# WEINZIERL

Switching Actuator 12-fold

KNX IO 512 *secure*

Operation and installation manual
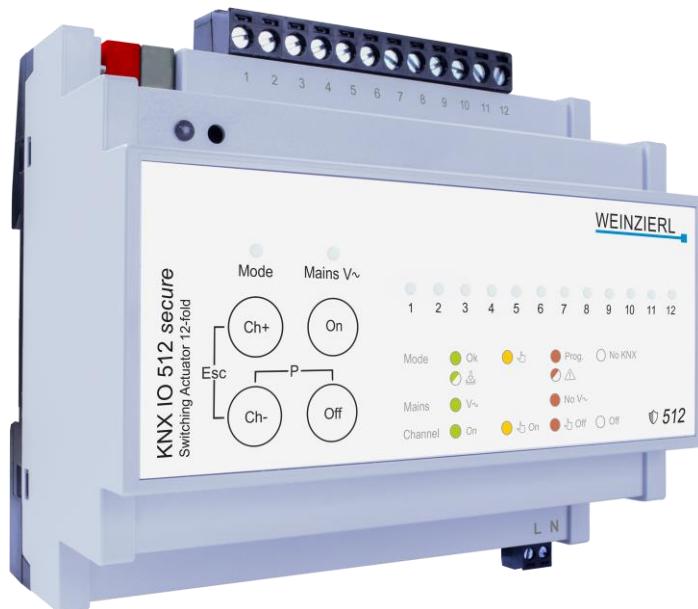
(Art. # 5491)

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Contents

1 Application

The KNX IO 512 *secure* is a compact switching actuator with 12 bistable outputs. The outputs are connected as closing contacts.

The actuator provides functions for universal outputs including scene control, switch on/off delay, staircase lighting switching and the control of heating valves (PWM for thermal actuators).

Further features:

- Central feed-in with mains monitoring
- Switching in zero crossing
- Offset switching for centralised commands
- Manual operation with multiple selection, even without KNX bus
- Direct switching with the ETS

4 buttons and 14 LEDs enable local operation and visualization of the device status.

In addition to the output channels, the device contains 15 independent logic or time functions. The device supports KNX Data Security.

2 Installation and commissioning

The KNX IO 512 *secure* is designed for installation on a DIN rail (35 mm) with a width of 1 unit (18 mm). It features the following controls and displays:

1. KNX bus connection
2. Programming LED
3. Button for programming mode
4. LED Mode (multicolor)
5. LED Mains V~ (multicolor)
6. LED Channel 1 – 12 (multicolor)
7. Button Ch+
8. Push-button Ch-
9. Button On
10. Button Off
11. Screw terminals
12. Mains voltage connection
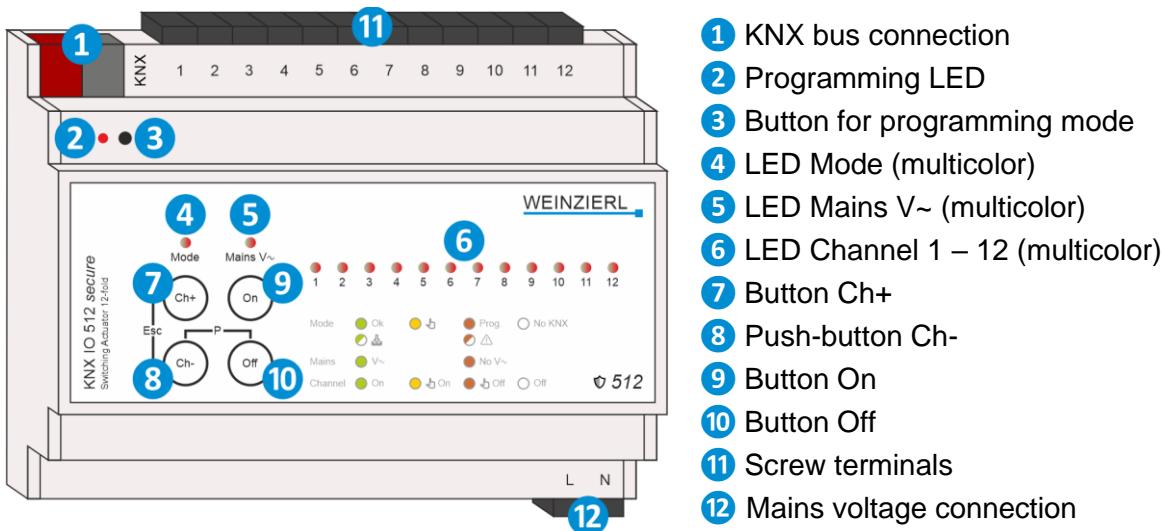
If there is no bus or mains voltage, the device has no (or limited) function.

2.1 KNX programming mode

KNX programming mode is switched on or off using the recessed KNX programming button **3** or by pressing buttons (P) **8** and **10** simultaneously.

When programming mode is active, the programming LED **2** and LED Mode **4** light up red.

The operation/display of the programming mode on the front can be disabled/enabled in the general parameters in the ETS®.

2.2 Manual operation and status display

The LED Mode **4** lights up green if KNX bus voltage is present and the LED Mains V~ **5** lights up green if mains voltage is present.

Summary of the states of the LED Mode **4**:

Behavior	Meaning
LED off	KNX bus not connected
LED lights up green	The device works in normal operating mode KNX bus is connected
LED lights up red	Programming mode is active
LED lights up orange	Manual operation is active
LED flashes red for 3 seconds	Programming mode cannot be activated KNX bus is not connected
LED flashes red	The device is not loaded correctly e.g. after canceling a download
LED flashes green	The device is currently in the ETS download

Summary of the states of the LED Mains V~ **5**:

Behavior	Meaning
LED lights up green	Mains voltage is present
LED lights up red	Mains voltage is not present
LED flashes red for 3 seconds	Manual operation cannot be started because Mains voltage is not present

Briefly pressing the Ch+ **7** or Ch- **8** button switches to manual operation. When manual operation is active, LED Mode **4** lights up orange, during which time the device cannot be controlled via the bus. The active channel is indicated by the numbered LEDs **6** in red (Off) or orange (On). The selected channel can be switched on with the On button **9** and switched off with the Off button **10**. To exit manual operation, the Ch+ **7** and Ch- **8** buttons must be pressed simultaneously.

By holding the Ch+ **7** or Ch- **8** button, several channels can be added to or removed from the selection. This allows several channels to be switched simultaneously using the On **9** and Off **10** buttons. The active channels are indicated by the numbered LEDs **6** in red (Off) or orange (On). Briefly pressing the Ch+ **7** or Ch- **8** button cancels the selection. To exit manual operation, the Ch+ **7** and Ch- **8** buttons must be pressed simultaneously.

Summary of the states of LED Channel 1 – 12 **6**:

Behavior	Meaning
LED off	Channel is switched off
LED lights up green	Channel is switched on
LED lights up red	Channel is switched off and is selected in manual operation
LED lights up orange	Channel is switched on and is selected in manual operation

Attention: If no mains voltage is present, the channel is displayed as switched off despite the relay being closed.

3 Reset to factory settings

It is possible to reset the device to the factory settings.

- Disconnect the mains voltage connection **12** from the appliance.
- Disconnect the KNX bus connection **1** from the device.
- Press and hold the KNX programming button **3**.
- Restore KNX bus connection **1** to the device.
- Press and hold the KNX programming button **3** for at least another 6 seconds.
- All LEDs (**4**, **5**, **6**) flash briefly to indicate that the factory settings have been reset successfully.

In the factory default settings, the device has the physical address 15.15.255 and no group addresses are connected. Also, KNX Data Security is disabled and the initial key (FDSK) must be used for secure commissioning.

4 Connection diagram
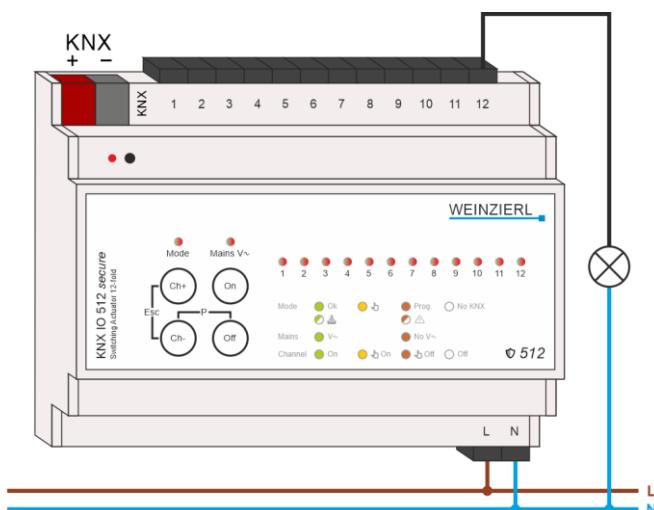
4.1 Pin assignment

Connection	Icon	Description
1	Ch 1	Channel 1 connection Output operated as closing contact
2	Ch 2	Channel 2 connection Output operated as closing contact
3	Ch 3	Channel 3 connection Output operated as closing contact
4	Ch 4	Channel 4 connection Output operated as closing contact
5	Ch 5	Channel 5 connection Output operated as closing contact
6	Ch 6	Channel 6 connection Output operated as closing contact
7	Ch 7	Channel 7 connection Output operated as closing contact
8	Ch 8	Channel 8 connection Output operated as closing contact
9	Ch 9	Channel 9 connection Output operated as closing contact
10	Ch 10	Channel 10 connection Output operated as closing contact
11	Ch 11	Channel 11 connection Output operated as closing contact
12	Ch 12	Channel 12 connection Output operated as closing contact
KNX	+	Positive connection for KNX bus
KNX	-	Ground connection for KNX bus
Net	L	Outer conductor connection
Net	N	Neutral conductor connection

5 KNX Security

The KNX standard was extended by KNX Security to protect KNX installations from unauthorized access. KNX Security reliably prevents the monitoring of communication as well as the manipulation of the system.

The specification for KNX Security distinguishes between KNX IP Security and KNX Data Security. KNX IP Security protects the communication over IP while on KNX TP the communication remains unencrypted. Thus, KNX IP Security can also be used in existing KNX systems and with non-secure KNX TP devices.

KNX Data Security describes the encryption on telegram level. This means that the telegrams on the twisted pair bus or via RF (radio frequency) are also encrypted.

Encrypted telegrams are longer than the previously used unencrypted ones. For secure programming via the bus, it is therefore necessary that the interface used (e.g. USB) and any intermediate line couplers support the so called KNX long frames.

6 ETS database

The ETS5 database (for ETS 5.7 or newer) can be downloaded from the product website of the KNX IO 512 *secure* (www.weinzierl.de) or from the ETS online catalogue.

The KNX IO 512 *secure* supports KNX Data Security to protect the device against unauthorized access from the KNX bus. If the device is programmed via the KNX bus, this is done with encrypted telegrams.

6.1 Secure commissioning

If the first product is inserted into a project with KNX Security, the ETS prompts you to enter a project password.
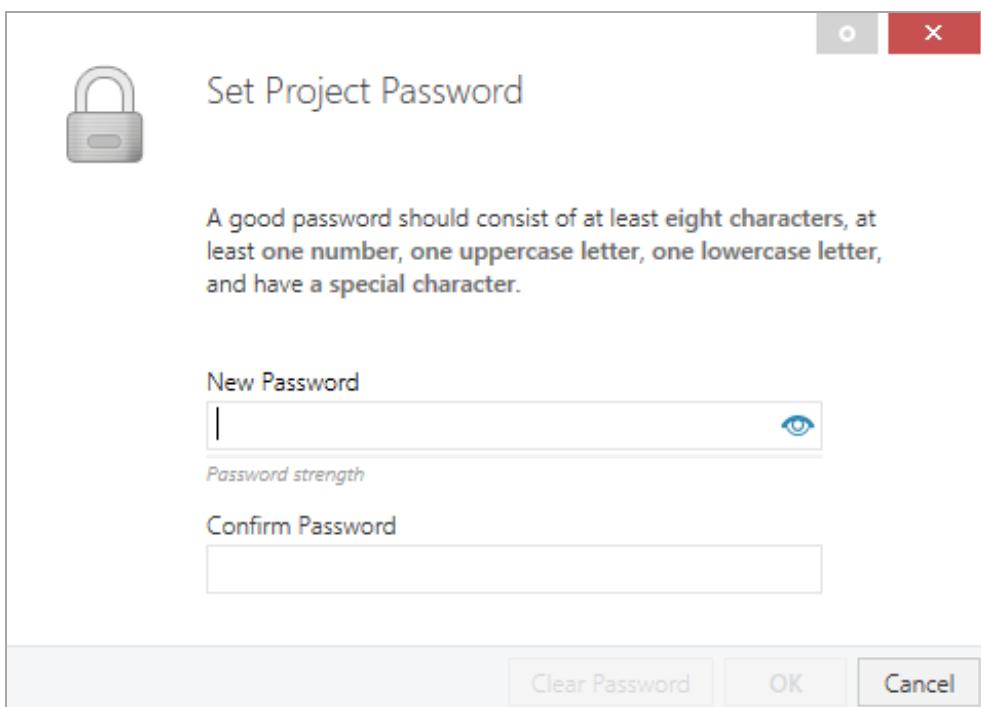
This password protects the ETS project from unauthorized access. This password is not a key that is used for KNX communication. The entry of the password can be bypassed with "Cancel", but this is not recommended for security reasons.

ETS requires a device certificate for each device with KNX Security that is created in the ETS. This certificate contains the serial number of the device as well as an initial key (FDSK = Factory Default Setup Key).
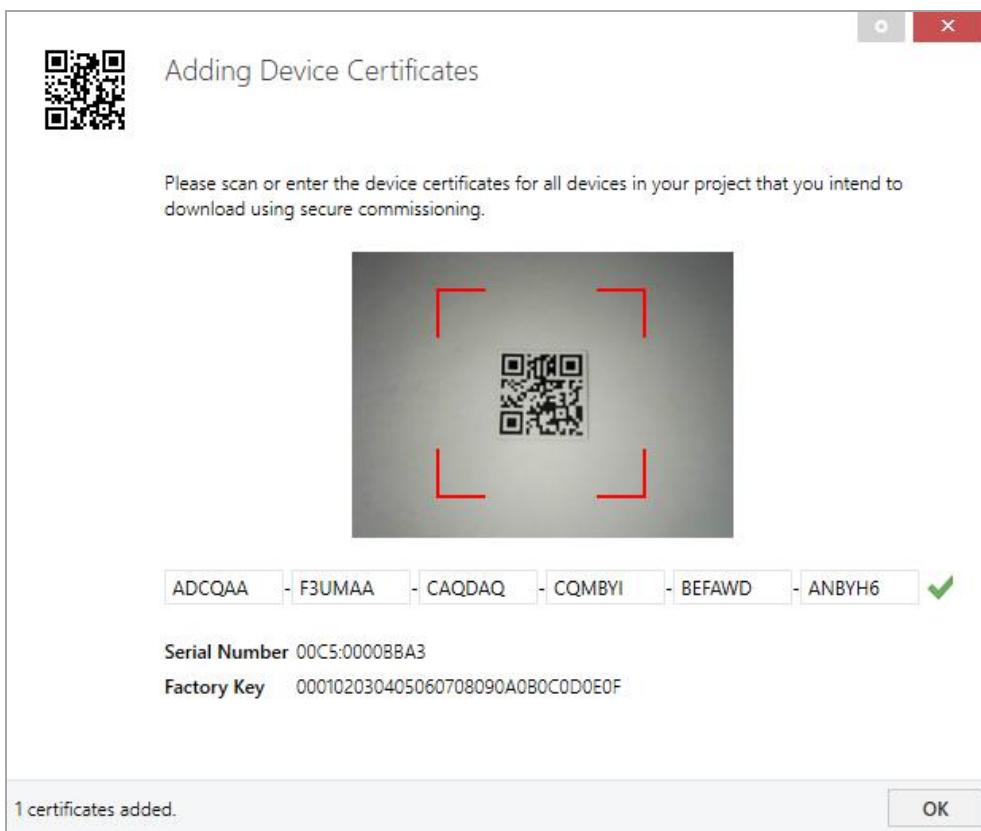
The certificate is printed as text on the device. It can also be scanned from the printed QR code via a webcam.

The list of all device certificates can be managed in the ETS panel Reports – Project Security.

This initial key is required to safely put a device into operation from the start. Even if the ETS download is recorded by a third party, the third party has no access to the secured devices afterwards. During the first secure download, the initial key is replaced by the ETS with a new key that is generated individually for each device. This prevents persons or devices who may know the initial key from accessing the device. The initial key is reactivated after a reset to factory default settings.

The serial number in the certificate enables the ETS to assign the correct key to a device during a download.

In the ETS project in the properties of the device, secure commissioning can be activated and the device certificate can be added:
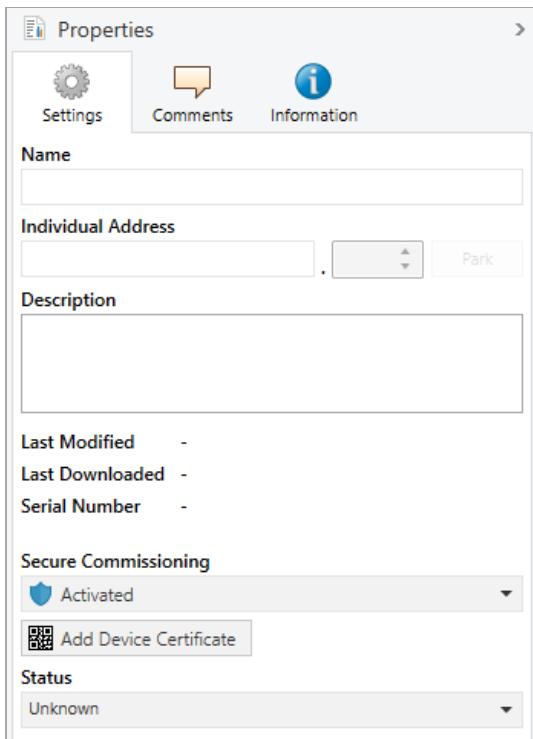
6.2   Secure group communication

Each object of the device can communicate either encrypted or unencrypted. The encryption is set under "Security" in the properties of the used group address:
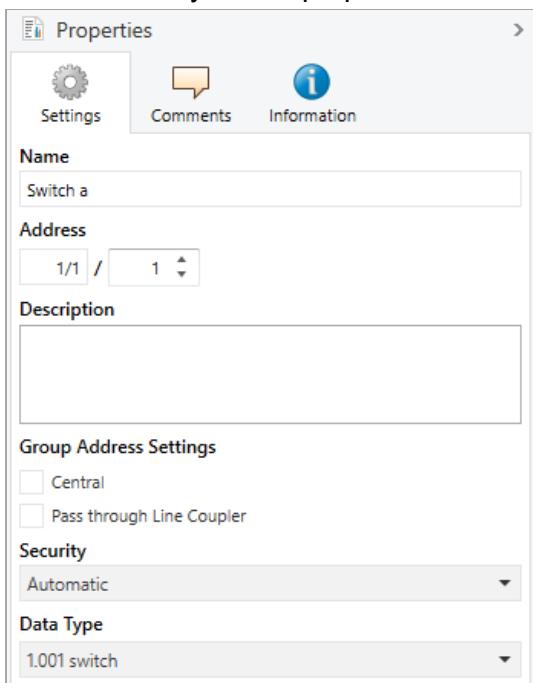
The setting "Automatic" activates encryption if both objects to be connected can communicate encrypted. Otherwise encrypted communication between the objects is not possible.

In the overview of communication objects in the ETS project, secured objects can be recognized by a shield symbol:

	Security	Number ▲	Name	Object Function	Description	Group Address
▪↹	🛡	11	Button A0: Object a	Switch	Switch a	1/1/1
▪↹		12	Button A0: Object b	Switch	Switch b	1/1/2
▪↹	🛡	21	Button A1: Object a	Switch	Switch a	1/1/1
▪↹		22	Button A1: Object b	Switch	Switch b	1/1/2

A separate key is automatically generated by the ETS for each secured group address. These keys can also be checked in the ETS panel Reports – Project Security. To enable all devices to communicate with a secure group address, the keys must be known to all. Therefore a download must be made into all devices that use this group address when a key is created or changed. A key is changed by the ETS e.g. when the encryption of a group address is switched off and on again.

6.3 Description

1.1.1 KNX IO 512 secure > Description	
Description	
General settings	KNX IO 512 secure Switching Actuator 12-fold
Test channels	
Diagnostics	
+ Channel 1	The KNX switching actuator KNX IO 512 secure offers 12 bistable relay outputs that are optimised primarily for the requirements of LED lights. However, other loads can also be switched.
+ Channel 2	The actuator offers comprehensive functions for universal outputs including scenes, switch-on and switch-off deay, staircase lighting switching and the control of heating valves (PWM for thermal actuators).
+ Channel 3	Further features:
+ Channel 4	- Central feed-in with mains monitoring - Switching in zero crossing
+ Channel 5	- Offset switching for centralised commands - Manual operation with multiple selection, even without KNX bus
+ Channel 6	- Direct switching with the ETS
+ Channel 7	Four push buttons and 14 LEDs allow a local operation and a visualization of the device state.
+ Channel 8	In addition to the output channels the device includes 16 independent functions for logic or timer control.
+ Channel 9	The device supports KNX Data Security.

The KNX switching actuator KNX IO 512 secure offers 12 bistable relay outputs that are optimised primarily for the requirements of LED lights. However, other loads can also be switched.

The actuator offers comprehensive functions for universal outputs including scenes, switch-on and switch-off deay, staircase lighting switching and the control of heating valves (PWM for thermal actuators).

Further features:
- Central feed-in with mains monitoring
- Switching in zero crossing
- Offset switching for centralised commands
- Manual operation with multiple selection, even without KNX bus
- Direct switching with the ETS

Four push buttons and 14 LEDs allow a local operation and a visualization of the device state.

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

The device supports KNX Data Security.

Wiring scheme:

Please consult device data sheet and manual for further information.

Contact:

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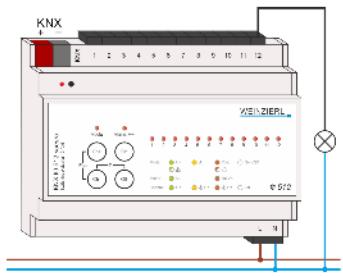
This page shows the device description and the corresponding wiring scheme.

6.4 General settings

Device name *(30 characters)*

Any name can be assigned to the KNX IO 512 *secure*. The device name should be meaningful, e.g. "Living room". This helps clarity in 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 ❸, the device allows activating the programming mode on the device front without opening the switchboard cover. Programming mode can be enabled and disabled by pressing buttons ❽ and ❿ simultaneously.

This function can be enabled and disabled via the parameter "Prog. Mode on device front" parameter to switch it on and off. The recessed programming button ❸ (next to the programming LED ❷) is always enabled and is not affected by this parameter.

Manual operation on the device

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

The device is in normal operating mode when manual operation is not active. In manual operation mode, received switching telegrams are ignored. When manual operation is ended (after the time limit has expired or manually), the last status of the outputs is retained until a switching telegram is received again. The following configuration options are available:

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

Min. offset when switching on

Enables several channels to be switched on at different times, e.g. to prevent voltage peaks in capacitive power supply units.

The choice is yours:

- Disabled
- 100 ms
- 200 ms
- 300 ms
- 400 ms
- 500 ms
- 600 ms
- 700 ms
- 800 ms
- 900 ms
- 1 s

Heartbeat

Sends values cyclically to the KNX bus to indicate that the device is currently ready for operation. The cycle time can be selected between 1 minute and 24 hours.

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

Send manual control status

This parameter can be used to query and output the current status of manual operation via a group object entry.

The following options are available:

- Disabled
  Status objects are disabled and hidden
- Only on request
  Send status objects only for read requests
- On change
  Send status objects on value change
- Cyclic and on change
  Send status objects cyclic and on value change

Cycle time *(for send manual operation status = 'Cyclic and on change')*

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Output

This parameter can be used to invert the value sent at the output:

- Not inverted
- Inverted

Group object	Type KNX	Size	Direction
GO 2 Manual operation – State	1.001	1 Bit	To KNX

Send operation data

This parameter can be used to query and output the total operating time and/or the total consumption of all channels via group object entries.

The choice is yours:

- Disabled
  The output of the total operating time and total consumption is disabled and the group object entries are hidden.
- Total operating time
  Outputs the total operating time for a group object entry in which at least one channel was switched on.
- Total consumption
  Outputs the total energy consumption of all channels via a group object entry. To do this, the consumption on the channel must be specified (see point 6.5 Channel 1 – 12: General under Average energy consumption).
- Both
  Combination of the two previous options

Send value *(with Send operation data != "Disabled")*

This parameter determines the sending behavior of the status objects.

The choice is yours:

- Only on read
  Send status objects only for read requests
- Cyclic by real time
  Status objects send cyclically according to past real time.
- Cyclic by operation time
  Status objects send cyclically according to elapsed operating time.
- Cyclic by real and operation time
  Status objects send cyclically according to past real time and past operating time. Various values can be selected for the respective times.

Cycle time (real time)

(with Send value = "Cyclic by real time" OR "Cyclic by real and operation time")

This parameter defines the cycle time after elapsed real time. Values range from 1 minute to 7 days.

Cycle time (operation time)

(with Send value = "Cyclic by operation time" OR "Cyclic by real and operation time")

This parameter defines the cycle time depending on the elapsed time during which the channel was active. Values range from 1 minute to 7 days.

Output *(with Send operation data = "Total consumption" OR "Both")*

Here you can select whether the total consumption should be displayed in Wh or kWh.

Group object	Type KNX	Size	Direction
GO 3 Total operation time in s – State	13.100	4 Byte	To KNX
GO 4 Total energy consumption in Wh – State	13.010	4 Byte	To KNX
GO 5 Total energy consumption in kWh – State	13.013	4 Byte	To KNX
GO 5 Operation time totals – Reset	1.015	1 Bit	From KNX

Send mains power state

This parameter can be used to query and output the current mains voltage status via a group object entry.

The choice is yours:

- Disabled
  Status objects are disabled and hidden
- Only on read
  Send status objects only for read requests
- Only on change
  Send status objects on value change
- Cyclic and on change
  Status objects send cyclically and on value change

Output

This parameter can be used to invert the value sent at the output:

- Not inverted
- Inverted

Cycle time *(with Send mains power state* = "Cyclic and on change")

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Group object	Type KNX	Size	Direction
GO 5 Mains power – State	1.001	1 Bit	To KNX

Send bus power loss counter

This parameter can be used to query and output the current number of bus voltage failures via a group object entry.

The choice is yours:

- Disabled
  Status objects are disabled and hidden
- Only on read
  Send status objects only for read requests
- Only on change
  Send status objects on value change
- Cyclic and on change
  Status objects send cyclically and on value change

Cycle time *(with Send bus power loss counter* = "Cyclic and on change")

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Group object	Type KNX	Size	Direction
GO 7 Bus power loss counter – State	13.001	4 Byte	To KNX

Send bus power uptime

This parameter can be used to query and output the total time during which the bus voltage was available via a group object entry.

The choice is yours:

- Disabled
  Status objects are disabled and hidden
- Only on read
  Send status objects only for read requests
- Cyclic
  Send status objects cyclically

Cycle time *(with Send bus power uptime* = "Cyclic and on change")

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Group object	Type KNX	Size	Direction
GO 8 Bus power uptime in s – State	13.100	4 Byte	To KNX

Send mains power loss counter

This parameter can be used to query and output the current number of mains voltage failures via a group object entry.

The choice is yours:

- Disabled
  Status objects are disabled and hidden
- Only on read
  Send status objects only for read requests
- Only on change
  Send status objects on value change
- Cyclic and on change
  Status objects send cyclically and on value change

Group object	Type KNX	Size	Direction
GO 9 Mains power loss counter – State	13.001	4 Byte	To KNX

Cycle time *(with Send mains power loss counter* = "Cyclic and on change")

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Send mains power uptime

This parameter can be used to query and output the total time during which the bus voltage was available via a group object entry.

The choice is yours:

- Disabled
  Status objects are disabled and hidden
- Only on read
  Send status objects only for read requests
- Cyclic
  Send status objects cyclically

Cycle time *(with Send mains power uptime* = "Cyclic and on change")

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Group object	Type KNX	Size	Direction
GO 10 Mains power uptime in s – State	13.100	4 Byte	To KNX

6.5   Test channels

This parameter page enables the channels to be switched on and off manually directly in the ETS without having to physically operate the device. The current status of each actuator and the mains voltage is also displayed. The display is updated when switching via the on/off buttons in the ETS or via the "Refresh" button. Only the physical address needs to be programmed to activate this function.

When the channels are activated via the ETS, control via the bus is deactivated. The device is reset to normal operation one minute after the last button is pressed.

6.6 Diagnostics

This parameter page enables the display of diagnostic data directly in the ETS without having to read out group objects. The availability and the number of power failures of the BUS and mains voltage are displayed. For each channel the operating time, the energy consumption and the number of switching cycles as well as the aggregated values for all channels are displayed. The display is updated using the "Refresh" buttons. To activate the function, only the physical address needs to be programmed.

Show reset buttons

This parameter activates buttons for resetting the diagnostic data of the channels.

6.7   Channel 1 – 12: General

Name *(30 characters)*

Any name can be assigned to the channel. However, this should be unique and meaningful, as this makes it easier to work with the associated group objects later on, as the assigned name is displayed there as a designation. If no name is assigned, the group objects are labeled "Channel 1 – 12: ...".

Function

This parameter defines the functionality of the channel. The following options are available:

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

> ℹ️ *More detailed descriptions of the functions can be found in the sections "Channel 1 – 12: ..."*

Scene function *(with Function = "Universal output")*

The scene function can be enabled or disabled here. If this function is enabled, the respective group object appears, as well as the parameter page "Channel 1 – 12: Scene function" for further configuration of scenes 1 - 16.

Group object	Type KNX	Size	Direction
GO 15 Channel 1 – 12: Scene - Active / Lrn.	18.001	1 Byte	From KNX

Send value *(with Function != "Disabled")*

This parameter defines the sending behavior of the status objects:

- Disabled
  Status objects are disabled and hidden
- Only on read
  Send status objects only for read requests
- Only on change
  Send status objects on value change
- Cyclic and on change
  Status objects send cyclically and on value change

Group object	Type KNX	Size	Direction
GO 14 Channel 1 – 12: Output - Status	1.001	1 Bit	To KNX
GO 15 Channel 1 – 12: Valve actuator (PWM) - Status*	5.001	1 Byte	To KNX

* with function = "Valve actuator (PWM for therm. actuators)"

Cycle time *(with Send value = "Cyclic and on change")*

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Lock function *(with Function = "Universal output" OR "On/Off delay" OR "Staircase function")*

The disable function can be enabled or disabled here. If this function is enabled, the respective group objects and the "Channel 1 – 12: Disable function" parameter page appear for further configuration. If the disable function has been enabled via the "Disable" group object, the received switching telegrams are not executed.

In addition to the lock object, there is also a priority object that can be used to switch independently of the lock. This makes it possible to set an initial state without affecting other functions.

Group object	Type KNX	Size	Direction
GO 12 Channel 1 – 12: Lock - Activate	1.001	1 Bit	From KNX
GO 13 channel 1 – 12: Prior. Output - Switch	1.001	1 Bit	From KNX

Lock function *(with Function "Valve actuator (PWM for therm. actuators)")*

The disable function can be enabled or disabled here. If this function is enabled, the respective group objects and the "Channel 1 – 12: Disable function" parameter page appear for further configuration. If the disable function has been enabled via the "Disable" group object, the control values received are not evaluated.

In addition to the disable object, a priority object, which can be used to set the control value independently of the disable, offers a further control option. This makes it possible to output a PWM without affecting other functions.

When the block is ended, the last control value received (not priority object) is output as PWM at the output

Group object	Type KNX	Size	Direction
GO 12 Channel 1 – 12: Lock - Activate	1.001	1 Bit	From KNX
GO 13 Channel 1 – 12: Prior. valve actuator (PWM) - Control value	5.001	1 Byte	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 be controlled by use of the priority object without canceling the lock.

Behavior on bus power loss *(with Function != "Disabled")*

The behavior that is maintained at the output during the bus voltage failure can be configured here.

The choice is yours:

- No reaction
- Switch on
- Switch off

Behavior after bus power return *(with Function != "Disabled")*

The behavior of the output after bus voltage recovery can be configured here.

The choice is yours:

- No reaction
- Switch on
- Switch off
- Status as before bus voltage failure

Behavior on mains power loss *(with Function != "Disabled")*

The behavior that is maintained at the output during the mains voltage failure can be configured here.

The choice is yours:

- No reaction
- Switch on
- Switch off

Behavior after mains power return *(with Function != "Disabled")*

The behavior of the output after mains voltage recovery can be configured here.

The choice is yours:

- No reaction
- Switch on
- Status as before mains voltage failure

> *In the event of bus and mains failure, the configured behavior of the voltage that failed first is used. On voltage recovery, the behavior of the mains voltage recovery has priority.*

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 be controlled by use of the priority object without canceling the lock.

Send operation data

This can be used to query the operating and/or consumption time of an individual channel via group object entries.

The following options are available:

- Disabled
  The output of the operating and consumption time is disabled and the group object entries are hidden
- Send time
  Outputs the operating time via a group object entry.
- Send consumption
  Outputs the total power consumption of the channel via a group object entry.
- Send both
  Combination of the two previous options

Send value *(with Send operation data != "Disabled")*

This parameter determines the sending behavior of the status objects.

The choice is yours:

- Only on read
  Send status objects only for read requests
- Cyclic by real time
  Status objects send cyclically according to past real time.
- Cyclic by operation time
  Status objects send cyclically according to elapsed operating time.
- Cyclic by real-time and operating time
  Status objects send cyclically according to past real time and past operating time. Various values can be selected for the respective times.

Cycle time (real time)

(with Send value = "Cyclic by real time" OR "Cyclic by real-time and operating time")

This parameter defines the cycle time after elapsed real time. Values range from 1 minute to 7 days.

Cycle time (operation time)

(with Send value = "Cyclic by operation time" OR "Cyclic by real-time and operating time")

This parameter defines the cycle time depending on the elapsed time during which the channel was active. Values range from 1 minute to 7 days.

Average power draw [W] *(with Send operation data = "Energy consumption" OR "Both")*

Determines the average energy consumption of the connected device in watts.

Output *(with Send operation data = "Energy consumption" OR "Both")*

Here you can select whether the total consumption should be displayed in Wh or kWh.

Group object	Type KNX	Size	Direction
GO 16 Channel 1 – 12: Operation time in s – State	13.100	4 Byte	To KNX
GO 17 Channel 1 – 12: Operation time – Reset	1.015	1 Bit	From KNX
GO 18 Channel 1 – 12: Energy consumption in kWh – State	13.010	4 Byte	From KNX
GO 18 Channel 1 – 12: Energy consumption in Wh – State	13.013	4 Byte	From KNX
GO 19 Channel 1 – 12: Energy consumption – Reset	1.015	1 Bit	From KNX

Send switching cycle counter

This parameter can be used to query and output the current number of switching cycles via a group object entry.

The choice is yours:

- Disabled
  Status objects are disabled and hidden
- Only on read
  Send status objects only for read requests
- Only on change
  Send status objects on value change
- Cyclic and on change
  Status objects send cyclically and on value change

Cycle time *(with Send switching cycle counter = "Cyclic and on change")*

This parameter defines the cycle time. Values range from 1 minute to 7 days.

Group object	Type KNX	Size	Direction
GO 20 Channel 1 – 12: Switch cycle counter – State	13.100	4 Byte	To KNX

6.8   Channel 1 – 12: Locking function

Condition:

Function is *"Universal output"*, *"On/Off delay"* or *"Staircase function"*.

Polarity of object

The mode of action of the object can be used to set how the lock is to be enabled - either by receiving a 1 or a 0.

The choice is yours:

- Lock active at 1
- Lock active at 0

Behavior on start

The status that is set when the lock is enabled at the output can be configured here.

The choice is yours:

- No reaction
- Switch on
- Switch off

Behavior at end

The status that is set when the lock is disabled at the output can be configured here.

The choice is yours:

- No reaction
- Switch on
- Switch off
- Status before lockdown
  This restores the original status before the lock was enabled.
  Switching telegrams received during the block are ignored.
- Status without lock
  The status of the last received switching telegram is restored here.
  This means that the received switching telegrams are taken into account during the block.
  This means that the status of the last switching telegram received is set when the lock is disabled.

Condition:

Function is "Valve actuator (PWM for thermal switching actuators)".

Polarity of object

The mode of action of the object can be used to set how the lock is to be enabled - either by receiving a 1 or by receiving a 0.

Behavior on start

The behavior at the output for the disable function can be configured here.

The choice is yours:

- No reaction
  The PWM value remains the same when the lock is enabled.
- Value
  When the lock is enabled, a defined PWM value is output.

Control value (PWM)

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

6.9   Channel 1 – 12: Universal output

If the universal output is selected for Function on the "Channel 1 – 12: General" parameter page, the channel can be used as a switching output. A parameter for the scene function is also displayed.

Group object	Type KNX	Size	Direction
GO 11 Channel 1 – 12: Output - Switch	1.001	1 Bit	From KNX

6.10 Channel 1 – 12: 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
  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 configured any scene numbers twice.

6.11 Channel 1 – 12: On/Off delay
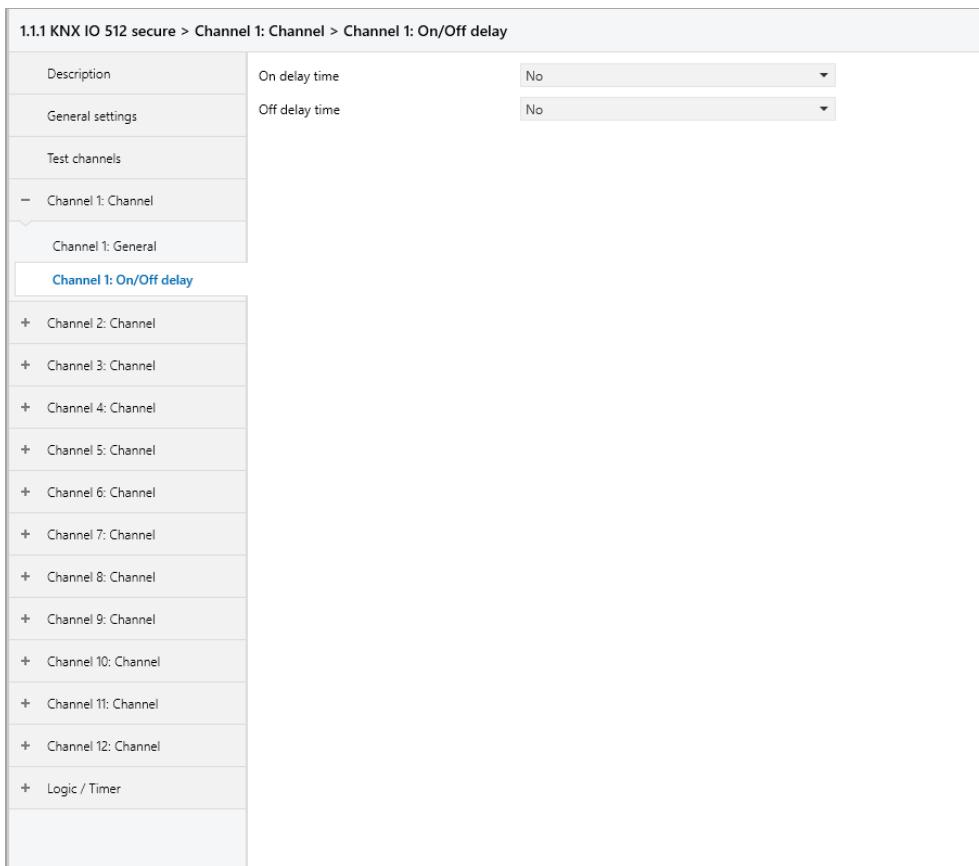
If the on/off delay is selected on the parameter page "Channel 1 – 12: General", delayed switching times can be configured. The "Channel 1 – 12: On/Off Delay" parameter page is displayed for this purpose.

Group object	Type KNX	Size	Direction
GO 11 Channel 1 – 12: Output - Switch	1.001	1 Bit	From KNX

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.

6.12 Channel 1 – 12: Staircase function

If the staircase function is selected on the parameter page "Channel 1 – 12: General", a group object for the staircase function appears in addition to the normal switching object. Via the additional parameter page "Channel 1 – 12: Staircase function" this function can be configured.

Group object	Type KNX	Size	Direction
GO 11 Channel 1 – 12: Output - Switch	1.001	1 Bit	From KNX
GO 15 Channel 1 – 12: Staircase function - Trigger	1.010	1 Bit	From KNX

Switch off time

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

Reaction to '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.

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.

6.13 Channel 1 – 12: Valve actuator (PWM for thermal servo)

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 A / B: 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 A / B: 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 11 Channel 1 – 12: Valve actuator (PWM) - control value	5.001	1 Byte	From KNX

Cycle 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.

Typical thermal servo requires several minutes for a valve change of 100 %.

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 for 8 min / OFF for 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.

Example:

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.

Monitoring interval *(with Stuck protection = "Enabled")*

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.

Execution time *(with Stuck protection = "Enabled")*

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

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 wentroller 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.

Monitoring interval *(with Protection on missing control value = "Enabled")*

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.

Protection control value (PWM) *(with Protection on missing control value = "Enabled")*

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.

6.14 Logic / Timer / Calculation

Function 1 – 16

These parameters contain the functions timer and logic, whereby all 16 functions are identical.

The following options are available:

- Disabled
  No parameters and group objects for timer and logic.
- Timer
  Parameters and group objects for timer are available.
- Logic
  Parameters and group objects for logic are available.
- Compare
- Parameters and group objects for compare are available.
- Calculation
  Parameters and group objects for calculation are available.

> *The functions for timer and logic 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.*

6.15 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

The type of time switch can be selected here:

- Switch-on delay
  The ON telegram (1) received on the input is delayed on the output.
  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

- **Switch-off delay**

  The OFF telegram (0) received on the input is delayed on the output.

  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

- **Switch-on and switch-off delay**

  The ON/OFF telegram (1/0) received on the input is delayed on the output.

  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

- **Impulse (staircase)**

  The ON telegram (1) received on the input is sent on the output. After a delay the output sends the OFF telegram (0).

  Input: `--1---------0------`

  Output: `--1-T-0-----------`

Group object	Type KNX	Size	Direction
Timer – Impulse (staircase) – Input	1.002	1 Bit	From KNX
Timer – 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.*

Delay [s]

This parameter defines the delay when sending at the output.

Output

Via this parameter the sent value on the output can be inverted:

- Not inverted
- Inverted

6.16 Function 1 – 16: Logic

Function name *(10 characters)*

The function name can be freely selected.

It is visible in the group object entry in the ETS software. This makes it easier to work with the associated group objects later, as the assigned name is displayed there as a designation.

Gate type

This parameter defines the type of logic gate:

- And gate
  The output is triggered ON (1), if all inputs are switched ON (1).
- OR gate
  The output is triggered ON (1), if at least one input is switched ON (1).
- XOR gate
  The output is triggered ON (1), if an odd number of inputs is switched ON (1).
- NAND gate
  The output is triggered ON (1), if at least one inputs is switched OFF (0).
- NOR gate
  The output is triggered ON (1), if all inputs are switched OFF (0).
- XNOR gate
  The output is triggered ON (1), if an even number of inputs is switched ON (1).

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
Logic – Gate input C – Input	1.002	1 Bit	From KNX
Logic – Gate input D – Input	1.002	1 Bit	From KNX

The output sends when a telegram is received at an input. The condition for this is that both inputs are valid (have received at least one telegram). The output sends a 1 if the respective condition is fulfilled, otherwise a 0.

- INVERTER
  The input is inverted at the output, ON (1) becomes OFF (0) and OFF (0) becomes EIN (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

The output transmits when a telegram is received at the input.

Number of inputs

This parameter defines the number of inputs for the logic gate.

Input (A, B, C, D)

This parameter specifies whether the input is to be filled via an external (from the bus) or internal value (from the device).

Value (A, B, C, D) *(with Input (A, B, C, D) = "Internal")*

This parameter defines the internal value that is used as an input.

The status of a channel can only be used as a value for the input if Send value is enabled for this channel.

Send cyclically

This parameter specifies whether the result is sent cyclically and at what interval.

6.17 Function 1 – 16: Compare

Function name *(10 Characters)*

The function name can be freely selected.

It is visible in the group object entry in the ETS software. This makes it easier to work with the associated group objects later, as the assigned name is displayed there as a description.

Operation

This parameter defines the type of comparison operation used to compare the values of input A and B:

- A < B
  Input A is less than input B
- A = B
  Input A is equal to input B
- A > B
  Input A is higher than input B

Input type

This parameter defines the type of inputs:
- Percent (DPT 5.001 - 1 Byte)
  Value range: 0 ($\triangleq$ 0) - 100% ($\triangleq$ 255)
- Integer (DPT 5.010 - 1 Byte)
  Wertebereich: 0 - 255
- Integer (DPT 7.001 - 2 Byte)
  Value range: 0 - 65535
- Integer (DPT 12.001 - 4 Bytes)
  Value range: 0 - 4294967295
- Float (DPT 9.001 - 2 Bytes)
  Value range: -671088.64 - +670433.28
- Float (DPT 14.001 - 4 Bytes)
  Value range: -3.4E+38 - +3.4E+38

Input A

This parameter specifies whether the input is to be filled via an external (from the bus) or internal value (from the device).

Value A *(with Input A = "Internal")*

This parameter defines the internal value that is used as an input.

The control value (DPT 5.010) of the channel can only be used as the value for the input if the channel is configured as a valve actuator and Send value is enabled.

Input B

This parameter specifies whether the input is to be filled via an external (from the bus), static (from the ETS) or internal value (from the device).

Value B *(with Input B = "Internal" OR Input B = "Static")*

This parameter defines the static or internal value that is used as an input.

The control value (DPT 5.010) of the channel can only be used as the value for the input if the channel is configured as a valve actuator and Send value is enabled.

For a combination of internal and external inputs, both should have an equivalent type. Otherwise, a new calculation function with the "Convert value" operation may help.

Send cyclically

This parameter specifies whether the result is sent cyclically and at what interval.

Group object	Type KNX	Size	Direction
Logic – Comparison – ... Byte input A*	5.001, 5.010, 7.001, 12.001, 9.001, 14.001**	1 Byte, 2 Byte, 4 Byte	From KNX
Logic – Comparison – ... Byte input B*	5.001, 5.010, 7.001, 12.001, 9.001, 14.001**	1 Byte, 2 Byte, 4 Byte	From KNX
Logic – Comparison – Output	1.002	1 Bit	To KNX

* Only for „Input A"/ "Input B" parameter = External

** Type KNX determined by "Input type" parameter

The output sends when a telegram is received at an input. The condition for this is that both inputs are valid (have received at least one telegram). The output sends a 1 if the respective condition is fulfilled, otherwise a 0.

6.18 Function 1 – 16: Calculation

Description	**Function 1: Calculation**
General settings	
Test channels	Function name
Diagnostics	Operation — Average of Input A and B
+ Channel 1	Input type — Integer (DPT 5.010 - 1 Byte)
+ Channel 2	Input A — ● External ○ Internal
+ Channel 3	Input B — External
+ Channel 4	Send cyclically — Disabled

(Navigation list: Channel 5, Channel 6, Channel 7, Channel 8, Channel 9, Channel 10, Channel 11, Channel 12, Logic / Timer / Calculation, Logic / Timer / Calculation, **Function 1: Calculation**)

Function name *(10 Characters)*

The function name can be freely selected.

It is visible in the group object entry in the ETS software. This makes it easier to work with the associated group objects later, as the assigned name is displayed there as a description.

Operation

This parameter defines the type of comparison operation:

- Average value of input A and B
  (input A + input B) / 2
- Convert value
  Convert input A to another type
- Limit value
  Limit input A

Input type *(with Input A != "Internal" OR for Input B != "Internal")*

This parameter defines the type of input:

- Percent (DPT 5.001 - 1 Byte)
  Value range: 0 (≙ 0) - 100% (≙ 255)
- Integer (DPT 5.010 - 1 Byte)
  Value range: 0 - 255
- Integer (DPT 7.001 - 2 Bytes)
  Value range: 0 - 65535
- Integer (DPT 12.001 - 4 Bytes)
  Value range: 0 - 4294967295
- Floating point number (DPT 9.001 - 2 Bytes)
  Value range: -671088.64 - +670433.28
- Floating point number (DPT 14.001 - 4 Bytes)
  Value range: -3.4E+38 - +3.4E+38

Input A

This parameter specifies whether the input is to be filled via an external (from the bus) or internal value (from the device).

Value A *(with Input = "Internal")*

This parameter defines the internal value that is used as the input.

The control value (DPT 5.010) of the channel can only be used as the value for the input if the channel is configured as a valve actuator and Send value is enabled.

Input B *(with Operation = "Average value of input A and B")*

This parameter specifies whether the input is to be filled via an external (from the bus), static (from the ETS) or internal value (from the device).

Value B *(with Input B = "Internal" OR Input B "Static")*

This parameter defines the static or internal value that is used as an input.

The control value (DPT 5.010) of the channel can only be used as the value for the input if the channel is configured as a valve actuator and Send value is enabled.

> *For a combination of internal and external inputs, both should have an equivalent type. Otherwise, a new calculation function with the "Convert value" operation may help.*

Correction *(with Operation = "Convert value")*

This parameter specifies whether the value is to be added with an offset or multiplied by a factor.

Offset *(with Correction = "Offset" AND for output type != "Binary (DPT 1.002 - 1 Byte)")*

This parameter defines the offset that is added to the input.

Factor *(with Correction = "Factor" AND for output type != "Binary (DPT 1.002 - 1 Byte)")*

This parameter defines the factor by which the input is multiplied.

Send 1 on *(with Operation = "Convert value" AND for output type = "Binary (DPT 1.002 - 1 Byte)")*

This parameter specifies whether 1 is sent at input A lower or higher than the threshold value.

Threshold value
(with Operation = "Convert value" AND for output type = "Binary (DPT 1.002 - 1 Byte)")

This parameter defines the threshold value to which the input is compared.

Limit (min.) *(with Operation = "Limit value")*

This parameter defines the lower limit with which the output is limited.

Limit (Max.) *(with Operation = "Limit value")*

This parameter defines the upper limit with which the output is limited.

Output type *(with Operation = "Convert value")*

This parameter defines the type of input:

- Binary (DPT 1.002 - 1 Byte)
  Value range: 0 - 1
- Percent (DPT 5.001 - 1 Byte)
  Value range: 0 ($\triangleq$ 0) - 100% ($\triangleq$ 255)
- Integer (DPT 5.010 - 1 Byte)
  Value range: 0 - 255
- Integer (DPT 7.001 - 2 Bytes)
  Value range: 0 - 65535
- Integer (DPT 12.001 - 4 Bytes)
  Value range: 0 - 4294967295
- Floating point number (DPT 9.001 - 2 Bytes)
  Value range: -671088.64 - +670433.28
- Floating point number (DPT 14.001 - 4 Bytes)
  Value range: -3.4E+38 - +3.4E+38

Send cyclically

This parameter specifies whether the result is sent cyclically and at what interval.

Group object	Type KNX	Size	Direction
Logic – Calculation – … Byte Input A*	5.001, 5.010, 7.001, 12.001, 9.001, 14.001**	1 Byte, 2 Byte, 4 Byte	Von KNX
Logic – Calculation – … Byte Input B*	5.001, 5.010, 7.001, 12.001, 9.001, 14.001**	1 Byte, 2 Byte, 4 Byte	Von KNX
Logic – Calculation – … Output	1.002, 5.001, 5.010, 7.001, 12.001, 9.001, 14.001***	1 Bit, 1 Byte, 2 Byte, 4 Byte	Nach KNX

Only for "Input A"/"Input B" parameter = External

** Type KNX determined by "Input type" parameter

*** Type KNX is determined by the types of the inputs. With the Operation "Convert value", the output type can be freely chosen.

> *The output sends when a telegram is received at an input. The condition for this is that both inputs are valid (have received at least one telegram). The output sends a 1 if the respective condition is fulfilled, otherwise a 0.*

> ⚠️ **WARNING**
>
> - The appliance may only be installed and put into operation by an authorized electrician.
> - The applicable safety and accident prevention regulations must be observed.
> - The appliance must not be opened.
> - When planning and installing electrical systems, the relevant guidelines, regulations and provisions of the respective country must be observed.
> - This appliance is permanently connected, therefore an easily accessible disconnecting device must be installed outside the appliance.
> - The connection requires a 16 A fuse for external overcurrent protection.
> - The power specifications are located on the side of the product.

Zero crossing detection using the patent no. EP2107585A2, Eltako GmbH Fellbach.

KNX

Product database for ETS 5/6
www.weinzierl.de/de/products/512/ets6

Data sheet
www.weinzierl.de/de/products/512/datasheet

CE declaration
www.weinzierl.de/de/products/512/ce-declaration

Tender text
www.weinzierl.de/de/products/512/tender-text

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