutter/blinds at the time of activation. The available choice is shown in the illustration below.



By selecting “Go to position”, a % value of the Roller blind/Venetian blind of the required position can be set. If the device is also used in Venetian blind configuration, the position of the slats can also be defined. If this is not used, the set value will not be considered.



4.7 Communication objects dedicated to the individual channel

The objects available for each single channel are activated in the “X-Y: Shutter/Blinds” menu.

16 different Communication Objects are available for each Shutter/Blinds channel. Below an example for channel A-B is shown.

1145	A-B: Shutter/Blinds	Up/Down command	1 bit	C	-	W	-	-	1-bit, up/down
1146	A-B: Shutter/Blinds	Up/Down status	1 bit	C	R	-	T	-	1-bit, up/down
1147	A-B: Shutter/Blinds	Shutter percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)
1148	A-B: Shutter/Blinds	Shutter percentage status	1 byte	C	R	-	T	-	8-bit unsigned value, percentage (0..100%)
1149	A-B: Shutter/Blinds	Stop/Step	1 bit	C	-	W	-	-	1-bit, step
1150	A-B: Shutter/Blinds	Slats percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)
1151	A-B: Shutter/Blinds	Slats percentage status	1 byte	C	R	-	T	-	8-bit unsigned value, percentage (0..100%)
1152	A-B: Shutter/Blinds	Upward movement status	1 bit	C	R	-	T	-	1-bit, boolean
1153	A-B: Shutter/Blinds	Downward movement status	1 bit	C	R	-	T	-	1-bit, boolean
1154	A-B: Shutter/Blinds	Up limit status	1 bit	C	R	-	T	-	1-bit, boolean
1155	A-B: Shutter/Blinds	Down limit status	1 bit	C	R	-	T	-	1-bit, boolean
1156	A-B: Shutter/Blinds	Scene ID	1 byte	C	-	W	-	-	scene control, scene control
1157	A-B: Shutter/Blinds	Forcing function command	2 bit	C	-	W	-	-	1-bit controlled, direction control 1
1158	A-B: Shutter/Blinds	Lock command	1 bit	C	-	W	-	-	1-bit, switch
1159	A-B: Shutter/Blinds	Lock status	1 bit	C	R	-	T	-	1-bit, switch
1160	A-B: Shutter/Blinds	Calibration function	1 bit	C	-	W	-	-	1-bit, up/down

4.7.1 Up/down command

This communication object is used to move the actuator channel in up/down commands for roller blinds and Venetian blinds.

4.7.2 Up/down status

This communication object is used to be able to receive the type of command given to the device channel.

4.7.3 Shutter percentage command

This communication object is used to set the roller blinds and Venetian blinds to a certain % position via KNX bus.

4.7.4 Shutter percentage status

This communication object is used to receive from the device the % value of the status which the run position of the motor is in. This value is sent at the end of each run or after reading via KNX bus.

4.7.5 Stop/Step

This communication object is used to stop the ongoing motor movement of the Venetian blind actuator channel. If the device is configured as Venetian blind, this communication object is also used to adjust the slats with single steps at the time.

4.7.6 Slats percentage command

This communication object is used to set the slats (Venetian blind setting only) at a certain % position via KNX bus.

4.7.7 Slats percentage status

This communication object is used to receive from the device the % value of the status which the slats run position is in. This value is sent at the end of each run or after reading via KNX bus.

4.7.8 Upward movement status - Downward movement status

These two communication objects send the movement direction status.

4.7.9 Up limit status – Down limit status

These two communication objects send a message when the up/down limit is reached.

4.7.10 Scene ID

See chapter 8 paragraph 8.1.2.

4.7.11 Forcing function command

This communication object is used to force an up/down command.

4.7.12 Lock command

This communication object is used to block the shutter/blinds. In this mode of operation, the channel performs an action according to its associated parameters in the lock section. Thus, any successive command targeting that channel is denied.

4.7.1 3 Lock status

This communication object gives the current lock status for that channel.

4.7.14 Calibration function

This communication object is used to perform a calibration of that specific channel when channel calibration parameter is enabled.

4.8 Communication objects for all channels

Each channel can be enabled to respond to “All shutter/blinds” commands enabling the parameter “General functions” for the specific channel.

4 different Communication Objects are available for all the channels.

796	All shutters/blinds	Up/Down command	1 bit	C	-	W	-	-	1-bit, up/down
797	All shutters/blinds	Shutter percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)
798	All shutters/blinds	Stop/Step	1 bit	C	-	W	-	-	1-bit, step
799	All shutters/blinds	Slats percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)

4.8.1 Up/Down command

This is the Up/Down broadcast communication object.

4.8.2 Shutter percentage command

This is the Shutter percentage broadcast communication object.

4.8.3 Stop/Step

This is the Stop/Step broadcast communication object.

4.8.4 Slats percentage command

This is the Slats percentage broadcast communication object.

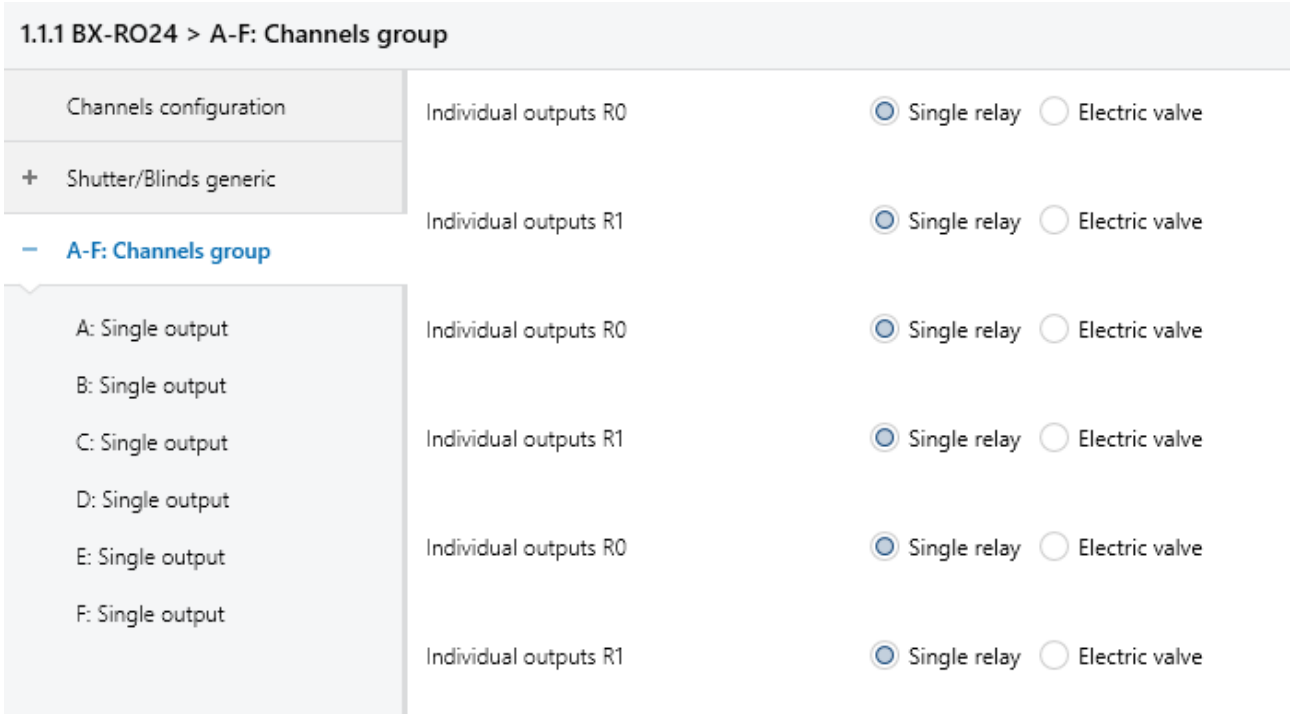
5 Single Output

The single output function is dedicated to acting as a contact with the different functions associated with it.

Up to 8 individual outputs can be associated with a main group of 8 channels. Up to 8 single output functions are available on the BX-R I O8, while up to 16 single output functions are available on the BX-RIO16.

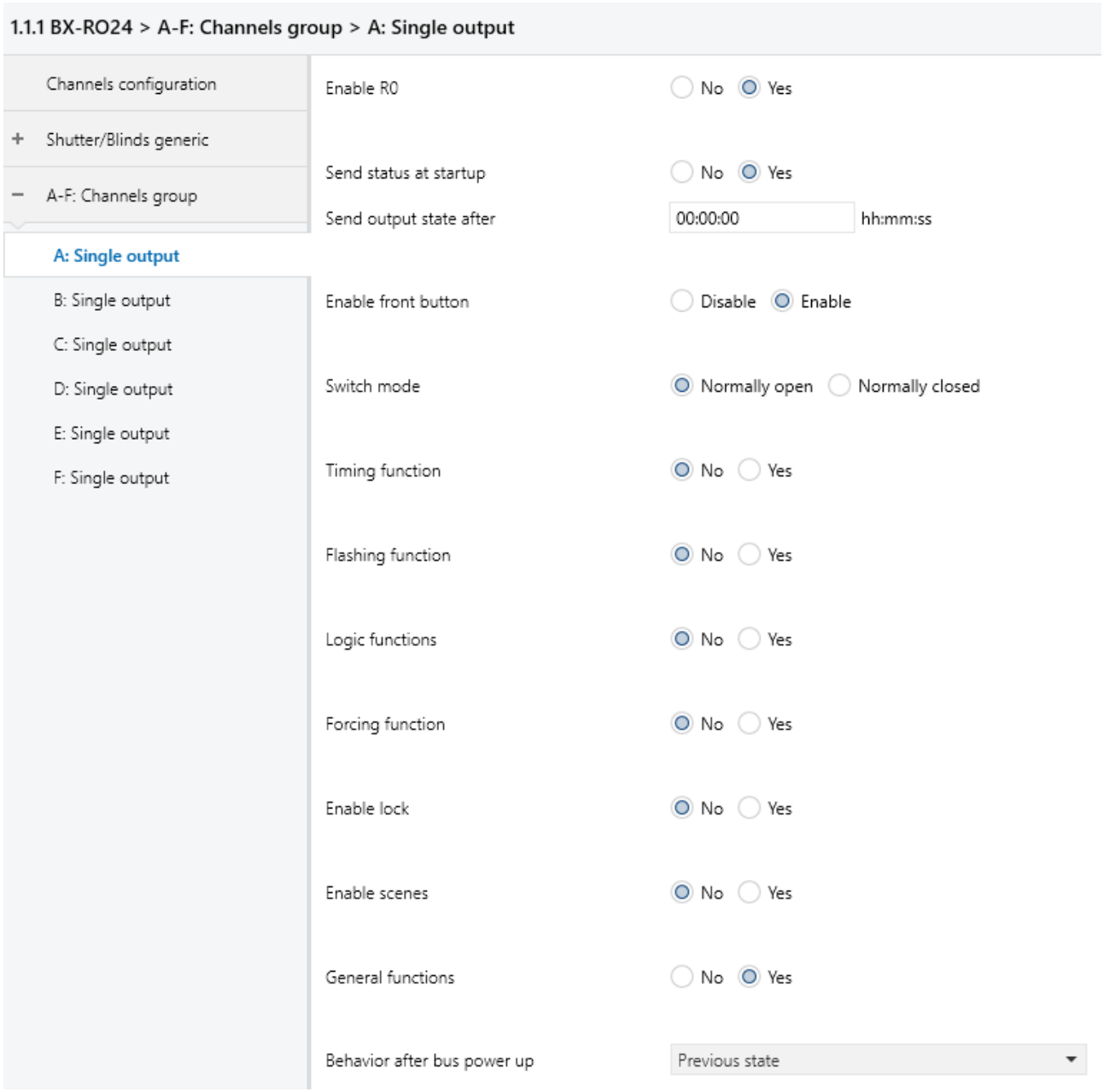
Here follows the list and description of the single output parameters.

5.1 X: Single Output



Choosing the option “Single relay”, a subpage dedicated to the parameters for that channel will appear under the X-Y channel group page.

Here, the list of all the configurable parameter for the single output function.



5.1.1 Enable Rn

This parameter enables the channel to work as a contact. Here is the list of all the available parameters for the single output.

5.1.2 Send status at startup

If “No” option is chosen, no output status will be sent on the bus during the startup of the device for this channel.

If “Yes” option is chosen, it is possible to set a delay after which the first output status will be sent on the bus.

5.1.3 Enable front button

Enabling the front button allows the user to open/close the relay by using the physical button on the front panel of the device.

5.1.4 Switch mode

With this parameter it is possible to choose if to consider the contact as normally open or normally closed.

5.1.5 Timing Function

This parameter enables the “Timing function” subpage (see the “Timing” paragraph).

5.1.6 Flashing function

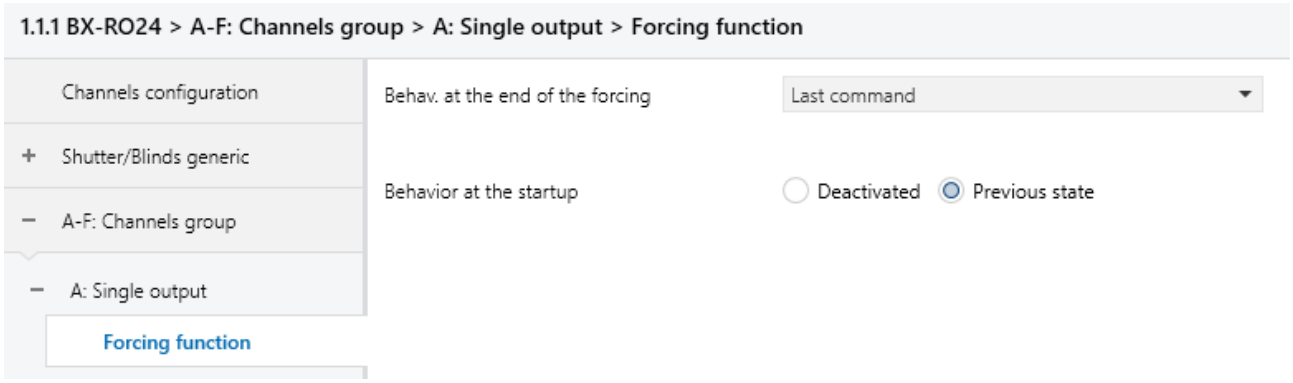
This parameter enables the “Flashing function” subpage (see the “Flashing” paragraph).

5.1.7 Logic function

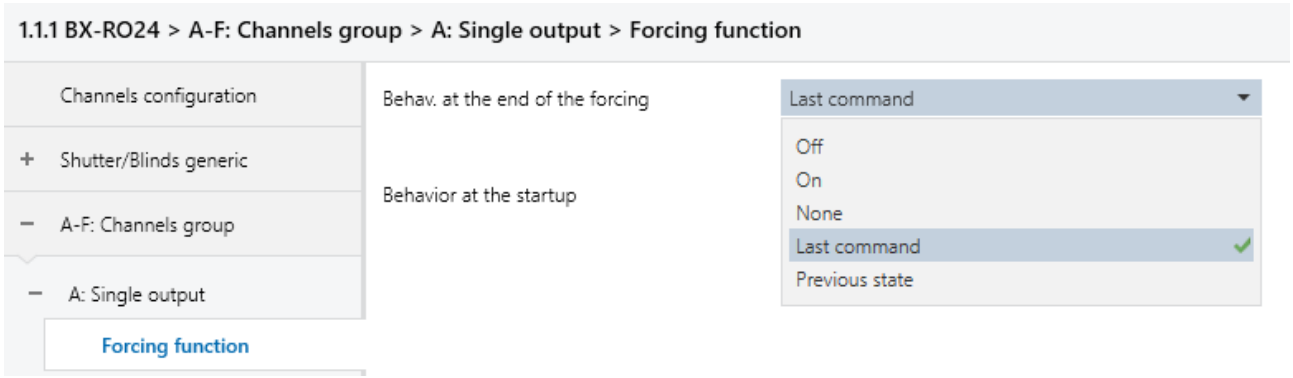
This parameter enables the “Logic function” subpage (see the “Logic functions” paragraph).

5.1.8 Forcing Function

This parameter enables the “Forcing function” subpage and the parameters dedicated to manage the behaviour of the channel when a force command is entered.



5.1.9 Behav. at the end of the forcing



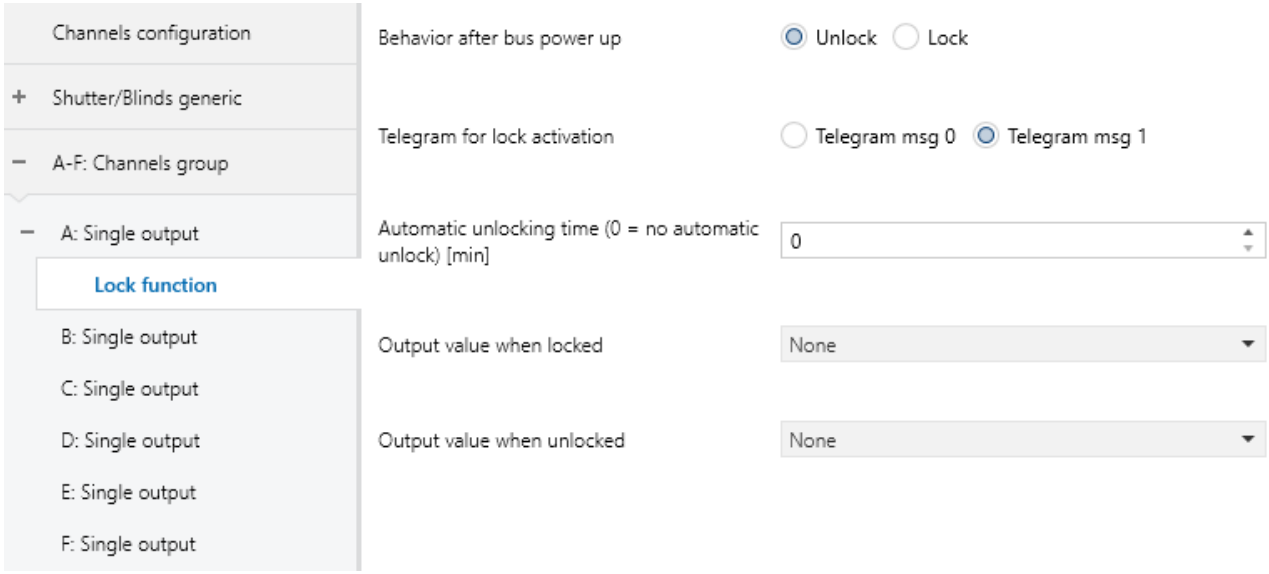
This parameter specifies the behaviour of the switch at the end of the forcing command. It is possible to choose between various options. If “Last command” is chosen, after the forcing is disabled, the last command from the bus will be implemented for that channel. While, the “Previous state” option will restore the switch state before the forcing command.

5.1.10 Behav. at the startup

When this parameter is set to “Previous state”, the switch will assume the last forcing status before the device shutdown.

5.1.11 Enable lock

This parameter enables the “Lock function” subpage and the parameters dedicated to manage the behaviour of the channel when a lock command is entered.



5.1.12 Behaviour after bus power up

This parameter specifies whether to lock the channel after the power on of the device.

5.1.13 Telegram for lock activation

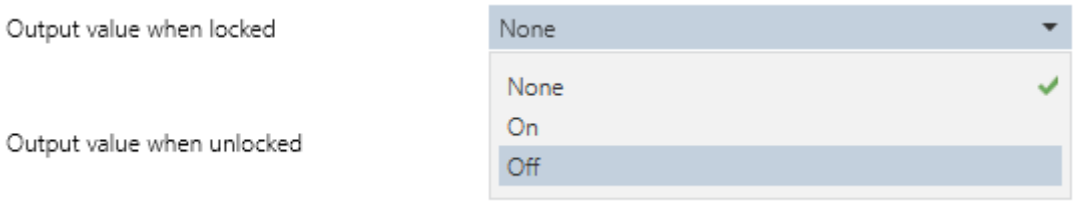
By setting this parameter it is possible to choose the type of message to send on the bus when the lock is activated.

5.1.14 Automatic unlocking time (0 = no automatic unlock) [min]

When this parameter assumes a value different from 0, it means that after that time an automatic unlock will apply for that channel.

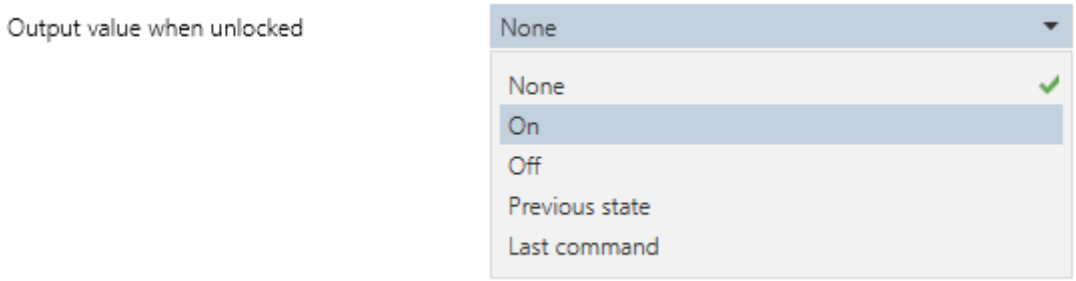
5.1.15 Output value when locked

This parameter specifies the behaviour of the channel when the lock command is set. It is possible to choose between the following options.



5.1.16 Output value when unlocked

This parameter specifies the behaviour of the channel when the unlock command is set.
It is possible to choose between the following options.



5.1.17 Enable scenes

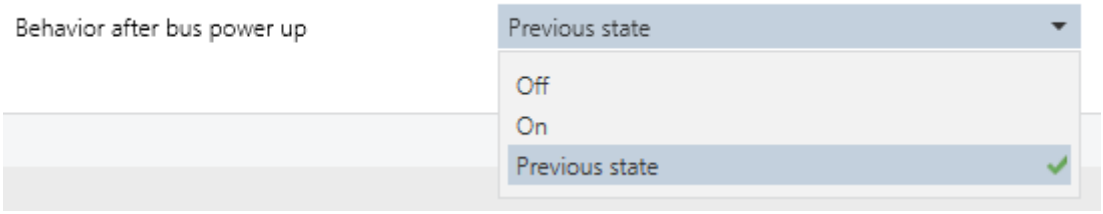
This parameter enables the “Scenes” subpage (see the “Scenarios” paragraph).

5.1.18 General functions

This parameter allows the “All switches” parameters to work for this channel.

5.1.19 Behavior after bus power up

This parameter specifies the channel behavior after the startup of the device.

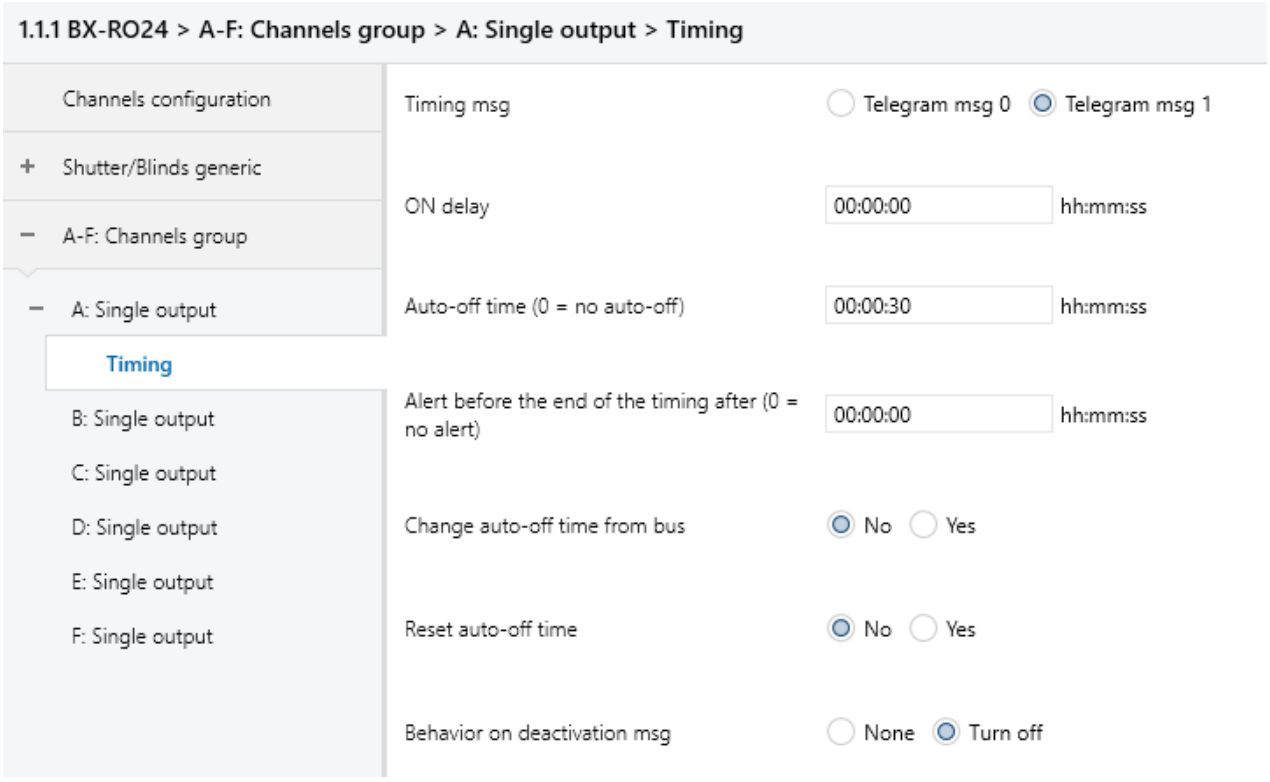


With the “Previous state” option, the device will store the last status of that channel before the shutdown and will recall it after the successive startup.

5.2 Timing

The timing function is enabled by the “Timing function” parameter in the “Single output” page.

This function delays the startup of the switch and it is used, for example, for the staircase lights.



5.2.1 Timing msg

This parameter specifies the type of telegram to be received when the timing command must be activated.

5.2.2 ON delay

This parameter defines how long the delay must last before turning on the switch.

5.2.3 Auto-off time (0 = no auto-off)

When this parameter is different from 0, the switch turns off automatically after the defined auto-off time.

5.2.4 Alert before the end of the timing after (0 = no alert)

With this parameter you can set that channel so that it flashes quickly after a specific time after the startup of the switch. It is used as an alert before turning off the light and it is set only when the auto-off time is set.

5.2.5 Change auto-off time from bus

This parameter enables two new communication objects for the channel.

23	A: Switch	Set auto-off interval	4 bytes	C	-	W	-	-	4-byte signed value, time lag (s)
24	A: Switch	Auto-off interval status	4 bytes	C	R	-	T	-	4-byte signed value, time lag (s)

This allows to change the auto-off interval through messages from the bus.

5.2.6 Reset auto-off time

When this parameter is set to “Yes”, if the timing is already activated and a new timing command comes from the bus, the auto-off timer restarts its counting.

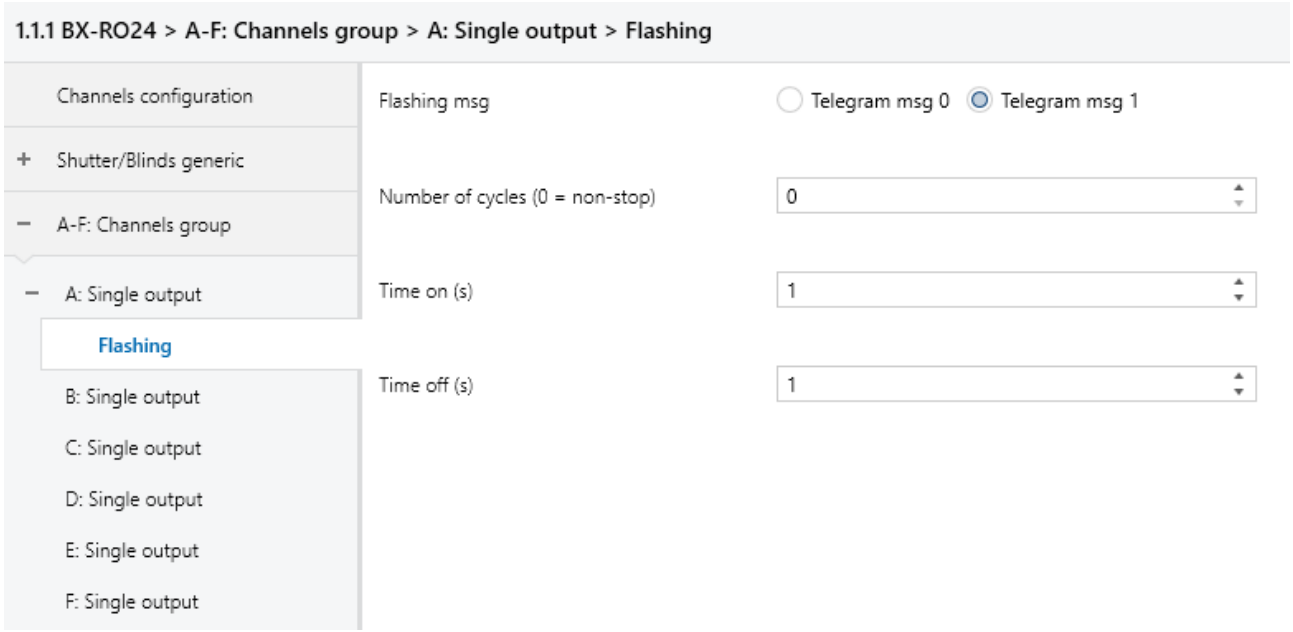
5.2.7 Behavior on deactivation msg

This parameter gives the possibility to choose if enabling the timing deactivation while it is on execution on that channel.

5.3 Flashing

The flashing function is enabled by the “Flashing function” parameter in the “Single output” page.

This function allows the channel to perform a temporized flashing when the correspondent communication object is received.



5.3.1 Flashing msg

This parameter specifies the type of telegram to be received when the flashing command is activated.

5.3.2 Number of cycles (0 = non-stop)

This parameter specifies the number of flashing. When 0, the channel will commutate continuously.

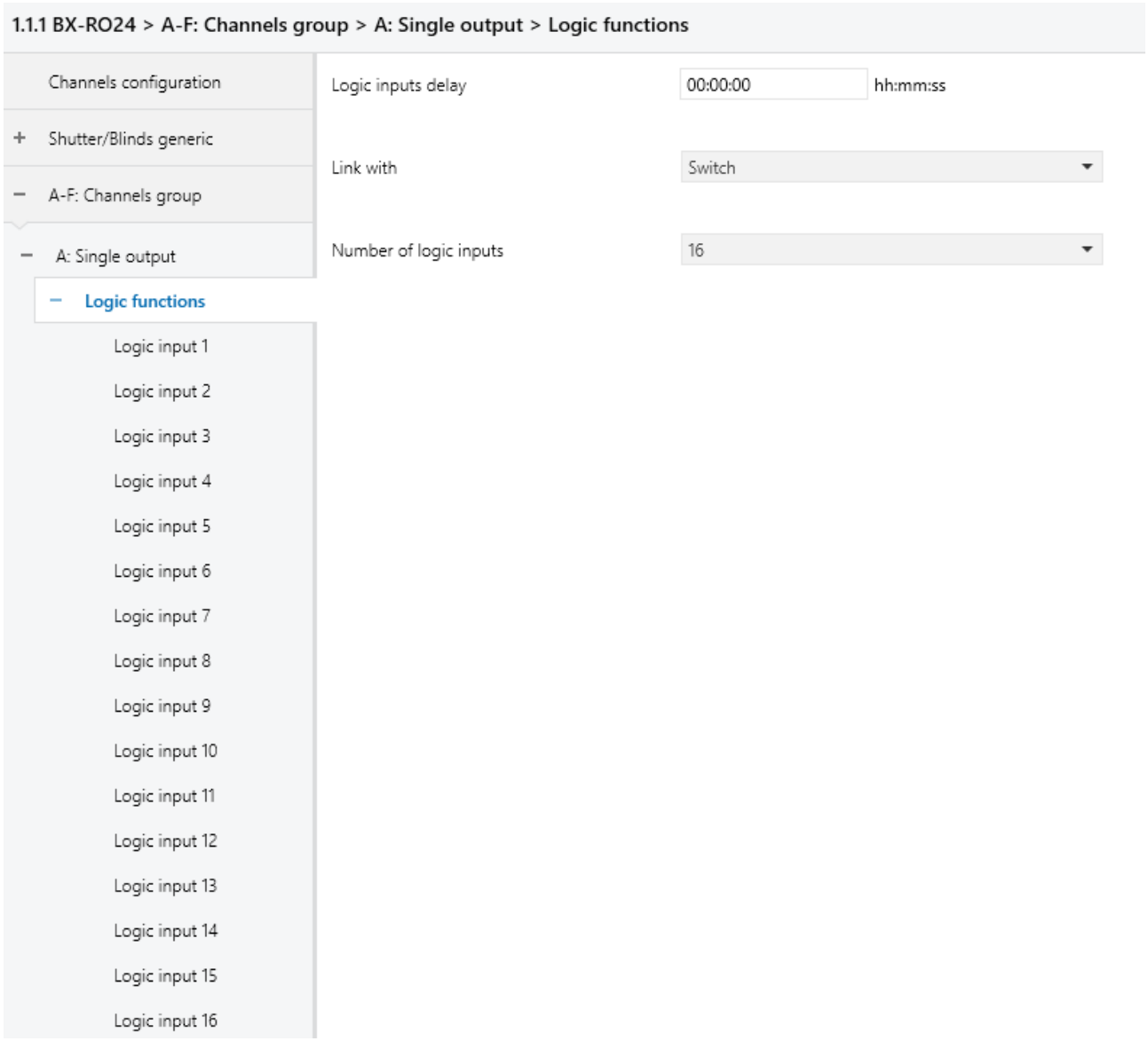
5.3.3 Time on (s) – Time off (s)

This parameter defines the startup period and the shutdown period of the switch during the flashing function.

5.4 Logic functions

The logic function is enabled by the “Logic function” parameter in the “Single output” page.

This function gives the possibility to associate to the channel several external inputs whose will be processed with logic operations specified by the user. If the result of the logic operation is 1, the contact will switch on according to the switch command. If the result is 0, the contact will switch off according to the switch command.

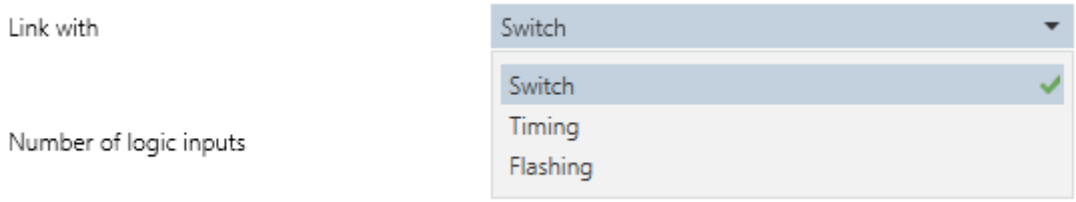


5.4.1 Logic inputs delay

With this parameter is possible to set a delay before the logic inputs should be processed for the first time.

5.4.2 Link with

With this parameter, it is possible to associate the logic function to one of the following contact functions.



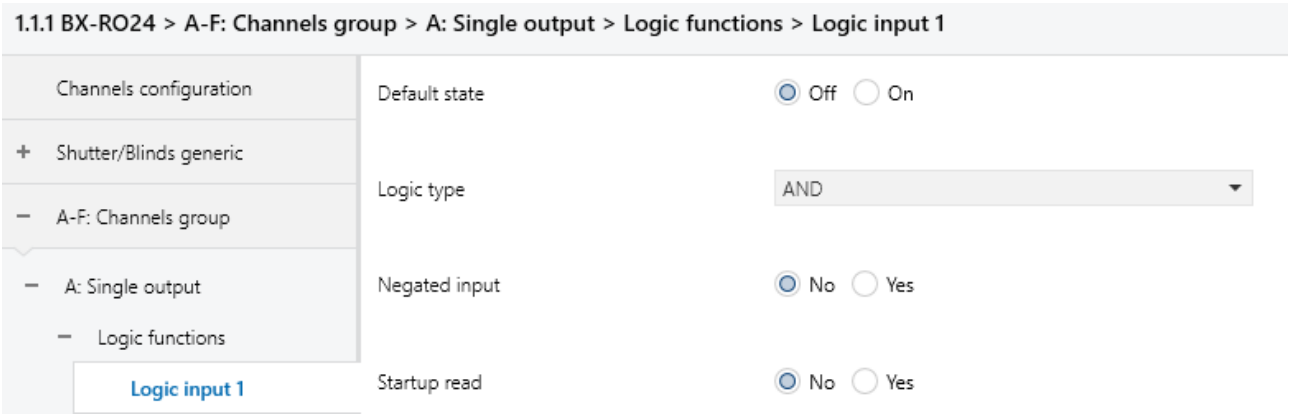
The chosen function will be performed by that channel when the logic operation gives 1 as result.

5.4.3 Number of logic inputs

Up to 16 logic inputs can be associated to each channel.

To each logic input can be associated a specific logic operation. The chain of logic operations is performed starting from the first logic input and ending with the last one.

The first logic operation is always done along with the current switch status.

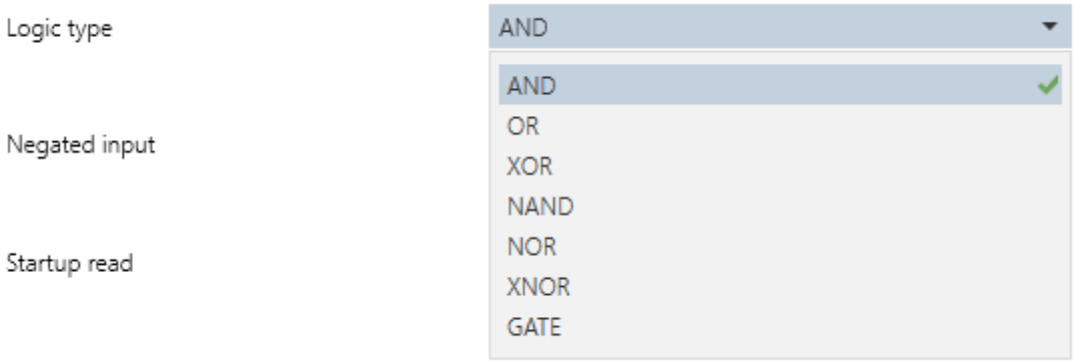


5.4.4 Default state

This parameter defines the state of the logic input at the startup.

5.4.5 Logic type

This parameter specifies the logic operation that must be executed on that logic input. Several logic operations are available.



The GATE operation passes the result of the previous operations only if the current logic input is active. If the current logic input is not active, the last result is maintained regardless the actual state of the logic inputs.

5.4.6 Negated input

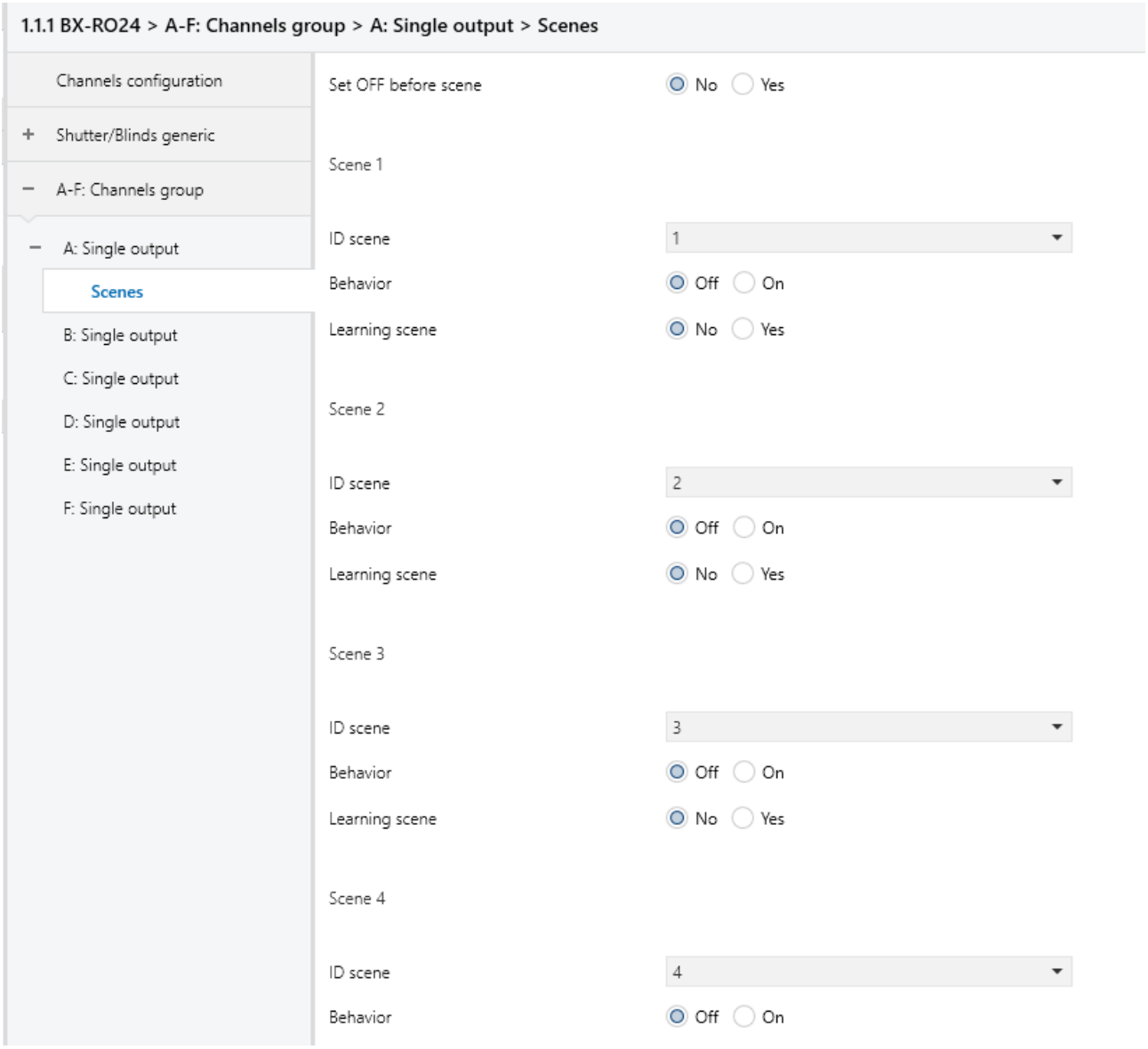
This parameter allows to negate the current value of the logic input.

5.4.7 Startup read

If this parameter is enabled, a reading request is sent over the bus for that specific logic input. This is done in order to synchronize the state of the logic inputs.

5.5 Scenarios

Enabling the parameter “Enable scenes”, a new subpage called “Scenes” will appear under the single output main page. It contains dedicated parameters for single output scenes.



Up to 8 scenes are available for each single output channel.

5.5.1 Set OFF before scene

This parameter always set off the switch before the scene is implemented.

5.5.2 ID scene

This parameter assigns the unique identifier for that specific scenario.

5.5.3 Behavior

This parameter specifies whether to turn the channel on or off in correspondence with the scenario.

5.5.4 Learning scene

This parameter enables or disables the storing/learning of the channel status through the use of the same communication object. When the scenario is recalled, the value learnt at the time of its storage will be recalled. This parameter can only be set when using the ETS program. Factory setting is “Disabled”.

5.6 Communication objects dedicated to the individual channel

22 different Communication Objects are available for each switch channel. Below an example for the channel A.

1	A: Switch	Forcing command	2 bit	C	-	W	-	-	1-bit controlled, switch control
2	A: Switch	Lock command	1 bit	C	-	W	-	-	1-bit, switch
3	A: Switch	Lock status	1 bit	C	R	-	T	-	1-bit, switch
4	A: Switch	Switch command	1 bit	C	-	W	-	-	1-bit, switch
5	A: Switch	Switch status	1 bit	C	R	-	T	-	1-bit, switch
6	A: Switch	Logic input 1	1 bit	C	-	W	T	U	1-bit, switch
7	A: Switch	Logic input 2	1 bit	C	-	W	T	U	1-bit, switch
8	A: Switch	Logic input 3	1 bit	C	-	W	T	U	1-bit, switch
9	A: Switch	Logic input 4	1 bit	C	-	W	T	U	1-bit, switch
10	A: Switch	Logic input 5	1 bit	C	-	W	T	U	1-bit, switch
11	A: Switch	Logic input 6	1 bit	C	-	W	T	U	1-bit, switch
12	A: Switch	Logic input 7	1 bit	C	-	W	T	U	1-bit, switch
13	A: Switch	Logic input 8	1 bit	C	-	W	T	U	1-bit, switch
14	A: Switch	Logic input 9	1 bit	C	-	W	T	U	1-bit, switch
15	A: Switch	Logic input 10	1 bit	C	-	W	T	U	1-bit, switch
16	A: Switch	Logic input 11	1 bit	C	-	W	T	U	1-bit, switch
17	A: Switch	Logic input 12	1 bit	C	-	W	T	U	1-bit, switch
18	A: Switch	Logic input 13	1 bit	C	-	W	T	U	1-bit, switch
19	A: Switch	Logic input 14	1 bit	C	-	W	T	U	1-bit, switch
20	A: Switch	Logic input 15	1 bit	C	-	W	T	U	1-bit, switch
21	A: Switch	Logic input 16	1 bit	C	-	W	T	U	1-bit, switch
22	A: Switch	Timing command	1 bit	C	-	W	-	-	1-bit, start/stop
23	A: Switch	Set auto-off interval	4 bytes	C	-	W	-	-	4-byte signed value, time lag (s)
24	A: Switch	Auto-off interval status	4 bytes	C	R	-	T	-	4-byte signed value, time lag (s)
25	A: Switch	Flashing command	1 bit	C	-	W	-	-	1-bit, start/stop
26	A: Switch	Scene ID	1 byte	C	-	W	-	-	scene control, scene control

5.6.1 Forcing command

When the forcing function is enabled for the channel, this communication object forces the output to be closed or open regardless any other commands from the bus. In this mode of operation, only the force and block commands can affect that channel. It is always possible to disable the forcing mode by using the same communication object.

5.6.2 Lock command

When the lock function is enabled for the channel, this communication object allows to block that channel to a specific state according to its block configuration parameters.

5.6.3 Lock Status

When the lock function is enabled for the channel, this communication object holds the lock status for that channel.

5.6.4 Switch command

This communication object is used to close or open the output of the corresponding channel.

5.6.5 Switch status

This communication object indicated the switch status for that channel.

5.6.6 Logic input x

When the logic function is enabled for the channel, these communications objects (up to 16 for channel) are used as logic inputs for that channel.

5.6.7 Timing command

When the timing function is enabled for the channel, this communication object is used to temporize the switching on of that channel.

5.6.8 Set auto-off interval

When the timing function is enabled for the channel, this communication object is used to change the auto-off timer for that channel.

5.6.9 Auto-off status

When the timing function is enabled for the channel, this communication object keeps the auto-off timer status for that channel.

5.6.10 Flashing command

When the flashing function is enabled for the channel, this communication object is used to start the periodic commutation of that channel, according to its flashing function configuration parents.

5.7 Communication objects for all channels

Each channel can be enabled to respond to “All switches” commands by enabling the parameter “General functions” for the specific channel.

3 different Communication Objects are available for all the channels.

793	All switches	Switch command	1 bit	C	-	W	-	-	1-bit, switch
794	All switches	Timing command	1 bit	C	-	W	-	-	1-bit, start/stop
795	All switches	Flashing command	1 bit	C	-	W	-	-	1-bit, start/stop

5.7.1 Switch command

This communication object commutates on (or off) all the switches.

5.7.2 Timing command

This communication object starts a temporized switching on for all the channels configured as single output.

5.7.3 Flashing command

This communication object starts the flashing function for all the channels configured as single output.

6 Electric valves

The single output function can also work to control an electric valve. Just select the "Electric valve" option under the channel configuration as shown below.

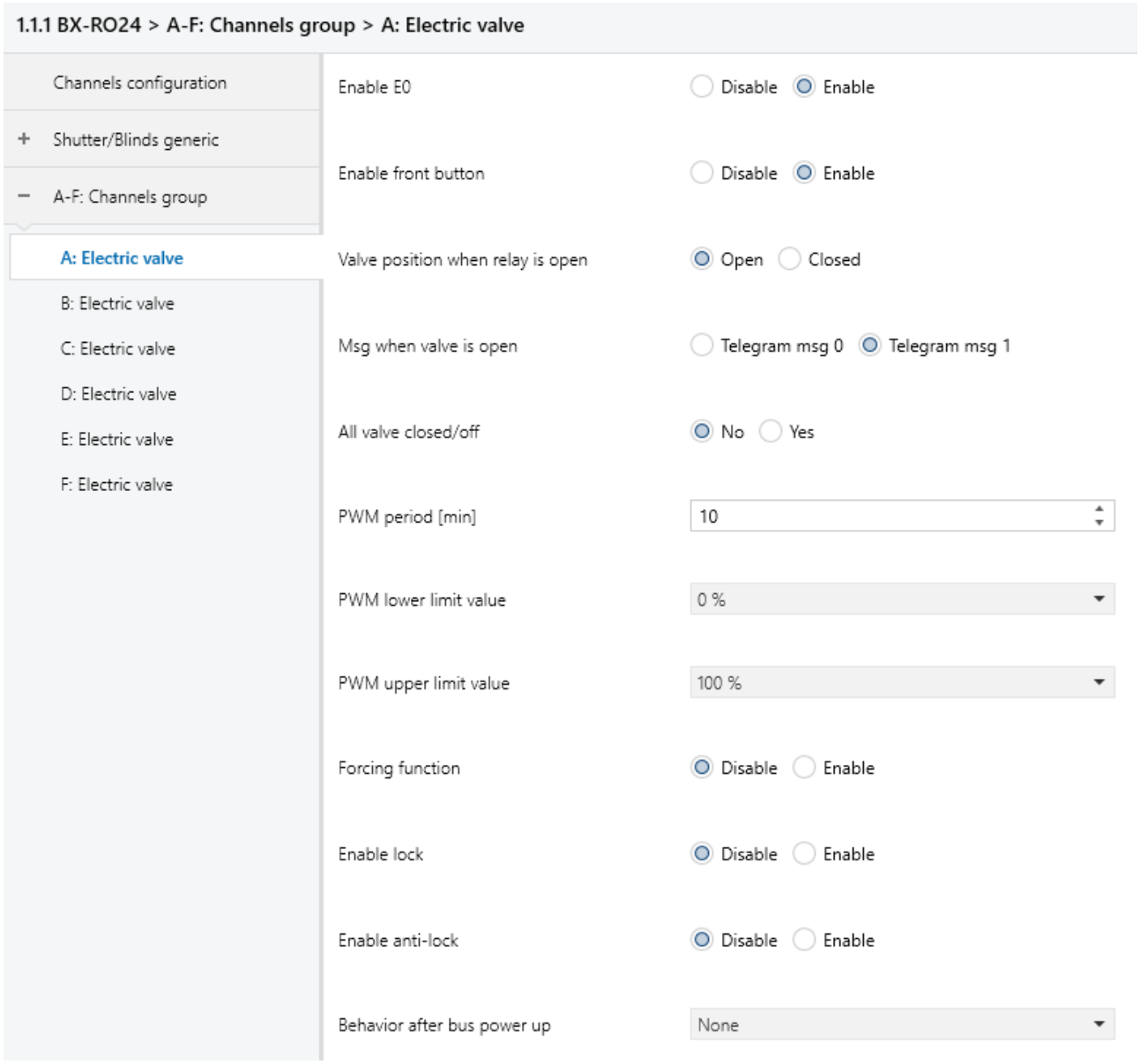
The electric valve function enables the PWM of the output in order to modulate, for example, the flow of current through a pipeline.

Up to 8 electric valves can be selected for a specific channel group. Up to 8 channels can be set as electric valves for the BX-RIO8, and up to 16 channels can be set as electric valves for the BX-RIO16.

6.1 X: Electric valve

When choosing the "Electric valve" option, a subpage dedicated to the parameters for that channel will appear under the X-Y channel group page.

Here the list of all the configurable parameter for the electric valve function.



6.1.1 Enable E0

This parameter enables the channel and its parameters for the electric valve function configuration.

6.1.2 Enable front button

This parameter enables the button on the front panel.

6.1.3 Valve position when relay is open

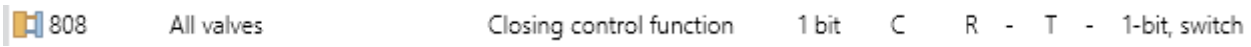
This parameter should be configured in order to associate a correspondence between the actuator relay and the valve that it has to control.

6.1.4 Msg when valve is open

With this parameter it is possible to choose the type of message to be sent (or received) when the valve is open, according to the previous parameter.

6.1.5 All valve closed/off

When this parameter is enabled, the channel will respond to the following common communication object.



This communication object will be discussed in the “Communication object for all channels” paragraph of this section.

6.1.6 PWM period [min]

This parameter is used to configure the PWM period for that channel. This enables a periodic square waveform to control the channel output.

6.1.7 PWM lower limit value

This parameter specifies the minimum percentage value for PWM. Lower values will be set to this percentage.

6.1.8 PWM upper limit value

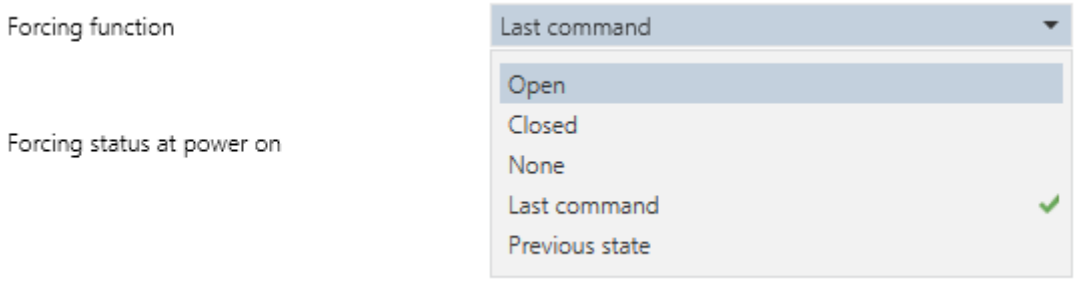
This parameter specifies the maximum percentage value for PWM. Higher values will be set to this percentage.

6.1.9 Forcing function

This parameter enables the “Forcing function” subpage and the parameters dedicated to manage the behaviour of the channel when a force command is entered.

6.1.10 Forcing function (behaviour)

This parameter specifies the channel behaviour when a forcing command is received from the bus.

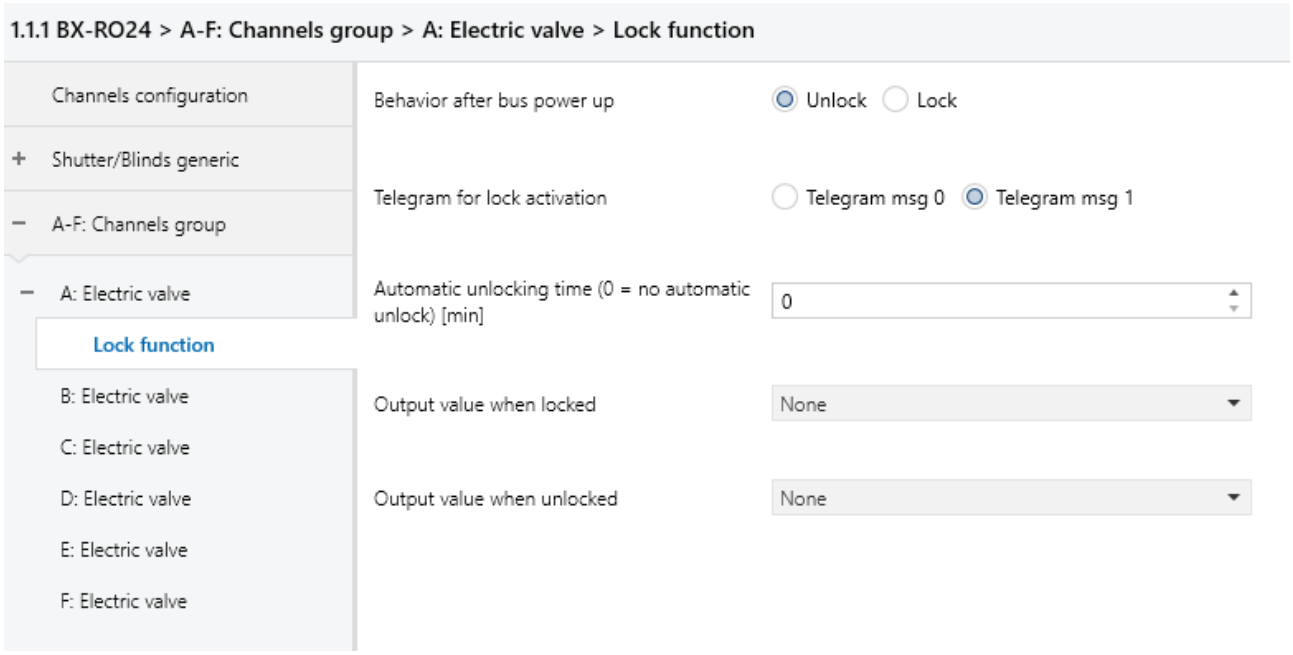


6.1.11 Forcing status at power on

This parameter specifies the forcing status at the startup of the device.

6.1.12 Enable lock

By enabling the block function, a new subpage called “Lock function” will appear under the “Electric valve” main page.



6.1.13 Behavior after bus power up

This parameter specifies whether the channel must be locked or not at the startup of the device.

6.1.14 Telegram for lock activation

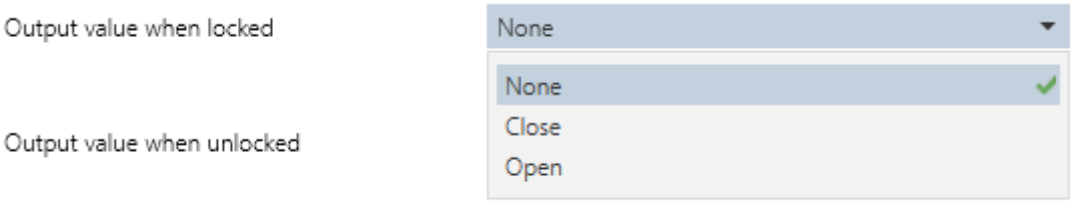
This parameter specifies the type of message to be received from the bus when the channel has to be locked.

6.1.15 Automatic unlocking time (0 = no automatic unlock) [min]

If this parameter is different from 0, it specifies an interval after which an automatic unlock of that channel will be performed.

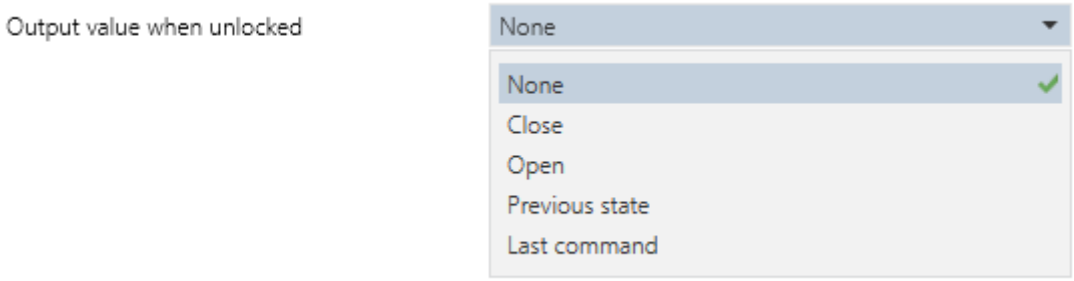
6.1.16 Output value when locked

This parameter specifies the state of the channel when a lock command is received from the bus.



6.1.17 Output value when unlocked

This parameter specifies the state of the channel when an unlock command is received from the bus.



With the “Previous state” option the channel will come back to its previous state.

While, with the “Last command” option, it will maintain the last command received during the lock mode.

6.1.18 Enable anti-lock

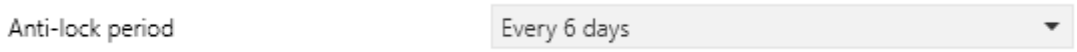
This parameter allows the channel to perform a commutation of its output when it remains closed over a certain period.

When this happens, the output will be toggled open for 5 min and then closed again.

This is usually done in order to prevent an unwanted blocking of the valve due to long period of inactivity.

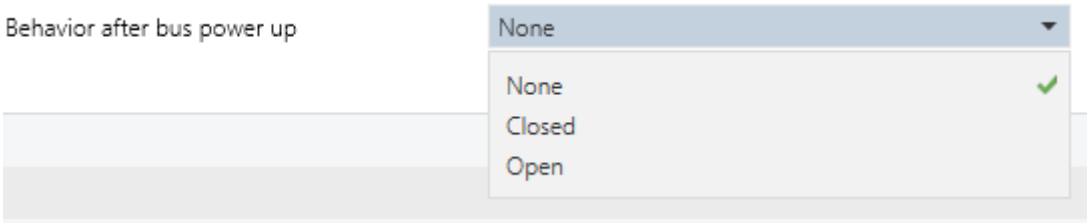
6.1.19 Anti-lock period

When the anti-lock is enabled, this parameter specifies the period after which the anti-lock must be performed.



6.1.20 Behavior after bus power up

This parameter specifies the channel behaviour after the startup of the device.



6.2 Communication objects dedicated to the individual channel

7 different Communication Objects are available for each electric valve channel. Below an example for the channel A.

625	A: electric valve	EV command	1 bit	C	-	W	-	-	1-bit, switch
626	A: electric valve	EV status	1 bit	C	R	-	T	-	1-bit, switch
627	A: electric valve	PWM percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)
628	A: electric valve	PWM percentage status	1 byte	C	R	-	T	-	8-bit unsigned value, percentage (0..100%)
630	A: electric valve	Lock command	1 bit	C	-	W	-	-	1-bit, switch
631	A: electric valve	Lock status	1 bit	C	R	-	T	-	1-bit, switch

6.2.1 EV command

This communication object is used to switch on or off the valve.

6.2.2 EV status

This communication object keeps the valve status for that channel.

6.2.3 PWM percentage command

This communication object is used to set the PWM duty cycle for that channel.

6.2.4 PWM percentage status

This communication object holds the PMW duty cycle status for that channel.

6.2.5 Forcing function command

This communication object is used to force a specific status for that channel. The status will be maintained until the forcing command is disabled.

6.2.6 Lock command

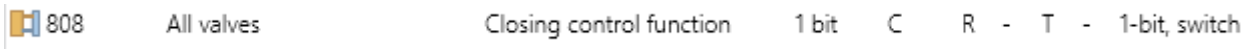
This communication object is used to block the channel to a specific state according to its parameter setting for the lock function.

6.2.7 Lock status

This communication object keeps the lock status for that channel.

6.3 Communication objects for all channels

Each channel can be enabled to respond to “All valves” commands by enabling the parameter “All valve closed/off” for the specific channel.



6.3.1 Closing control function

This communication object is used to check if all channel configured as valves are closed (or in their off state).

When the returned value is 1, it means at least one valve is open. While, if the returned value is 0, it means that all the valves are closed.

This is true only for the valves enabled to this communication object.

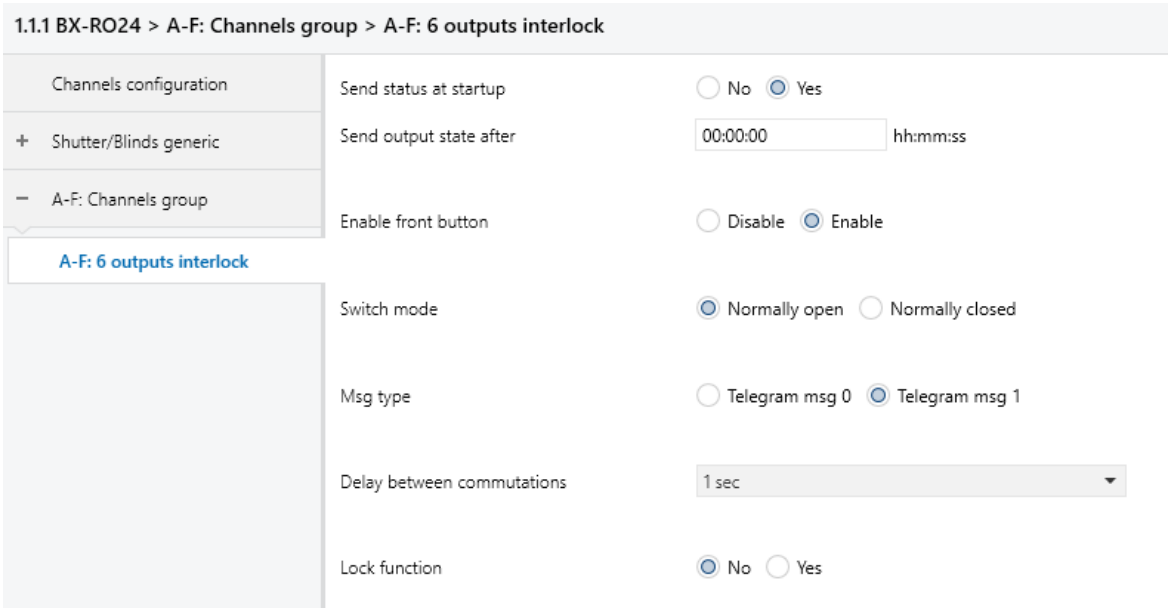
7 Interlocks

Interlocks are used to help prevent any damage to the load by avoiding more than one contact from being active at the same time.

Up to 8 outputs can be grouped within an interlock function. Different configurations are available; from 2-outputs interlocks to 8-outputs interlocks. Based on this, up to 4 interlocks are available (8 in the case of the BX-RIO16) if all are configured as 2-outputs interlocks, while up to 1 (2 in the case of the BX-RIO16) interlocks are available if all are configured as 8-outputs interlocks.

It follows the parameters description for the 6-outputs interlocks, which is representative of the category.

7.1 X-Y: n outputs interlock



7.1.1 Send status at startup

When this parameter is enabled, every time the actuator is turned on, the interlock status will be sent to the bus.

7.1.2 Send output state after

If the previous parameter is set to “Yes”, this parameter allows to configure a delay for the first sending of the interlock status.

7.1.3 Enable front button

This parameter is configured to enable the front panel button.

7.1.4 Switch mode

This parameter is used to configure the switch as normally open or normally closed, according to the load.

7.1.5 Msg type

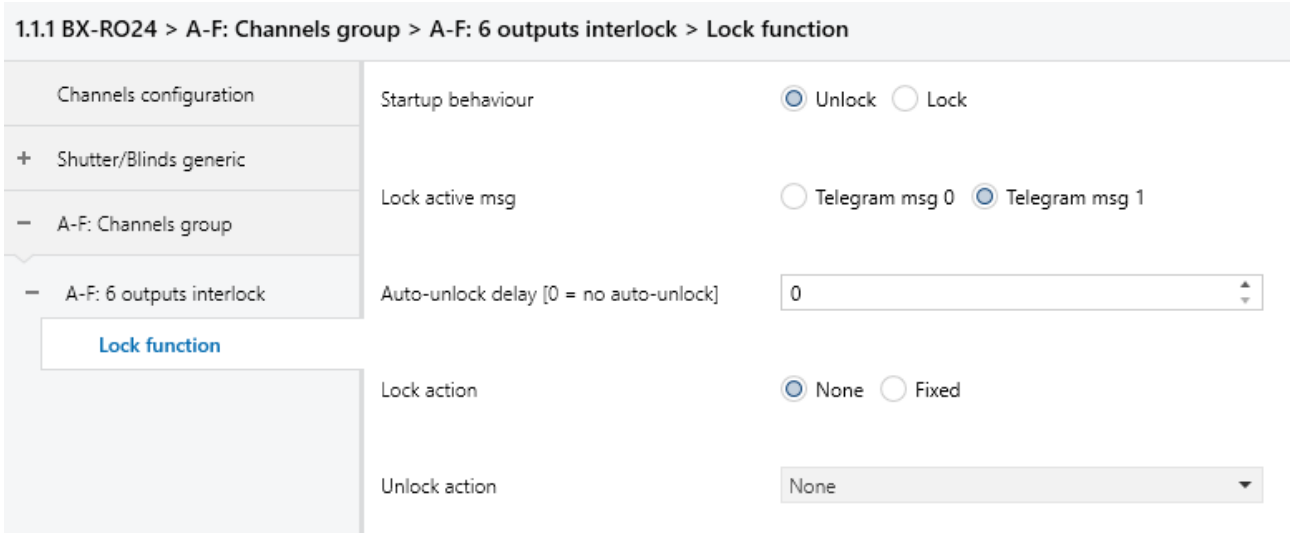
This parameter is used to configure the bus message which corresponds to the setting on and the setting off for that channel.

7.1.6 Delay between commutations

This parameter is used to set a delay between each output commutation.

7.1.7 Lock function

This parameter enables the lock command for the channel. When enabled, a new subpage called “Lock function” appears. Here it is possible to configure the behaviour of that channel when a lock command is received to the bus.



7.1.8 Startup behaviour

With this parameter it is possible to choose if the channel initial state must be locked or not.

7.1.9 Lock active msg

This parameter specifies the type of message to be send over the bus in order to lock or unlock the channel.

7.1.10 Auto-unlock delay (0 = no auto-unlock)

When this parameter is different from 0, it specifies a time after which the channel will be automatically unlocked.

7.1.11 Lock action

When this parameter is set to “Fixed”, every time a lock command is received, the interlock will assume a specific value.

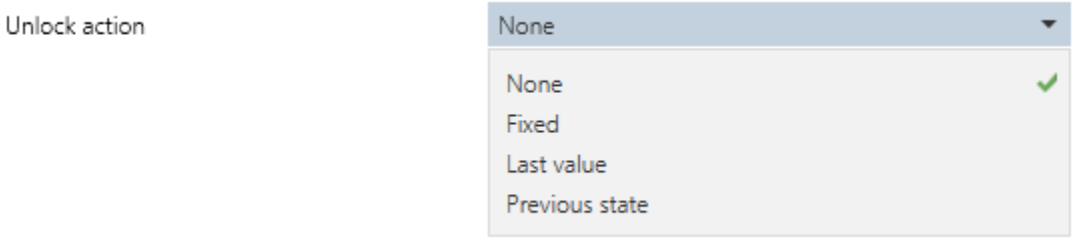
7.1.12 Fixed position

When a fixed action is set under the lock command, this parameter specify the action itself.

Where 0 means all outputs deactivated, 1 means first output active, 2 means second output active and so on.

7.1.13 Unlock action

This parameter specifies the channel action when an unlock message is received to the bus.



7.2 Communication objects dedicated to the individual channel

Up to 16 different Communication Objects are available, according to the interlock function type, for each interlock channel. Below an example for the channel A-F configured as 6-outputs interlock.

1909	A-F: Interlock 6	Lock command	1 bit	C	-	W	-	-	1-bit, switch
1910	A-F: Interlock 6	Lock status	1 bit	C	R	-	T	-	1-bit, switch
1911	A-F: Interlock 6	Group command	1 byte	C	-	W	-	-	8-bit unsigned value, counter pulses (0..2...
1912	A-F: Interlock 6	Group status	1 byte	C	R	-	T	-	8-bit unsigned value, counter pulses (0..2...
1913	A-F: Interlock 6	Output 1 command	1 bit	C	-	W	-	-	1-bit, switch
1914	A-F: Interlock 6	Output 1 status	1 bit	C	R	-	T	-	1-bit, switch
1915	A-F: Interlock 6	Output 2 command	1 bit	C	-	W	-	-	1-bit, switch
1916	A-F: Interlock 6	Output 2 status	1 bit	C	R	-	T	-	1-bit, switch
1917	A-F: Interlock 6	Output 3 command	1 bit	C	-	W	-	-	1-bit, switch
1918	A-F: Interlock 6	Output 3 status	1 bit	C	R	-	T	-	1-bit, switch
1919	A-F: Interlock 6	Output 4 command	1 bit	C	-	W	-	-	1-bit, switch
1920	A-F: Interlock 6	Output 4 status	1 bit	C	R	-	T	-	1-bit, switch
1921	A-F: Interlock 6	Output 5 command	1 bit	C	-	W	-	-	1-bit, switch
1922	A-F: Interlock 6	Output 5 status	1 bit	C	R	-	T	-	1-bit, switch
1923	A-F: Interlock 6	Output 6 command	1 bit	C	-	W	-	-	1-bit, switch
1924	A-F: Interlock 6	Output 6 status	1 bit	C	R	-	T	-	1-bit, switch

7.2.1 Lock command

This communication object appears only if the correspondent parameter is enabled. It is used to lock or unlock the channel.

7.2.2 Lock status

This communication object keeps the lock status for that specific channel.

7.2.3 Group command

This communication object controls the whole interlock group. When 0 is send, all the outputs will be disabled. Other values indicate the output that has to be activated.

7.2.4 Group status

This communication object keeps the interlock group status, according to which channel is active.

7.2.5 Output X command

These communication objects are used specifically for each single output belonging to the interlock group.

7.2.6 Output X status

These communication objects contain the state for each output belonging to the block group.

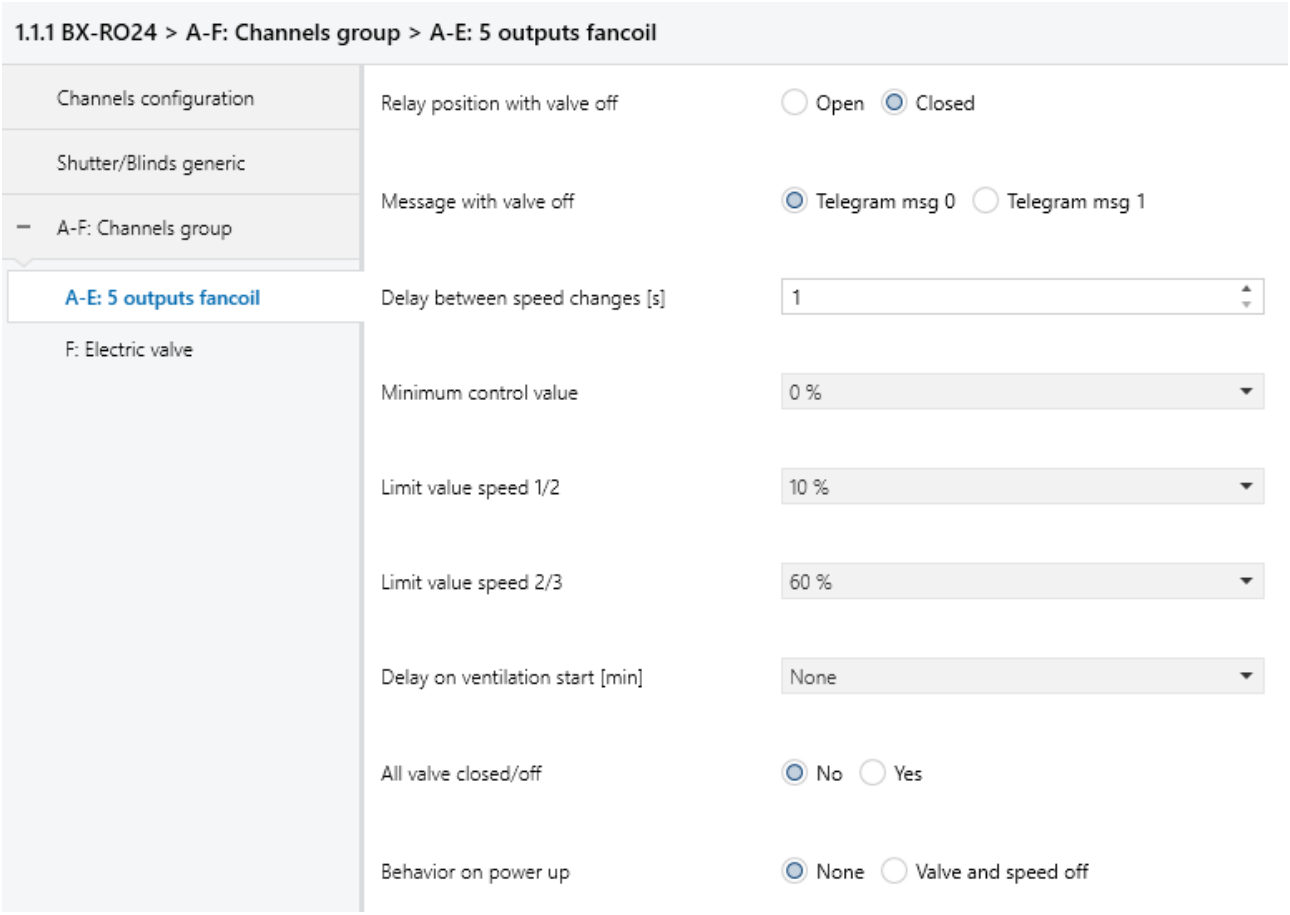
8 Fancoils

The actuator outputs can be configured to control fancoils.

Up to 5 outputs can be grouped within a fan coil function. Different configurations are available; from 2-outputs fancoil unit to 5-outputs fancoil. Based on this, up to 4 fancoils are available (8 in the case of the BX-RIO16) if all are configured as 2-outputs fancoils, while up to 1 (2 in the case of the BX-RIO16) fancoils are available if all are configured as 5-outputs fancoils.

This is followed by a description of the parameters for the 5-output fan coil, which is representative of the category.

8.1 X-Y: n outputs fancoil



8.1.1 Relay position with valve off

This parameter specifies which relay position the actuator should consider when the valve is off.

8.1.2 Message with valve off

This parameter specifies the type of message associated with the off state of the valve.

8.1.3 Delay between speed changes [s]

This parameter specifies a delay between the commutations of the outputs.

8.1.4 Minimum control value

This parameter specifies a percentage value under which all the output related to the speeds are turned off.

8.1.5 Limit value speed 1/2

This parameter specifies the limit percentage value for the commutation between speed 1 and speed 2.

8.1.6 Limit value speed 2/3

This parameter specifies the limit percentage value for the commutation between speed 2 and speed 3.

8.1.7 Delay on ventilation start [min]

With this parameter it is possible to specify a time before which the ventilation must be kept off.

8.1.8 All valve closed/off

This parameter enables the channel to be considered by the “Closing control function” communication object.

8.1.9 Behavior on power up

This parameter specifies the channel behaviour after the actuator startup.

8.2 Communication objects dedicated to the individual channel

Up to 12 different Communication Objects are available, according to the fancoil function type, for each fancoil channel. Below an example for the channel A-E configured as 5-outputs fancoil.

1097	A-E F5 valve	Heating	1 bit	C	-	W	-	-	1-bit, switch
1098	A-E F5 valve	Heating status	1 bit	C	R	-	T	-	1-bit, switch
1099	A-E F5 valve	Cooling	1 bit	C	-	W	-	-	1-bit, switch
1100	A-E F5 valve	Cooling status	1 bit	C	R	-	T	-	1-bit, switch
1101	A-E: F5 speed	Percentage command	1 byte	C	-	W	-	-	8-bit unsigned value, percentage (0..100%)
1102	A-E: F5 speed	Percentage status	1 byte	C	R	-	T	-	8-bit unsigned value, percentage (0..100%)
1103	A-E: F5 speed	Speed 1 command	1 bit	C	-	W	-	-	1-bit, switch
1104	A-E: F5 speed	Speed 1 status	1 bit	C	R	-	T	-	1-bit, switch
1105	A-E: F5 speed	Speed 2 command	1 bit	C	-	W	-	-	1-bit, switch
1106	A-E: F5 speed	Speed 2 status	1 bit	C	R	-	T	-	1-bit, switch
1107	A-E: F5 speed	Speed 3 command	1 bit	C	-	W	-	-	1-bit, switch
1108	A-E: F5 speed	Speed 3 status	1 bit	C	R	-	T	-	1-bit, switch

8.2.1 Heating

This communication object is used to control the first fancoil output valve.

8.2.2 Heating status

This communication object keeps the first fancoil output valve status.

8.2.3 Cooling

This communication object is used to control the second fancoil output valve.

8.2.4 Cooling status

This communication object keeps the second fancoil output valve status.

8.2.5 Percentage command

This communication object is used to control the fancoil outputs dedicated to the speeds through a percentage.

8.2.6 Percentage status

This communication object keeps the percentage status for the speeds.

8.2.7 Speed n command

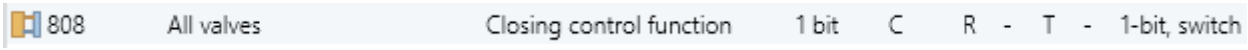
These communication objects are used to control the outputs dedicated to the speeds by means of 1-bit datapoint.

8.2.8 Speed n status

These communication objects keep the speed status for each output dedicated to the speed.

8.3 Communication objects for all channels

Each channel can be enabled to respond to “All valves” commands by enabling the parameter “All valve closed/off” for the specific channel.



8.3.1 Closing control function

This communication object is used to check if all channel configured as valves are closed (or in their off state).

When the returned value is 1, it means at least one valve is open. While, if the returned value is 0, it means that all the valves are closed.

This is true only for the valves enabled to this communication object.

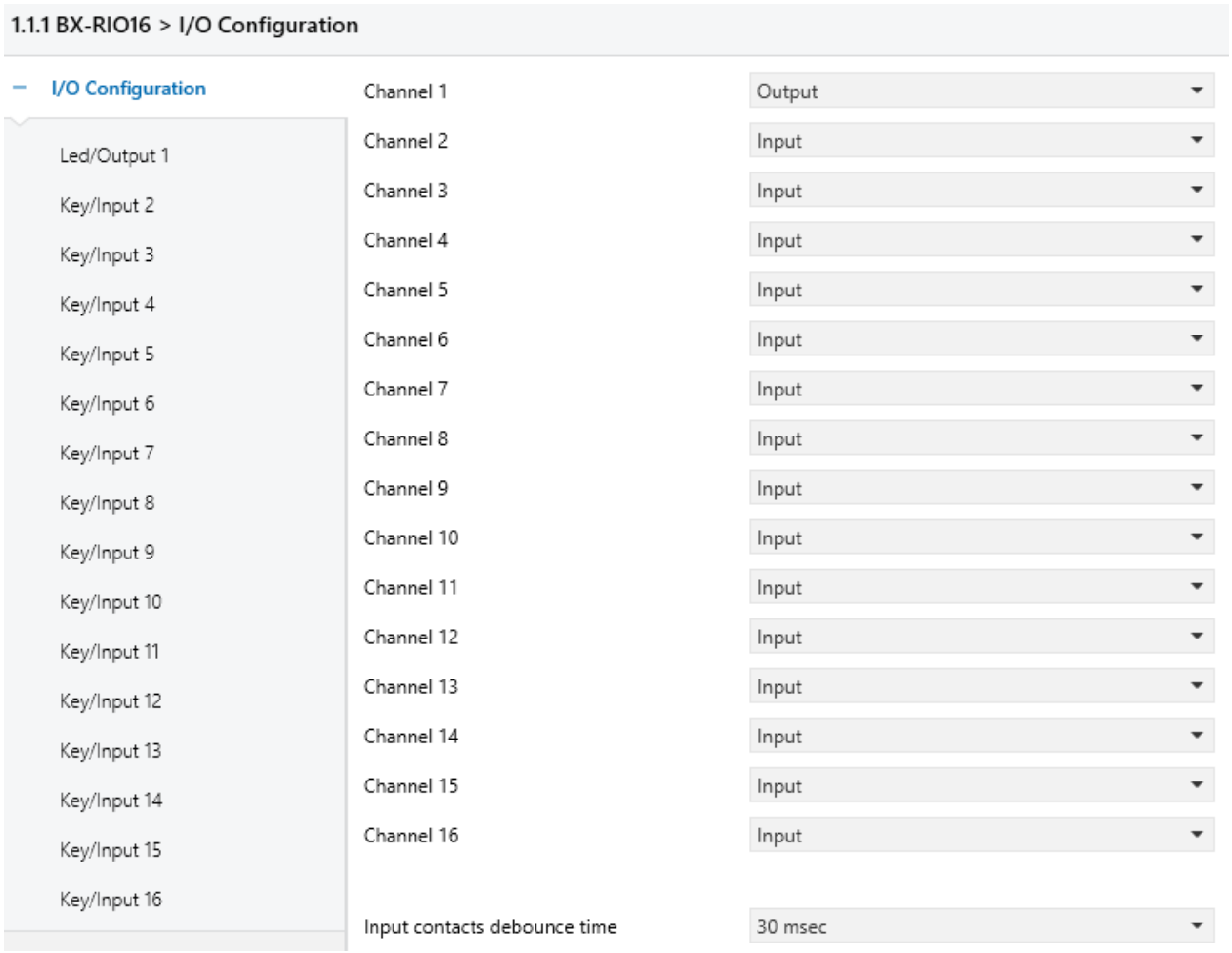
9 Digital Inputs-Outputs

The BX-RIO16 and BX-RIO8 have 16 and 8 digital ports respectively that can be configured as inputs or outputs individually.

These ports can be used for a variety of applications, including interfacing external contacts/buttons and/or managing LEDs.

The various possible configurations are examined in detail below.

9.1 I/O Configuration

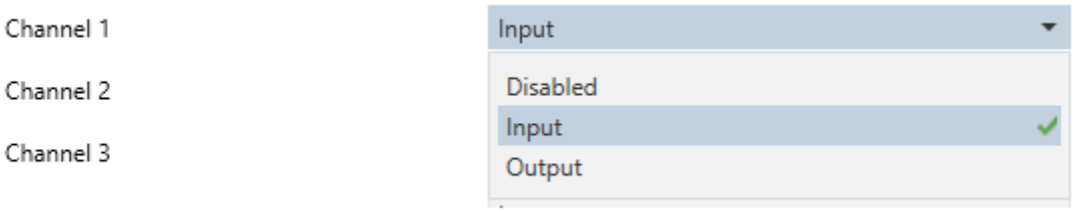


From the I/O configuration page, you can configure channels as inputs or digital outputs as needed. The image above shows the case of the BX-RIO16 which has 16 digital I/O channels, while in the case of the BX-RIO8 8 digital I/O channels will be available.

For each channel enabled as input or output, there is a subpage where you can configure the operation of the channel using specific parameters.

9.1.1 Channel N

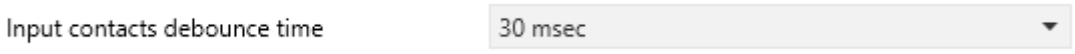
From this parameter you can configure the channel as an input or output, or disable it.



Depending on the configuration of the channel as an input or output, a new subpage will open from which it will be possible to set the specific parameters of the channel itself.

9.1.2 Input contacts debounce time

This parameter allows you to set an debounce bounce time for the inputs, in order to filter out any oscillations related to non-ideality typical of external contacts.

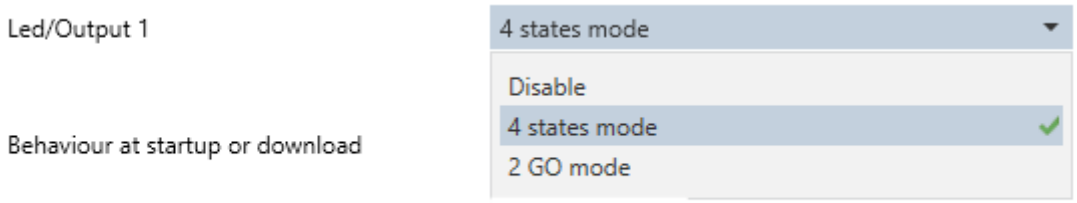


9.2 Led/Output n

When the I/O port is configured as an output, a corresponding page will appear below the main I/O configuration page. Here you can set the channel parameters. These parameters are examined in detail below.

9.2.1 Led/Output No

This parameter allows you to set the operation of the output according to two modes that differ according to the type of communication objects made available.



In the "4 states mode" the following communication objects are made available.

2500	Led/Output 1	Set ON/OFF	1 bit	C	-	W	T	U	1-bit, switch
2501	Led/Output 1	ON/OFF status	1 bit	C	R	-	T	-	1-bit, switch
2502	Led/Output 1	Set alarm 1	1 bit	C	-	W	T	U	1-bit, alarm
2503	Led/Output 1	Alarm 1 status	1 bit	C	R	-	T	-	1-bit, switch
2504	Led/Output 1	Set alarm 2	1 bit	C	-	W	T	U	1-bit, alarm
2505	Led/Output 1	Alarm 2 status	1 bit	C	R	-	T	-	1-bit, switch

These communication objects are described individually below.

9.2.2 ON/OFF setting

This communication object allows you to control the status of the corresponding output from the KNX bus.

9.2.3 ON/OFF status

This communication object allows the current status of the corresponding output to be read from the KNX bus.

9.2.4 Set alarm 1 & 2

This communication object can be assigned to a one-bit alarm message, the meaning of which is set by the channel parameters.

9.2.5 Alarm Status 1 & 2

This communication object allows the status of alarms 1 and 2 to be read from the KNX bus.

In the "2 GO mode" the following communication objects are made available.

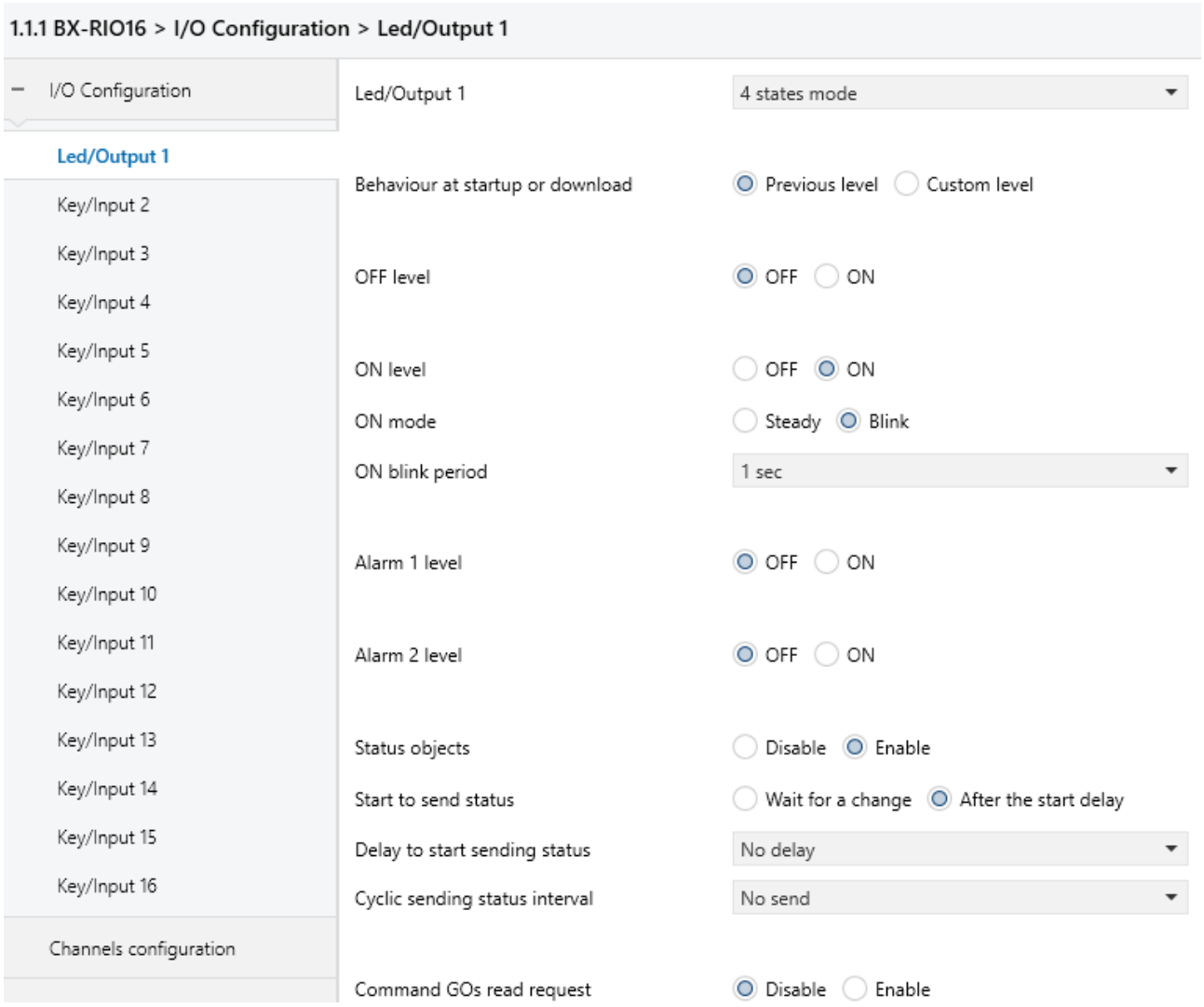
2500	Led/Output 1	Set combination bit 0	1 bit	C	-	W	T	U	1-bit, switch
2502	Led/Output 1	Set combination bit 1	1 bit	C	-	W	T	U	1-bit, switch

9.2.6 Set combination bit 0 & 1

These communication objects allow you to set a value to the 2 bits, bit 0 and bit 1, which corresponds to an output behavior that can be set by the channel parameters.

Below we will look at the parameters depending on the output mode selected.

In the "4 state mode" the following channel configuration parameters are available;



9.2.7 Behaviour at startup or download

This parameter allows you to select the state that the output should assume when the ETS application is started or downloaded. With the "Previous level" option, the state that the output had before the device was turned off will be maintained, while with the "Custom level" option, the user will be able to set a specific state that the output will have to assume at each start or download of the ETS application.

9.2.8 OFF Level and ON Level

These parameters make it possible to assign the behavior that the output should assume in the event of ON/OFF messages coming from the KNX bus.

In the case of the "ON" setting, it is also possible to specify whether the output should remain active permanently or whether it should perform a flashing function, in the second case it is possible to set a "Flashing period ON".

9.2.9 Alarm Level 1 & 2

These parameters make it possible to assign the behavior that the output should assume in the event of alarm messages coming from the bus. Also in this case it is possible to configure an output behavior completely similar to the "ON Level" and "OFF Level" parameters described above.

9.2.10 Status objects

When enabled, this parameter makes available the communication objects related to the output states and the alarms associated with it.

9.2.11 Start to send status

This parameter allows you to set a delay, which can be selected from "Delay to start sending status", on the sending of the output status at the startup.

9.2.12 Cyclic sending status interval

This parameter allows you to set a cyclic sending of the channel state according to a time interval that can be set by a specific parameter.

9.2.13 Command GOs read request

When this parameter is enabled, a request will be made on the bus of all command objects assigned to that channel. This facilitates synchronization between the actuator and external supervision.

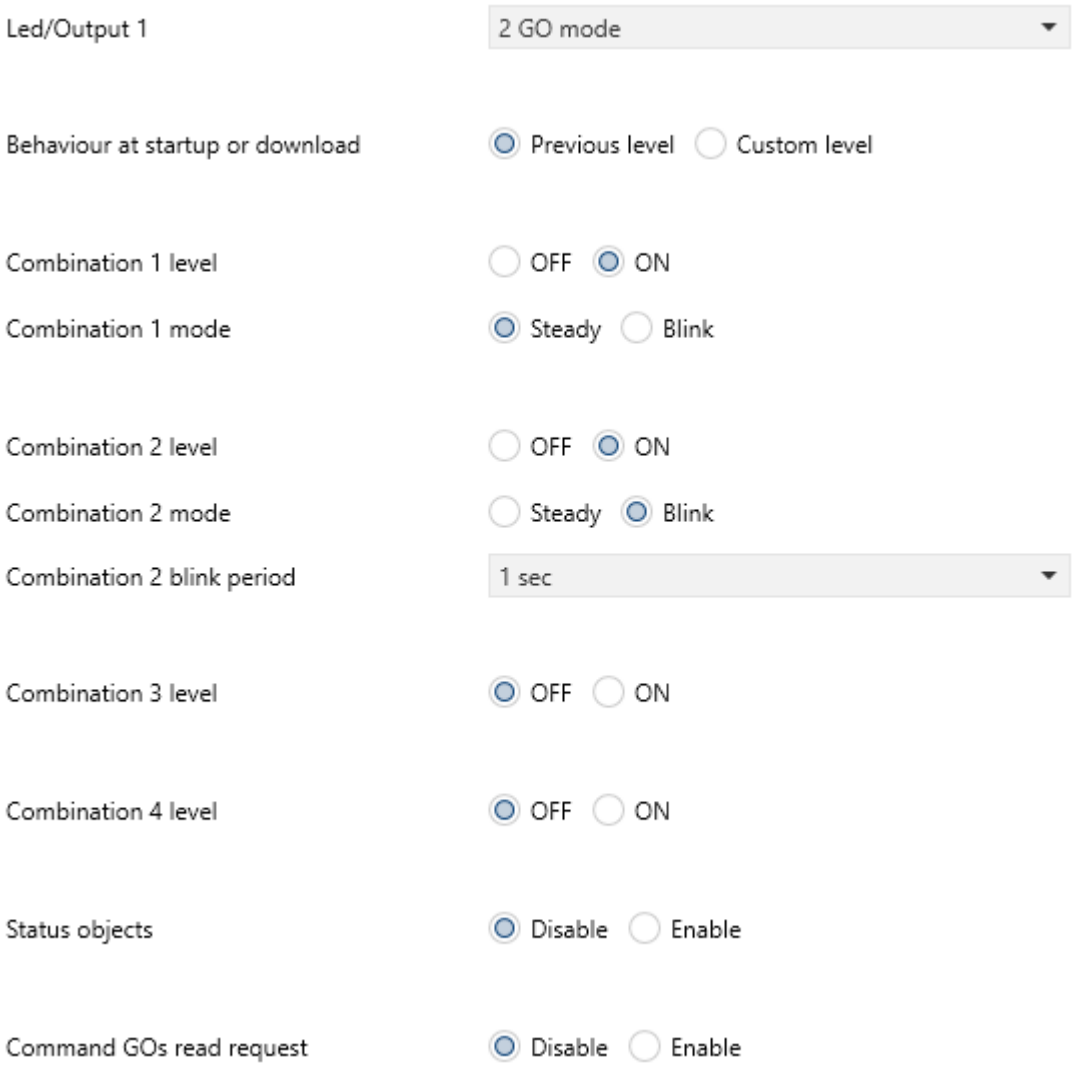
9.2.14 Delay to first read request of command GOs

With this parameter, you can set a delay on the first request to read communication objects when the device is started.

9.2.15 Interval to cyclic read request of command GOs

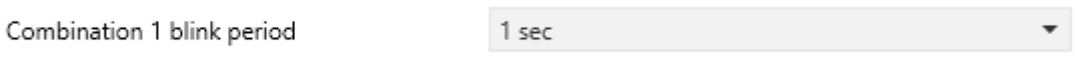
With this parameter it is possible to set a cyclic reading of the command communication objects according to a time interval that can be set by a specific parameter.

In the "2 GO mode" the following channel configuration parameters are available.



9.2.16 Combination 1-2-3-4 level

With this parameter it is possible to set the state that the output should assume when the corresponding combination of bits is received. In case of ON, it is possible to choose whether to keep the state of the output fixed or to perform a flashing function. The flashing period can be set by a special parameter.

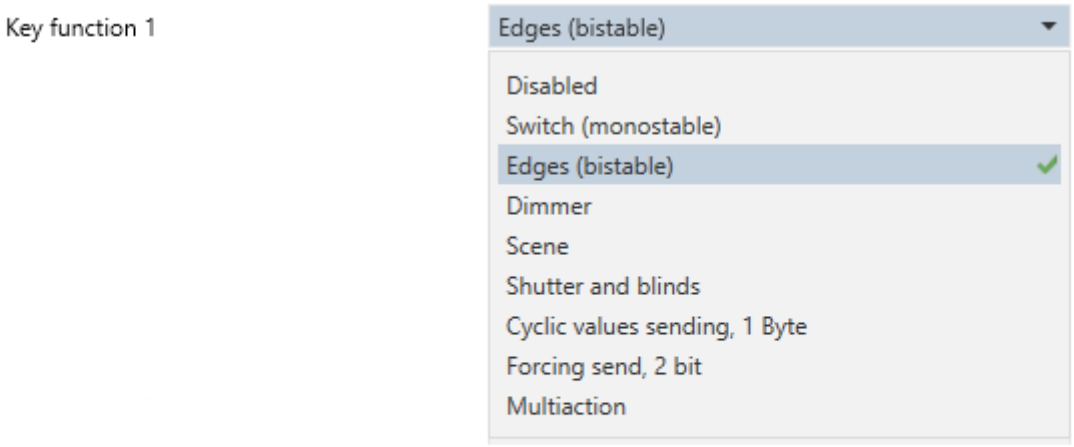


9.3 Key/Input

When the I/O port is configured as an input, a corresponding page will appear below the configuration page. Here you can set the channel parameters.

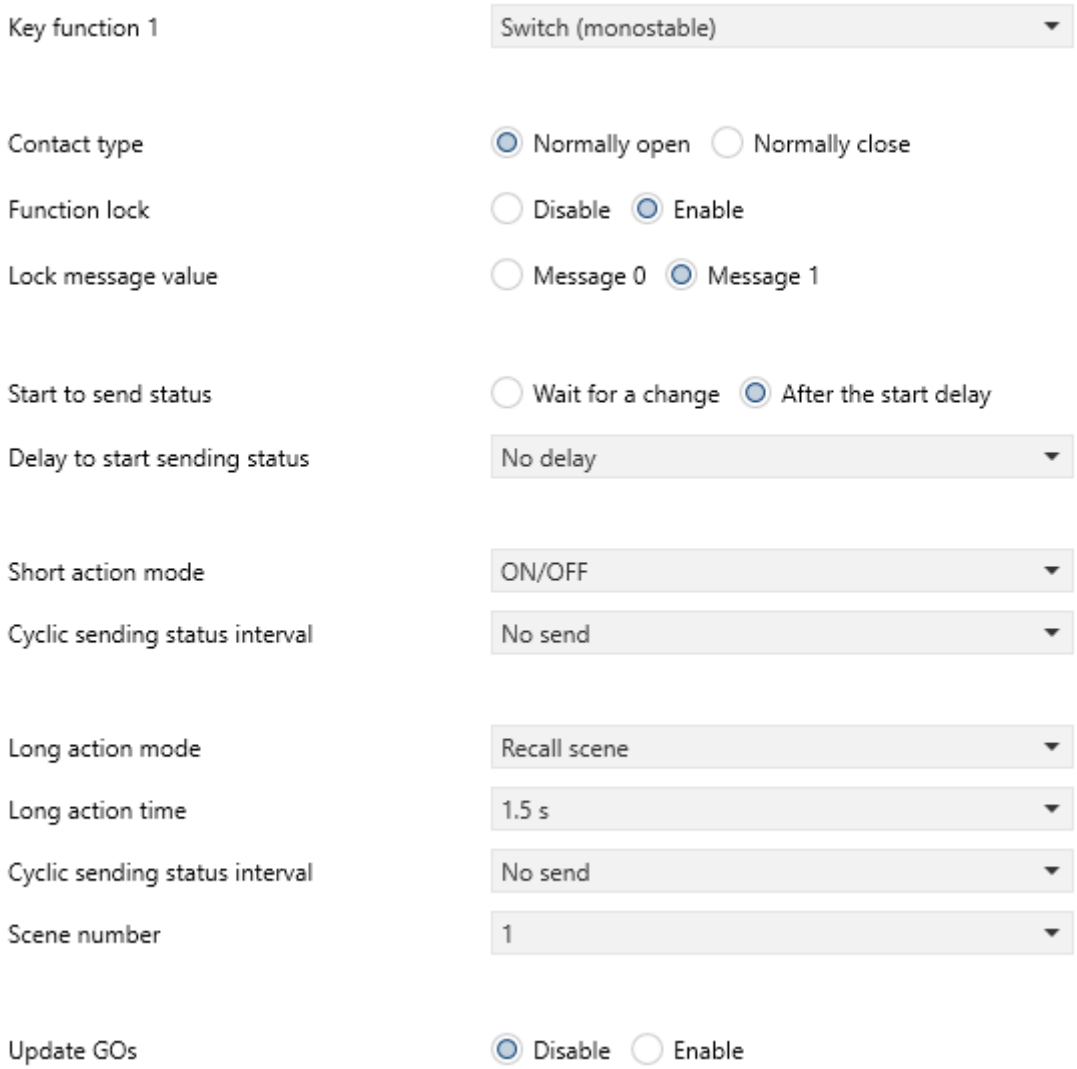
9.3.1 Key function n

This parameter allows you to set a specific mode of operation for that channel.



The parameters that characterize the different modes of operation will be described below.

In "Switch (monostable)" mode, it is assumed that the button connected to the input has only one stable position, so the state is maintained when the button is released.



In this mode, the communication object "Key/Input n" reports the status of the input.

9.3.2 Type of contact

This parameter specifies the type of contact you are using as "Normally Open" or "Normally Closed".

9.3.3 Function lock

When enabled, this parameter provides two communication objects that can be used to block the channel and read the status of the block associated with that channel.

2109	Key/Input 1	Enable function lock	1 bit	C	-	W	-	-	1-bit, enable
2110	Key/Input 1	Function lock enable status	1 bit	C	R	-	T	-	1-bit, state

9.3.4 Start to send status

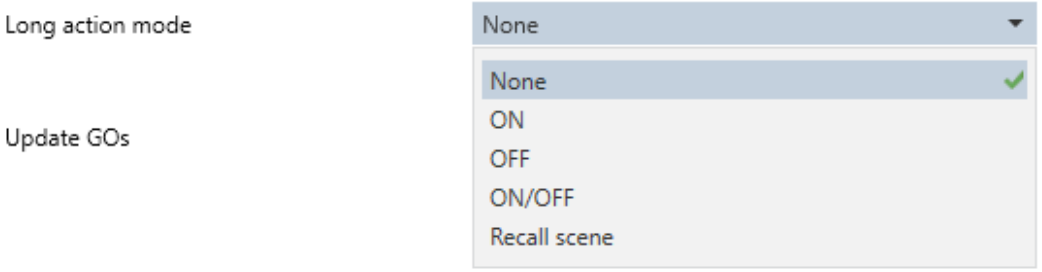
This parameter allows you to enable an initial delay on the sending of the channel status on the KNX bus. When set to "Wait for a change" the channel status will only be sent as a result of input change.

9.3.5 Cyclic sending status interval

With this parameter, you can select a cyclic sending interval of the input status on the KNX bus.

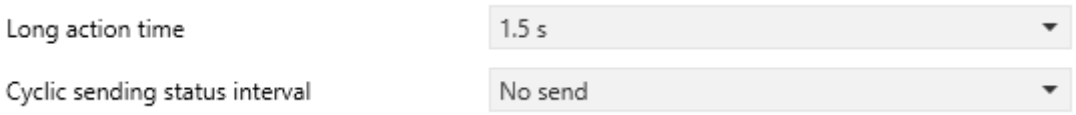
9.3.6 Long action mode

This parameter allows you to assign a specific function in case of a long press of the button assigned to the input.

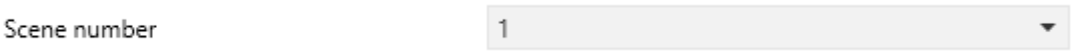


In the case of "ON", "OFF" or "ON/OFF" setting, a corresponding message will be sent to the KNX bus in correspondence with a long action on the input, indicating the new status via a new communication object dedicated to the long press.

Using the following parameters, it is also possible to set the "Long Action Time" and a "Status Cyclic Send Interval" dedicated to the long press of the input.



In the case of action mode set to "Recall scene", in addition to what has already been described, there will be an additional parameter that specifies the scenario number.

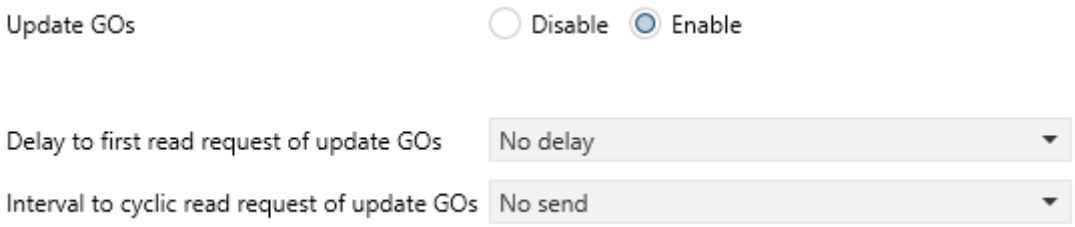


And the corresponding communication object will send the ID of the set scenario.

9.3.7 Update GOs

When enabled, this parameter allows a reading of the communication objects of the channel even without actually changing their status. This allows for better synchronization between the actuator and external supervision.

In this case, you can parameterize a read delay at startup and a cyclic read request interval.



In "Edges (bistable)" mode, it is assumed that the button connected to the input has two stable positions, so the commuting state will switch whenever the contact changes position.

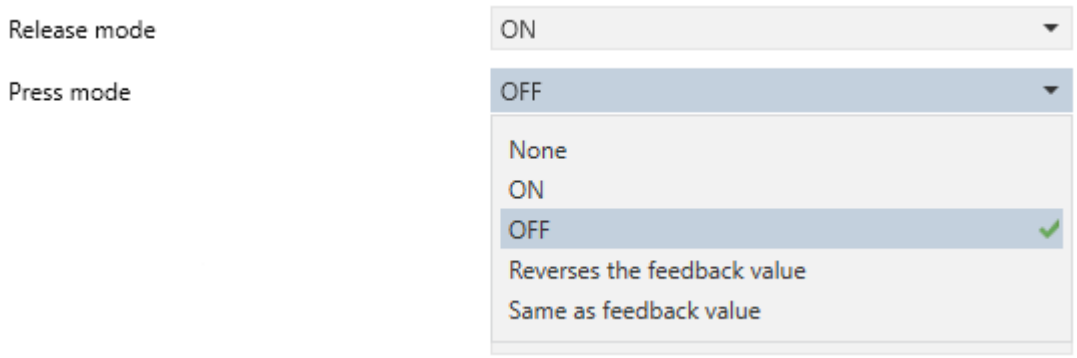
Below are the communication objects and parameters that characterize this mode of operation.

In this mode, you still have up to 3 communication objects. A communication object dedicated to writing the status of the contact and 2 communication objects dedicated to the management of the blocking of the channel itself.

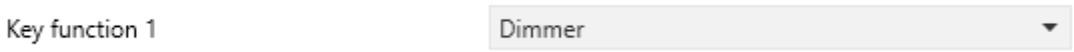
2100	Key/Input 1	Edges (press/release)	1 bit	C	-	W	T	U	1-bit, switch
2109	Key/Input 1	Enable function lock	1 bit	C	-	W	-	-	1-bit, enable
2110	Key/Input 1	Function lock enable status	1 bit	C	R	-	T	-	1-bit, state

9.3.8 Release Mode and Pressure Mode

These two parameters make it possible to assign a behavior in case of pressure and in case of release of the switch connected to the input.



In "Dimmer" mode, it is possible to interface an input to make an adjustment.



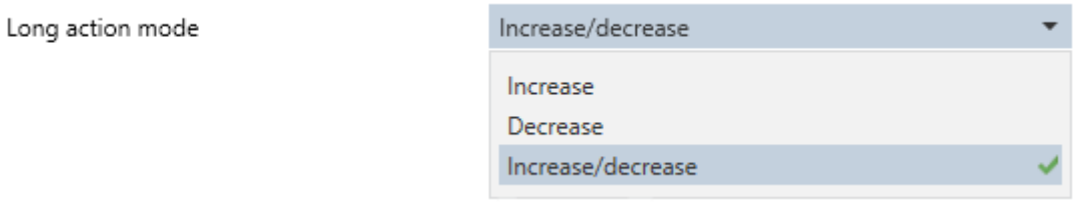
Below are the communication objects and parameters that characterize this mode of operation.

In this mode, you still have up to 4 communication objects. A communication object, "Switching", dedicated to writing the status of the contact, a communication object, "Adjustment", dedicated to 4-bit regulation according to datapoint 3.007 of the KNX standard. 2 communication objects are dedicated to the management of the block for the channel itself.

2100	Key/Input 1	Switching	1 bit	C	-	W	T	U	1-bit, switch
2104	Key/Input 1	Dimming	4 bit	C	-	-	T	-	dimming control
2109	Key/Input 1	Enable function lock	1 bit	C	-	W	-	-	1-bit, enable
2110	Key/Input 1	Function lock enable status	1 bit	C	R	-	T	-	1-bit, state

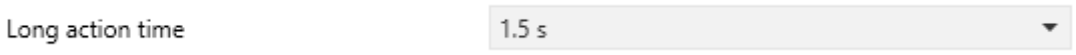
9.3.9 Long action mode

This parameter specifies the action to be taken following the detection of a long inlet pressure.



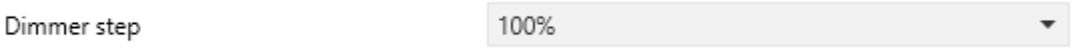
9.3.10 Long action time

This parameter specifies the amount of time the button must remain pressed for the press to be interpreted as long.



9.3.11 Dimmer step

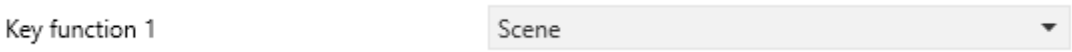
This parameter specifies the maximum increase of the dimmer following a long press of the input.



9.3.12 Send stop on release

By means of this parameter it is possible to specify whether or not to stop the dimmer adjustment following the release of the input button, before the maximum preset value is reached.

In "Scenario" mode, a scenario can be called up by pressing an input button.



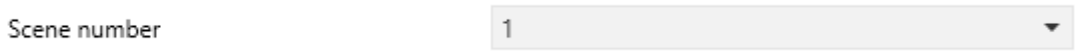
Below are the communication objects and parameters that characterize this mode of operation.

2105	Key/Input 1	Scene	1 byte	C	-	-	T	-	scene number, scene number
2109	Key/Input 1	Enable function lock	1 bit	C	-	W	-	-	1-bit, enable
2110	Key/Input 1	Function lock enable status	1 bit	C	R	-	T	-	1-bit, state

In this mode, you have up to 3 communication objects. A communication object, "Scene", returns a scene ID as a result of an action on the entrance. On the other hand, 2 communication objects are dedicated to the management of the blocking of the channel itself.

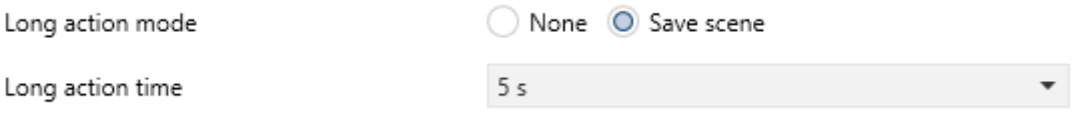
9.3.13 Scene number

This parameter specifies the ID of the scene to be invoked in the event of an action on the input.

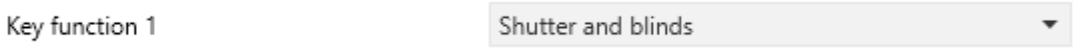


9.3.14 Long action mode and long action time

With this parameter, you can save a scenario after a long press, the duration of which is specified in the "Long action time" parameter.



In "Shutters and blinds" mode, an input can be used to control the movement of roller shutters.



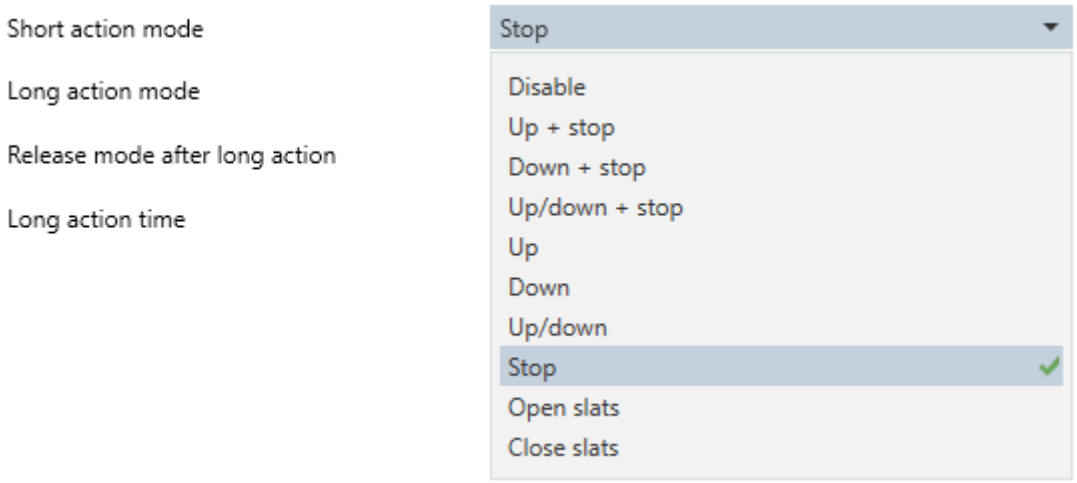
Below are the communication objects and parameters that characterize this mode of operation.

2100	Key/Input 1	Shutter stop	1 bit	C	-	-	T	-	1-bit, step
2101	Key/Input 1	Shutter move	1 bit	C	-	-	T	-	1-bit, up/down
2109	Key/Input 1	Enable function lock	1 bit	C	-	W	-	-	1-bit, enable
2110	Key/Input 1	Function lock enable status	1 bit	C	R	-	T	-	1-bit, state

In this mode, you still have up to 4 communication objects. A communication object, "Shutter stop", is used to interrupt any active movement of the roller shutter. On the other hand, the communication object "Shutter move" is used to activate an upward or downward movement of the roller shutter. The other two communication objects are dedicated to the usual channel blocking operations.

9.3.15 Short action mode

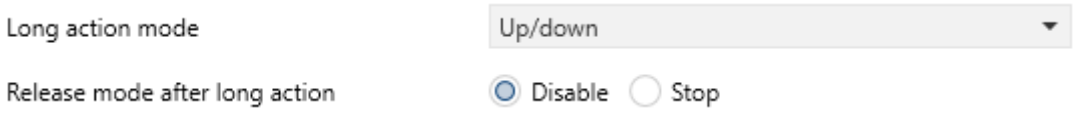
This parameter allows you to set an action to be performed on the roller shutters in response to a short press of the button connected to the input.



In the case of Venetian blinds, it is also possible to set an action for opening or closing the slats.

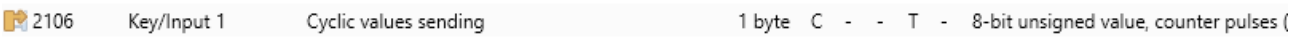
9.3.16 Long action mode and Release mode after long action

With these parameters, you can specify a behavior after a long press of the input button. You can also specify whether to make a "Stop" command when the same button is later released.



In the "Cyclic values sending, 1 Byte" mode, an input can be used to sequentially send single-byte values on the KNX bus.

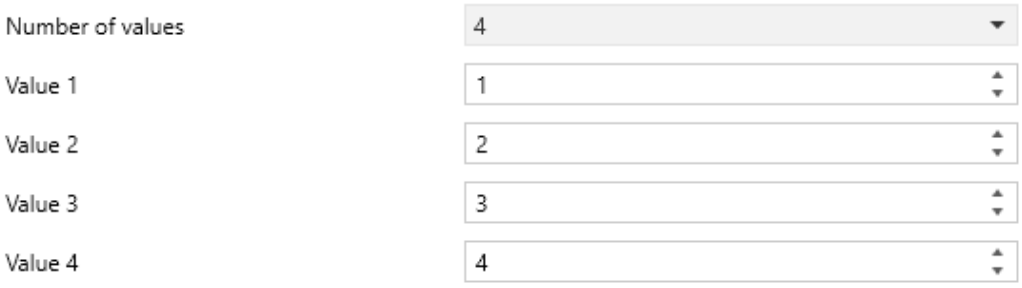
Below are the communication objects and parameters that characterize this mode of operation.



The object of communication that characterizes this mode is that of "Cyclic values sending", which allows the sending of the 1-byte values set by the parameters of the channel itself.

9.3.17 Number of values and Value n

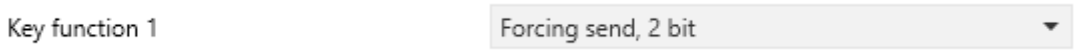
Through these parameters it is possible to set up to 4 single-byte values that will be sent sequentially on the KNX bus following a press of the input button.



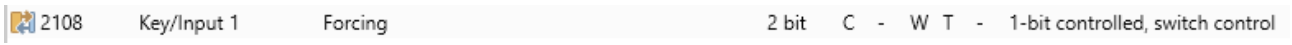
9.3.18 Long action mode

It is also possible to manage a long press of the input button. In this case, you can still define a set of up to 4 values to be sent sequentially on the KNX bus, in this case following a long press of the input button.

In "Forcing send, 2 bit" mode, you can use an input to send a force message.



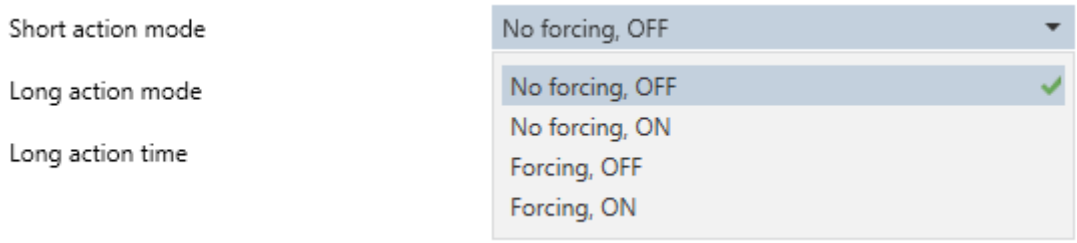
Below are the communication objects and parameters that characterize this mode of operation.



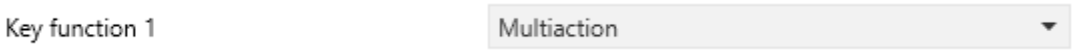
The communication object "Forcing" is used as a 2-bit command to force a specific action according to datapoint 2.0.0.1 of the KNX standard.

9.3.19 Short - Long action mode

Through these parameters it is possible to specify the meaning of the 2 bits used, the enabling or disabling of the forcing function by short press and long press of the input button.



In "Multiaction" mode, one input can be used to perform different actions according to the channel parameterization. The configurable actions correspond to those already described in the previous modes.



The communication objects are the same as in the previous modes according to the configuration set.

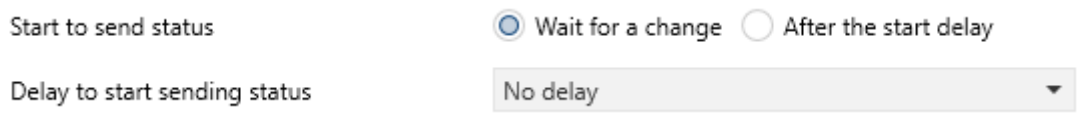
9.3.20 Edges mode (bistable)

With this parameter it is possible to set the input contact as a bistable contact, in order to perform an action at the switching edges of the contact itself.

When enabled, the meanings of "release" and "press" become "open contact" and "closed contact"

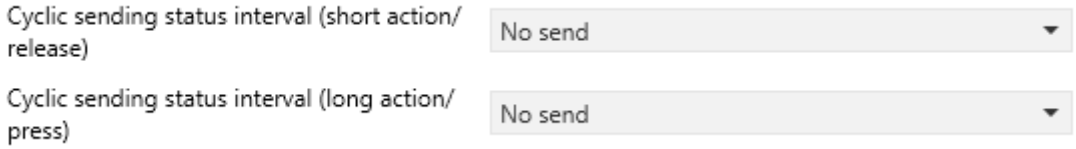
9.3.21 Start to send status

This parameter allows you to configure the sending of the state at startup time. The sending can be at the first change of the contact or after a delay that can be set by a special parameter.



9.3.22 Cyclic sending status interval (short action/ release) – (long action/release)

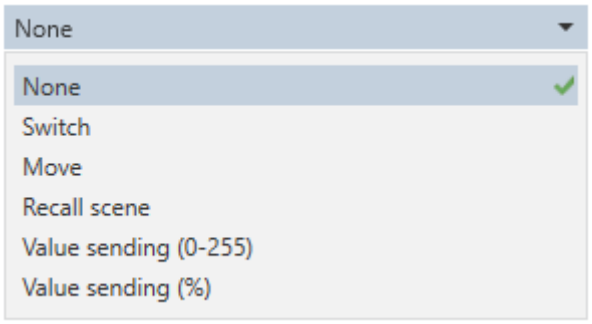
With these parameters, it is possible to configure a cyclic sending of the short and long action states according to settable intervals.



9.3.23 Action n (short action/release)

Up to 3 actions can be set in correspondence with a short action carried out on the corresponding input contact.

The actions that can be selected correspond to the same views in the previous modes of operation, with the addition of the possibility of a percentage send.



9.3.24 Action n (long action/press)

Also for the long press, it is possible to set up to 3 actions to be performed at a long press of the input contact.

10 Front Panel

On the front panel of the actuator, a physical button is dedicated to each channel.

The physical buttons are interlocked with each other until the ETS application is loaded into the device. This is done to prevent accidental damage to loads due to simultaneous activation of channels.

In this case, each button operates in "toggle" mode, which means that the contact will not remain active after the button is released.

After downloading the ETS application, the behavior of each front panel button may be different depending on the channel configuration.

10.1 Shutters/Venetian blinds: behavior of the physical button

When the channel is configured as "Shutters/Venetian blinds", the first button is always dedicated to upward movement, while the second button is used for downward movement.

For this type of function, the button works in "toggle" mode, which means that the contact will not remain active after the button is released.

10.2 Single Output/Solenoid Valve: Physical Button Behavior

When the channel is configured as "Single Output" or "Solenoid Valve", when the associated front panel button is pressed, the contact switches and holds position even after the button is released.

10.3 Interlock: Physical Button Behavior

When the channel is configured as "Interlock", when the associated front panel button is pressed, any other outputs of that channel will be muted before the target one is activated.

In this case, the new status will be retained.

ARTICLE 10.4 Fancoils: Physical Behavior of Buttons

In order to prevent accidental damage, the physical buttons related to the fan coils are always kept disabled.

11 Appendix

11.1 How to Properly Connect the RIO8 and RIO16 Actuator to Different Loads

The BX-RIO8/RIO16 multifunction actuator makes a huge number of configurations possible. Different loads can be attached to it according to specific rules described below.

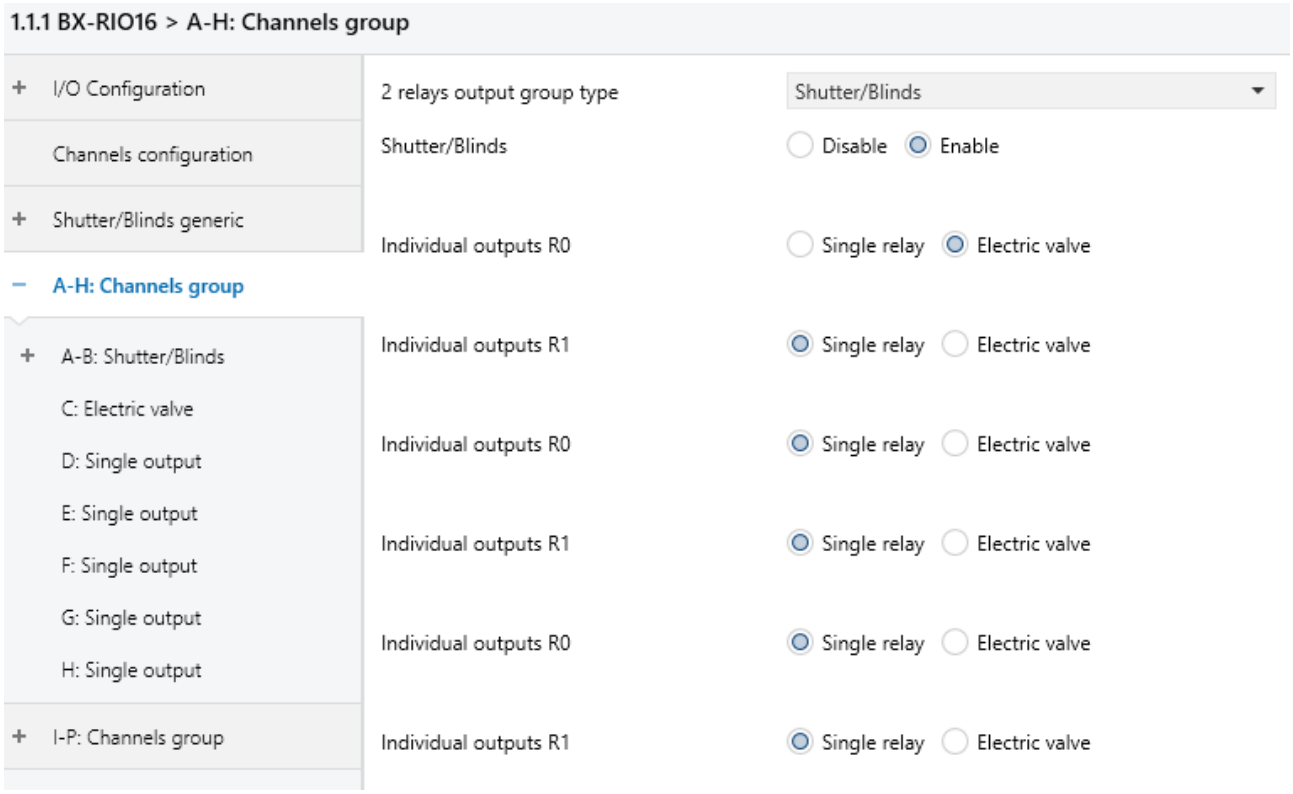
1. When choosing a specific configuration for an X-Y group of channels, functions whose number of associated outputs is greater are usually placed at the top of the group.

2. The fan coils always have the first outputs dedicated to speeds and the last outputs dedicated to valves (heating and cooling).

3. For roller shutter/venetian blinds, the first outlet is used for upward movement and the second for downward movement.

In general, the position of the channels always follows the order on the ETS software.

Here's an example.



In this case, Shutter/Blinds is a 2-output function, while solenoid valves are 1-outlet. Thus, the channels dedicated to the Shutters/Venetian blinds function are positioned in the first positions of the group (A-B in this case), while the channels dedicated to the valve outlets are positioned in the following positions (C to H in this case).

11.2 Front Panel LED Light Meaning

The front panel LEDs indicate the status of the output based on the channel configuration.

The following rules work for standard configurations.

1. For the single channel output configuration, the LED light is on when the switch is closed.

2. For valve configurations, the channel LED light is on when the valve is open.