KNX Home Automation

Manual 53KNX10012

M0758 - REV00
November 2023

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General information

Item 53KNX10012 allows the independent switching of twelve electrical loads. The device is equipped with an integrated interface module to the KNX bus and is built in an eight-module DIN-rail housing, ready for installation on a unified rail within electrical panels. During operation, the module receives communication telegrams from the KNX bus sent by another device (e.g. a manual command, sensor, timer etc.).
These telegrams cause outputs to be activated or deactivated by applying a series of utility functions defined according to the programming. Manual control of the outputs is also possible using the front panel buttons; LED indicators allow monitoring the status of the outputs. The device draws its power supply exclusively from the KNX bus line with a SELV voltage of 30 VDC.

Characteristics

The characteristics are described with reference to fig. 1

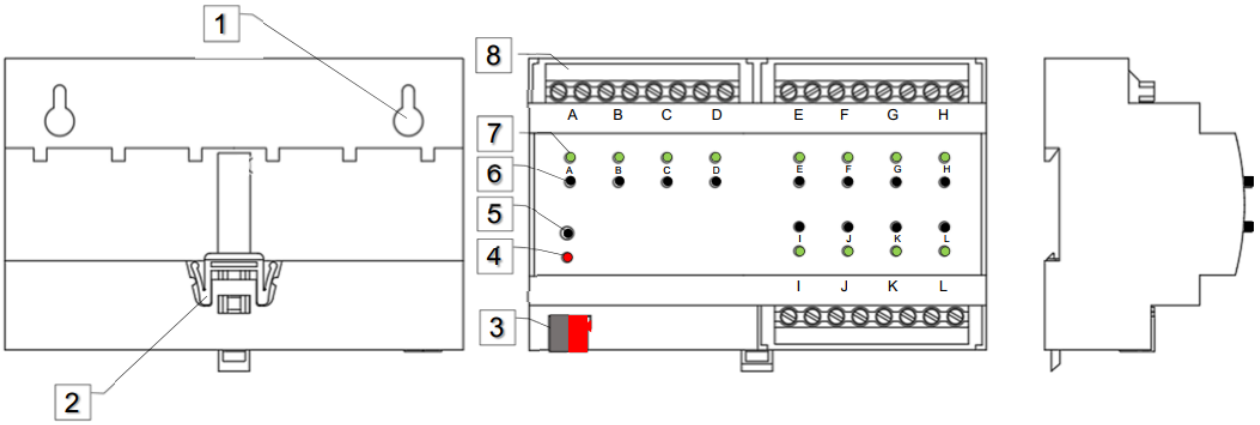


fig. 1a fig. 1b fig. 1c

Legend - fig. 1

1. Wall fixing slot
2. DIN rail coupling tooth
3. KNX bus line connection terminals
4. Programming LEDs
5. Programming button
6. Button to force channel A (also in line for channels B ÷ H and bottom right for channels I ÷ L)
7. Channel A status LED (also in line for channels B ÷ H and bottom right for channels I ÷ L)
8. Output connection terminals: in-line for channels A to H and bottom right for channels I to L.

Mechanical

- Mechanical classification according to EN 50491-2: 3M2.
- Container: 8 DIN modules (142 l x 90 h x 64 d) mm
- Protection rating: IP20 (IP40 when installed).
- Container colour: grey RAL 7035.
- Fixing: on EN 50022 DIN rail.
- Weight: 422 g

Connections

The connections for the outputs (fig. 1b position ⑧) are via screw terminals:

- Insulation stripping: 8mm.
- Screw: head for flat-head screwdriver 4.5 x 0.8 mm.
- Tightening torque: 0.5 Nm
- Capacity: 0.2 mm2 ÷ 6 mm2 flexible (30 ÷ 10 AWG), 0.2 mm2 ÷ 6 mm2 rigid (30 ÷ 10 AWG).
- Opening: 3.4 mm x 4.8 mm

For the bus connection (fig. 1b position ③) there is a 2-pole removable spring-loaded terminal block standard KNX TP1 (red + black) for rigid cables:

- Insulation stripping: 6mm.
- Clamping: spring
- Capacity: 4 x rigid wire; Ø 0.6 ÷0.8 mm.
- Terminal +V: BUS positive.
- Terminal -V: GND.

Weather conditions

- Climate class according to EN 50491-2: 3K5.
- Operating ambient temperature range: -5 °C ÷ +45 °C.
- Relative humidity: max. 90% non-condensing.
- Storage conditions: -5 °C ÷ +45 °C; max RH 90%
- Transport conditions: -25 °C ÷ +70 °C.
- Max altitude: 2000 m a.s.l.

KNX bus power supply

- Bus rated voltage: 30 VDC
- Bus absorption: < 10 mA
- Max. Bus absorption: < 50 mA (for max. 80 ms per relay).

Final Actuator

- Bistable relay with 1 potential-free closing contact (16A / 250V~).
- Minimum contact opening distance of less than 3 mm, and in any event no less than 1.2 mm, to ensure functional interruption and not safety insulation.
- Safety distances between exchange contact and internal active parts: 6 mm (surface and in air).
- If one of the contacts is used in grid voltage circuits, the adjacent contact cannot be used in SELV or PELV circuits.

Nominal load

Max. switching frequency: 6 cycles/min.
Rated voltage: 230V~.

- Ohmic load (cosϕ 1): 10A.
- Motor: 4A.
- Incandescent lamp: 10A.
- LED lamp: 1.7A.
- Electronic transformer: 6A.
- Ferromagnetic transformer: 6A.

- Rephased fluorescent lamp (140 µF): 6A.

Inrush current

IIR = 320 A for 2 ms

Overload or short-circuit protection

Install a C10 1.5kA (min) circuit breaker or a 10A GF 1.5kA (min) fuse in series with the circuit.

Electrical durability

- > 100,000 operations @ 10 A PF 1 and 8 A PF 0.4 @ 230 V~ (1 s ON, 9 s OFF).
- > 100,000 operations @ 6 A cosϕ 0.4 @ 230 V~ (1 s ON, 9 s OFF).
- > 6,000 operations @ 4 A motor load @ 230 V~ (0.5 s ON, 0.5 s OFF).

Mechanical durability

- 1,000,000 operations at the maximum switching frequency of 60 cycles/min.

Forcing button ⑥

They are always active and operate in toggle mode, permanently reversing the current status, until a new telegram changing the status is received from the bus. If a timer is associated with the output (e.g. staircase light), the timer does not start.

Output status LEDs ⑦

They always follow the status of the contact: they turn green when the contact is closed.

Programming LED ④

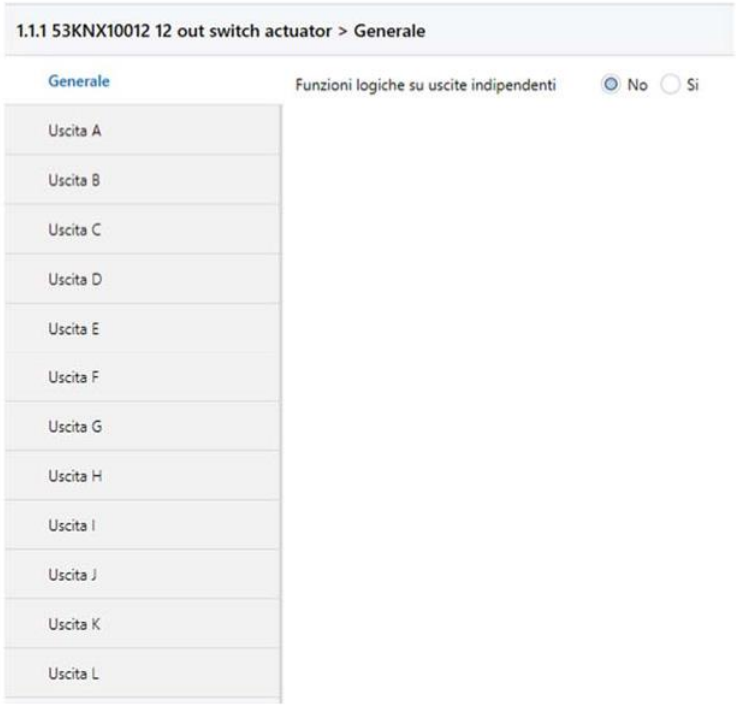
Normally off, it turns red when the device is in address programming mode (the ⑤button is momentarily pressed). The red light flashes when ETS initiates address detection.

Programming button ⑤

When it is pressed for a short time, the device will enter the programming mode.

ETS library

The ETS library features a series of parameters used to characterise the operation of each actuator output.
These parameters are appropriately divided into twelve pages dedicated to the configuration of each channel; two main pages are added for assigning the function to each relay.



- Max. number of group addresses: 200
- Maximum number of associations: 200

General page

The sole purpose of this page is to allow the user to decide whether or not to enable the Logic functions.
Logic functions are found on this generic page because they are 16 resources that can be freely assigned to any channel.
Enabling the logic functions determines the appearance of the communication objects provided for reading the control variables.
Enabling a logic function means that the state of the relay output is no longer controlled by the switching communication object, but by the result of the enabled logic function with the switching communication and logic function objects at its input. Please refer to the dedicated section for more details.

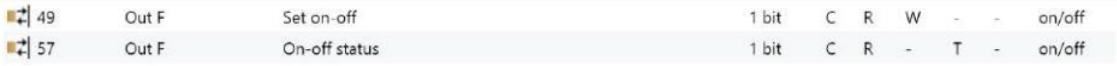
Output A,B,C,D,E,F,G,H,I,J,K,L

The traditional functions of the load control output are to define the Contact Logic, activate the Staircase Light Timer, associate the output with Scenarios and the possibility of working in conjunction with general controls.
Contact type defines whether the logic condition of the OFF relay contact is to be of the open or closed type. The typical default value is open, i.e. non-conductive circuit.

The **Output status at start-up** defines the behaviour of the relay when the system is switched on.

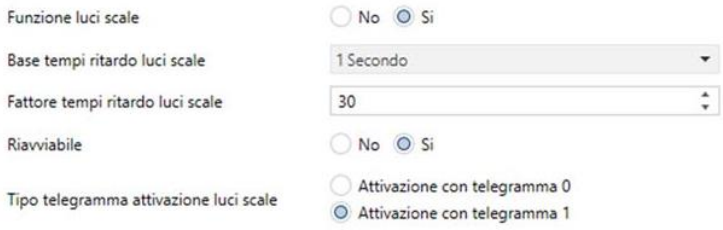
- **Always off** is the precautionary condition that will keep the output switched off.
- Alternatively, it is possible to set the opposite condition **Always on**, or
- It is possible to set the **Previous status** to restore the setting that existed before the power failure. This condition is particularly suitable for use with lighting.

Each output parameterised as a generic load is always assigned two communication objects, the first called **On-off command** to switch the output and the second called **On-off status** to notify changes in the output status.

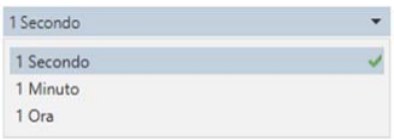


Staircase light function

When the Staircase Light function is activated, the following configuration parameters are displayed.



The **Staircase light delay time factor** is the parameter that defines the duration of the Staircase light function. In order to know the exact value, this factor must be multiplied by the unit of measurement defined in the field above, referred to as the **Staircase light delay base times**.



It is now possible to select a value of 1 s, 1 min or 1 h.
The product of these two factors is the length of time for which the staircase light will remain on.
By enabling the Staircase Light function, a dedicated communication object is introduced to activate this function.

This means that it will be possible to switch on the Staircase Light on a timed basis using the **Staircase Light command** communication object, or to switch it on permanently using the **On-off command** standard object.
By enabling the **Restart** parameter, it is possible to start counting the time each time the start telegram message is sent; otherwise, if this function is not enabled, the time will continue to run until the end without the possibility of extending the activation time.

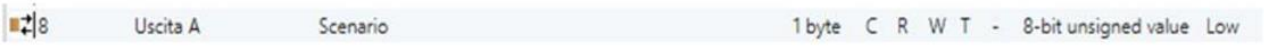
The **Staircase light activation telegram type** indicates which value will determine the activation of the staircase light function. In this, and in other cases, different values can trigger the activation of the function: it can be the value 1 sent when a button is closed or the value 0 generated by the opening of a door contact.

Scenarios

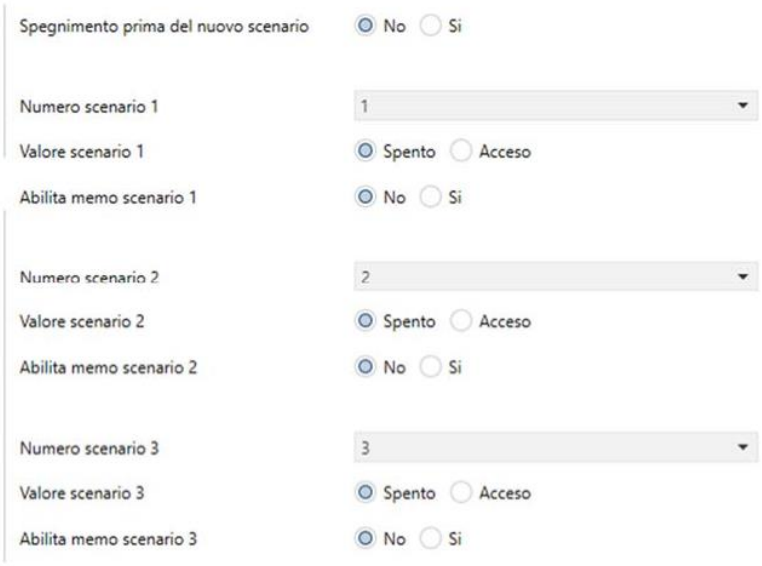
The Generic Load function allows KNX scenarios to be activated. In this case, the side menu is configured to access the **Exit X Scenarios** page.

A scenario is a predetermined number sent via the bus to synchronise all devices that have been activated to recognise it.
This is a very powerful synchronisation technique for communication objects with different data types, since the value to be assigned to the status has previously been stored in the device as a configuration parameter.

Each scenario-enabled channel will have its own 1-byte **Scenario** communication object (Data Type 5), through which it can receive a synchronisation telegram containing the scenario number to be referred to for status assignment.



There are 64 scenes available in KNX, numbered sequentially from 1 to 64.



Ave actuators allow assigning each output 8 different actions to be assigned to one of 64 available scenarios.

- Scenario X number defines the scenario number to be associated with that particular action.
- Scenario X value defines the status to be assigned to the action to be performed.
- Enable scenario X storage enables the storage function.
  A special command can be sent over the bus to ask devices to save their contingent status as a new value to be assigned to this scenario. The new value will replace the value stored in the configuration parameters. This option allows the end customer to configure scenarios independently without having to program the system.

Finally, here is some information on the first of the parameters that can be configured in the table.
It is called Switch Off before the new scenario and requires the module to switch all outputs OFF before the status of the outputs can be changed to activate a scenario.
This is a precautionary measure, very similar to interlocked mode, which prevents two relays with opposite functions from closing during a configuration change.

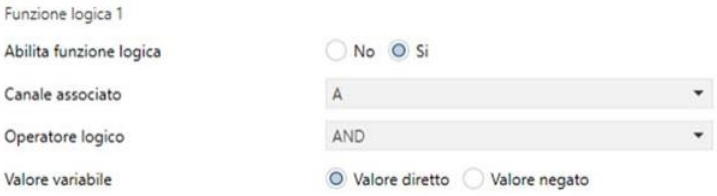
Logic function

As mentioned above, logic functions are initially only available in the Generic Load mode.
Logic functions make it possible to make the status of a channel dependent on the occurrence of certain situations, defined through the configuration of logic operators.
16 generic logic operators are available, which can be assigned to the desired channels without restrictions. When a logic function is assigned to a channel, its status is no longer determined by its communication object alone, but by the result of the logic operation between its communication object and the one assigned to the logic function called Logic Function X.

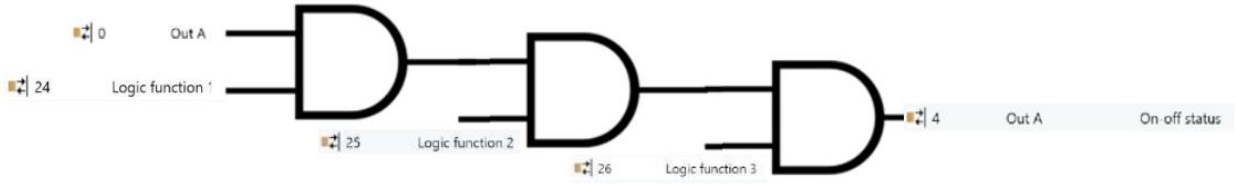
A clear example of a blocking function can be seen above. This is a function obtained by inverting the variable logic input by changing the Variable Value option.

Output A is dependent on the logic operator AND associated with it. This means that the output will only match the input if the logic of the variable is equal to 0 (please compare with the truth table below).

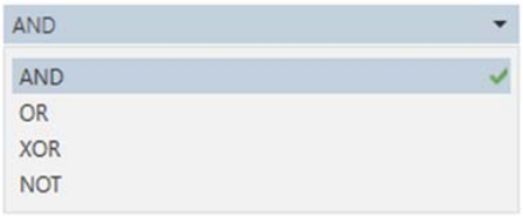
A	L.F.1	Out
0	1	0
1	1	0
0	0	0
1	0	1



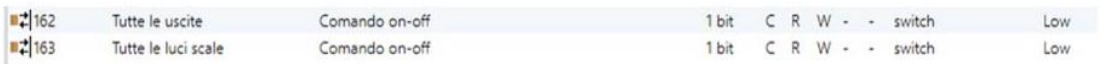
Logic functions are resources that can be freely associated with any channel. Therefore, several may be allocated to the same channel, as in the example above.
In this case, the final result should be calculated by arranging the ports in series, from the lowest ID to the highest, and applying the output of the first to an input of the next.



The available ports are AND, OR, XOR and NOT.



General controls



We have not yet mentioned certain communication objects called **All**, which, if previously enabled, can change the status of several actuator outputs simultaneously.

There is an **All Outputs** control to switch the outputs programmed as generic load and an **All staircase lights** for the staircase light function.
A generic load output responds to the All control if the **Enable general controls** option is enabled.

Regulatory compliance

- RoHS Directive 2011/65/EU
- REACh Regulation (EC) No. 1907/2006

- EN 50491-2 General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS). Part 2: Environmental conditions.

- EN 50491-3 General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS). Part 3: Electrical safety requirements.

- EN 50491-4-1 General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS). Part 4-1: General functional safety requirements for products intended to be integrated in HBES and BACS systems

- EN 50491-5-1 General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS). Part 5-1: Electromagnetic Compatibility (EMC) test requirements, conditions and set-ups.

- EN 50491-5-2 General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS). Part 5-3: Electromagnetic compatibility (EMC) requirements for HBES/BACS devices used in residential, commercial and light industrial environments.

- EN 50428 Switches for household and similar fixed electrical installations - Collateral standard - Switches and related accessories for use in home and building electronic systems (HBES).

Lista sequenziale degli oggetti di comunicazione

N°	Nome oggetto	Condizione di abilitazione	Dim.	Flags					DPT
0	Out A Set on-off	Always	1 Bit	C	R	W			[1.001] switch
1	Out B Set on-off	Always	1 Bit	C	R	W			[1.001] switch
2	Out C Set on-off	Always	1 Bit	C	R	W			[1.001] switch
3	Out D Set on-off	Always	1 Bit	C	R	W			[1.001] switch
4	Out A On-off status	Always	1 Bit	C	R		T		[1.001] switch
5	Out B On-off status	Always	1 Bit	C	R		T		[1.001] switch
6	Out C On-off status	Always	1 Bit	C	R		T		[1.001] switch
7	Out D On-off status	Always	1 Bit	C	R		T		[1.001] switch
8	Out A set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
9	Out B set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
10	Out C set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
11	Out D set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
24	Logic function 1 variable	Logic function 1 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
25	Logic function 2 variable	Logic function 2 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
26	Logic function 3 variable	Logic function 3 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
27	Logic function 4 variable	Logic function 4 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
28	Logic function 5 variable	Logic function 5 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
29	Logic function 6 variable	Logic function 6 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
30	Logic function 7 variable	Logic function 7 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
31	Logic function 8 variable	Logic function 8 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
32	Logic function 9 variable	Logic function 9 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
33	Logic function 10 variable	Logic function 10 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
34	Logic function 11 variable	Logic function 11 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
35	Logic function 12 variable	Logic function 12 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
36	Logic function 13 variable	Logic function 13 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
37	Logic function 14 variable	Logic function 14 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
38	Logic function 15 variable	Logic function 15 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
39	Logic function 16 variable	Logic function 16 enable = yes	1 Bit	C	R	W	T		[1.002] boolean
48	Out E Set on-off	Always	1 Bit	C	R	W			[1.001] switch
49	Out F Set On-off	Always	1 Bit	C	R	W			[1.001] switch
50	Out G Set on-off	Always	1 Bit	C	R	W			[1.001] switch
51	Out H Set on-off	Always	1 Bit	C	R	W			[1.001] switch
52	Out I Set on-off	Always	1 Bit	C	R	W			[1.001] switch
53	Out J Set on-off	Always	1 Bit	C	R	W			[1.001] switch
54	Out K Set on-off	Always	1 Bit	C	R	W			[1.001] switch
55	Out L Set on-off	Always	1 Bit	C	R	W			[1.001] switch
56	Out E On-off status	Always	1 Bit	C	R		T		[1.001] switch
57	Out F On-off status	Always	1 Bit	C	R		T		[1.001] switch
58	Out G On-off status	Always	1 Bit	C	R		T		[1.001] switch
59	Out H On-off status	Always	1 Bit	C	R		T		[1.001] switch
60	Out I On-off status	Always	1 Bit	C	R		T		[1.001] switch
61	Out J On-off status	Always	1 Bit	C	R		T		[1.001] switch

62	Out K On-off status	Always	1 Bit	C	R		T		[1.001] switch
63	Out L On-off status	Always	1 Bit	C	R		T		[1.001] switch
64	Out E set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
65	Out F set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
66	Out G set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
67	Out H set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
68	Out I set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
69	Out J set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
70	Out K set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
71	Out L set scene	Enable scene = Yes	1 Byte	C	R	W	T		[5.*] 8-bit unsigned value
136	Out A Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
137	Out B Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
138	Out C Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
139	Out D Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
140	Out E Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
141	Out F Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
142	Out G Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
143	Out H Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
144	Out I Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
145	Out J Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
146	Out K Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
147	Out L Set stair light	Stairs light function = Yes	1 Bit	C	R	W			[1.001] switch
162	All single outs set on-off	Always	1 Bit	C	R	W			[1.001] switch
163	All single stair lights set on-off	Always	1 Bit	C	R	W			[1.001] switch

Installation and use

The installation of the receiver must include an upstream double pole disconnector and be housed in an enclosure with an appropriate degree of protection. A circuit breaker or fuse, of a rating appropriate to the load current, and in any case not exceeding 10A - 230V~, must then be provided for each of the controlled loads.

Independent outputs