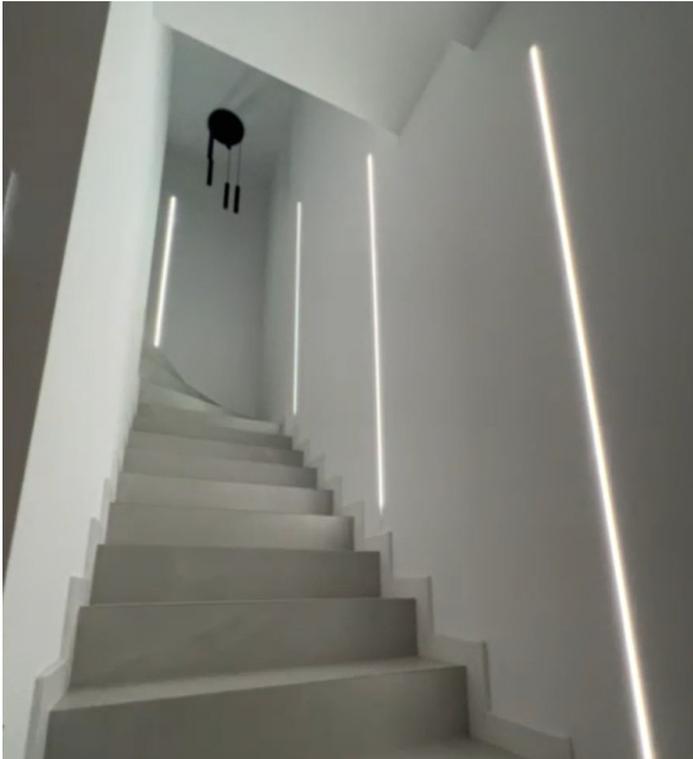


N_tronic

USER MANUAL

MDimmer

3 channel LED dimmer



The manual is compatible with the firmware version of the device v1.01

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1. Safety rules

In this manual you will find information on how the device works, safe use and proper operation. Before assembly and commissioning, please read and understand this manual carefully and follow the rules below. Please contact the company if you have any questions. In order to avoid electric shock or damage to the module, mechanical and electrical installation should be carried out by qualified personnel. Make sure all wires are connected correctly before turning on the power. Do not make any modifications to the connected cables when the device is powered. Ensure proper working conditions, do not expose the device to direct and strong influence of thermal radiation.



LED ceiling lighting

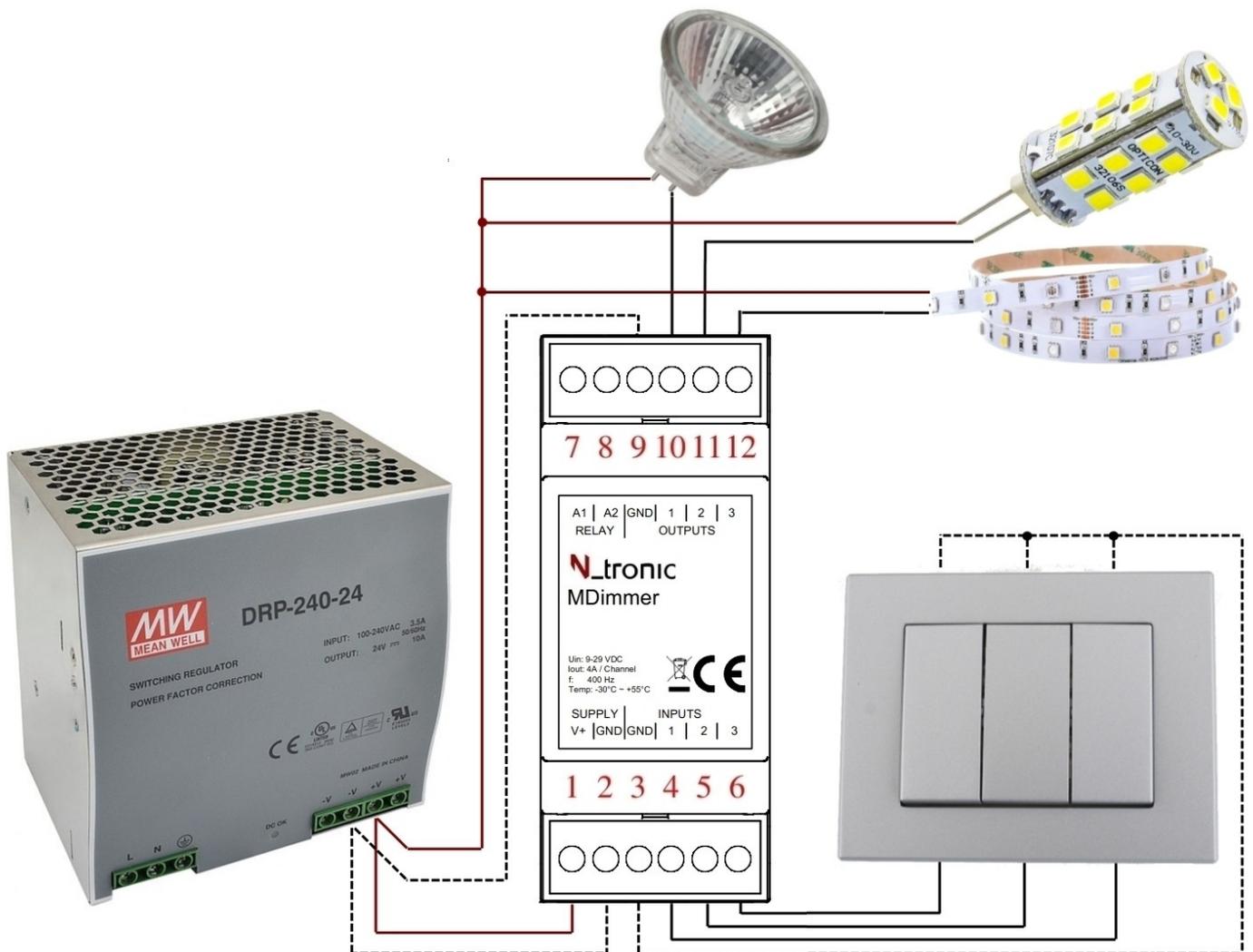
2. Application of the device

The MDimmer dimmer is a device used to control the brightness of light sources in LED technology up to 24 V DC. It has been designed in a DIN rail housing. After connecting the signals, it does not require user configuration.

It has 3 independent PWM high-current outputs. The negative potential "-" of the controlled source should be connected to the output. The light source can be any receiver that can be controlled by a PWM signal, for example, an LED bulb, LED strip or even a halogen bulb.

A separate OC type input is assigned to each output. Giving a negative potential "-" to the input triggers reactions. If we connect, for example, a button to the input, the control will work correctly when the button gives a negative "-" potential to the input. Any monostable buttons can be connected to the inputs - they return to their original state after being released. Classic bell or roller shutter buttons will perform the control functions very well.

In addition, to operate a separate power supply for LED sources, the MDimmer is equipped with a relay output. It is active when a control signal is present on one of the outputs. Support for an additional power supply can be used to save energy when light sources are powered from another power supply with higher power.



3. Way of work

With the MDimmer, we can independently control three lighting channels of LED light sources. Each channel has one assigned input. The inputs should be connected to the stable mono buttons that provide the negative signal of the module power supply. This is discussed in more detail in the section describing the inputs. Using the inputs, the user can control the brightness of each channel.

Two types of signal are recognized:

- **Short press – changes the output state to the opposite one.** If the output worked, it is switched off and vice versa. The module remembers the set lighting level of each channel until the power is turned off. After switching on the power supply of the module, all outputs are turned off, and a short press of the control button sets the maximum brightness on the input.

- **Long press – if we hold down the control button for more than 0.5 s, the brightness level changes.** Gradually every 10ms until the button is released. When the button is released, the direction of brightness adjustment changes. This means that the next time a long press is detected, if we were brightening before, we will now dim the light and vice versa.

- **Double click – activates the given LED output no matter what state it is currently in, to the brightness level of 40%.** For example, if a given input is turned off, after double-clicking, we get the output with 40% power. If it was on, the power is set to 40%.

- **Triple click – activates the given LED output regardless of what state it is currently in, to the brightness level of 70%.** For example, if a given input is turned off, after triple clicking we get the output with 70% power. If it was on, the power is set to 70%.

During brightening, after reaching the maximum brightness, the light is dimmed for 0.5s. Thanks to this, it is clear that a given channel shines with 100% brightness.

The module has programmed brightness steps which are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 25, 30, 40, 50, 70, 90 , 100%.



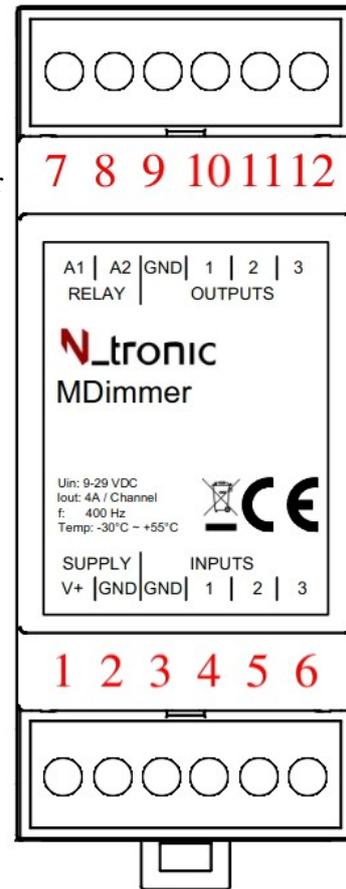
4. Hardware

4.1. Terminals

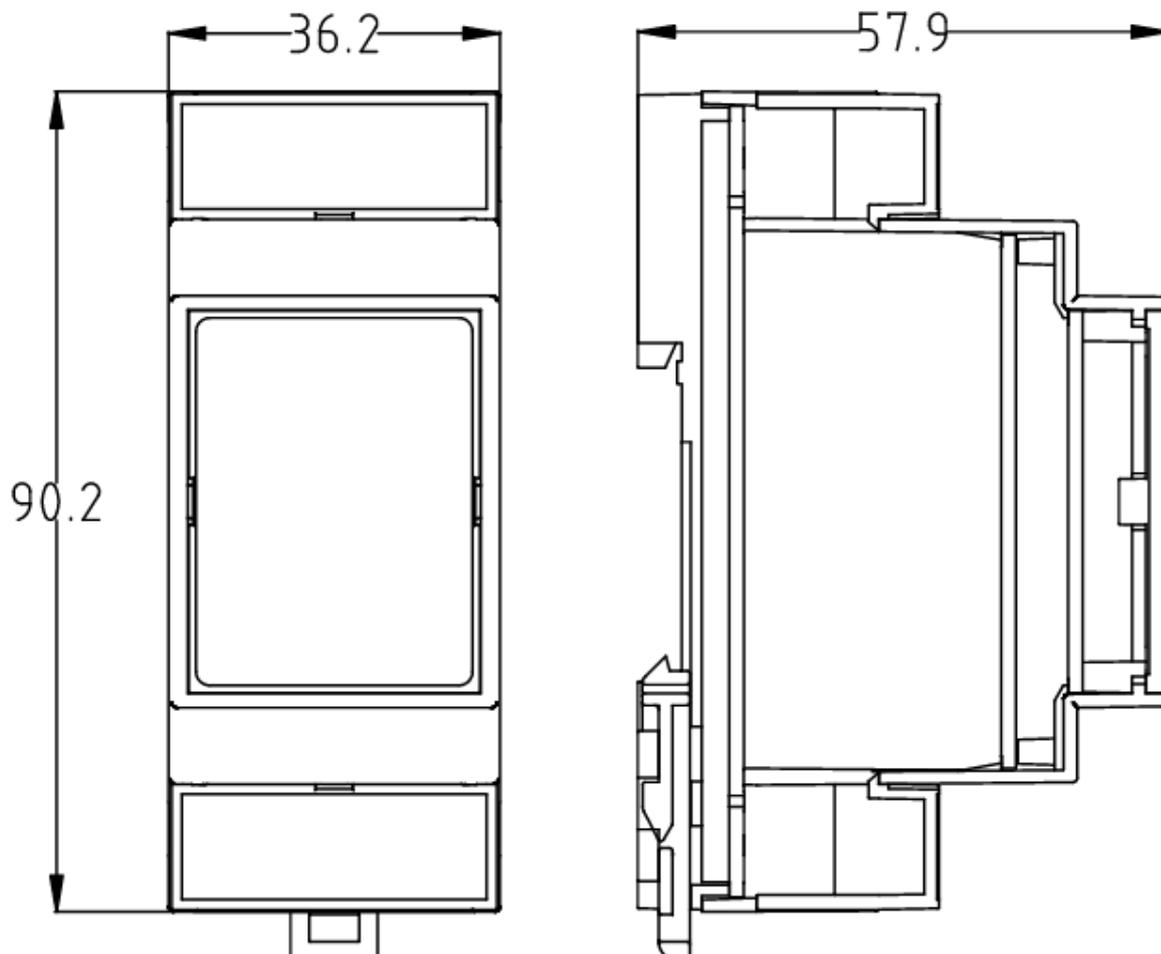
Terminal strips with a spacing 5,08mm and a maximum diameter 1.5mm² are placed in the device to connect the wires.

1. V+: positive power terminal (od +12 do +24 V DC)
2. GND : negative power terminal
3. GND: negative input terminal
4. IN1: input no 1
5. IN2: input no 2
6. IN3: input no 3
7. A1: 1 relay output
8. A2: 2 relay output
9. GND: negative output terminal
10. OUT1: output no 1
11. OUT2: output no 2
12. OUT3: output no 3

The device can be powered by DC voltage in the range of 12 - 24V on terminals 1, 2.



4.2. Case dimensions



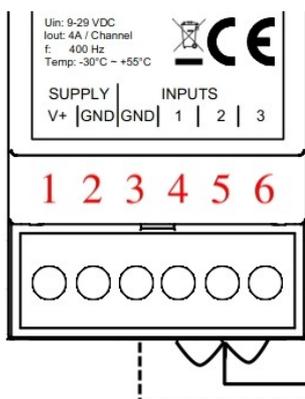
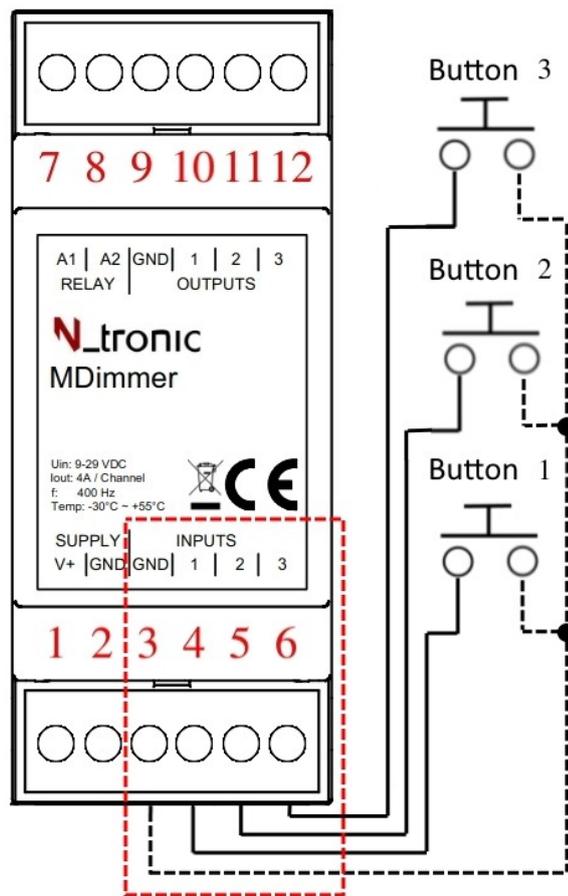
5. Wejścia

MDimmer has three inputs I1, I2, I3, respectively on screw terminals No. 4, 5, 6. They respond to the supply ground. Terminal no. 3 GND allows for easy ground connection to the buttons.



Any monostable buttons, i.e. returning to their original state after being released, can be connected to the inputs. For example, classic bell or roller shutter buttons. They should be connected between the ground available on terminals 2 or 3 and inputs I1, I2, I3.

It is recommended to use solid buttons that ensure a secure connection when pressed. Push-buttons with poor contact quality may cause a jitter effect with a single press, which may result in misinterpretation of the pulses by the device. MDimmer has a contact vibration elimination system, but in extreme cases it may not work.



If you want to control the brightness of several channels at the same time with one button, you can bridge the inputs. It is recommended to make these connections right next to the device.

At distances greater than 5 - 10 m, in order to reduce interference, we recommend using twisted pair cables to connect the buttons.

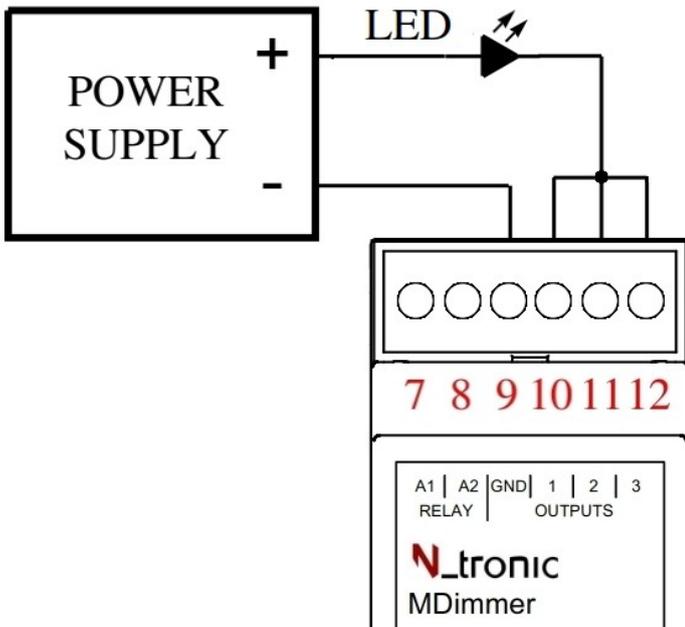
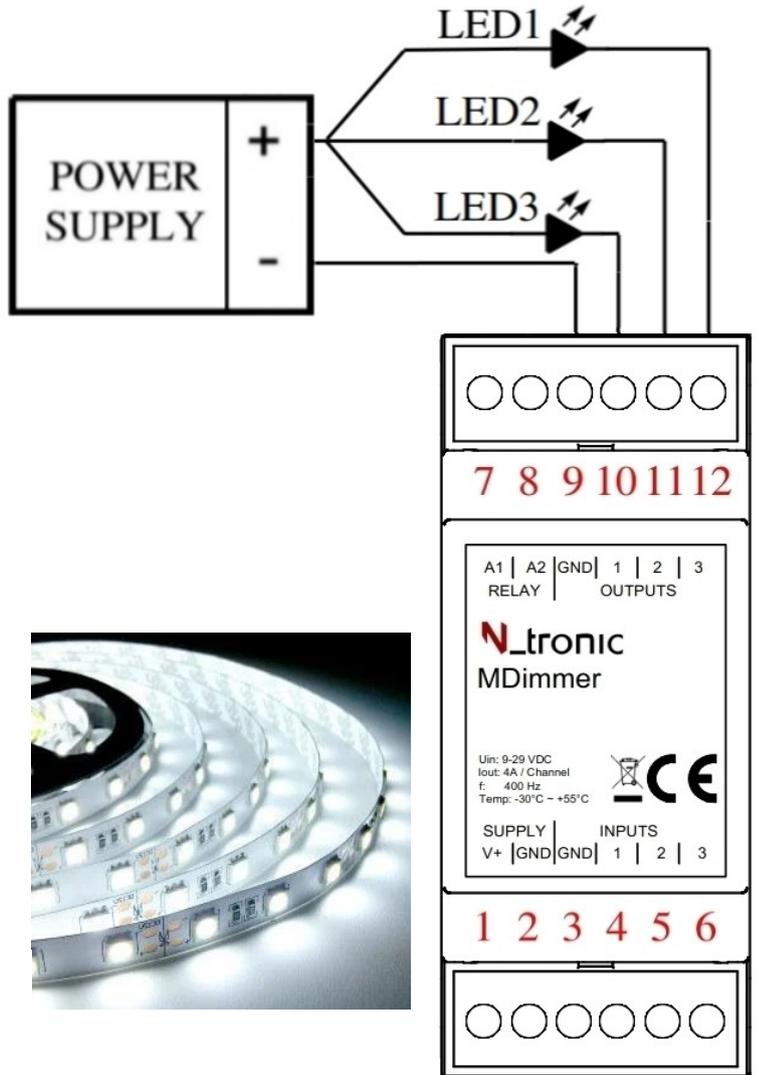
6. Outputs

6.1. Outputs LED

The outputs **O1**, **O2**, **O3**, respectively on terminals 10, 11, 12 are used to control power and the brightness of the connected light sources. During operation, they provide the ground potential in the form of PWM (Pulse Width Modulation) pulses. This is a method of pulse width adjustment consisting in cyclic switching the output on and off, where the ratio of the ON time to the OFF time of the transistor is proportional to the desired brightness level. The switching takes place at a frequency of 400 Hz. Such switching speed is not noticeable to the human eye as well as in cameras or digital cameras. Thanks to PWM modulation, we obtain a simple, effective and linear adjustment of the brightness of virtually any connected LED light source.

This brightness control, however, will not work with devices with built-in voltage converters or stabilizers, such as most LED replacements in halogen bulbs.

Each of the outputs can be loaded with a current of up to 5 A, which allows you to control receivers up to 360W with a 24V power supply.



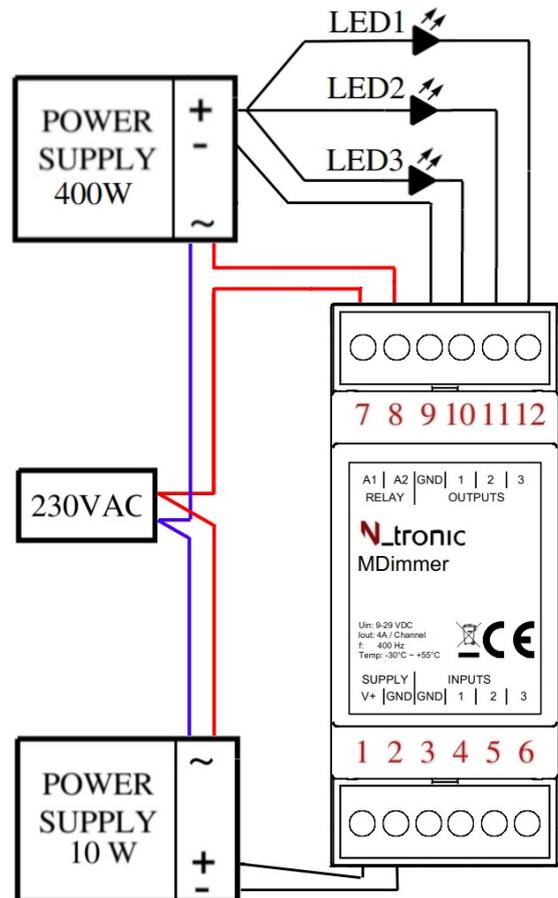
The outputs work independently, but they can be connected in parallel to support a light source that consumes more current than the efficiency of a single output. However, it should be remembered to bridge in this case also the appropriate inputs so that the channels work with the same filling.

6.2. Relay output

The device has a NO type relay output. Connection of terminals A1 and A2 (terminals 7 and 8) occurs when any of the outputs is active. This feature enables the automatic disconnection of the additional power supply when none of the outputs is active, and we want the power supply to not consume energy in the idle state. In this case, it is required to use a second power supply of less power, which permanently powers the MDimmer dimmer. The described way of working is shown in the figure beside.

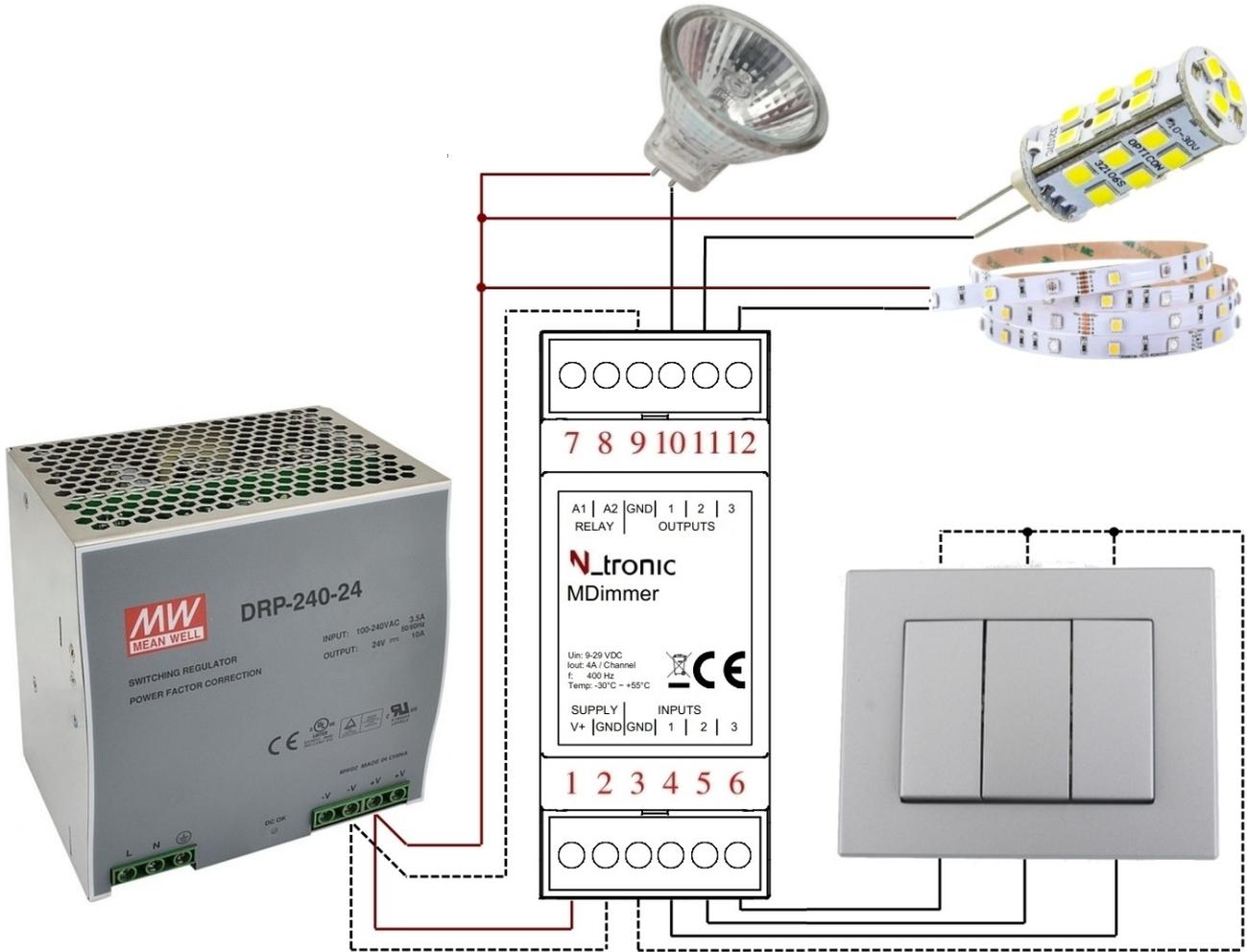
Zastosowany przekaźnik to **RM-84-2012**:

Producer	RELPOL
Relay type	elektromagnetyczny
Pin configuration	DPDT
AC contact load capacity	8A / 250V AC
DC contact load capacity	8A / 24V DC
contact current max.	8A

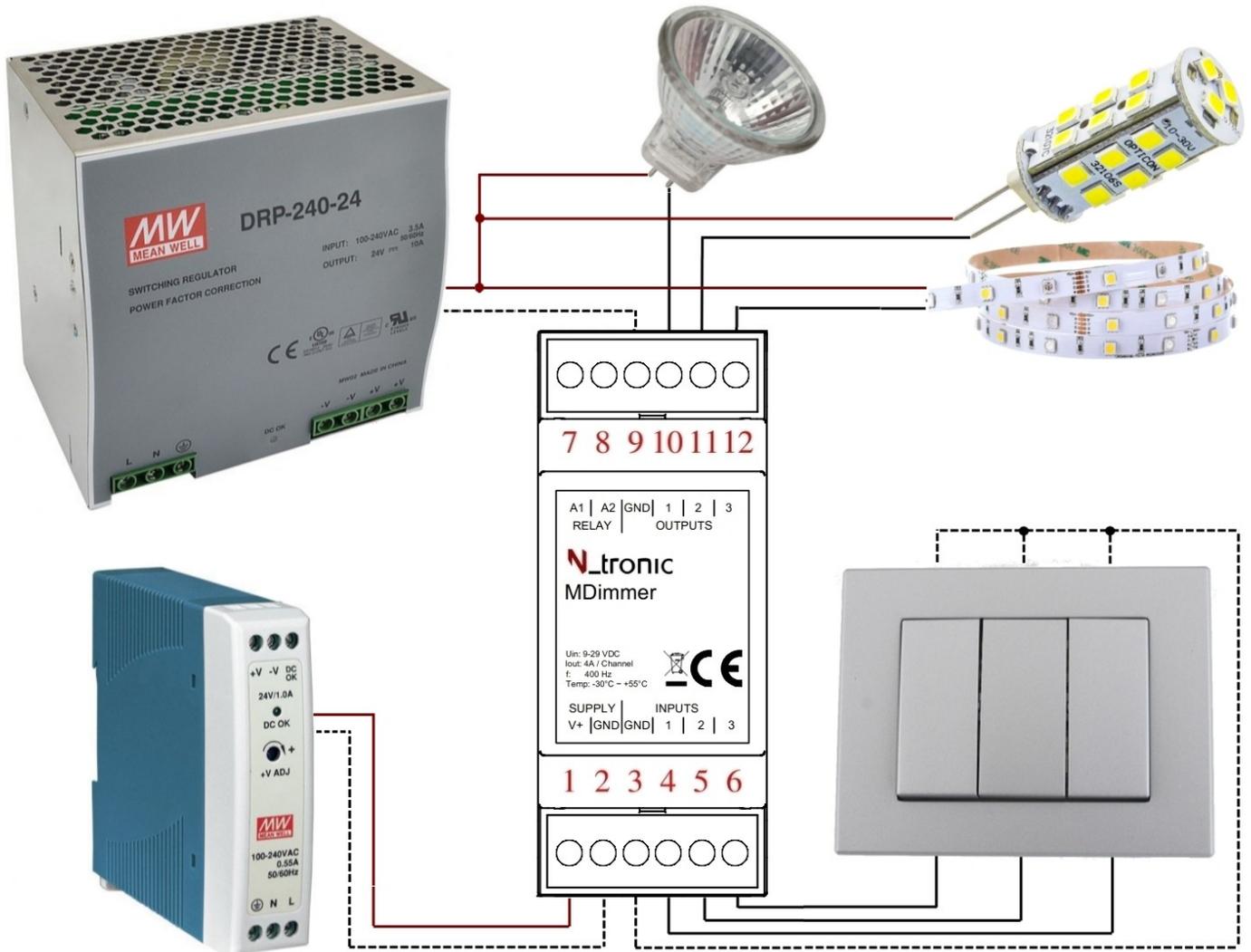


7.Connection

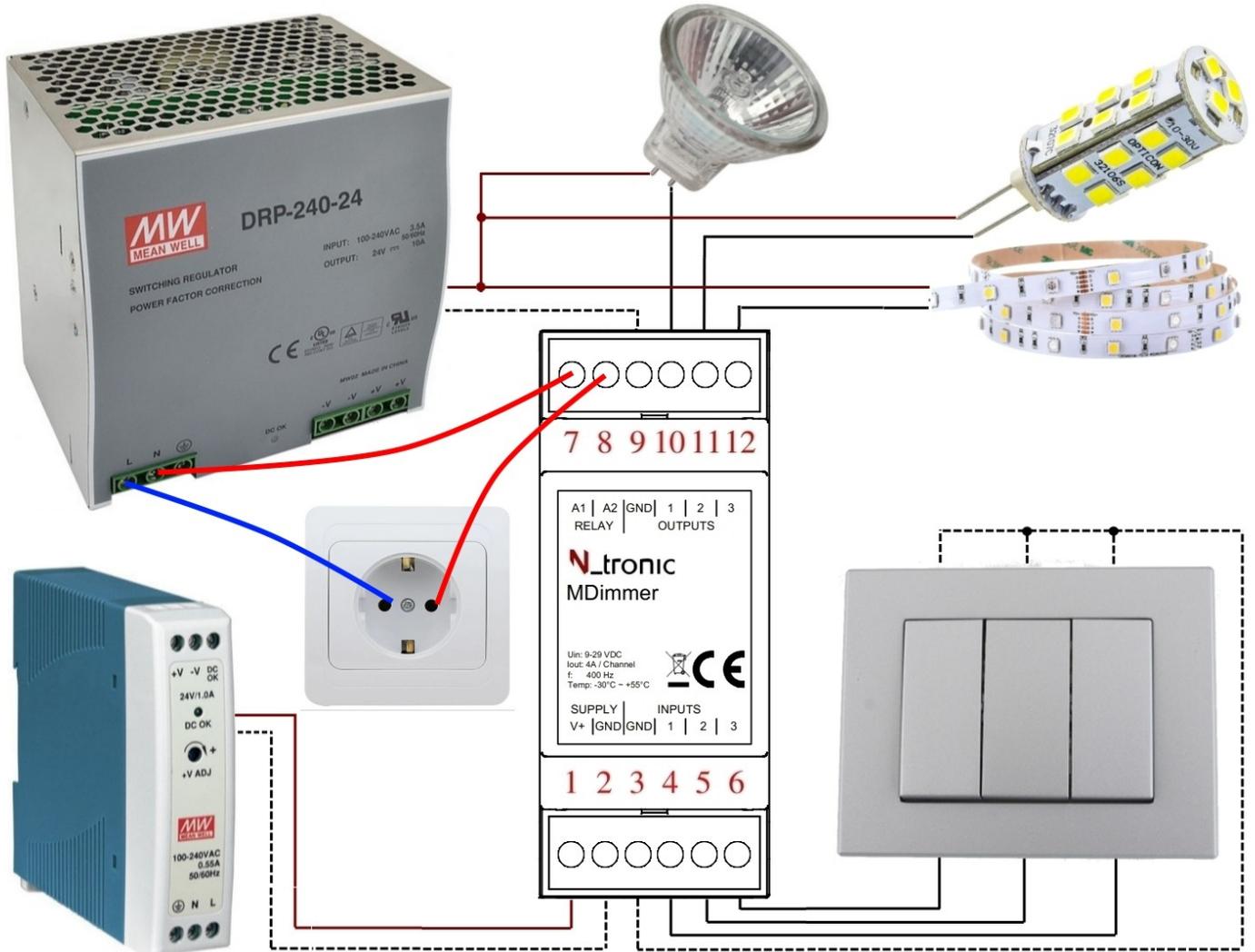
7.1.One power supply



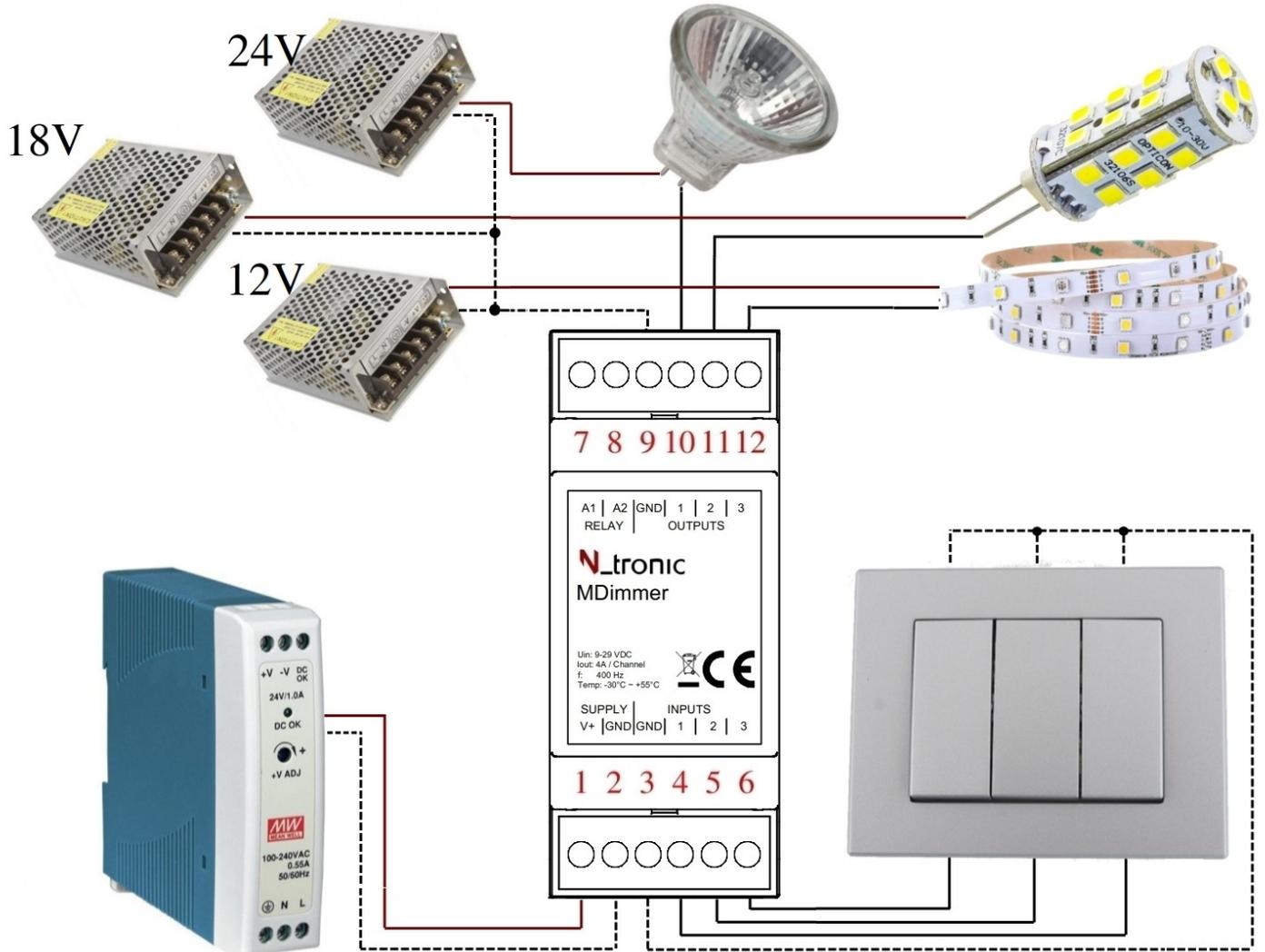
7.2. Two power supplies



7.3. Two power supplies with one controlled by relay output



7.4. Separate power supplies for each output



8. Work safety

- Please read this user manual before using the device.
- Installation of the device and all connections should always be performed with the power supply disconnected.
- The device has no user serviceable parts. In the event of damage, repairs may only be made by an authorized service indicated by the manufacturer. Any attempt to repair or modify the device yourself will void the warranty.
- The device has been designed in such a way that it can be used indoors, without direct exposure to weather conditions.
- Devices should be protected from liquids or high humidity.
- The device is designed to work with stabilized DC voltage power supplies with overvoltage and short-circuit protection. We recommend using power supplies that allow you to connect the ground (additional surge protection).
- During a thunderstorm or a long period of non-use, we recommend disconnecting the power supply.
- When operating with loads close to maximum, the device may become very hot. Ensure adequate ventilation of the device and it is not recommended to install it near other heat sources.
- The devices should be connected in accordance with the specified polarity, and the maximum load of the outputs should not be exceeded.
- All electrical connections should be made with cables of appropriate cross-sections so as not to exceed a voltage drop of 3% at maximum load.
- It is absolutely necessary to use additional short-circuit protection appropriate for the installation using the LED lighting control system (power supplies with short-circuit protection, additional fuses on individual circuits, etc.).
- At least every 2 years, perform a technical inspection of the device and check whether the safety of use has not deteriorated. If any irregularities are found, the devices must be returned for repair.
- Make sure the device is properly installed before powering up. • The device should be protected against contact with children.
- the device may generate acoustic noises when working with high currents as a result
- A phenomenon called magnetostriction. This is normal behavior resulting from the laws of physics and does not constitute grounds for complaint. This phenomenon intensifies as the value of the switched current increases. Too small cross-sections of wires and errors in the installation of LED lighting can also cause this type of phenomena.

9. Specification

PWM outputs

Number of output channels	3
Signal frequency	400Hz
Type of output channels	OC (Connects GND)
Continuous current carrying capacity of the outputs	4A /channel
PWM output control	Assembly data Gradually

Assembly data

Dimensions	90,2x 36.2 x 50,8 mm
Material	Self-extinguishing polycarbonate
Color	Light gray RAL 7035
Fixing	On 35mm DIN rail

Relay output

Relay type	RM84-2012
Continuous current carrying capacity of the contact	2A
Maximum switching power in AC1 category	65,5 VA
Contact resistance	50 mΩ
Sterowanie	Automatic when one of the outputs is active

Zasilanie

Supply voltage	9 – 29V DC
Power input	<1,5 W
Working temperature	-30 - +50 °C

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