

Operation and installation manual KNX IO 511 (1O2I)

(Art. # 5232)

Switching actuator with 1 output and 2 binary inputs



KNX IO 511 (1O2I)

Application

The KNX IO 511 (1O2I) is a compact switching actuator with 1 bi-stable output and 2 binary inputs. The actuator provides the function for universal outputs including scene control, timer, staircase lighting and heating valves (PWM for thermoelectric valve drives).

The inputs can be connected to conventional switches with an external voltage of 12 to 230 V. In ex-factory settings the inputs are connected internally to the actuator. The actuator combined with input B1 serves as a latching relay. Input B2 is used for zero crossing detection.

Two push buttons and three LEDs allow a local operation and a visualization of the device state.

In addition to the output and input channels the device includes 16 independent functions for logic or timer control.

1. Installation and Connection

The KNX IO 511 (1O2I) is designed for installation on a DIN rail (35 mm) with a width of 1 unit (18 mm). An installation-friendly design with pluggable screw terminals helps to reduce the cost of commissioning. It features the following controls and displays:



- 1 KNX bus connector
- 2 Programming LED
- 3 Button f. programming mode
- 4 LED On/1 (multicolor)
- 5 LED Ch/M (multicolor)
- 6 LED --/2 (multicolor)
- 7 Button A (On/1)
- 8 Button B (Off/2)
- 9 Pluggable screw terminals

This device is powered by the KNX bus. An external power supply is not necessary.



The device is not working without bus power.

A. KNX Programming mode

The KNX programming mode is activated/deactivated either by pressing the flushed KNX programming button **3** or by simultaneously pressing the buttons **7** and **8**. Accessing the programming mode via the device front buttons can be enabled / disabled via the ETS® by changing the value of *Prog. mode on device front*.

When the programming mode is active, the programming LED **2** and LED Ch/M **5** light red.

B. Manual operation and status display

The LED Ch/M **5** lights up or flashes if the device is successfully powered by the KNX bus.

By pressing button A **7** long, the manual operation mode will be entered for channel (A). This is indicated by cyclic single flashing of LED Ch/M **5** in orange.

The actuator (channel A) can be switched on with button On **7** and switched off with button Off **8**. The manual operation mode can be exit by pressing the buttons (Esc) **7** und **8** simultaneously.

The LED A **4** is used to display the status of the channel (A). It lights when the channel is on and is switched off when the channel is off.

By pressing button B **8** long, the manual operation mode will be entered for channel pair B (Ch B In1/In2). This is indicated by cyclic double flashing of LED Ch/M **5** in orange.

If manual operation of channel pair B is activated, the bus telegrams of In1 and In2 can be triggered by button 1 **7** and 2 **8**, if input channel is configured by ETS.

LED 1 **4** and LED 2 **6** are used to indicate state of selected channel pair while manual operation. They light green when the button 1 **7** or 2 **8** is pressed.

The manual operation mode can be exit by pressing the buttons (Esc) **7** und **8** simultaneously.

Summary of the states of LED Ch/M **5** :

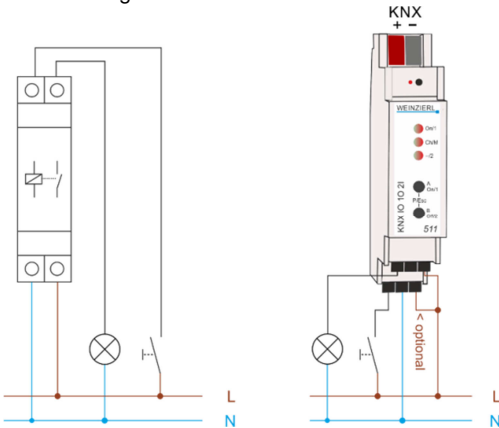
LED Status	Meaning
LED lights green	Device is working in standard operation mode.
LED lights red	Programming mode is active.
LED flashes 1x orange	Programming mode is not active. Manual operation is active. Switching first channel (A)
LED flashes 2x orange	Programming mode is not active. Manual operation is active. Switching channel pair (B In1/In2)
LED blinks red	Programming mode is not active. Manual operation is not active. The device is not properly loaded e.g. after an interrupted download.
LED blinks green	The device is currently loaded by the ETS.

2. Ex-factory behavior

In ex-factory state, the binary inputs are internally connected to the actuator channel.

By applying a voltage pulse to binary input B1, the actuator switches over (toggle function). The device thus behaves like a latching relay. This presetting enables the replacement of a conventional impulse switch by the KNX IO 511 without programming. For this function, the device must be connected to the KNX bus voltage. The KNX IO 511 can then be programmed and integrated into the KNX system.

Binary input B2 is configured as zero crossing detection. If the input is connected to phase (L), the actuator switches at zero crossing of the mains voltage. This protects the relay contacts, especially with capacitive loads (switching power supplies / LED lights) and increases the life time of the device. If input B2 is not connected, the actuator switches without taking into account the zero crossing.



Conventional latching relay

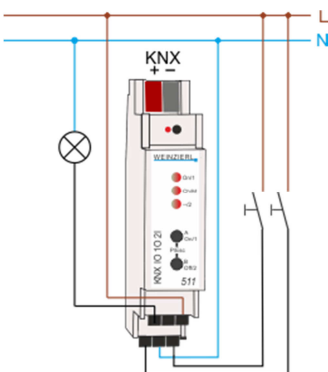
KNX IO 511 (102I)

3. Reset to factory device settings

It is possible to reset the device to its factory settings:

- Disconnect the KNX Bus connector ① from device
- Press the KNX programming button ③ and keep it pressed down
- Reconnect the KNX Bus connector ① of device
- Keep the KNX programming button ③ pressed for at least another 6 seconds
- A short flashing of all LEDs (② ④ ⑤ ⑥) visualizes the successful reset of the device to factory default settings.

4. Wiring scheme



C. Pluggable screw terminals

Ch A Out	Ch A !Out	Ch A Cm
Ch B In 1	Ch B Cm	Ch B In 2

Top connector

The top pluggable screw terminal ⑨ on the left terminal pin Ch A Out are used as closer. The central terminal pin Ch A !Out serve as opener. On the right terminal pin Ch A Cm the common pin is contacted e.g. the voltage to be switched.

Bottom connector

The middle pin of the bottom connector ⑨ shall be connected to the common wire (neutral for 230V AC and GND for DC). The left and right pin shall be connected to the corresponding switches / push buttons.

5. ETS database

The ETS database (for ETS 4.2 ETS and 5) can be downloaded from the product website of the KNX IO 511 (102I) (www.weinzierl.de) or via the KNX online catalogue.

ETS parameter dialog

The following pages and parameters are visible in the ETS.

D. Description:

1.1.1 KNX IO 511 (102I) > Description

Description	KNX IO 511 (102I) Switching actuator with 1 output and 2 binary inputs	WEINZIERL
General settings		
Logic / Timer		
+ Channel A: Actuator	The KNX IO 511 (102I) is a compact switching actuator with 1 bi-stable output and 2 binary inputs.	
+ Channel B: Input 1	The actuator provides the function for universal outputs including scene control, timer, staircase lighting and heating valves (PWM for thermoelectric valve drives).	
+ Channel B: Input 2	The inputs can be connected to conventional switches with an external voltage of 12 to 230 V. In ex-factory settings the inputs are connected internally to the actuator. The actuator combined with input B1 serves as a latching relay. Input B2 is used for zero crossing detection. Two push buttons and three LEDs allow a local operation and a visualization of the device state. In addition to the output and input channels the device includes 16 independent functions for logic or timer control.	

Wiring scheme:

Please consult device data sheet and manual for further information.

Contact:
Weinzierl Engineering GmbH
Achatz 3
84508 Burgkirchen / Alz
Germany
www.weinzierl.de
info@weinzierl.de

The first page shows general information about the device.

General settings:

1.1.1 KNX IO 511 (1021) > General settings

Description	Device name	KNX IO 511 (1021)
General settings	Send delay after bus power return	5 s
Logic / Timer	Prog. mode on device front	<input type="radio"/> Disabled <input checked="" type="radio"/> Enabled
+ Channel A: Actuator	Manual operation on device	Enabled with time limit 10 min
+ Channel B: Input 1	Heartbeat	<input type="radio"/> Disabled <input checked="" type="radio"/> Enabled
+ Channel B: Input 2	Cycle time	5 min
	Binary inputs	
	Long button press after	1.2 s

Device name (30 Characters)

An arbitrary name can be assigned for the KNX IO 511 (1021). The device name should be meaningful, e.g. „Living Room“. This helps the clarity of the ETS project.

Send delay after bus power return

A send delay of telegrams after the return of the bus voltage can be set via this parameter. In this case, telegrams from the device are sent to the KNX bus in a delayed manner by the set time. This results in a reduction of the bus load at a bus power return. Other functions such as receiving telegrams of switching operations of the actuator are not affected by this parameter.

Prog. mode on device front

In addition to the normal programming button **3** the device allows activating the programming mode on the device front without opening the switchboard cover. The programming mode can be activated and deactivated via pressing simultaneously both buttons **7** and **8**.

This feature can be enabled and disabled via the parameter „Prog. mode on device front“. The recessed programming button **3** (next to the Programming LED **2**) is always enabled and not influenced by this parameter.

Manual operation on device

This parameter is used to configure the manual operation on the device. The manual operation mode can be disabled or activated (with or without time limitation). The time limit defines the duration until the automatic return from the manual operation mode back into the normal operating mode.

The device is in normal operating mode when the manual control is not active. In the manual operating mode, received switching telegrams are ignored. When the manual operation mode is terminated (after expiry of the time limit or manually), the last state of the outputs remains, until a new switching telegram is received again.

The following options are selectable:

- Disabled
- Enabled with time limit 1 min
- Enabled with time limit 10 min
- Enabled with time limit 30 min
- Enabled without time limit

Heartbeat

Cyclic sending of values to the KNX-Bus, to indicate that the device is operational. For the *Cycle time* values between 1 min and 24h are selectable.

Group Object	Type KNX	Size	Direction
GO 1 Heartbeat - Trigger	1.001	1 Bit	To KNX

Long button press after

The time for detection of a long button press can be set here, this time is valid for all input channels.

E. Actuator 1: General:

1.1.1 KNX IO 511 (1021) > Channel A: Actuator > Actuator 1: General

Description	Name	Actuator 1
General settings	Function	Universal output
Logic / Timer	Scene function	<input checked="" type="radio"/> Disabled <input type="radio"/> Enabled
- Channel A: Actuator	Send state	Cyclic and on change
	Time for cyclic state	6 h
Actuator 1: General	Behavior on bus power failure	No reaction
+ Channel B: Input 1	Behavior after bus power return	State like before bus power failure
+ Channel B: Input 2	Lock function	<input checked="" type="radio"/> Disabled <input type="radio"/> Enabled

Name (30 Characters)

An arbitrary name can be assigned for the channel. However, this should be clear and meaningful, this makes it easier to work with the associated group objects, because the given name is displayed there as a label. If no name is assigned, the group objects are named „Actuator A: ...“.

Function

This parameter defines the functionality of the actuator.

The following options are selectable:

- Disabled
- Universal output
- On/Off delay
- Staircase function
- Valve actuator (PWM for thermal servo)

A more detailed description of the functions can be found in the individual function descriptions under Function (...).

If the actuator is not „Disabled“, the following parameters are displayed:

Behavior on bus power failure

The behavior which is held at the output during the bus power failure can be configured here.

The following options are selectable:

- No reaction
- Switch on
- Switch off

Behavior after bus power return

Here the behavior of the output after bus power return can be configured.

The following options are selectable:

- No reaction
- Switch on
- Switch off
- State like before bus power failure

Send state

This parameter defines the behavior of the state objects:

- Disabled
State objects are deactivated and not displayed
- Only on read
State objects send only on request
- On change
State objects send on value change
- Cyclic and on change
State objects send cyclically and on value change

Group Object	Type KNX	Size	Direction
GO 18 Actuator 1: Output - State	1.001	1 Bit	To KNX
GO 19 Actuator 1: Valve actuator (PWM) - State*	5.001	1 Byte	To KNX

* if valve actuator was selected

Time for cyclic state

Is selected state object "Cyclic and on change", in this parameter the cycle time can be set.

Lock function

With this parameter the lock function can be enabled. If this functionality is activated, the associated group objects as well as the parameter page "Actuator 1: Lock function" are displayed for further configuration. If the lock has been activated via the group object "Lock", the received switching telegrams are not executed.

In addition to the lock object, there is also a priority object, which can be switched independently of the lock. Thus, it is possible to set an output state without affecting other functions.

Group Object	Type KNX	Size	Direction
GO 15 Actuator 1: Lock - Activate	1.001	1 Bit	From KNX
GO 16 Actuator 1: Prior. output - Switch	1.001	1 Bit	From KNX

Example of the priority object:

In the case of events in public buildings or in restaurants, the normal operation can be set into an inoperative state by the lock group object. Thus it is possible to lock during the lecture or concert, switches that are accessible to unauthorized persons, in order to prevent unmeant switching. Nevertheless, the individual lamps can controlled by use of the priority object without canceling the lock.

F. Lock function:

Polarity of object

This parameter defines, if the lock should be activated by receiving a 1 or by receiving a 0.

The following options are selectable:

- Lock active on 1
- Lock active on 0

Behavior on start

This parameter configures, which state the output should set, if the lock activates.

The following options are selectable:

- No reaction
- Switch on
- Switch of

This output state can still be changed by the priority object.

Behavior at end

This parameter defines, which state the output should set, if the lock deactivates.

The following options are selectable:

- No reaction
- Switch on
- Switch off
- State before lock
- State without lock

State before lock:

This restores the original state before the lock was activated. Switching telegrams received during the lock are ignored.

State without lock:

Here the state of the last received switching telegram is restored. This takes into account the received switching telegrams during the lock. Thus, when the lock is deactivated, the last received switching telegram is set.

Function (Universal output)

If the universal output is selected on the parameter page "Actuator 1: General", the actuator can be used as a switching output. A parameter for the scene function is also displayed.

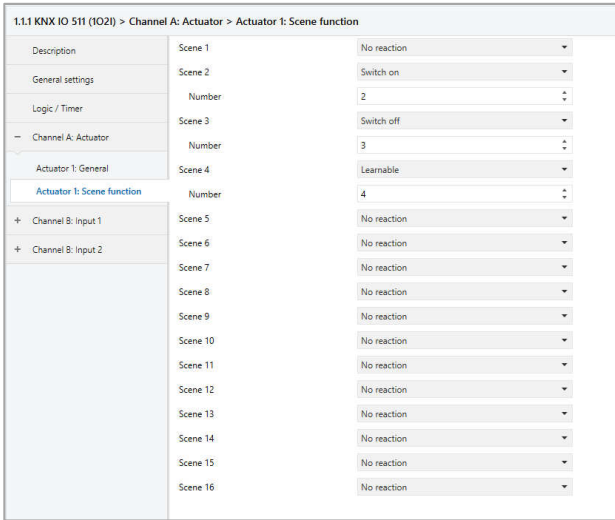
Group Object	Type KNX	Size	Direction
GO 11 Actuator 1: Output - Switch	1.001	1 Bit	From KNX

Scene function

With this parameter the scene function can be enabled or disabled. If this functionality is enabled, the respective group object as well as the parameter page "Actuator 1: Scene function" are displayed for further configuration of scenes 1-16.

Group Object	Type KNX	Size	Direction
GO 12 Actuator 1: Scene - Activ./Lrn.	18.001	1 Bit	From KNX

G. Scene function:



Scene 1-16

These parameters can be used to configure the state, which is set at the output when the respective scene is executed.

The following options are selectable:

- No reaction
- Switch on
- Switch off
- Learnable

Learnable:

By using a scene control telegram, the current state at the output can be saved for the respective scene. This allows the user to customize the scene without ETS download.

Number

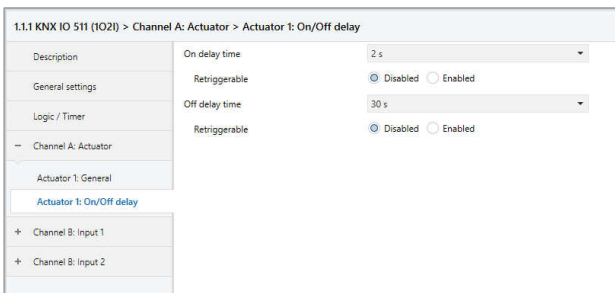
This parameter sets any scene number between 1 and 64 to the scene. There must not be configured any scene numbers twice.

Function (On/Off delay)

If the ON/OFF delay is selected on the parameter page "Actuator 1: General", delayed switching times can be configured. The "Actuator 1: On/Off Delay" parameter page is displayed for this purpose.

Group Object	Type KNX	Size	Direction
GO 11 Actuator 1: Output - Switch	1.001	1 Bit	From KNX

H. On/Off delay:



On delay time

The duration of the switch-on delay is configured in this parameter.

Input -----1-----0-----
Output -----| -T-1-----0-----

Off delay time

The duration of the switch-off delay is configured in this parameter.

Input -----1-----0-----
Output -----1-----| -T-0-----

Retriggerable

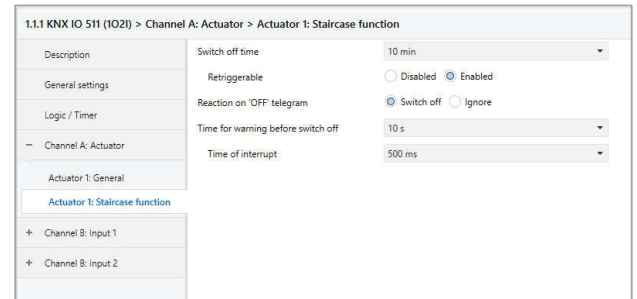
If these parameters are activated, the respective delay time is restarted upon receipt of the corresponding switching signal.

Function (Staircase function)

If the staircase function is selected on the parameter page "Actuator 1: General", a group object for the staircase function appears in addition to the normal switching object. Via the additional parameter page "Actuator 1: Staircase function" this function can be configured.

Group Object	Type KNX	Size	Direction
GO 11 Actuator 1: Output - Switch	1.001	1 Bit	From KNX
GO 13 Actuator 1: Staircase function - Trigger	1.010	1 Bit	From KNX

I. Staircase function:



Switch of time

The time for which the output is activated after an ON telegram (object of the staircase function) has been received, can be set in this parameter.

Input -----1-----0-----
Output -----1-T-0-----

Retriggerable

This parameter can be used to set whether the follow-up time is to be restarted when an ON telegram is received on the object of the staircase function.

Reaction on 'OFF' telegram

This parameter can be used to set whether an OFF telegram on the object of the staircase function should be processed or ignored.

Time for warning before switch off

The time between pre-warning and deactivation is configured, or the pre-warning is deactivated with this parameter. If the pre-warning time is longer than the actual follow-up time, no pre-warning is carried out.

Time of interrupt

The pre-warning is indicated by a brief interruption (switch off -> switch on). The duration of this interrupt is configured in this parameter.

Note: LED lamps often have a long follow-up time, in which the lamp still lights even though it is already switched off. With such lamps longer interrupt times must be set to generate a "visible" interruption.

Function (Valve actuator)

The function valve actuator is foreseen to control thermoelectric valve drives which are used for floor heating but also for radiators. It maps the continuous position (0% - 100%) to an ongoing On/Off sequence called PWM (pulse width modulation) signal.

If the valve actuator is selected on the parameter page "Actuator 1: General", a group object for the valve actuator appears instead of the normal switching object. This allows the current PWM at the output to be set via KNX (0% - 100%). An additional parameter page "Actuator 1: Valve actuator" appears for the configuration of the valve actuator.

The received control value is saved automatically by the device, to continue faultless after a possible bus power loss.

Group Object	Type KNX	Size	Direction
GO 14 Actuator 1: Valve actuator (PWM) – Control value	5.001	1 Byte	From KNX

J. Valve actuator:

1.1.1 KNX IO 511 (1021) > Channel A: Actuator > Actuator 1: Valve actuator

Description	Cyclic time (PWM)	15 min
General settings	Maximum control value (PWM)	100 %
Logic / Timer	Stuck protection	<input type="radio"/> Disabled <input checked="" type="radio"/> Enabled
Channel A: Actuator	Execution time	5 min
Actuator 1: General	Monitoring interval	7 days
Actuator 1: Valve actuator	Protection on missing control value	<input type="radio"/> Disabled <input checked="" type="radio"/> Enabled
Channel B: Input 1	Protection control value (PWM)	10 %
Channel B: Input 2	Monitoring interval	2 h

Cyclic time (PWM)

The cyclic time of the PWM, which is used to control a servo drive, is configured with this parameter. One cycle involves a time range in which the output is switched on and one in which the output is switched off. The cyclic time corresponds to the period between two rising edges (state change at the output from OFF to ON). The longer the flow of the heating circuit (tube / pipe length), the higher the cyclic time should be set.

Note: Typical thermal servo require several minutes for a 100% valve change.

Maximum control value (PWM)

This parameter can be used to limit the maximum control value. The control value is expressed in percent and defines the period during which the output is switched on in one cycle.

Example:

Cyclic time = 10 Min.

Maximum control value (PWM) = 80 %

Maximal output state = ON - 8 min / OFF - 2 min

Stuck protection

With the stuck protection, it is intended to prevent the valve from being damaged by corrosion or calcification, that it can no longer be moved. In case stuck protection is enabled, this is only triggered if the value is permanently 0 % or 100 %. On every other control value the servo already moves, so there is no need for a stuck protection.

Control value 0% → Open servo for the set time

Control value 100% → Close servo for the set time

In case the valve is not allowed to open, the stuck protection must be disabled.

Execution time

If the stuck protection is activated, this parameter is used to set the duration of the state change.

Monitoring interval

If the stuck protection is activated, this parameter sets the monitoring interval. If the state of the output remains unchanged for this time, the lock protection is triggered.

Protection on missing control value

This parameter enables the protection function on missing control value telegrams. This is necessary in order to prevent unwanted and uncontrolled overheating or cooling down of the room, when the control value is missing.

Protection takes effect, as soon as no telegrams are received from the controller over a longer period of time. As soon as this extended telegram pause has occurred, it can be assumed that the corresponding controller has failed or the connection between the controller and the valve actuator has been interrupted.

Protection control value (PWM)

If the protection on missing control value is enabled, this parameter sets a protection control value. This configured PWM value will set the output, if the protection is active.

As soon as telegrams from the controller are received again, the protection control value (PWM) is overwritten by the received value. The protection does not react again, until the waiting time in the set monitoring interval is exceeded between individual telegrams.

Monitoring interval

If the protection on missing control value is enabled, this parameter sets the monitoring interval. If no further telegram is received by the device during this time, the protection function takes effect.

Lock function (with valve actuator)

With this parameter the lock function can be disabled or enabled. If this functionality is activated, the associated group objects as well as the parameter page "Actuator 1: Lock function" are displayed for further configuration. If the lock has been activated via the group object "Lock", the received switching telegrams are not executed.

In addition to the lock object, there is also a priority object, which can be used to set a control value independently of the lock. Thus, it is possible to set an output PWM without affecting other functions.

When the lock is ended, the last received value (not priority object) is represented as PWM at the output.

Group Object	Type KNX	Size	Direction
GO 15 Actuator 1: Lock - Activate	1.001	1 Bit	From KNX
GO 17 Actuator 1: Prior. valve actuator (PWM) – Control value	5.001	1 Byte	From KNX

K. Lock function:

1.1.1 KNX IO 511 (IO2I) > Channel A: Actuator > Actuator 1: Lock function

Description	Polarity of object	<input checked="" type="radio"/> Lock active on 1 <input type="radio"/> Lock active on 0
General settings	Behavior on start	<input type="radio"/> No reaction <input checked="" type="radio"/> Value
Logic / Timer	Control value (PWM)	50 %

Channel A: Actuator

- Actuator 1: General
- Actuator 1: Valve actuator
- Actuator 1: Lock function**

Channel B: Input 1

Channel B: Input 2

Polarity of object

This parameter defines, if the lock should be activated by receiving a 1 or by receiving a 0.

The following options are selectable:

- Lock active on 1
- Lock active on 0

Behavior on start

This parameter defines, which behavior the output should represent, if the lock activates.

The following options are selectable:

- No reaction
- Value

No reaction:

The PWM value remains as to begin of the lock function.

Value:

When the lock is activated, a defined PWM value is represented on the output.

Control value (PWM)

If a defined PWM value should be set to the output when the lock is activated, this value can be set with this parameter.

L. Input B1: General

1.1.1 KNX IO 511 (IO2I) > Channel B: Input 1 > Input B1: General

Description	Name	Input B1
General settings	Function	Disabled

Logic / Timer

Channel A: Actuator

Channel B: Input 1

Input B1: General

Channel B: Input 2

Name (30 Characters)

An arbitrary name can be assigned for the channel. However, this should be clear and meaningful, this makes it easier to work with the associated group objects, because the given name is displayed there as a label. If no name is assigned, the group objects are named "Input ..." with the channel number, which is also used in this manual. The 1st binary input will be described below, the functioning of the other channel is according to the 1st.

Function

This parameter defines the functionality of the connected contact. The following options are selectable:

- Disabled
- Switching
- Dimming
- Shutter
- Send value
- Scene
- Impulse counter
- Latching relay, toggle INTERNAL*
- Latching relay, on INTERNAL*
- Latching relay, off INTERNAL*
- Zero crossing detection INTERNAL**

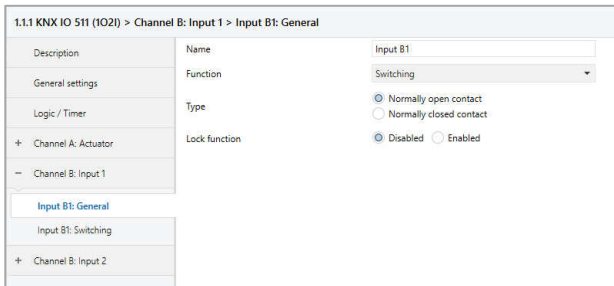
*An internal connection from the binary input to the actuator. In this case there will be no telegram on the bus, instead directly the actuator is switched on, off or toggled. With this toggle function it's possible, to replace a latching relay with the KNX IO 511 (IO2I) and used all existing wiring, without configuring any new KNX group addresses at the device.

**An internal connection from the binary input to the actuator to switch the relay in the zero crossing at 100V – 230V / 50Hz – 60Hz. This treats the conducts of the relay with care and thus increases the lifetime of the relay. In case that the zero crossing cannot be detected identically e.g. the phases is not connected to the pin, the relay is switched immediately, like the function is not selected.

ATTENTION: The zero crossing detection must not be used from several channels at the same time!

A more detailed description of the functions can be found in the individual function descriptions.

M. Function „Switching, Dimming, Shutter, Send value, Scene“



If an input function of a channel is selected, the following parameters are displayed:

Type

The mode of operation of the contact connected to the input channel can be configured here:

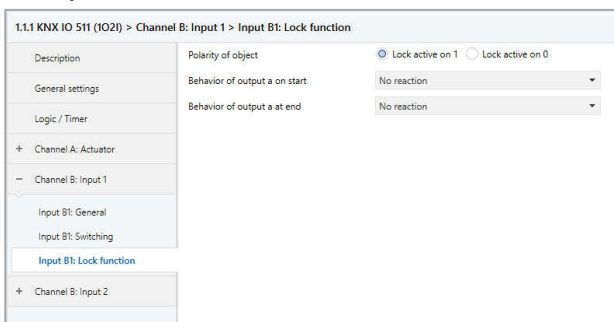
- Normally open contact
- Normally closed contact

Lock function

With this parameter the lock function can be enabled. If this functionality is activated, the associated group objects as well as the parameter page "Input B1: Lock function" are displayed for further configuration. If the lock has been activated via the group object, no telegrams are triggered by state changes of the connected contact.

Group Object	Type KNX	Size	Direction
GO 26 Input B1: Lock - Activate	1.001	1 Bit	From KNX

N. Input B1: Lock function



Polarity of object

This parameter defines, if the lock should be activated by receiving a 1 or by receiving a 0.

The following options are selectable:

- Lock active on 1
- Lock active on 0

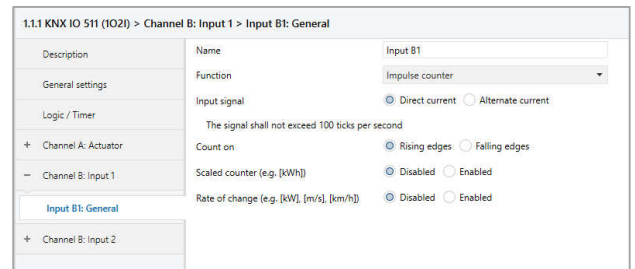
Behavior of (...) on start

The telegram can be configured here, which is sent when the lock is activated.

Behavior of (...) at end

The telegram can be configured here, which is sent when the lock is deactivated.

O. Function „Impulse counter“



If the impulse counter function is selected, further parameters are displayed in the general settings of the input channel. Here, the general settings of the impulse counter are made, a scaled counter and/or counter of the rate of change must also be selected.

Input signal

Here it can be selected whether DC or alternating voltage is applied to the binary input.

Count on

This parameter can be used to determine whether the value of the counter is increased at the rising or falling edge at the input

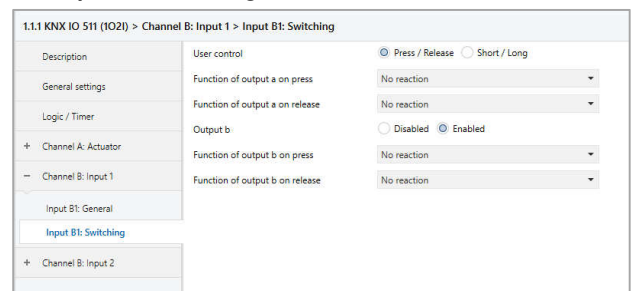
Scaled counter (e.g. [kWh])

Here, the scaled counter can be activated, the parameter page "Scaled counter" is displayed when activated.

Rate of change (e.g. [kW], [m/s], [km/h])

The counter for a rate of change can be activated here. If activated, the "Rate of change" parameter page is displayed.

P. Input B1: Switching



If the switching function is selected, up to 2 binary switching telegrams can be sent via the following objects:

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Output a – Switch	1.001	1 Bit	To KNX
GO 22 Input B1: Output b – Switch	1.001	1 Bit	To KNX

Output b is only visible when activated by parameter.

User control

The parameter "User control" determines whether telegrams are sent when the input is changed (e.g. key switches) or when the input is operated short/long (e.g. switching/dimming switches).

Function of (...) on press / short press
Function of (...) on release / long press

It is selectable for each object, which telegram is sent on opening/closing the contact or on short/long button press.

- No reaction
- Switch on
- Switch off
- Toggle

Output b

Here you can show/hide the parameters and the object for output b.

Q. Input B1: Dimming



On selection of function Dimming following objects are visible:

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Dimming on/off – Switch	1.001	1 Bit	To KNX
GO 22 Input B1: Dimming relative – Brighter/Darker	3.007	4 Bit	To KNX

Dimming function

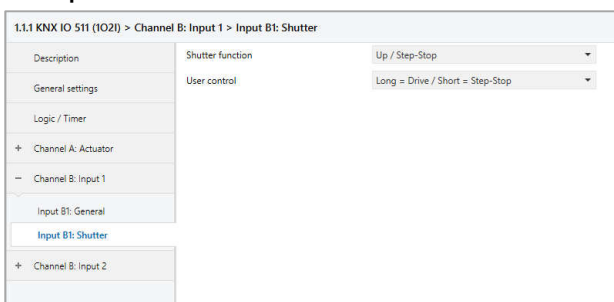
The dimming function parameter determines whether only one switching / dimming direction or 1-button control is to be used:

- On / Dim brighter
- Off / Dim darker
- Toggle direction

If the input detects a short button press, a switching telegram is sent via object 21. On long button press, a relative dimming is sent over the entire dimming range to object 22. When releasing after long button press, a dimming-stop telegram is sent via object 22.

The time for detection of a long button press can be set in the general parameters and is valid for all channels.

R. Input B1: Shutter



On selection of Shutter function following objects are visible:

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Drive start – Up/Down	1.008	1 Bit	To KNX
GO 22 Input B1: Drive stop – Step/Stop	1.007	1 Bit	To KNX

Shutter function

The “Shutter function” parameter determines whether only one shutter direction or 1-button control is to be used:

- Up / Step-Stop
- Down / Step-Stop
- Toggle direction

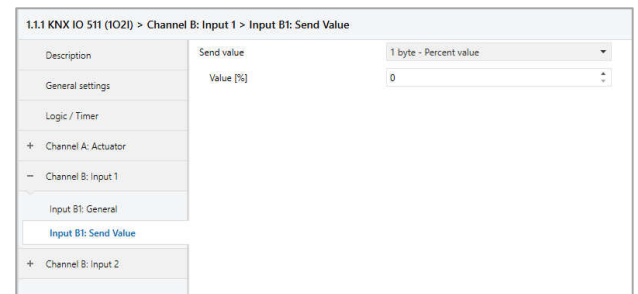
User control

The parameter “User control” determines the sending of telegrams on short and long button press:

- Long = Drive / Short = Step/Stop
 Long button press: Drive command via object 21.
 Short button press: Stop/step command via object 22
- Short = Drive / Short = Step/Stop
 Alternately drive command via object 21 und stop/step command via object 22 on short button press, long button press is not evaluated
- Pressed = Drive / Release = Stop
 On button press drive command via object 21, on releasing the button stop/step command via object 22

The time for detection of a long button press can be set in the general parameters and is valid for all channels.

S. Input B1: Send value



If function Send value is selected, the following telegrams can be sent at button press:

- 1 byte - Percent value

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Send percent value (1 byte) – Set value	5.001	1 Byte	To KNX

- 1 byte - Integer value

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Send integer value (1 byte) – Set value	5.010	1 Byte	To KNX

- 2 byte - Integer value

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Send integer value (2 byte) – Set value	7.001	2 Byte	To KNX

- 2 byte - Float value

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Send float value (2 byte) – Set value	9.001	2 Byte	To KNX

- 3 byte - RGB value

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Send RGB color value (3 byte) – Set value	232.600	3 Byte	To KNX

- 14 byte - ASCII string

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Send ASCII string (14 byte) – Set value	16.000	14 Byte	To KNX

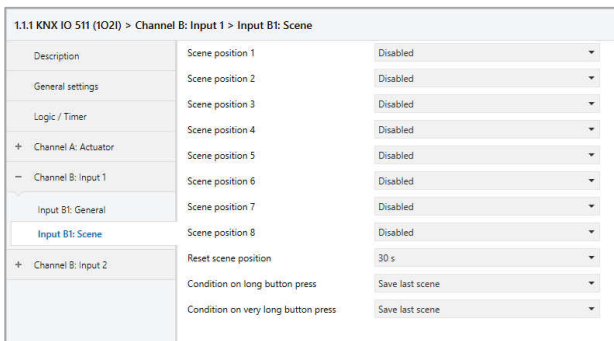
- Shutter

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Send blind position – Set position	5.001	1 Byte	To KNX
GO 22 Input B1: Send slat position – Set position	5.001	1 Byte	To KNX

A field for entering the values to be sent is displayed, as well as the objects appropriate to the selected type.

If the shutter is selected as the value to be sent, height is sent on button press, lamella is sent on releasing the button, if the respective value is used.

T. Input B1: Scene



On selection of Scene function the following object is visible:

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Scene – Activ./Lrn.	18.001	1 Byte	To KNX

Scene position 1 - 8

For each position, scene 1 – 64 can be activated.

If only one scene position is activated, it is sent on short button press.

If several scene positions are used, the activated positions are switched through with each short button press.

Reset scene position

The behavior for selection and transmission of the scene positions can be determined via the parameter "Reset scene position":

- Never

Starting with the first scene position, the next scene position of the list is sent with each short button press, after the last scene position has been sent, the list starts again from the beginning.

- After execution

Beginning with the first scene position, each short button press switches the scene position by one position within the execution delay, at the end of the execution delay, the current scene position is sent

- 5 Sec. - 10 Min.

On each button press the configured delay time is started.

Starting with the first scene position, the next scene position of the list is sent with each short button press, after the last scene position has been sent, the list starts again from the beginning.

After the delay time has expired, the list starts again at the first scene position on the next short button press.

When the lock function is used, the scene position is always reset when unlocking.

Condition on long/very long button press

It is also possible to select how a long and very long button press is to be treated:

- No reaction

- Save last scene

A telegram for "save scene" with the last sent scene is triggered.

- Send scene

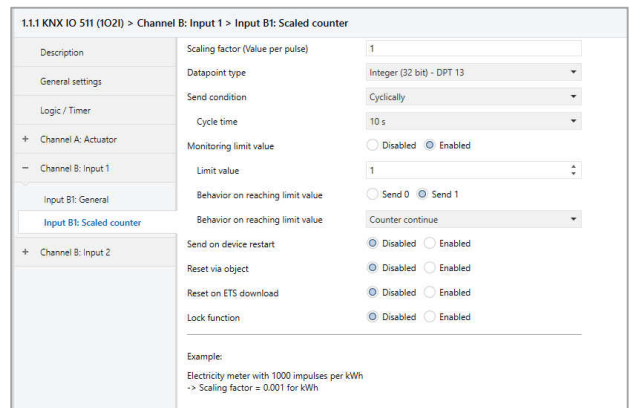
The scene configured in the appearing parameter is sent.

- Reset position

This function is used to override the behavior as set in the "Reset scene position" parameter.

The duration of time for detecting a very long button press is twice the time for detecting a long button press, as it is parameterized in the general settings.

U. Input B1: Scaled counter



This counter can be used to count values on input impulses, where an integer value or a floating-point value can be selected as a counter variable. With this function, e.g. Electrical energy can be counted directly and sent to the bus via an object.

Scaling factor (Value per pulse)

Here, a floating-point value is to be entered. It determines the value by which the counter value is increased per pulse.

Datapoint type

The datapoint type of output object of the counter variable can be selected here:

- Integer (32 Bit) – DPT 13

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Counter – Value	13.013	4 Byte	To KNX

- Float (16 Bit) – DPT 9

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Counter – Value	9.024	2 Byte	To KNX

- Float (32 Bit) – DPT 14

Group Object	Type KNX	Size	Direction
GO 21 Input B1: Counter – Value	14.056	4 Byte	To KNX

Send condition

This parameter can be used to determine how the current counter value is to be sent:

- On read
No independent sending of the counter value by the device
- On change
An additional parameter is displayed to select the minimal delta from the last sent value for sending a new counter value
- Cyclically
An additional parameter is displayed to configure the sending frequency of the counter variable.
- On change and cyclically
Both sending conditions are active.

If the counter is locked by the object, also cyclic sending is stopped.

Monitoring limit value

When limit monitoring is activated, the following object is displayed:

Group Object	Type KNX	Size	Direction
GO 22 Input B1: Counter threshold – State	1.002	1 Bit	To KNX

When limit monitoring is activated, the following parameters are displayed:

Limit value

Here you can edit the checked limit value. The data-point type is the same as the counter value.

Behavior on reaching limit value (object)

Here it is possible to determine whether a 0 or a 1 is sent via the object "Counter threshold – State" when the limit value is reached.

Behavior on reaching limit value (counter)

In addition to the limit value itself, it is possible to determine the behavior of the counter when the limit value is reached:

- Counter continue
Counter value continues increasing on ever pulse
- Counter reset and continue
Counter value is reset to 0 and continues increasing on ever pulse
- Counter stop
Counter value stays on limit value and must be reset by object

Send on device restart

It can be determined with this parameter whether the counter value should be sent when the device is restarted.

Reset via object

If this function is activated, the following object appears:

Group Object	Type KNX	Size	Direction
GO 25 Input B1: Reset – Trigger	1.017	1 Bit	From KNX

When a telegram is received via this object, the current count values are reset to 0.

Reset after ETS download

If this parameter is activated, the counter values are reset to 0 after device reset (e.g. after ETS download), otherwise they are retained.

Lock function

The lock function can be activated or deactivated here. If this functionality is activated, the following group object appears, as well as the parameter page "Lock function" for detailed configuration.

Group Object	Type KNX	Size	Direction
GO 26 Input B1: Lock – Activate	1.001	1 Bit	From KNX

If the lock has been activated via the group object, state changes at the input do not cause an increase of the counter variable.

V. Input B1: Lock function

Polarity of object

This parameter can be used to determine how the lock is to be activated, either by receiving a 1 or a 0. The corresponding telegram disables the lock again.

Behavior on start of lock

With this parameter the behavior of the counter can be configured when the lock is activated:

- Counter stop
- Counter stop and reset

Behavior on end of lock

With this parameter the behavior of the counter can be configured when the lock is deactivated:

- Counter continue
- Counter reset and continue

W. Input B1: Rate of change

1.1.1 KNX IO 511 (IO21) > Channel B: Input 1 > Input B1: Rate of change

Description: Scaling factor (Value per delta in base time span) 1

General settings: Time base: Pulses per second (e.g. [m/s], [km/h]) Pulses per hour (e.g. [kW])

Logic / Timer: Measurement time span: 10 s

+ Channel A: Actuator: Datapoint type: Float (16 bit) - DPT 9 Float (32 bit) - DPT 14

- Channel B: Input 1: Send condition: On read

Input B1: General: Monitoring limit value: Disabled Enabled

Input B1: Rate of change: Limit value: 1

+ Channel B: Input 2: Behavior on exceeding limit value: Send 0 Send 1

Behavior on going below limit value: Send 0 Send 1

Example:
 Electricity meter with 1000 impulses per kWh
 -> Scaling factor = 0.001 for kW
 -> Scaling factor = 1 for W
 Anemometer with 4 pulses per 1s at 1m/s
 -> Scaling factor = 0.25 for m/s
 -> Scaling factor = 0.25 * 3.6 = 0.9 for km/h

This counter is used to connect devices to the bus where the rate of change is critical within a time interval, e.g. an anemometer.

Scaling factor (Value per delta in base time span)

A floating-point value is to be entered here. It determines the value by which the counter value is increased on every pulse

Time base

Here the time base of the rate of change can be specified:

- Pulses per second (e.g. [m/s], [km/h])
Value from parameter Scaling factor is multiplied by 1
- Pulses per hour (e.g. [kW])
Value from parameter Scaling factor is multiplied by 3600

Measurement time span

The measurement time span determines how quickly the counter can react to changes. Therefore, a short sample rate should be selected for fast processes (e.g. anemometer).

The rate of change is calculated using the 3 parameters mentioned above:

The device saves several meter readings per measurement interval, scales it with the scaling factor * time base and divides it by the measuring interval.

Datapoint type

The datapoint type of output object of the counter variable can be selected here:

- Floating point (16 Bit) - DPT 9

Group Object	Type KNX	Size	Direction
GO 23 Input B1: Rate of change – Value	9.024	2 Byte	To KNX

- Floating point (32 Bit) - DPT 14

Group Object	Type KNX	Size	Direction
GO 23 Input B1: Rate of change – Value	14.056	4 Byte	To KNX

Send condition

This parameter can be used to determine how the current counter value is to be sent:

- On read
No independent sending of the counter value by the device
- On change

An additional parameter is displayed to select the minimal delta from the last sent value for sending a new counter value

- Cyclically

An additional parameter is displayed to configure the sending frequency of the counter variable.

- On change and cyclically

Both sending conditions are active.

Monitoring limit value

When limit monitoring is activated, the following object is displayed:

Group Object	Type KNX	Size	Direction
GO 24 Input B1: Rate threshold – State	1.002	1 Bit	To KNX

When limit monitoring is activated, the following parameters are displayed:

Limit value

Here you can edit the checked limit value. The datapoint type is the same as rate of change value.

Behavior on exceeding limit value

In addition to the limit value itself, it is possible to determine whether the counter should transmit 0 or 1 via the object if the limit value is exceeded.

Behavior on going below limit value

Here it is possible to determine whether the counter should transmit 0 or 1 via the object if the counter variable goes under limit value.

Example: Electricity meter with S0 interface

From the data sheet of the electricity meter it can be seen that the device delivers 500 pulses per kWh. A device with constant power of 1kW is connected to this current meter for one hour.

The scaled counter measures the energy consumed:

Scaling factor: 1 / 500 = 0.002 -> Output in kWh

The counter for the rate of change measures the current power:

Scaling factor:

- *Output in kW: 1/500 = 0.002*

- *Output in W: 1/500 * 1000 = 2*

Time base: Pulses per hour

Measurement time span: 300 s

Example: Anemometer

From the data sheet of the electricity meter it can be seen that the device delivers 4 pulses/s at a wind speed of 1 m/s.

The counter for the rate of change measures the wind speed:

Scaling factor:

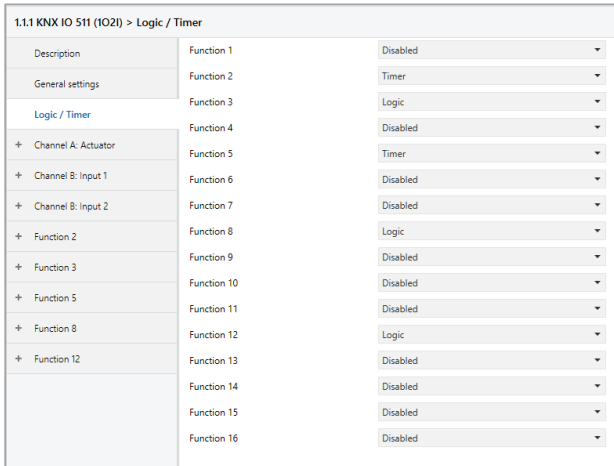
- *Output in m/s: 1/4 = 0.25*

- *Output in km/h: 1/4 * 3.6 = 0.9*

Time base: Pulses per second

Measurement time span: 10 s

X. Logic / Timer



Function 1 - 16

These channels contain additional functions such as timing and logic. All these 16 additional functions are identical.

The following options are selectable:

- Disabled
- Timer
- Logic

Function type (Disabled)

If the function type is set to "Disabled", no timer or logic specific parameters and group objects are available.

Function type (Timer)

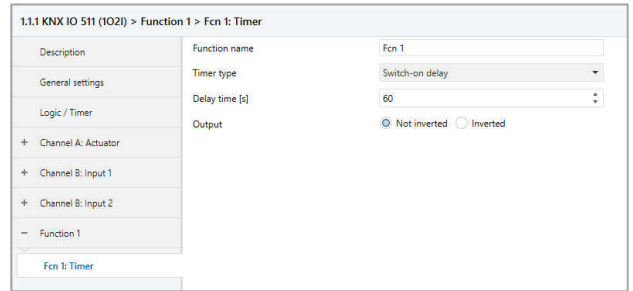
The timer-specific parameters and group objects are available.

Function type (Logic)

The logic-specific parameters and group objects are available.

Note: These additional logic and timer functions can be linked to one another by means of the associated group objects. This also allows to create complex structures. For this purpose, the output of a function is set to the same group address as the input of the next function.

Y. Function 1 – 16 (Timer)



Function name (10 Characters)

The function name can be chosen freely. The name is visible in the group object entry in the ETS software. This makes it easier to work with the associated group objects, because the given name is displayed there as a label.

Timer type (Switch-on delay)

A timer that switches ON after duration defined in 'Delay time [s]' parameter. The output value can be inverted by parameter 'Output' (Not inverted / Inverted).

Input -----1-----0-----
Output -----| - T - 1-----0-----

Group Object	Type KNX	Size	Direction
Timer – Switch-on delayed - Input	1.002	1 Bit	From KNX
Timer – Switch-on delayed - Output	1.002	1 Bit	To KNX

Timer type (Switch-off delay)

A timer that switches OFF after duration defined in 'Delay time [s]' parameter. The output value can be inverted by parameter 'Output'. (Not inverted / Inverted)

Input -----1-----0-----
Output -----1-----| - T - 0-----

Group Object	Type KNX	Size	Direction
Timer – Switch-off delayed - Input	1.002	1 Bit	From KNX
Timer – Switch-off delayed - Output	1.002	1 Bit	To KNX

Timer type (Switch-on and -off delay)

A timer that switches ON and OFF after duration defined in 'Delay time [s]' parameter.
The output value can be inverted by parameter 'Output'. (Not inverted / Inverted)

Input -----1-----0-----
Output -----| -T-1-----| -T-0-----

Group Object	Type KNX	Size	Direction
Timer – Switch-on/off delayed - Input	1.002	1 Bit	From KNX
Timer – Switch-on/off delayed - Output	1.002	1 Bit	To KNX

Timer type (Impulse (Staircase))

Timer with impulse that – after being switched **ON** – **automatically switches OFF** after a defined duration defined in 'Delay time [s]' parameter.
The output value can be inverted by parameter 'Output'. (Not inverted / Inverted)

Input -----1-----0-----
Output -----1-T-0-----

Group Object	Type KNX	Size	Direction
Timer – Switch-impulse (staircase) - Input	1.002	1 Bit	From KNX
Timer – Switch-impulse (staircase) - Output	1.002	1 Bit	To KNX

Each timer can be stopped by sending the opposite value to its input group object.

For example:

An already started switch on timer can be stopped by sending OFF (0) to its input group object.



Z. Function 1 – 16 (Logic)

Group Object	Type KNX	Size	Direction
Logic – Gate input A - Input	1.002	1 Bit	From KNX
Logic – Gate input B - Input	1.002	1 Bit	From KNX
Logic – Gate output – Output	1.002	1 Bit	To KNX

Function name (10 Characters)

The function name can be chosen freely.
The name is visible in the group object entry in the ETS software. This makes it easier to work with the associated group objects, because the given name is displayed there as a label.

Gate type (AND gate)

The output is triggered on (1), if both inputs are switched on (1).

Gate type (OR gate)

The output is triggered on (1), if one or both inputs are switched on (1).

Gate type (XOR gate)

The output is triggered on (1), if the two inputs are not equal.

Gate type (NAND gate)

The output is triggered on (1), if one or both inputs are switched off (0).

Gate type (NOR gate)

The output is triggered on (1), if both inputs are switched off (0).

Gate type (XNOR gate)

The output is triggered on (1), if both inputs are equal.

Gate type (INVERTER)

Input on (1) is converted into output off (0). Input off (0) is converted into output on (1).

Group Object	Type KNX	Size	Direction
Logic – Gate input - Input	1.002	1 Bit	From KNX
Logic – Gate output – Output	1.002	1 Bit	To KNX



WARNING

- The device must be mounted and commissioned by an authorized electrician.
- The prevailing safety rules must be heeded.
- The device must not be opened.
- For planning and construction of electric installations, the relevant guidelines, regulations and standards of the respective country are to be considered.
- The device is a permanently connected equipment: A readily accessible disconnect device shall be incorporated external to the equipment.
- The installation requires a 16 A fuse for external overcurrent protection.
- The power rating is indicated on the side of the product.



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