

en/BL-Ctrl_2.0

32

HolgerB
MikroKopter.de

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1 Brushless-Controller Version 2.0

[Shoplink](#)

Note:

The BL-Ctrl 2.0 controller is specifically designed and optimized for our MK3638 motor. For maximum stability of the [MikroKopter](#) setpoints are set almost instantaneously on the motor. If other motors (especially larger power classes) are used with this controller, this fast change of setpoints can easily lead to very high peak currents, which bring the BL-Ctrl control to the limit or an overload. This is no fault of BL-Ctrl2.0 controller, but a systemic property. Please consider carefully whether a different motor is suitable.

1.1 main Features

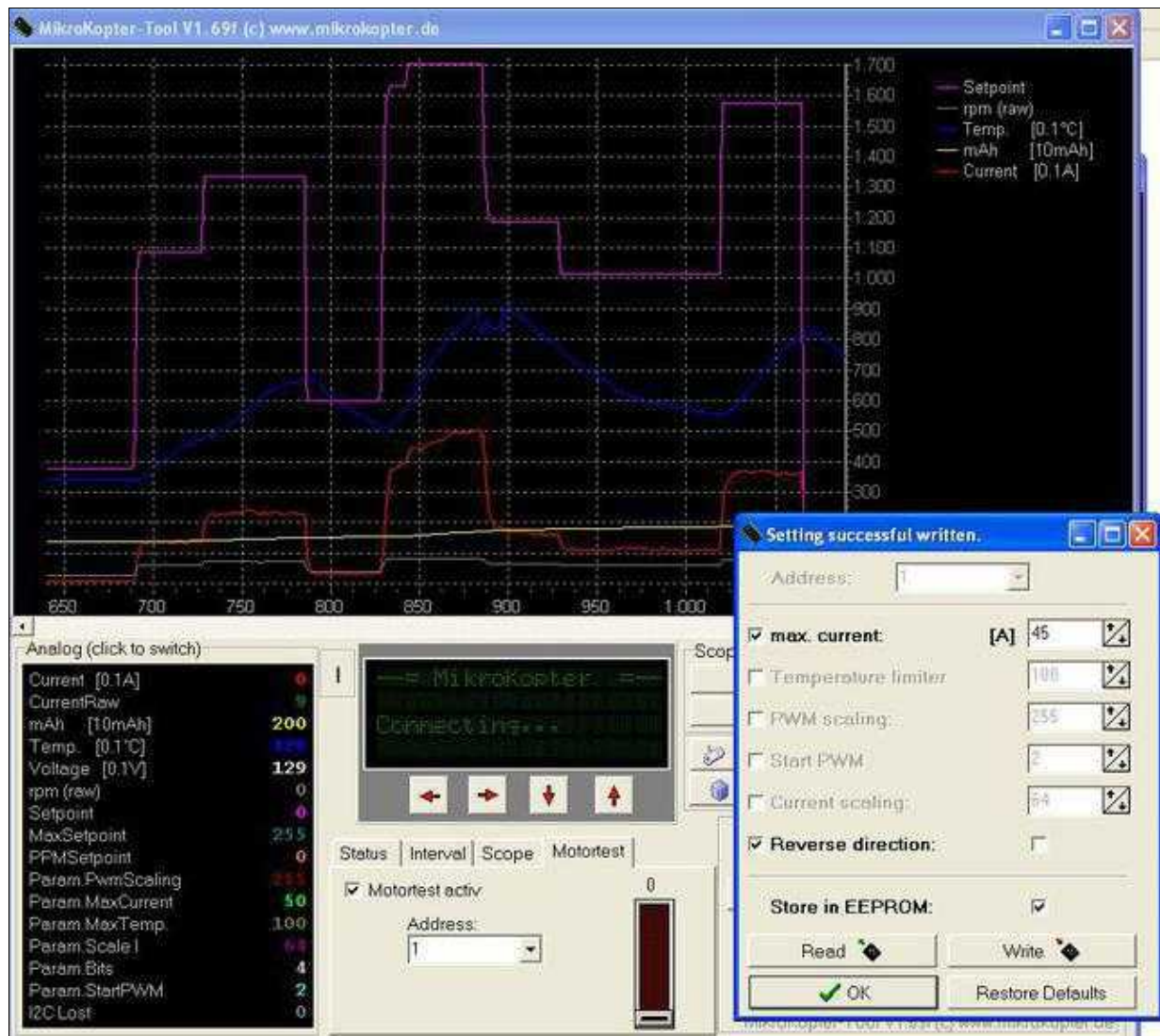
- ATMEGA168 with 16kB Flash
- Current: **35A continuous & 40A Peak** (provided there is good cooling)
- Voltage: up to 5s-[Lipo](#) (18,5V)
- Sizes: 21 x 44mm (like the V1.0)
- Capacitors: a second capacitor is required for currents > 20A

1.2 Features

- Current measurement
- **Temperature measurement**
- **Voltage measurement**
- 11Bit **Resolution** (2047 steps)
- I2C-Bus for [MikroKopter](#)
- serial port for MKTool
- PPM-input (Important: if the PPM-input is used make sure the 4-5 jumper is not closed)
- Jumper to address the **Addresses 1-8**
- Configurable by the I2C-bus using Koptertool -> the Koptertool can remain connected to the Navi or the FC

1.2.1 Show temperatures in the virtual display

1.2.2 Display of the measured values in MKTool



(in this case the BLC must directly connected to the MKUSB)

1.2.3 value of the rotation speed

The motor speed in RPM (Rotation per minute) is:

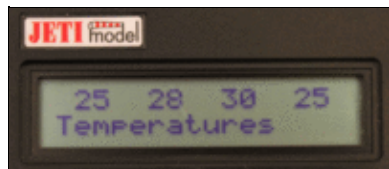
- $UPM = raw * 780 / \text{no. of magnets}$
- Example: at $rpm(raw) = 30$ is the speed 2340rpm if the motor has 10 magnets

Electrical commutation frequency vs. rotation speed

- $RPM = f * 60 * 2 / \text{magnets}$

The maximum electrical commutation frequency of the BL2.0 is 1666Hz, so the max rotation speed is 20.000rpm if the motor has 10 magnets

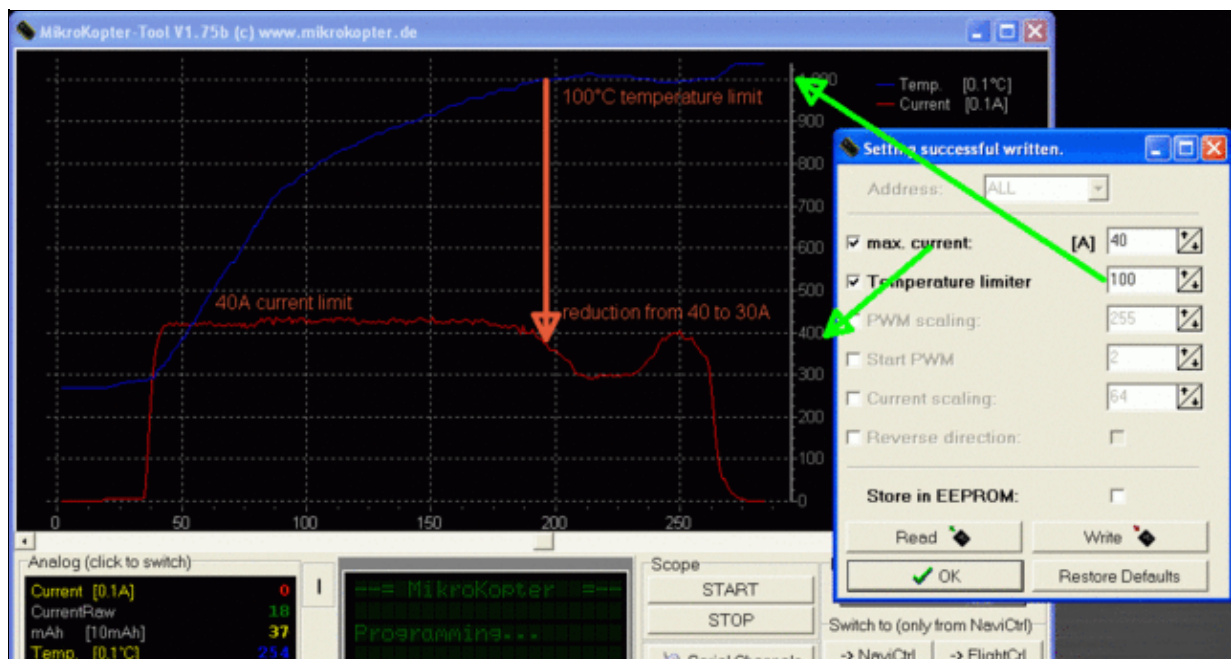
1.2.4 Display of the temperatures in the display Jeti



See also: [JetiBox](#)

1.3 Safety

- adjustable current limit, gently slows down and doesn't shut off
- gentle reduction of temperature
- doesn't start at $> 85^\circ \text{C}$ (if the engine is blocked for some time)



1.4 Adjustable

The settings are recorded at the start of the MK into the BL-Controller.

The settings can be stored manually in the single controllers.

In order to show the BL-Ctrl menu **press Ctrl + Settings**.

1.4.1 Meaning of the parameters:

- **Max. current:** Sets the upper limit for the motor current in amperes. At higher currents it is not switched off but cut back
- **Temperature Limiter:** Limits the maximum temperature of the board in °C. At higher temperatures are not turned off, but cut back (one percent per 0.1 ° C)
- **PWM Scaling:** defines the maximum power at maximum setpoint. This allows you to limit the maximum thrust, without losing resolution on the gas control.
- **Start PWM:** set PWM when you start the engines. When the motors start badly, you can modify this value.
- **Current Scaling:** this value is used for individual fine tuning of the current measurement of a controller.
- **Reverse Direction:** Here you can reverse the direction of a controller by software.

1.4.2 Notes

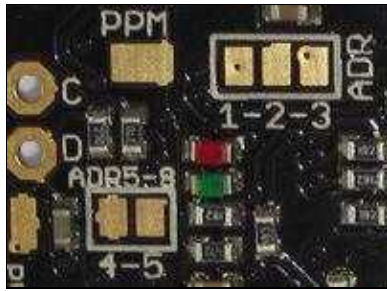
- You can set the parameters of a single controller using its address, or even all at the same time (select "Any").
- Only activated (front checkbox) parameters are set.
- To store the settings permanently (ie, even after restart) in the controllers you must activate the option "Store to EEPROM" before writing.
- The default settings can be loaded again when the button "Restore Default" is pressed. However, these are stored permanently only if you have also selected the option "Store to EEPROM".
- Only settings of controllers whose gas mixing in the mixer table is greater than 0, which means are then used in the attitude control, can be written and read.

See also: [Firmware 0.80](#)

1.5 Address selection

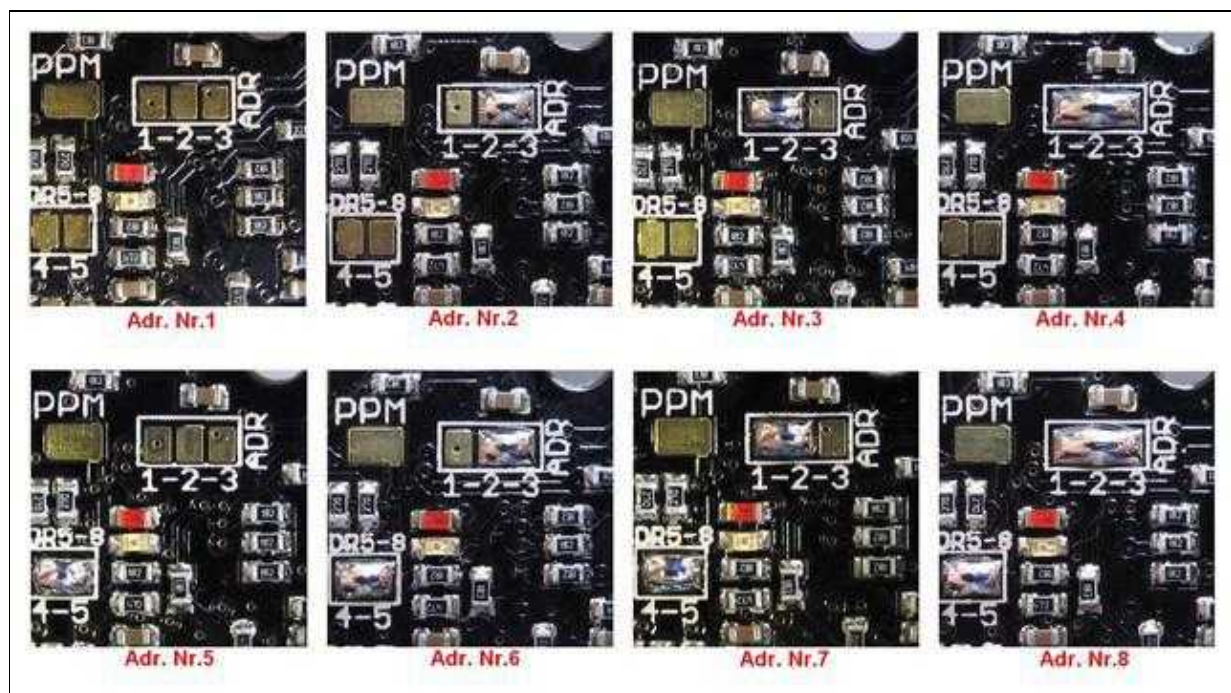
Each engine requires a unique address. Therefore the BL controls addresses are assigned by 1-8.

On BL-Ctrl V2.0 the motor address is set on the board using jumpers (use solder).



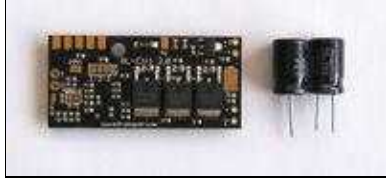
Where:

Adress (Motor)	1-2	2-3	4-5
1	open	open	open
2	open	closed	open
3	closed	open	open
4	closed	closed	open
5	open	open	closed
6	open	closed	closed
7	closed	open	closed
8	closed	closed	closed



1.6 Capacitors

The BL-controller comes with two capacitors. The second capacitor is needed from 20A. It does not hurt if you fit both capacitors.



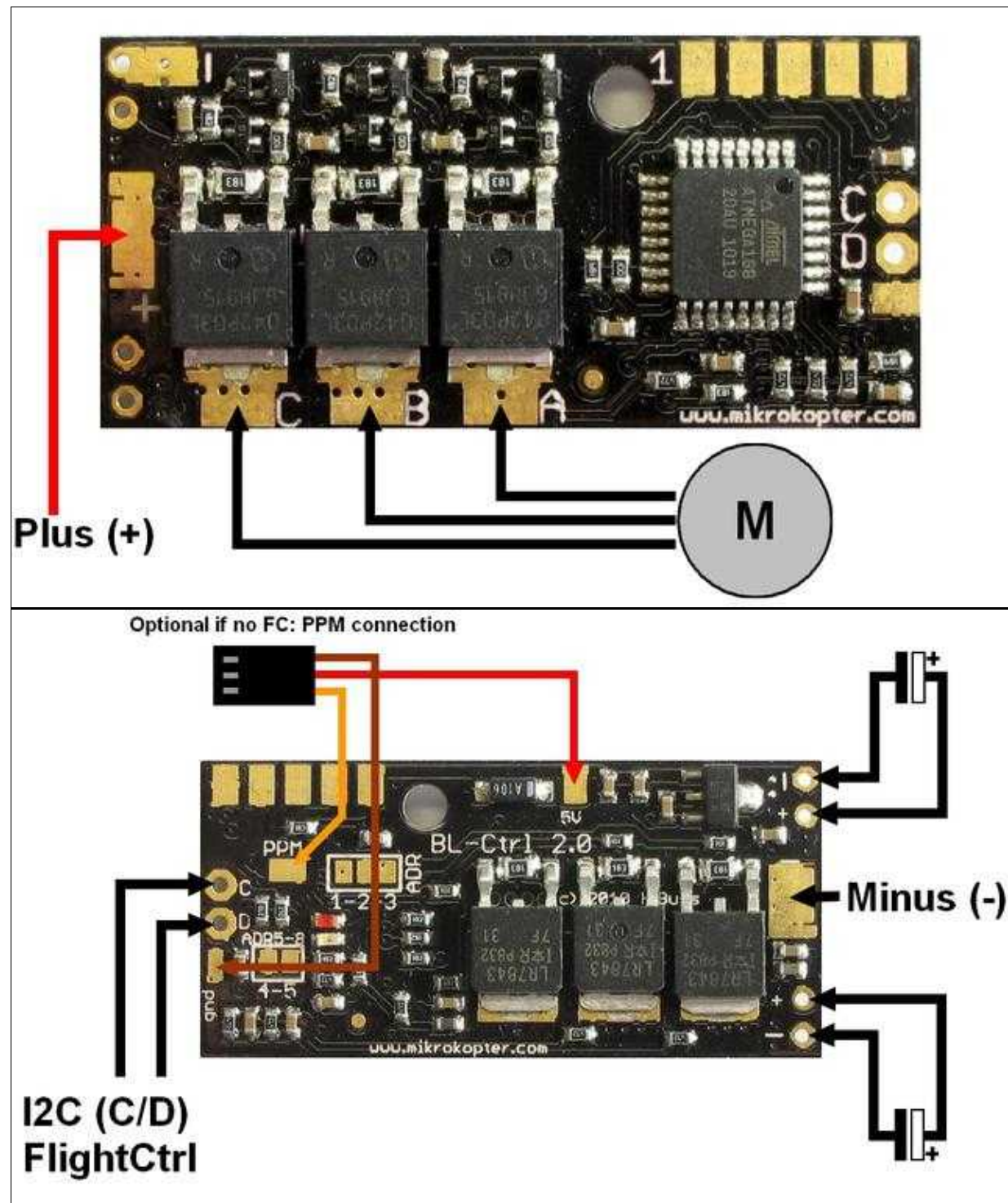
Important note: polarity - the white, thick-minus mark of capacitors must be on the board margins

1.7 Wiring diagram

http://mikrocontroller.com/files/BL_Ctrl_V2_0_Doku.pdf



1.8 Connection



INFO: Normally you connect the BL-Ctrl on the "I2C-Bus" of the [FlightCtrl](#) and set the needed address with a solder-bridge on the BL. But if you want to connect the BL-Ctrl with an PPM-cable (see second picture: PPM connection), an addressing with a solder-bridge is not necessary.

1.9 BL-Ctrl in Okto distribution



1.10 Software Update

All BL-Ctrl are already set with the latest software and also tested. If you have to install the software again you can find it here:

BL-Ctrl V2.0 - Adr. 1-8: [Download](#)

[description](#) of the BL-Update

1.10.1 Addresses 9-12

For larger [MikroKopters](#) with more than 8 motors, you need to update the firmware:

BL-Ctrl V2.0 - Adr. 9-12: [Download](#)

1.11 Miscellaneous

- The software source of these BL-Ctrl is not open
- [Here](#) the ATMEGA168 incl. Bootloader as spare part
- If there is a software update: the software may be updates only by serial MKTool. Using the SPI one would delete the boot loader - which is not public

[General info on BL-Ctrl](#)

2 I2C protocol for developers

Here the description of the [BICtrlProtocol](#)

- KategorieMK-Baugruppe/en