USER MANUAL

Drivers AutoSteps

This manual covers the configuration and operation of two controllers for automatic LED brightness control on staircases.

The functions and configuration methods in both controllers are identical. The only difference is that the AutoSteps24 controller has a greater number of LED outputs. All functions will be explained using the smaller controller as an example.

***AutoSteps24**: 24 channel staircase lighting controller with four motion sensor inputs*

***AutoSteps**:18 Channel staircase lighting controller with four motion sensor inputs.*

The manual is compatible with the device's firmware version. v2.11

Version1.0

Table of contents

1.Safety rules

In this manual, you will find information about the device's operation, safe usage, and proper handling. Before installation and startup, please read and understand this manual thoroughly and follow the guidelines below. If you have any questions, please contact the company.

To prevent electric shock or module damage, mechanical and electrical installation should be performed by qualified personnel. Ensure that all wires are correctly connected before powering the device. Do not modify any connected wires while the device is powered. Provide proper operating conditions and avoid exposing the device to direct and intense heat radiation.

2.Product purpose

The AutoSteps staircase lighting controller enables automatic control of staircase lighting. It allows for a decorative visual effect by smoothly brightening and dimming the step lighting.

The device can be used to control lighting in hallways, passageways, pathways to properties, driveways, and ceiling lighting.

The device is configured useing four buttons on the front panel and an OLED display. The controller is designed for installation in a DIN rail enclosure.

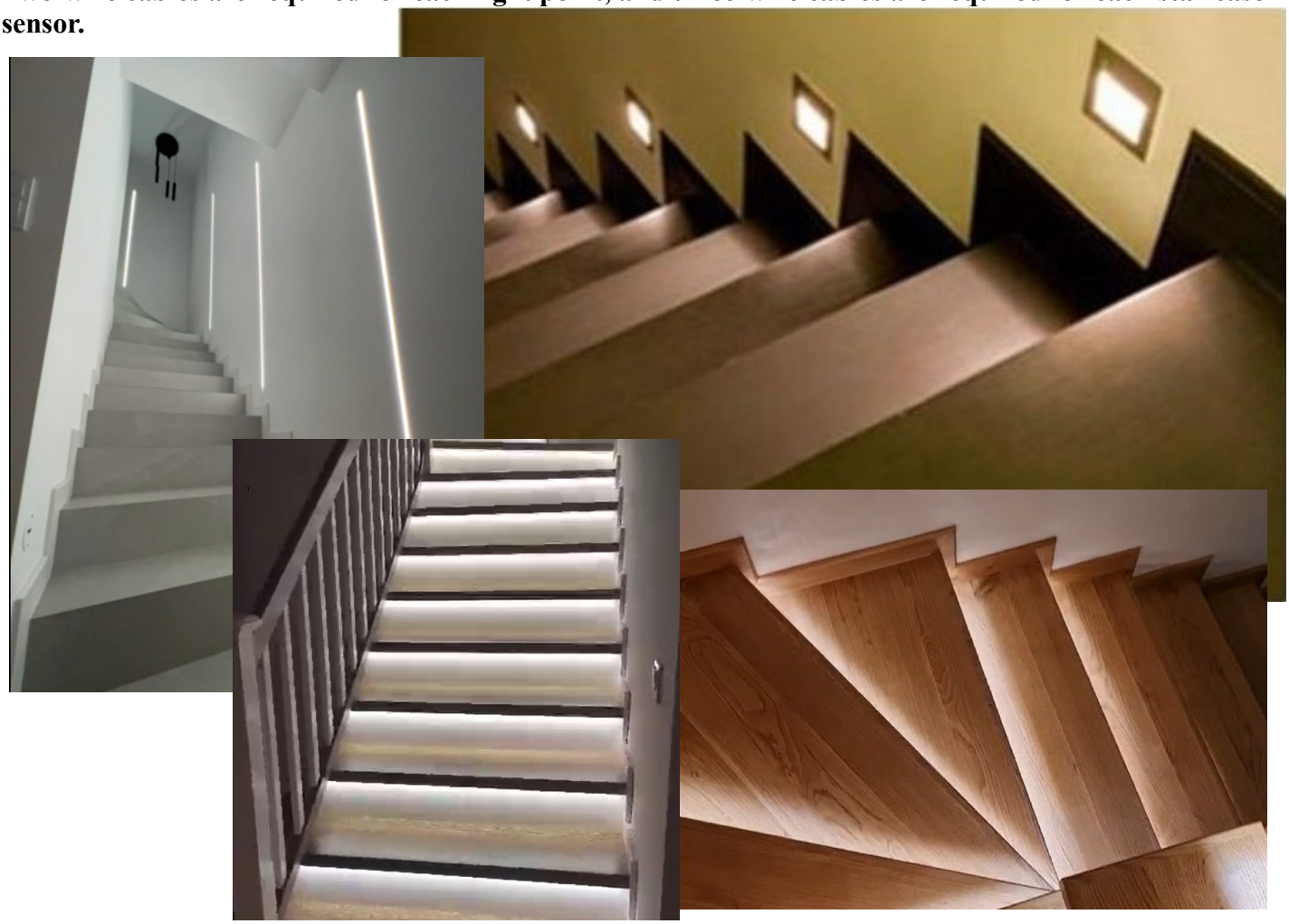
The device allows for independent control of LED lighting sources up to 24V DC. For brightness control, 18 or 24 independent PWM transistor outputs (open collector) are available. The negative potential "-" of the controlled source should be connected to the output. The light source can be any load that can be controlled via a PWM signal, such as

- LED bulb, LED strip, LED module, LED bar, LED spotlight

Depending on the LED power and wire cross-section, the distance between the light sources and the controller can be up to several meters.

The controller has four galvanically isolated inputs. By applying a signal from motion sensors, these inputs activate animations that control the brightness of the connected light sources. The triggering signal for each input is the application of the device's ground. All open-collector or NO (normally open) relay-type sensors will function properly. A momentary push button—returning to its original state after release—can also be connected to the inputs, such as classic doorbell or roller shutter switches.

Two-wire cables are required for each light point, and three-wire cables are required for each staircase sensor.



3. Way of working - animations

The device allows you to configure four animations: A1, A2, A3, and A4. Each animation is a procedure for controlling the outputs (lighting) according to its settings. Animations operate independently and should be treated as separate sequences. This means you can set up four independent LED sequences.

For example, if you have two motion sensors, you can use two sequences: bottom-to-top (A1) and top-to-bottom (A2). Each sequence can be configured separately, and only one motion sensor can be assigned to each sequence. However, the same motion sensor can be assigned to multiple animations if needed.

By default, each animation waits for an TRIG activation signal. When a signal appears on the input corresponding to a given animation (TRIG: I1, I2, I3, or I4), the animation switches to ON mode.

If the animation has a blocking animation (LOCK) set, and this blocking animation is in waiting mode (WAIT), the transition to ON mode will not occur. Instead, the countdown for the blocking animation will be reset.

This is intended to prevent unnecessary animation activation when passing by the sensor while leaving the staircase area. The WAIT stage involves counting down a set time during which all LEDs of the given animation remain continuously lit.

Animation stages:

All animations status preview screen

1 **ON** – Animation work.
Sequential lighting of the steps. After the last step is lit, the process transitions to the waiting stage.

1. **WAIT –** Waiting
After time T2, if the animation set in LOCK is not active, the process transitions to the END stage.
2. **END** – Dimming all steps from the animation within time T3. If the EXIT parameter is set to STX or STY, the steps dim sequentially. When the EXIT parameter is set to ALL, all steps in the animation dimm together. The elevator effect does not occur.
3. **OFF** – Waiting state for animation activation.

The status of the animation, motion sensors, and LED outputs can be monitored in the preview menu (eye icon from the main menu). In this menu, you can also simulate the activation of motion sensors.

Animation Settings Menu

3.1.Animation settings

In each animation we distinguish the following settings:

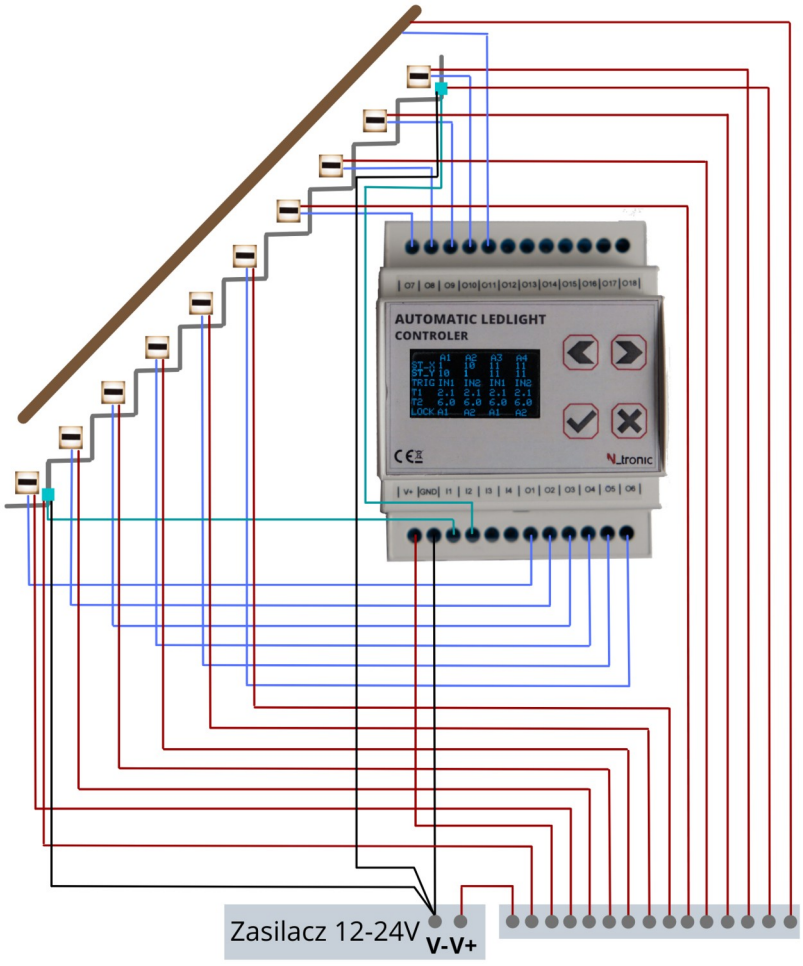
- **ST_X (X)** - animation start step:
The first step from which the steps will start lighting up. If this value is 11, then when the animation starts, the step under output O11 will be lit up, then the next one, up to step ST_Y.
- **ST_Y (Y)** – animation final step.
At the output marked ST_Y the brightening stage will end.
- **TRIG (TR) –** the input number that is to trigger the given animation.
Detecting the power ground state on this input will activate the animation if it is turned off.

- **AN** –Type of animation.
  - WAW — Smooth illumination of the steps one by one.
  - STE – Step-by-step instant lighting of the steps.
  - CAS – Falling steps effect.
  - ELE – Elevator effect.
  - ANI – An animation in which the lights turn on and off – this is a presentation effect.

- **LOCK (LO)**– The number of another animation blocking the deactivation of the animation. If the animation set in LOCK is active, the configured animation cannot proceed to the deactivation stage.
- **T1 –** Time to illuminate a single step.
- **T2** – Continuous lighting time after all steps have been illuminated.
- **T3** –Degree extinction time.
- **EXIT (EX)** – Method of dimming LEDs.
  - ALL – disabling all stairs from animation at once.
  - STX – fading out the steps one by one, starting with the steps from the ST_X setting.
  - STY – extinguishing the steps one by one, starting with the step with the ST_Y setting.
- **BR** – individual brightness level for a given animation. The GLO setting indicates the default brightness level assigned in the main settings.
- **TA** – individual running time of a given animation
  - **GLO** setting means default animation working hours are according to main settings
  - The **USR** setting allows you to enter individual animation times.
- **HandRa** – Here, we select which output the handrail lights are connected to. These outputs will turn on first and turn off last when this animation is activated.
- **NightL** – We can set a different brightness level for this animation at specific times. This is useful when we don't want to be blinded at night. By default, the animation illuminates the lights with the power set in the global settings.

Example. We have 10 steps connected to outputs O1 – O10 and 2 motion sensors at the bottom and top of the stairs, connected to inputs I1 and I2, respectively. In this case, two animations, A1 and A2, are sufficient to control the lighting from both directions.

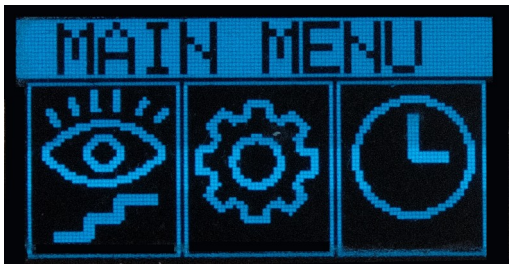
- A1 we assign it to ignite from below:
  A1: ST_X: 1, ST_Y: 10, TRIG: IN1, AN: WAW, LOCK A2
- A2 we assign to light from above:
  A2: ST_X: 10, ST_Y: 1, TRIG: IN2, AN: WAW, LOCK A1



4.Menu operation

When the device is turned on, it displays a startup screen with three icons. Using the arrow buttons, we can select which setting we want to enter.

- The confirmation button is responsible for the commands to enter the setting and OK.
- The cross button is responsible for undoing and canceling commands..

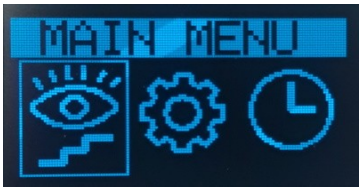


Menu view after device startup

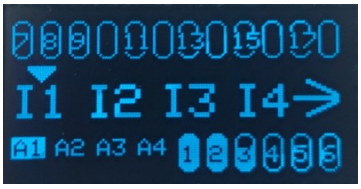
4.1.Device operation preview screens

In the preview screens, we can monitor the current status of outputs and animations, as well as simulate the activation of input signals. There are two types of preview screens:

- **Basic preview:**
  Active animations, motion sensors, and LED outputs are highlighted. By selecting the input number I1 – I4 with the flashing triangle, we can simulate its activation. Clicking the right arrow will take us to the detailed preview screen.
- **Detailed preview:**
  In addition to viewing the status of inputs, outputs, and animations, we can see the current animation stage, the number of the illuminated step, and the animation stage timer status. By selecting with the flashing triangle, we can simulate the activation of inputs.



Preview menu selection



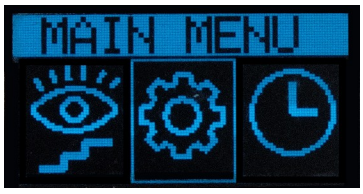
Basic preview

Detailed preview

4.2.Settings screens

In the settings screen we can parameterize:

a) GEN. SETTINGS – uanimation settings – specific parameters of each light run.
b) ACTIVE TIME – gworking hours – when the device should respond to motion sensors.
c) MAX BRIGHTNES – maximum brightness level of LED outputs.
d) REST LIGHT – rest light.
e) INPUTS LOGIC — input logic.



Selecting the device settings menua

Selecting settings

4.2.a. GEN. SETTIN — Animation settings

The screen displays the basic animation settings. If we want to edit the settings of a specific animation, we need to use the arrows to select the animation number and press confirm – this will switch to the editing screen for that animation.

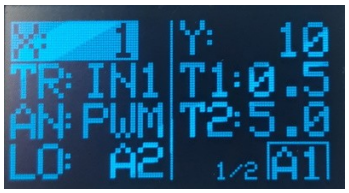
In each animation, we can edit: the starting and ending step, times (T1, T2, T3), operating mode, blocking animation, and fading method, maximum brightness level, individual operating times, LED brightness, and handrail settings.

Animation selection screen to change settings

A detailed description of animation settings can be found in section 3.1.

Edit settings:
Select a setting, press OK.
SAVE saves.

Selecting outputs for operating handrail lights



Changing Animation Settings 1/2

Changing Animation Settings 2/2

4.2.b. ACTIVE TIME – working hours

Working hours selection setting screen

We have 4 operating modes to choose from.

- **ALWAYS** – Work all the time.
- **SPECYFIC** –set working hours.

The **TStart** and **TStop** parameters determine at what times the animations will run.

- **ASTRONOMIC** – The Start and Stop parameters determine the times at which the animations will run.
- **Input No 4** – Operates only when a signal is applied to input 4.

Astronomical Clock Delays Setting

Specific working hours settings

Aktualną godzinę i datę wprowadzamy do urządzenia przez wejście w zegar z menu startowego.

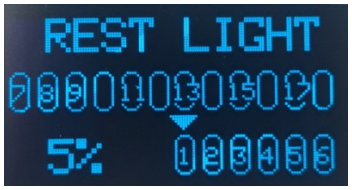
*Not every device has an active astronomical clock function.

4.2.c. MAX BRIGHTNES – maximum brightness level

Maximum Brightness Setting Screen

Here, we define the maximum brightness level to which the LEDs will illuminate. This functionality can be useful when we don't want the stairs to be too bright in the evening. Brightness can be determined based on the global animation setting (BR:GLO) or individually for each animation in the specific animation settings. Described in section 3.1.

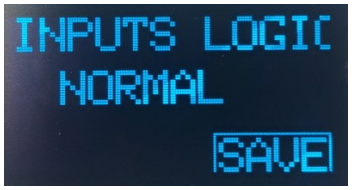
4.2.d. REST LIGHT – rest light,



Rest light setting screen

Here, we define the minimum standby illumination level for individual steps. We can set the brightness and choose which steps should remain lit during operating hours. This is useful, for example, when we want certain steps to stay illuminated throughout the evening. When an animation is triggered, the step will light up, but during fading, it will stop at the level set on this screen.

4.2.e. INPUTS LOGIC — input logic.



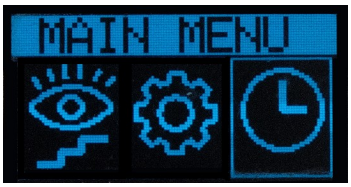
Rest light setting screen

On this screen, we determine whether the input should respond to the presence or absence of ground. If the sensors supply power when motion is detected, this parameter should be set to **INVERSED**.

4.3.Time setting screen

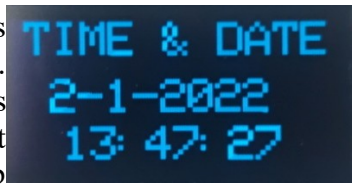
The device has a built-in real-time clock, allowing us to set specific times during the day when the stairs should light up. This enables us to disable the device during the day when there is sufficient natural light.

- **Date and time screen:**
- The screen displays the current date and time. To edit these parameters, press and hold the confirmation button.
- **Edit date and time:**
- Use the arrow keys to select a parameter for editing. After pressing OK, the cursor will start blinking, allowing you to adjust the parameter using the arrow keys. Pressing OK again confirms the new value. The SAVE button saves the settings.

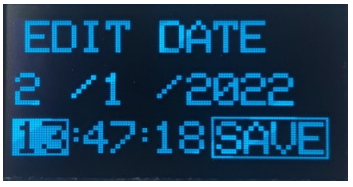


Selecting the date and time entry menu

The device features a time backup system that allows the clock to function without power for up to 7 days. This parameter is essential for controlling the hours during which the stairs should be illuminated. It applies to the function described in section 4.2.b ACTIVE TIME.



Date and time screen



Date and time edit screen

4.4.Screen saver

If no button is pressed for 5 minutes, the screen will turn off. Pressing a button again will turn the screen back on. This is intended to prevent premature pixel burnout on the OLED display.

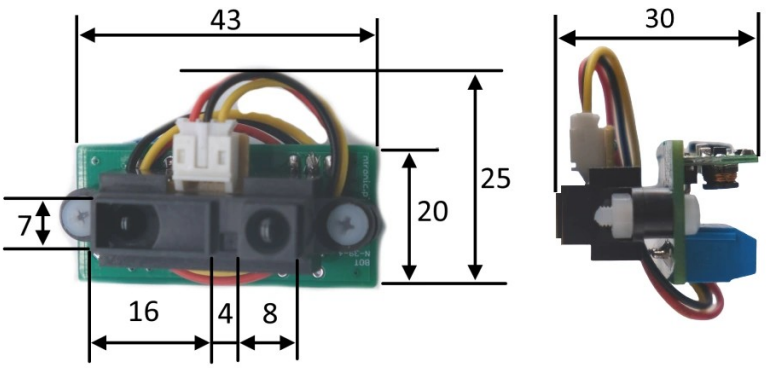
5.Entrances

The stair lighting controller is equipped with four independent galvanically isolated digital inputs. The inputs operate independently of each other. If a GND ("-") signal is detected at the terminal, the controller recognizes it as motion detection.

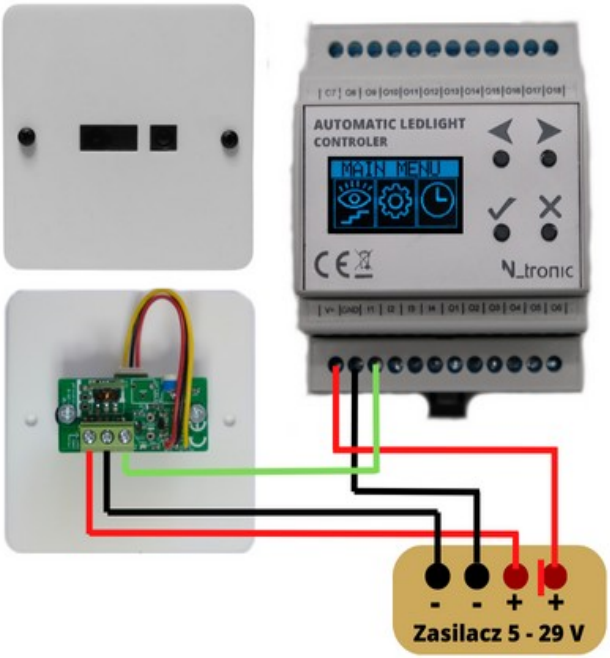
All open-collector sensors and NO-type relay sensors will function correctly.

Dedicated motion sensors with a SHARP laser sensor can be purchased for the controller. They feature a potentiometer for adjusting the detection range and an LED indicator. The sensors are designed for installation in a 60 mm junction box.

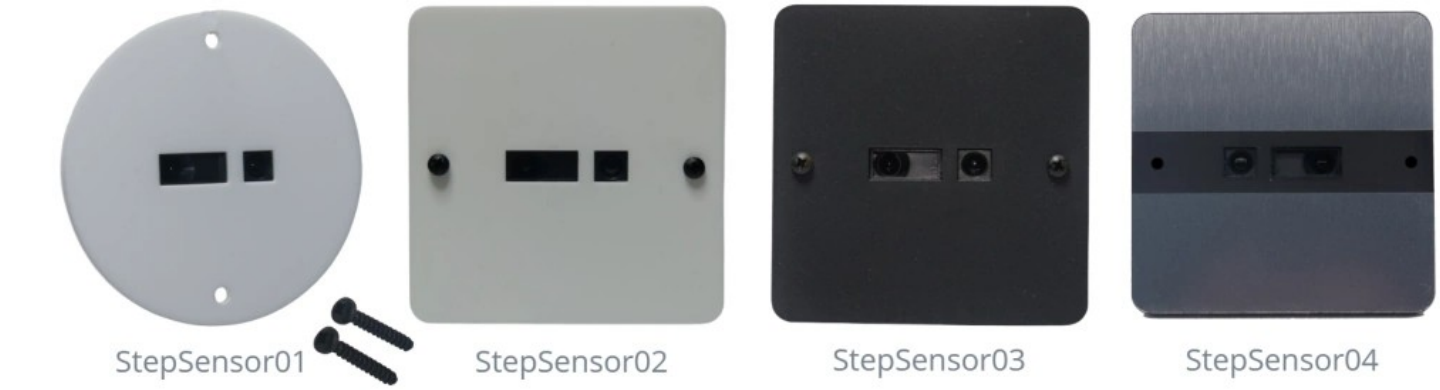
Laser motion sensors are available in a version for custom installation or for mounting in a 60 mm electrical junction box.



Dimensions of the motion sensor for self-installation



Motion sensor connection diagram



Visual variants of motion sensors.

6.Exits

Outputs O1 - O18 are used for powering and controlling the brightness of connected light sources.
During operation, they provide a ground potential in the form of PWM (Pulse Width Modulation) pulses. This is a method of pulse width regulation based on cyclic switching on and off of the output, where the ratio of ON time to OFF time of the transistor is proportional to the desired brightness level.

Switching occurs at a frequency of 400 Hz. This switching speed is not noticeable to the human eye, cameras, or digital cameras. Thanks to PWM modulation, we achieve a simple, effective, and linear brightness adjustment for virtually any connected LED light source.
Sterowanie to natomiast nie będzie współpracować ze źródłami światła posiadającymi wbudowane przetwornice napięcia lub stabilizatory. Przykładem takich urządzeń jest większość diodowych zamienników z żarówek halogenowych.
Każde z wyjść możemy obciążyć prądem do 4 A.

7.Terminal description

Do podłączenia przewodów w urządzeniu umieszczono listwy zaciskowe o rozstawie 5,08 mm i maksymalnej średnicy 1.5mm$^{2.}$

1. V+: dodatni zacisk zasilania
2. GND: ujemny zacisk zasilania

3. I1: wejście nr 1
4. I2: wejście nr 2
5. I3: wejście nr 3
6. I3: wejście nr 4

7. O1: wyjście nr 1
8. O2: wyjście nr 2
9. O3: wyjście nr 3
10. O4: wyjście nr 4
11. O5: wyjście nr 5
12. O6: wyjście nr 6
13. O7: wyjście nr 7
14. O8: wyjście nr 8
15. O9: wyjście nr 9
16. O10: wyjście nr 10
17. O11: wyjście nr 11
18. O12: wyjście nr 12
19. O13: wyjście nr 13
20. O14: wyjście nr 14
21. O15: wyjście nr 15
22. O16: wyjście nr 16
23. O17: wyjście nr 17
24. O18: wyjście nr 18

Urządzenie zasilamy poprzez podanie napięcia stałego z zakresu 5 - 24 V na zaciski 1 i 2.

8.Mezzanine service

Thanks to the presence of four digital inputs, it is possible to implement mezzanine floor control with direction recognition of a person's movement.

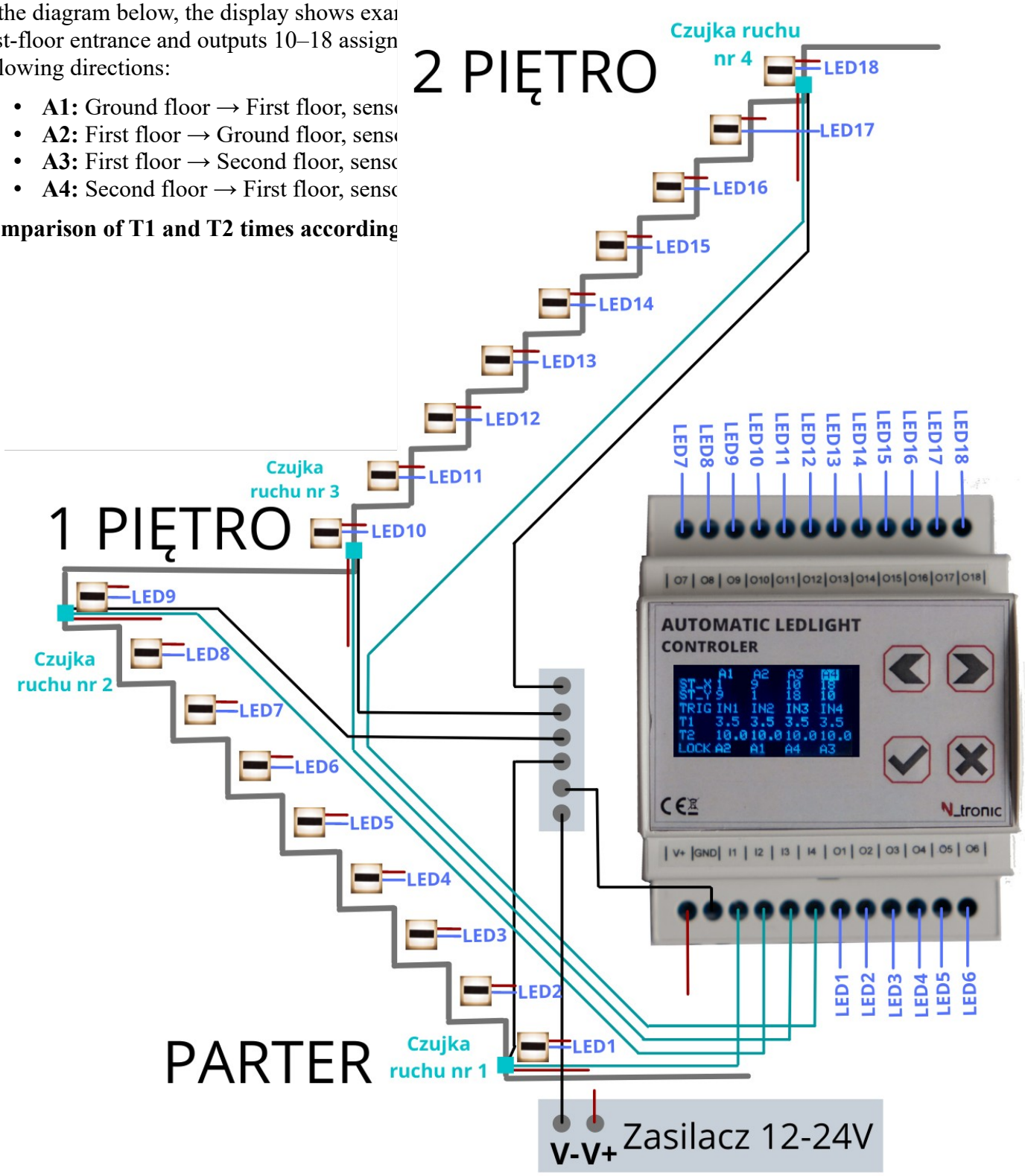
In the diagram below, for clarity, positive power connections have been omitted. They are marked with a red line and, in reality, should be connected to the positive power terminal. Light sources and sensors can be powered by separate power supplies, but their ground connections must be shared.

In the case of mezzanine floor handling, motion sensors 1 and 2 should be assigned to animations A1 and A2, respectively, and will control the path between the ground floor and the first floor. The path between the first and second floors will be controlled by sensors 3 and 4, along with animations A3 and A4. It is crucial to place sensors 2 and 3 in locations that correctly detect the direction of a moving person.

In the diagram below, the display shows exa
first-floor entrance and outputs 10–18 assign
following directions:

- **A1:** Ground floor → First floor, sens
- **A2:** First floor → Ground floor, sens
- **A3:** First floor → Second floor, sens
- **A4:** Second floor → First floor, sens

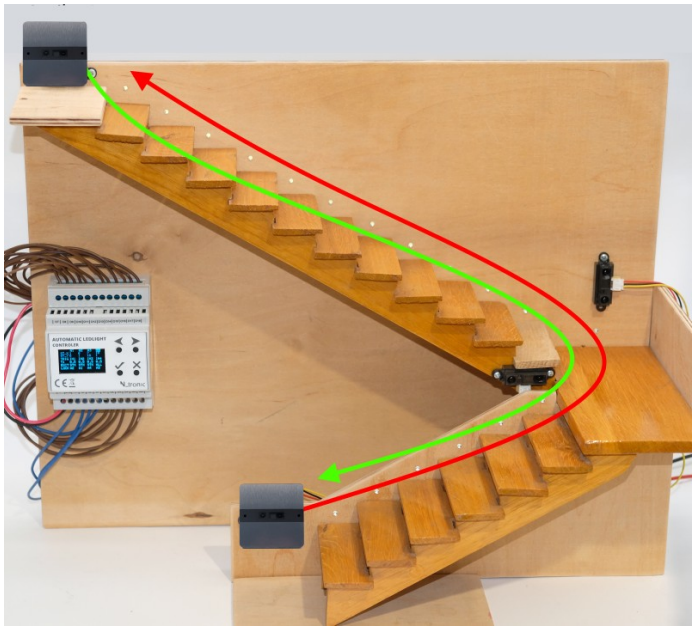
Comparison of T1 and T2 times according

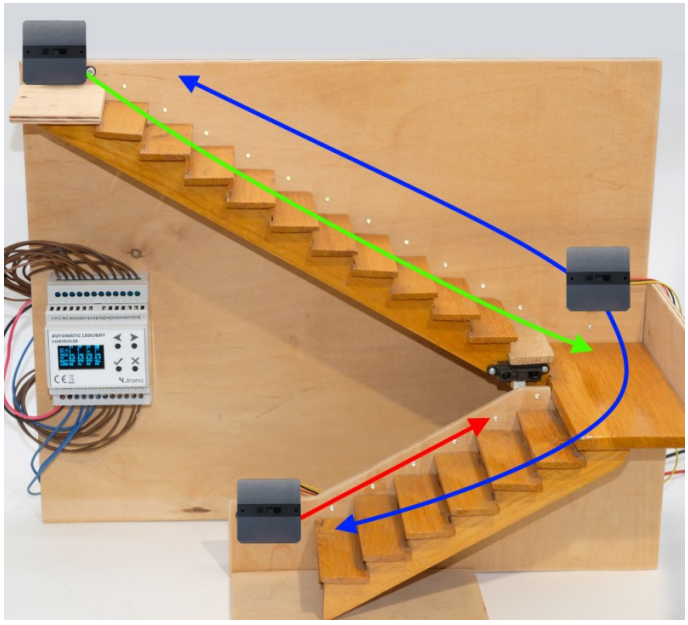


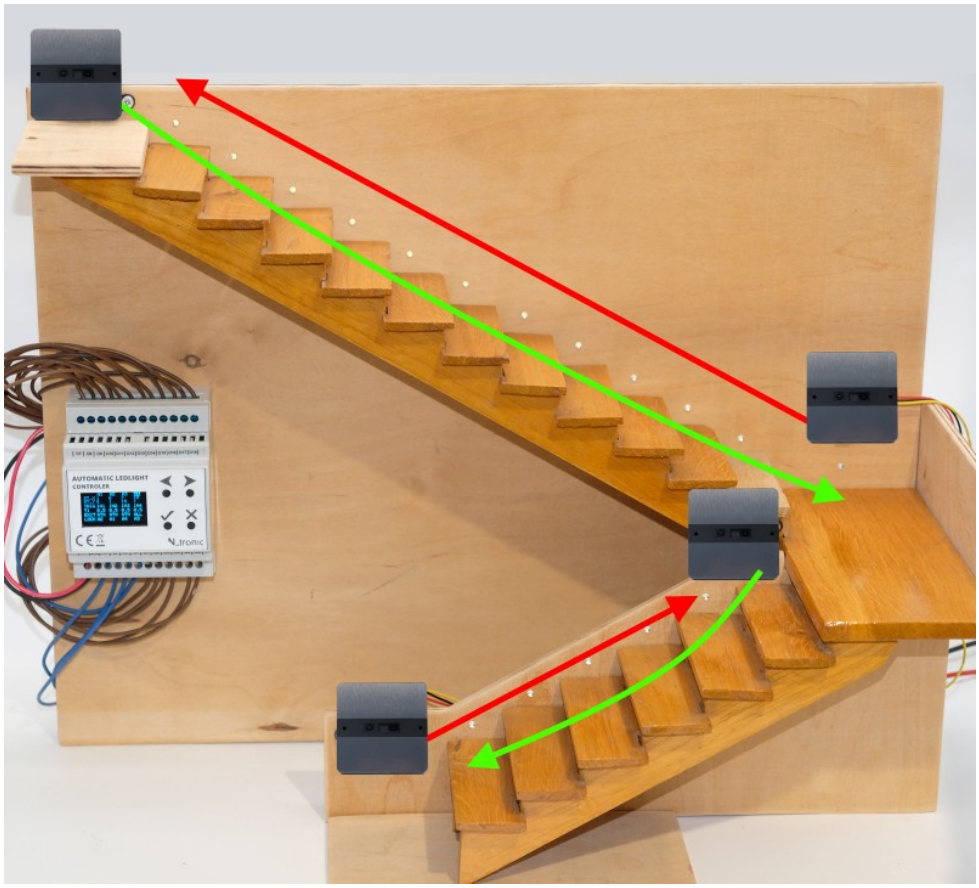
9.Possible configurations

The availability of four digital inputs allows for various operating modes of the controller, making it suitable for different types of staircases.

It can be used for both simple staircases and more advanced configurations with mezzanine floor support. Below are examples of the controller's applications in different staircases.

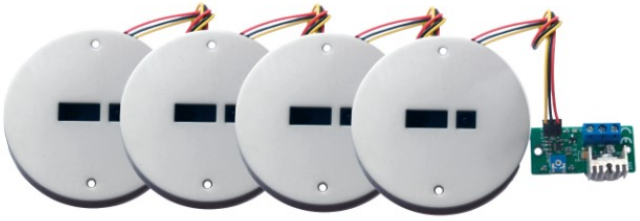




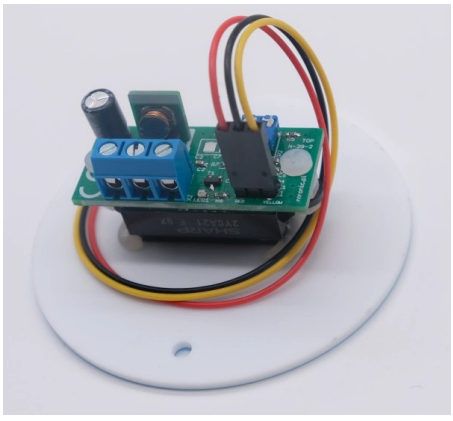


10.Work safety

- Before using the device, read this user manual carefully.
- The installation of the device and all connections must always be performed with the power supply disconnected.
- The device contains no user-serviceable parts. In case of damage, repairs may only be carried out by an authorized service center designated by the manufacturer. Any attempt to repair or modify the device independently will void the warranty.
- The device is designed for indoor use only and should not be exposed to direct atmospheric conditions.
- The device must be protected from liquids and high humidity.
- The device is designed to work with stabilized DC power supplies that have overvoltage and short-circuit protection. We recommend using power supplies that allow grounding connection for additional overvoltage protection.
- During storms or extended periods of inactivity, we recommend disconnecting the power supply.
- When operating at loads close to the maximum, the device may heat up significantly. Ensure adequate ventilation and avoid installing it near other heat sources.
- The device must be connected with the correct polarity. Do not exceed the maximum output loads.
- All electrical connections should be made using cables of appropriate cross-sections to avoid a voltage drop of more than 3% at maximum load.
- Proper short-circuit protection must be used for the LED lighting control system installation (power supplies with short-circuit protection, additional fuses on individual circuits, etc.).
- A technical inspection should be performed at least every two years to ensure that the device's safety has not deteriorated. If any irregularities are found, the device should be sent for repair.
- Before powering the device, ensure it has been installed correctly.
- The device should be kept out of reach of children.
- When operating with high currents, the device may generate acoustic noises due to a phenomenon known as magnetostriction. This is a normal physical effect and does not constitute grounds for a warranty claim. The effect intensifies with increasing switching current. Using cables with insufficient cross-sections and installation errors in the LED lighting system may also contribute to such noises.



Czujnik ruchu StepSensor-01



11.Specyfications

Exits PWM	
Number of output channels	18
Number of output channels	400Hz
Output control	Stepped / PWM
Output Channel Type	OC (open collector, sinking)
Output current capacity:	Continuous: 4A per channel
Installation data	
Dimensions	90,5 × 71 × 62 mm
Material	Self-extinguishing polycarbonate
Color	Light grey RAL 7035
Fixing	On a 35 mm DIN rail
Control inputs	
Type	Digital
Galvanic isolation	Yes
Power Supply	
Supply voltage / Power consumption	6 – 29 VDC / <1,5W
Operating temperature	-30 - +50 °C