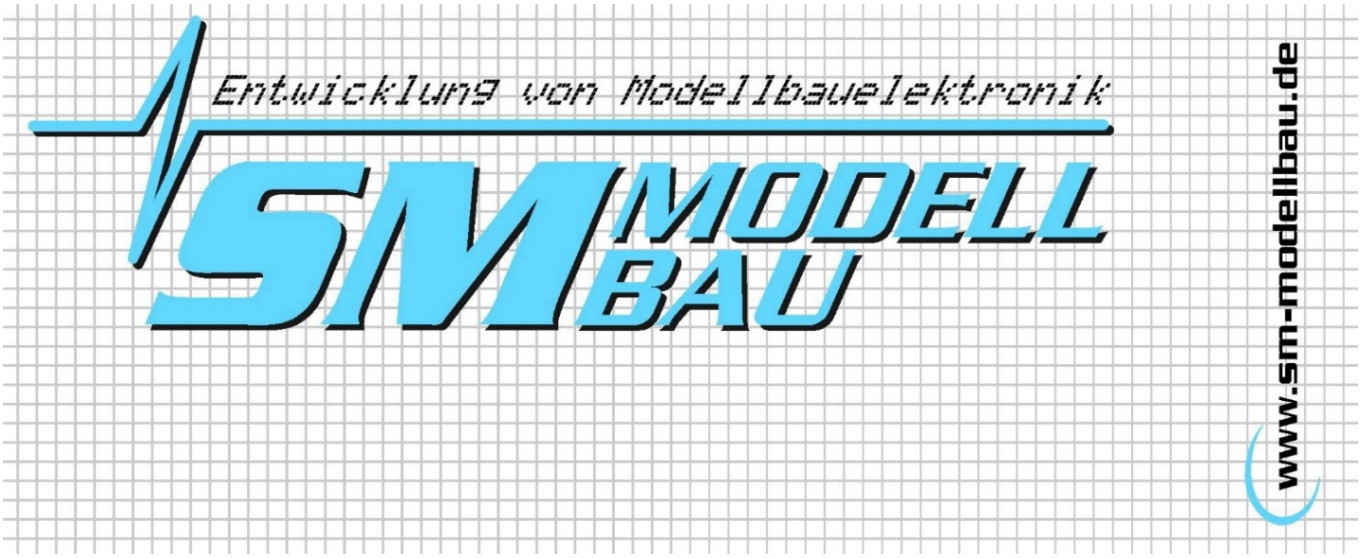


LED Current Controller Manual

CONTENTS

OVERVIEW

LEDs have a characteristic curve (the behavior from current to voltage), making it difficult to supply the voltage present in our models efficiently. Furthermore, a supply with a constant voltage is not possible because the slightest changes in the voltage or the LED's temperature significantly affects the flowing current.

The power supply of LEDs for lighting a model usually includes a resistor in series of the LED. This is necessary to limit the current of the LED and to minimize the effects of voltage changes. Nevertheless, this does not result in a constant current. A decreasing voltage (battery is empty) also reduces the current and thus the brightness. The resistor also consumes energy and will produce heat.

The LED Current Controller solves these problems. It is a switching controller that provides a constant current supply to the LEDs. This LED Current Controller replaces the previously used resistor with all its disadvantages. The LED Current Controller delivers a continuous output current independent of the input voltage with very high efficiency.

BENEFITS:

- No need for resistors to control LED current flow (less heat generation)
- No additional energy consumption from resistors.
- Hardly any heat generated (no cooling of the electronics necessary).
- Can use a smaller battery for the same runtime.
- Constant LED brightness regardless of battery voltage.
- Significantly fewer energy losses.
- Short circuit protection at the output.
- Easy to dimension even when changing the supply voltage.

The LED Current Controller is available in five different current configurations to closely match selected LEDs used. The current should correspond to the rated current of the LEDs in continuous operation. Of course, the cooling of the LEDs is necessary if needed. In case of doubt, select a lower current module.

OPERATION

The LED Current Controller can be controlled in several different modes, eliminating the need for control circuits such as light controllers or remote switches.

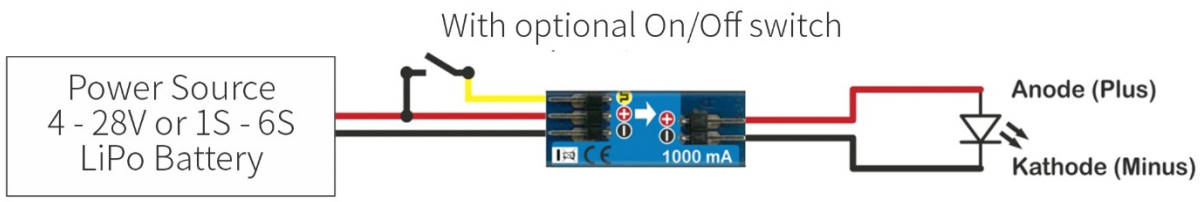
It can be connected directly to a receiver with a digital switching output, existing light controller, or it can be turned on or off with a switch.

EXAMPLES

The LEDs should be used without any resistor in series on the LED. Existing resistors should be removed or shortened, as they only generate heat and increase the required supply power.

STANDALONE

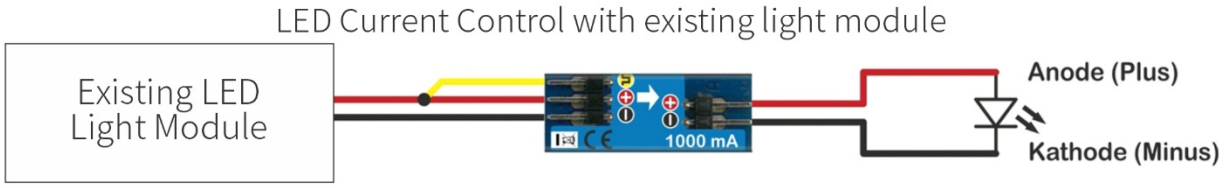
The most straightforward way to install the LED Current Controller is direct to a power source (4V to 28V) and operated by a switch. You can eliminate the switch by connecting the control signal wire to the positive lead of the battery.



EXISTING LIGHT MODULE

Suppose there is an existing light controller such as a remote switch controller or LED light control board. In that case, you can add the LED Current Controller module to the existing LED controller (remove or shorten existing resistors).

The existing control module will control the LED Current Controller.



RECEIVER CONTROL

Radio receivers that can set a channel to operate as a digital switch, such as Jeti and Graupner, can have the LED Current Controller directly operated from the radio.

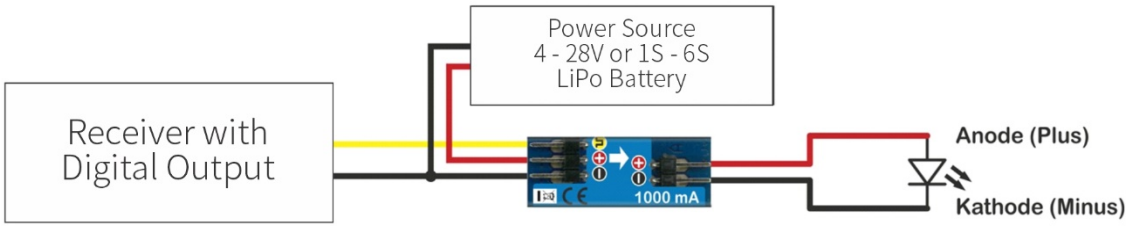
Using digital switches opens up the possibilities for programming flashing lights, flashers, and more without the need for additional electronics.

NOTE: *A servo output signal cannot control the LED Current Controller. The receiver channel output has to set as a digital output.*

NOTE: *Ensure that the current needed to power the LEDs can be provided by the receiver's power system. When in doubt, you should consider powering the LED Current Controller from a separate power source.*

EXTERNAL POWER

If the receiver's power source is not sufficient, you can power the LED Current Controller from an external power source. Follow the diagram to ensure proper connection.



LED CONNECTIONS

For proper and safe operation, make sure that neither the positive or negative leads of the LEDs have contact with other parts of your system. DO NOT combine all the negative or positive leads of the LEDs to a common connection!

SERIAL AND PARALLEL CONNECTIONS

The LED Current Controller supports multiple LED connections, provided that proper wiring and dimensioning are observed. Not all LEDs are created equal. For example, an ultra-bright, white LED has a forward voltage of 3.3V at 500mA. Depending on the receiver voltage, we can connect the LED Current Converter with one or two LEDs (in series) directly to the receiver. At 500mA, the voltage loss from the LED Current Controler is about 0.3V. The approximate voltage needed to operate the two LEDs is calculated as 3.3V + 3.3V + 0.3V = 6.9V. In this case, a receiver 6.6V battery pack will be sufficient to power the two LEDs in series.

When a higher voltage is available, for example, from the main battery like a 4S LiPo pack, you can have up to four LEDs with the same current connected in series.

EXAMPLE

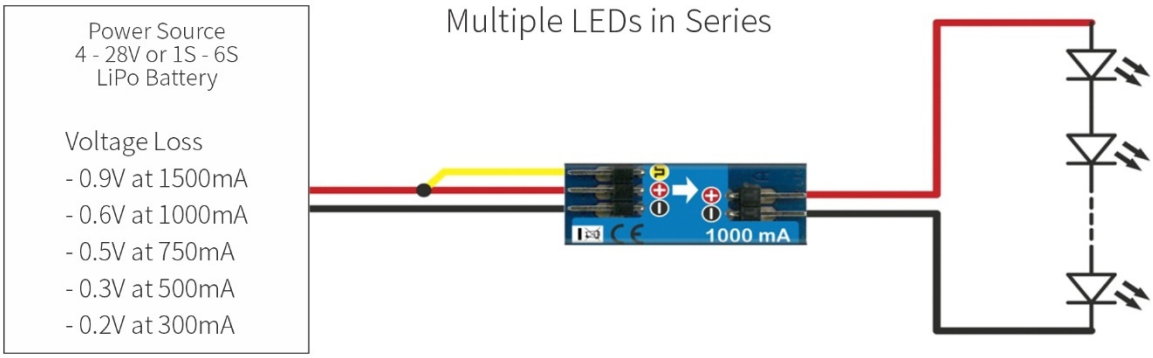
We want to connect four LEDs where each has a forward voltage of 3.3V at 100mA.

The total current consumption of all LEDs is 400mA, so we select the 500mA LED Current Converter module to power the LEDs. At 500mA, that module has 0.3V voltage loss (see table below).

The voltage needed to power those 4 LEDs in series is calculated as follows:

3.3V + 3.3V + 3.3V + 3.3V + 0.3V = 13.5V which is the minmal voltage needed to power the LEDs.

In this example, a 4S LiPo would work very well.



You should avoid connecting the LEDs in parallel as it will result in an unequal current flow between the LEDs.

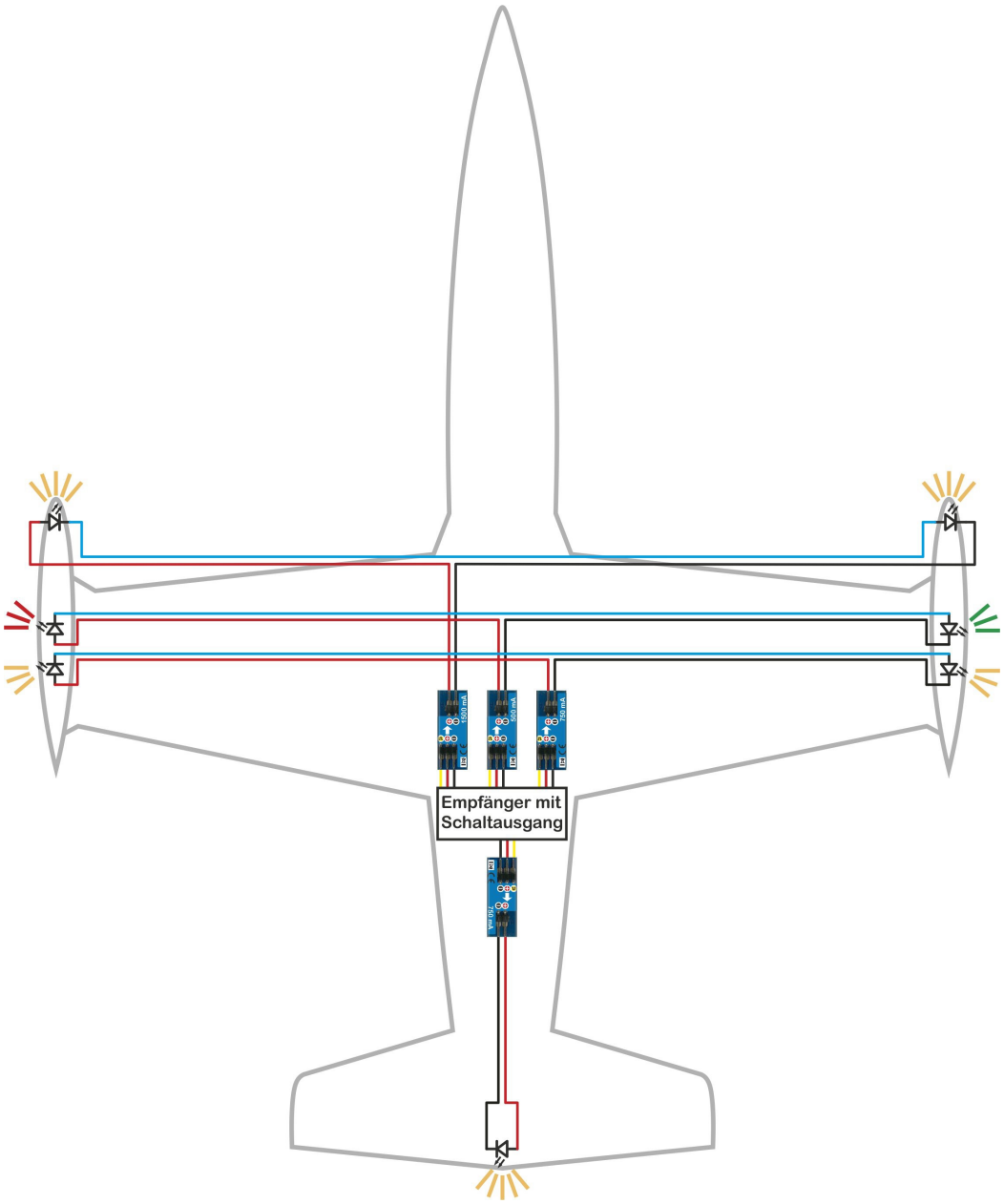
TECHNICAL DATA

Input Voltage:	4V to 28V → 1S to 6S LiPo
Regulated Output Current:	300 mA / 500 mA / 750 mA / 1000 mA / 1500 mA depending on module
Minimum Voltage Difference::	Approx. 0.6V at 1000 mA. The input voltage has to be approx. 0.6V higher than the total requierd LED voltage at output
Control Options:	• The output can be switched on and off with a digital signal, no further switch or circuits are necessary. • The permissible switching voltage is between 3 V and 28 V. • If the switching function is not needed, the switching input is connected directly to the positive voltage input.
Integrated Protection:	• Interruption at the exit • Short circuit at the output • Overcurrent of the entire module (2A Polyfuse built-in)
Consumtion in Off State:	Approx. 2 µA
Dimensions:	32 x 12 x 5 mm
Weight:	< 2 g

SAMPLE SETUP

The example below shows different wiring options when powering the LED Current Controler directly from the receiver. You can have separate channels for each LED light group or combine them on a single channel. This setup shows using two LEDs in series for navigation lights, strobe, and landing lights.

NOTE: Depending on the LED type used, you will have to ensure proper cooling as some LEDs can get very hot during operation.



GRAUPNER DIGITAL SWITCHES

Graupner radios can have a digital switch output set either from the receiver or from the radio. When a receiver channel is set as a digital output, it behaves like an On/Off switch that can control anything such as relays, modules, and even LEDs directly (mind the output voltage or better, use the LED Current Controller.

When a channel is set to digital output, there is no servo control possible on that channel.

The following receivers can provide a digital output on any channel: GR-12, GR-16, GR-24, GR-32. You will need to install the latest firmware (7.0.7 or higher).

All Graupner HoTT radios can be used with digital switches as follows:

1. Decide which channel is used for digital switch output. You can assign a control, mix, or flight mode to activate that channel.
2. From the settings and data view menu access, the receiver menu interface and follow the steps below

In this example, we select channel five as our digital output. The default is pulse (for servos) which needs to change to On/Off. Use the navigation keys applicable for your radio model to navigate through the menus to make settings changes.

NOTE: Those settings and any other settings made directly in the receiver will remain until you change them back or after performing a factory reset. If you switch the receiver to another model, it is good practice to reset the receiver back to its factory defaults.

MZ-16 and MZ-32 Radios

These radio models have more advanced digital switch capabilities, further enhancing the LED Current Controller's possibilities.

Check the manual for additional details.

Control Hobbies
3450 Palmer Drive 4-277
Cameron Park, CA 95682
United States
+1-877-238-0911
www.controlhobbies.com