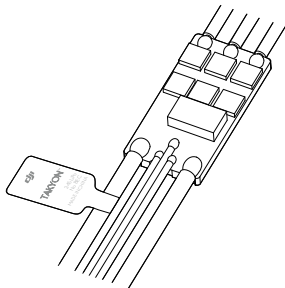# TAKYON Z415-M / Z425-M

Electronic Speed Controller

User Manual (V1.0)

2016.07

dji

Searching for Keywords

Search for keywords such as "battery" and "install" to find a topic. If you are using Adobe Acrobat Reader to read this document, press Ctrl+F on Windows or Command+F on Mac to begin a search.

Navigating to a Topic

View a complete list of topics in the table of contents. Click on a topic to navigate to that section.

Printing this Document

This document supports high resolution printing.

Contents

Disclaimer

Thank you for purchasing the TAKYON™ Z415-M / Z425-M Electronic Speed Controller (hereinafter referred to as "product"). Read this disclaimer carefully before using the product. By using this product, you hereby agree to this disclaimer and signify that you have read it fully. Please use this product in strict accordance with this document. SZ DJI TECHNOLOGY CO., LTD. and its affiliated companies assume no liability for damage(s) or injuries incurred directly or indirectly from using or refitting this product improperly.

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This disclaimer is produced in various languages. In the event of variance among different versions, the Simplified Chinese version shall prevail when the product in question is purchased in China, and the English version shall prevail when the product in question is purchased in any other region.

Warning

1. Always attempt to fly your aircraft in areas free of people, animals, power lines, and other obstacles.
2. DO NOT approach or touch the motors or propellers when the unit is powered on.
3. Be sure to use the product in strict accordance with the specifications (voltage, current, temperature, etc.) listed in this document. Failure to do so may result in permanent damage to the product.
4. The input throttle signal mode (regular or OneShot125) cannot be changed while the product is in use. Set the input throttle signal mode on your flight controller. Restart the electronic speed controller to apply the new mode.
5. Ensure that there are no open circuits or short circuits when soldering the power cables.
6. Before takeoff, ensure that the propellers and motors are installed correctly.
7. Ensure that all parts of the aircraft are in good condition. DO NOT fly with worn or damaged parts.
8. Ensure that all parts are firmly in place and all screws are tight before each flight.

Legend

⚠ Important   ☼ Hints and Tips   ▤ Reference

If you encounter any problems or if you have any questions, please contact your local DJI authorized dealer or DJI Support.
DJI Support Website:
http://www.dji.com/support

Download the latest version of this manual from:
http://www.dji.com/product/takyon-z425-m-and-z415-m

Visit the official DJI Forum for more topics:
http://forum.dji.com

Visit the DJI Online Store for more related products:
http://store.dji.com

For details on our after-sales policy, visit: **http://www.dji.com/service**. If you are unable to view the webpage or would like to request a hard copy of our policy, please contact your local DJI branch office or authorized dealer.

Profile

The Takyon Z415-M / Z425-M Electronic Speed Controller (ESC) is designed for racing drones. It uses a 32-bit motor driver integrated circuit developed by DJI with a maximum main frequency of 100 MHz, and its maximum output PWM frequency can reach 48 kHz. When using the Takyon Z415-M / Z425-M ESC, the ripple voltage of the power supply is 40% lower than when using an ESC of the same volume to effectively avoid abnormal power supply to other devices. The Takyon Z425-M ESC also uses a high-precision crystal oscillator to achieve more precise and responsive control, and to skip throttle range calibration.

DJI Assistant 2 allows you to configure the timing, acceleration, active braking, motor rotation direction and other parameters. Built- in configurations, specifically for different propellers and applications, can be selected to minimize setup time and risk. Upgradable firmware ensures the Takyon series stays up-to-date with DJI's latest motor control technology and features.

Features

3D Mode

Active Braking Function

Excellent Motor Compatibility*

Adjustable Output PWM Frequency

Motor Rotation Direction Quick Settings

Maximum Continuous Current: 15 A (Z415-M) or 25 A (Z425-M)

* Refer to Compatible Motor Models (p. 19) for details.

High Rotational Speed Motors

• 40,000 rpm (7 pole pairs) • 280,000 rpm (1 pole pair)

Two Throttle Signal Modes

• Regular throttle signal: 30 Hz to 500 Hz PWM signal

• OneShot125 signal: 30 Hz to 650 Hz

PC Assistant Software

• Timing settings   • Active braking settings

• Startup tone settings   • Motor rotation direction settings

• Acceleration settings   • Motor rotation direction testing

• Throttle range settings   • Firmware upgrade

Complete Electromagnetic Compatibility Test

• Radiated emission   • Electrostatic discharge immunity

• Radiated RF electromagnetic field immunity

Typical Application

• Racing drones

> **Active Braking**: The motor actively provides a reverse torque when decelerating, recovering some of the rotational energy. Normal braking mainly relies on air resistance.

> ⚠ DO NOT use a direct-current power supply for testing to avoid damage to the electronic speed controller and power supply when active braking function is enabled.

Connection

Tools Required: Power distribution board (PDB), electric soldering iron and soldering tin

1. Solder the ESC's black and red power cables to the pads on the PDB as shown.
2. Connect the signal cable to your flight controller. The signal cable's white wire transmits the control signal; the red wire transmits the data signal; the black wire is for ground.
3. Connect the motor to the ESC.

Signal Cable (to flight controller)

ESC

Motor

Power Cables

PDB
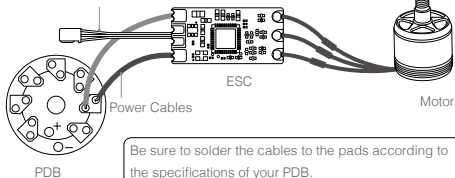
Be sure to solder the cables to the pads according to the specifications of your PDB.

The PDB in the figure uses its outer pads for the black cables, and the inner pads for the red cables. Cut the cables to length. The cables should not be so long as to bunch up near the solder point.

⚠ Ensure that there are no open circuits or short circuits when soldering the ESC cables.

☼ It is recommended that you solder a power connector on the PDB for the battery.

Using DJI Assistant 2

DJI Assistant 2 is used to upgrade and configure the ESC.

⚠️   • The DJI Takyon Updater is required but is not included with the ESC. To use DJI Assistant 2, connect the ESC to a computer through the DJI Takyon Updater as shown below.
    • To ensure your own safety, remove the propellers or disconnect the ESC and motors before using DJI Assistant 2.
    • Unplug any other serial devices that are connected to your computer before using the DJI Takyon Updater.

ESC   Takyon Updater
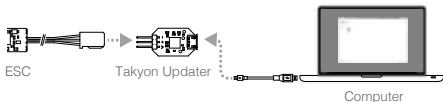
Computer

1. Download and install DJI Assistant 2 from the official DJI website. http://www.dji.com/product/takyon-z425-m-and-z415-m/info#downloads
2. Connect the Takyon Updater to the ESC with the signal cable and to your computer with a Micro USB cable. The signal cable's white wire transmits the control signal (⎍); the red wire transmits the data signal (+); the black wire is for ground (-). DO NOT reverse the signal cable.
3. Connect a battery (2S - 4S LiPo) to supply power to the ESC. Do not disconnect the ESC from your computer or the power supply until configuration is complete.
4. Launch DJI Assistant 2. When a connection is established, the software

will display the connected devices.

5. Click the device name ▣ under "Connected Devices" to enter the settings page and configure the ESC.

   Active Braking: Enable or Disable

   Acceleration: Between 1 and 100

   Timing: Medium or High

   Motor Rotation Direction: Clockwise or Counter-clockwise

   Startup Tone: DJI (♪ 1356), Simple (♪ 1) or Mute (not recommended)

   Throttle Range: Regular or 3D mode

   Motor Rotation Direction Quick Set: Enable or Disable

   Output PWM Frequency: 16 kHz, 32 kHz, 48 kHz

   Click ⓘ on the right side of the software interface for more details about the parameters.

6. Click ⬇ on the top left corner of "Connected Devices" to enter the firmware update page. Check the current firmware version and ensure the installed firmware is up-to-date. If not, login with your DJI account and click the Upgrade button.

⚠ If your ESC is not recognized by DJI Assistant 2 (no connected devices):

- Check if there is more than one FTDI device connected such as another DJI Takyon Updater, a DJI Updater, an FTDI USB adapter or development board (e.g. a BeagleBone, Raspberry or Arduino board). Unplug the other FTDI devices, restart the ESC and DJI Assistant 2, and try again.
- Re-connect the ESC and the power supply in the following order: Connect the ESC to your computer, connect the power supply to the ESC, and then launch DJI Assistant 2.

Using the Remote Controller for ESC Configuration

⚠ Be sure to remove the propellers before configuring the ESC.

If your ESC is in the regular input throttle signal mode, calibrate the throttle range and switch the motor rotation direction using the remote controller.

1. Power on the remote controller and receiver. Ensure a good communication between them.
2. Push the throttle stick all the way up, connect the ESC to the motor and power on the ESC. The motor will start beeping, alternating between a double beep and a triple beep with a two-second gap between each beep. To configure the ESC, carry out each of the following movements within the two-second gap.
   a. Throttle Range Calibration
      After the double beep, pull the throttle stick all the way down. A 1-second beep will sound if calibration is complete.
   b. Motor Rotation Direction Switch
      After the triple beep, pull the throttle stick all the way down. A 1-second beep will sound once motor rotation direction has been switched.

Motor Rotation Direction Quick Setting

⚠ • Be sure to remove the propellers before configuring the motor rotation direction.
• Motor rotation direction quick setting is enabled by default. It can be disabled in DJI Assistant 2.
• Motor rotation direction quick setting can be done just once between powering on and running the motor.

The Takyon Z415-M / Z425-M ESCs feature motor rotation direction quick setting. Users can easily switch to the opposite direction. within 7 seconds after the system has been powered on. Follow the instructions below:

1. Connect the ESC to the motor and power on the ESC. The motor will emit a startup tone (unless muted) to indicate that the system is ready.
2. Within 7 seconds of powering on, manually rotate the motor in any direction, and the motor will emit three beeps.
3. Within 3 seconds of the three beeps, manually rotate the motor in the opposite direction. A long beep will sound once motor rotation direction has been switched.

System Status Beep Codes

You can instantly tell the system's status by observing the emitted sounds from the motor.

Normal	Description
Startup Tone ♪	System ready.
Abnormal	Description
Rapid Beeping	Starting input signal is not at minimum. Check the settings of your flight controller, receiver and remote controller.
Slow Beeping	No signal input.
Alternating Double and Triple Beeps	Using the remote controller for configuration.
Three Beeps	Enter motor rotation direction quick settings.

Specifications

Parameters	Z415-M	Z425-M	Unit
Max Allowable Voltage	17.4	17.4	V
Max Allowable Current* (Continuous)	15	25	A
Max Peak Current (< 3 sec)	20	30	A
Max OneShot125 Signal Frequency	650	650	Hz
Max Regular Signal Frequency	500	500	Hz
Defaulted Output PWM Frequency	16	16	kHz
Weight (With Cables)	6.3	7.5	g
Battery	2S - 4S LiPo		
Operating Temperature	-10° to 40° C (14° to 104° F)		

* The data was measured in ventilated environment and at a temperature of 25° C.

Extreme Operating Environment

Unless specified, the data below was measured with an input voltage of 14.8 V, and at a temperature of 25°C.

Parameters	Z415-M		Z425-M		Unit
	Min	Max	Min	Max	
Input Voltage	6.4	17.4	6.4	17.4	V
Allowable Current (Continuous)	-	15	-	25	A
Peak Current (< 3 sec)	-	20	-	30	A
PWM Input Signal Level	3.0	5.0	3.0	5.0	V
Oneshot125 Signal Frequency	30	650	30	650	Hz
Regular Signal Frequency	30	500	30	500	Hz
Operating Temperature	-10	50	-10	50	℃

Recommended Operating Environment

Parameters	Z415-M			Z425-M			Unit
	Min	Typ	Max	Min	Typ	Max	
Input Voltage	7.4	14.8	13.05	7.4	14.8	17.4	V
PWM Input Signal Level	3.3	-	5.0	3.3	-	5.0	V
Oneshot125 Signal Frequency	30	-	650	30	-	600	Hz
Regular Signal Frequency	30	-	500	30	-	500	Hz
Operating Temperature	-10	25	40	-10	25	40	℃

Typical Environment Characteristics

Unless specified, the data below was measured with an input voltage of 11.1 V, and at a temperature of 25°C.

Parameters	Z318			Z420			Unit
	Min	Typ	Max	Min	Typ	Max	
Quiescent Current	0.0263	0.0269	0.0273	0.0268	0.0275	0.0278	A
Current at Full Throttle*	12.985	13.0825	13.170	13.159	13.254	13.421	A
ESC Temperature When Hovering**	-	39.2	-	-	43.4	-	℃

Test Environment:

* Current at Full Throttle
  Propeller: 5040; Motor: 2206 (KV2300)
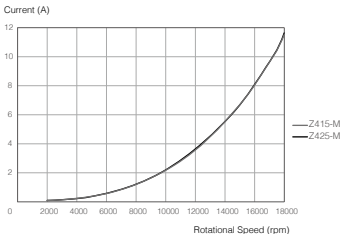
** ESC Temperature When Hovering
  Frame: diagonal wheelbase, 250 mm; Propeller: 5040; Motor: 2206 (KV2300);
  Battery: 4S LiPo, 2600 mAh; Total quadcopter weight: 601.2 g
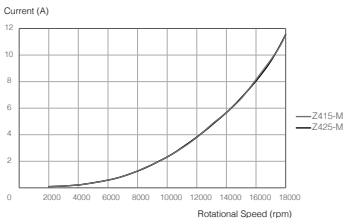
Performance Diagram

The data below was measured using the 2206 (KV2300) motor and 5040 propeller, and at a temperature of 25°C.
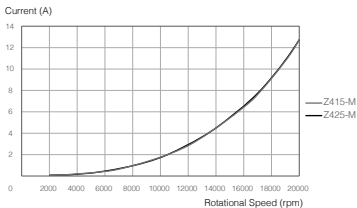
1. Input voltage of 11.1 V, Active Braking enabled, and High Timing set.
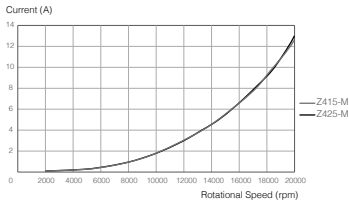
Current (A)

Rotational Speed (rpm)

2. Input voltage of 11.1 V, Active Braking disabled, and High Timing set.

Current (A)

Rotational Speed (rpm)

3. Input voltage of 14.8 V, Active Braking enabled, and High Timing set.

Current (A)

	Z415-M
	Z425-M

Rotational Speed (rpm)

4. Input voltage of 14.8 V, Active Braking disabled, and High Timing set.

Current (A)

	Z415-M
	Z425-M

Rotational Speed (rpm)

5. Input voltage of 14.8 V, Active Braking enabled, and High Timing or Medium Timing set.

Z415-M

Power Loading (g/W)

Rotational Speed (rpm)

Z425-M

Power Loading (g/W)
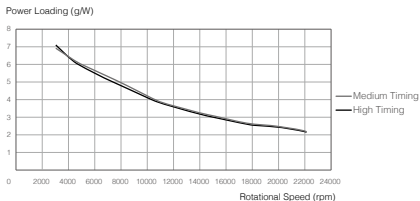
Rotational Speed (rpm)
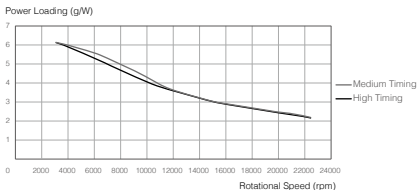
The maximum rotational speed in the diagrams above corresponds to the power loading as shown in the table below:

Parameters	Z415-M with Medium Timing	Z415-M with High Timing	Z425-M with Medium Timing	Z425-M with High Timing
Rotational Speed (rpm)	22119	22353	22310	22534
Power Loading (g/w)	2.187	2.127	2.167	2.125

ESC Dimensions

4.65

75.00   24.00   100.00

12.00   132.00
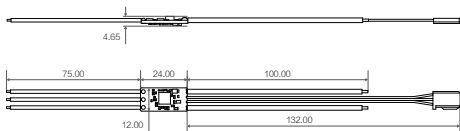
Unit: mm

Compatible Motor Models

The Takyon Z415-M / Z425-M ESCs are compatible with motors (including but not limited to): 1306, 1804, 1806, 2204, 2206, 2208, 2212, 2216, 2312, 2808, 3506

Compliance Information

Comply with the FCC, CE and RoHS rules.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EU Compliance Statement: SZ DJI TECHNOLOGY CO., LTD. hereby declares that this device is in compliance with the essential requirements and other relevant provisions of the EMC Directive.

A copy of the EU Declaration of Conformity is available online at www.dji.com/euro-compliance

EU contact address: DJI GmbH, Industrie Strasse. 12, 97618, Niederlauer, Germany

DJI Support
http://www.dji.com/support

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Download the latest version from
http://www.dji.com/product/takyon-z425-m-and-z415-m

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DJI by sending a message to **DocSupport@dji.com**.