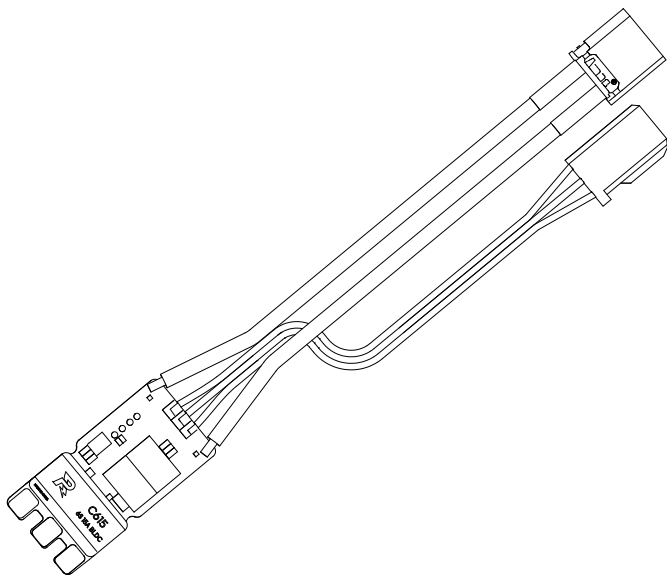# RoboMaster C615

Brushless DC Motor Speed Controller

User Guide

V1.0   2019.10

dji

Disclaimer

Thank you for purchasing the ROBOMASTER™ C615 Brushless DC Motor Speed Controller (hereinafter referred as "speed controller"). Read this disclaimer carefully before using this product. By using this product, you hereby agree to this disclaimer and signify that you have read it carefully. Install and use this product in strict accordance with all related documents. SZ DJI TECHNOLOGY CO., LTD. (abbreviated as "DJI"), and its affiliated companies assume no liability for damage(s) or injuries incurred directly or indirectly from using, installing, or modifying this product improperly, including but not limited to using non-designated accessories.

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Warning

1. Read and understand the entire user guide before first-time use of the speed controller. Make sure to use the speed controller in strict accordance with the working conditions listed such as the voltage, current range, and temperature; otherwise, the speed controller may be damaged permanently.

2. To avoid being hurt, DO NOT approach or touch the motor while it is operating.

3. Make sure there are no short circuits, all cables are correctly connected, and motor cables are correctly soldered.

4. The temperature of the speed controller increases when the output power is high. Handle carefully to avoid scalding.

5. Make sure all parts are in good condition. Replace the speed controller when any part is worn out.

6. Make sure the heat-shrink tubing is in good condition. Replace it when necessary.

Introduction

The RoboMaster C615 Brushless Motor Speed Controller offers precise and responsive motor control and uses a DJI-designated 32-bit motor driver, allowing for a maximum main frequency of 100 MHz and a maximum output PWM frequency of 48 kHz. Additionally, the speed controller also features a stall protection function that automatically cuts off the phase currents when the motor is stalled, preventing the speed controller from being damaged. The anti-static design of the speed controller ensures a high level of reliability and stability. This speed controller is compatible with the RoboMaster Snail 2305 Brushless DC Motor, which, when combined, creates a high-performance propulsion kit.

Features

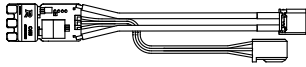Adjustable output PWM frequency
Supports 3S-6S LiPo batteries

Includes high-compatibility, high-speed motors
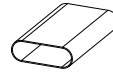• Max 40000 rpm (7 pole pairs)
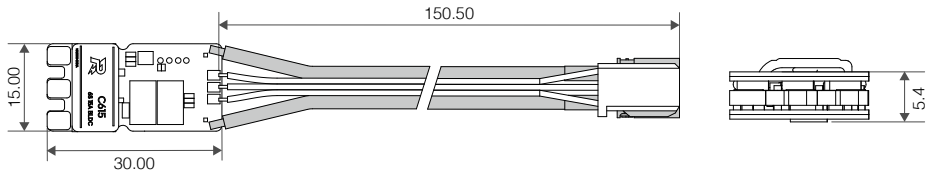• Max 280000 rpm (1 pole pair)

Supports DJI Assistant 2

In the Box

C615 Speed Controller × 1
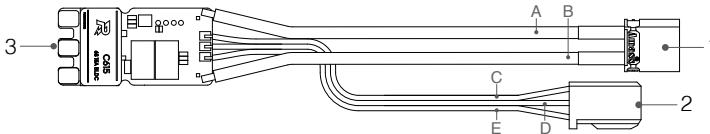
Heat-Shrink Tubing × 1

Speed Controller Dimensions

Note: In the above diagram, heat-shrink tubing is not included.

Unit: mm

Overview

Speed Controller

1. Power Cable
   Connects to a 24V power supply to provide power for the speed controller. From top to bottom: A:Black (GND) ; B: Red (+).

2. PWM Cable
   Connects to the PWM port of the external device to control the rotational speed of the motor. Connects to a USB-to-serial converter, and then connects the USB-to-serial converter to a computer in order to configure the parameters or update the firmware of the speed controller via DJI Assistant 2. From top to bottom: C: Black (GND); D: Grey (TX); E: White (PWM/RX).

3. Solder Pad for 3−Phase Cable
   Solder the 3-phase cable of the motor to the solder pad. Make sure there is no short circuit and the cable is correctly soldered.

Connection

Tool required: Electric soldering iron and soldering tin.

1. Solder the 3-phase cable of the motor to the speed controller, and then test if the motor rotates in the required direction. If not, switch any two wires of the 3-phase cable, or set the motor's rotational direction via DJI Assistant 2 or PWM Configuration. Refer to the Using DJI Assistant 2 and PWM Configuration sections for more details.

2. Connect the PWM cable to the PWM port on the control panel.
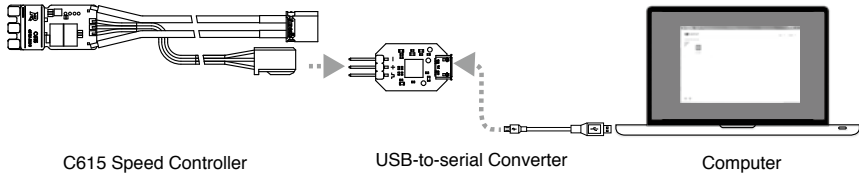
3. Connect the power cable to a power supply.

Using DJI Assistant 2

DJI Assistant 2 can be used to configure the parameters and update the firmware of the speed controller.

⚠ Unplug any other serial devices connected to your computer before connecting the speed controller.

C615 Speed Controller　　　　USB-to-serial Converter　　　　Computer

1. Download and install DJI Assistant 2 from the official RoboMaster website:
   https://www.robomaster.com/zh-CN/products/components/detail/2139

2. Connect the PWM cable to a USB-to-serial converter. The PWM cable's black wire is for ground (GND), grey wire transmits the data (TX), and the black wire receives the data (PWM/RX). Connect the USB-to-serial converter to the computer.

3. Connect the power cable to a power supply. DO NOT cut off the power supply during configuration.

4. Launch DJI Assistant 2. DJI Assistant 2 displaying that the speed controller has been connected means a connection has been established. Click ESC to open the speed controller management page.

5. Setting parameters: Under "Settings," users can set the basic parameters such as active braking, inlet angle, motor direction, startup tone, and throttle range. Under "Advanced Settings," quick turn settings can be enabled, and three PWM output frequencies are available to select.

6. Firmware Update: Under "Firmware Update," users can check current firmware version and download the latest firmware for update. Please note that before updating the firmware, you should first log in to your DJI account.

PWM Configuration

1. Connect the PMW cable to the PWM port of a control device such as the development board, or the receiver of a remote controller.

2. Set the pulse width of the PWM signal to the maximum value. Connect the speed controller and the motor, and then connect to the power source to power on. The motor will sound a double beep and a triple beep alternatively with an interval of two seconds. During the intervals, follow the steps below to configure:

a. Throttle Range Calibration

Set the pulse width of the PWM signal to the minimum value within two seconds of hearing a double beep. A single beep of the motor indicates that the throttle range calibration is completed.

b. Switching the Motor's Rotational Direction

Set the pulse width of the PWM signal to the minimum value within two seconds of hearing a triple beep. A single beep of the motor indicates that the motor's rotational direction has been switched.

⚠ If the "Quick Turn Settings" is disabled in DJI Assistant 2, you can only switch the motor's rotational direction using DJI Assistant 2.

Beep Code Descriptions

The motor will beep when it is in use. The table below contains more information regarding what these sounds indicate.

| Normal Status	Description
Chime	Ready to work
Abnormal Status	Description
Rapid Beeping	Minimum PWM signal pulse width not reached. Check the control panel, receiver, or the remote controller settings.
Slow Beeping	No PWM signal
Alternating Double and Triple Beeps	Use the PWM for PWM configuration and set the motor's rotational direction.

Specifications

Rated Voltage	DC 24 V
Max Allowable Voltage	DC 26 V
Max Allowable Phase Current (Continuous)	15 A
Max Allowable Peak Current (3 sec)	20 A
Max Control Signal Frequency	500 Hz
Control Throttle Range*	400-2200 µs
Default Output PWM Frequency	16 kHz
USB-to-serial Converter Voltage	3.3 to 5 V
Weight	9.7 g
Supported Battery	3S-6S LiPo
Operational Temperature Range	-10° to 40° C (14° to 104° F)
Compatible Motor Models:	Including but not limited to: Snail 2305, 2216, 2312

* PWM throttle range can be set using DJI Assistant 2.

Performance

The figures were generated when the speed controller was used together a RoboMaster Snail 2305 Brushless DC Motor.
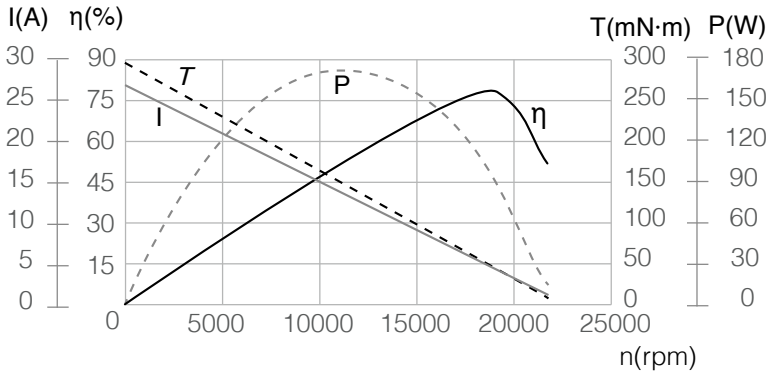
η - Motor Efficiency, T- Torque, P- Output Power, I- Speed Controller Input Current, n- Rotational Speed

The data above was generated in a laboratory setting with an output of 24 V at a temperature of 25° C (77° F). These figures should be used for reference only. In an environment with a temperature of 25° (77° F) where no extra cooling installations are available, the speed controller and motor cannot work when the current exceeds 20 A, can work for a short period (approx. three seconds) when the current is from 15 to 20 A, and can work continuously when the current is below 15 A. Make sure to control running time properly in accordance with actual working temperature and dissipation.

The content is subject to change without prior notice.
Visit the product page on the official RoboMaster website for more information.

https://www.robomaster.com