

**Revised edition**  
**V series electronic speed regulator user manual**  
Ver.1.0.1

Version change history

Date	Version	Change log
2024.6.15	Ver.1.0.0	Create version
2024.9.2	Ver.1.0.1	Modify the throttle stroke and some description errors

## 目录

Revised edition .....	1
V series electronic speed regulator user manual .....	1
Ver.1.0.1 .....	1
1 .Introduction .....	3
2 .Precautions .....	3
3. Feature of product .....	3
4.Product specifications .....	3
Technical Specifications .....	4
6. User Guide .....	6
6.1Precautions .....	6
7. Normal Power-on Process .....	6
8.Protection Function Description .....	7
9.Common Faults and Alert Tones Description .....	7
10.Setting the ID via the upper computer .....	8
11.Set the ID in PX4 flight controller .....	9
12.Rotation direction setting .....	11
13Encoder Calibration .....	13
14.Rotor lock configuration .....	14
15.Firmware Upgrade .....	16
16.CAN protocol related .....	18

## 1 .Introduction

FOC — Field-Oriented Control, a smart drive vector control technology, demonstrates higher efficiency, lower operating temperature, faster response speed, reduced noise, lower interference, linear throttle control, precise control performance, and efficient energy recovery compared to ESCs of the same power.

## 2 .Precautions

- This series of ESCs uses FOC driving mode and requires strict matching of motor parameters. It is important to note that this program is unique; each program is only suitable for a specific combination of motor and propeller and cannot be simultaneously compatible with multiple combinations. If you need to use it, please be sure to contact the manufacturer.
- The power setup for this ESC does not recommend changing the propeller to avoid triggering ESC protection due to inappropriate combinations, which may cause the equipment to malfunction. During ground testing, please do not install the propeller to ensure safety.
- Before connecting the ESC and related components, ensure that the contact points are well-insulated to prevent short circuits that could damage the ESC. Carefully check the connections of each component, as poor connections may lead to improper control of the aircraft or cause unforeseen equipment damage.
- Before using this ESC, carefully read the V series ESC user manual to ensure proper matching of the power system and avoid damage to the ESC due to incorrect configurations.
- If you need to solder the input and output connectors of the ESC, use a soldering tool with sufficient power to ensure a secure connection.
- Do not allow the ESC's external surface temperature to exceed 90 °C, as high temperatures may damage the ESC and could potentially cause motor damage or a crash.
- To change the motor's direction during operation, you can either swap the order of any two phase wires or adjust the settings through the ground control station.

## 3. Feature of product

- 3.1 Supports DroneCAN protocol to achieve rapid integration with PX4 flight control.
- 3.2 Equipped with PWM and CAN dual throttle input design to back up each other.
- 3.3 PWM and CAN dual isolated inputs to ensure signal transmission reliability.
- 3.4 Support rotor lock.

## 4.Product specifications

Model	Persistent Current	Peak Current	BEC	Cells (4.2V)	Reference options	Weight(Not inc wires)g	Appearance Dimensions (mm)
V-40A-14S	20A	40A	No	6-14s	Adjustable Parameters	50	62*30*18
V-60A-14S	30A	60A	No	6-14s	Adjustable Parameters	63	77*33*19
V-80A-14S	40A	80A	No	6-14s	Adjustable Parameters	78	84*35*19
V-120A-14S	60A	130A	No	6-14s	Adjustable Parameters	130	103*50*26
V-150A-14S	70A	160A	No	6-14s	Adjustable Parameters	206	116*49*31
V-200A-14S	100A	200A	No	6-14s	Adjustable Parameters	243	127*56*33

### Technical Specifications

Model	Protocol	Isolation Method	Firmware Upgrade	Digital Communication Throttle	PWM Level	PWM Frequency	PWM pulse width	Throttle calibration	Dual Throttle	Rotor lock	Protection level
V-40A-14S	CAN bus (RS485 can be customized)	Fully Isolated	Support	Support(CAN)	5V/3.3V	50-500 Hz	1040-1940 us	Non-calibratable	Support (CAN+PWM)	Support ,Custom motor required	IP55 (customizable to IP67)
V-60A-14S	CAN bus (RS485 can be customized)	Fully Isolated	Support	Support(CAN)	5V/3.3V	50-500 Hz	1040-1940 us	Non-calibratable	Support (CAN+PWM)	Support ,Custom motor required	IP55 (customizable to IP67)
V-80A-14S	CAN bus (RS485 can be customized)	Fully Isolated	Support	Support(CAN)	5V/3.3V	50-500 Hz	1040-1940 us	Non-calibratable	Support (CAN+PWM)	Support ,Custom motor required	IP55 (customizable to IP67)

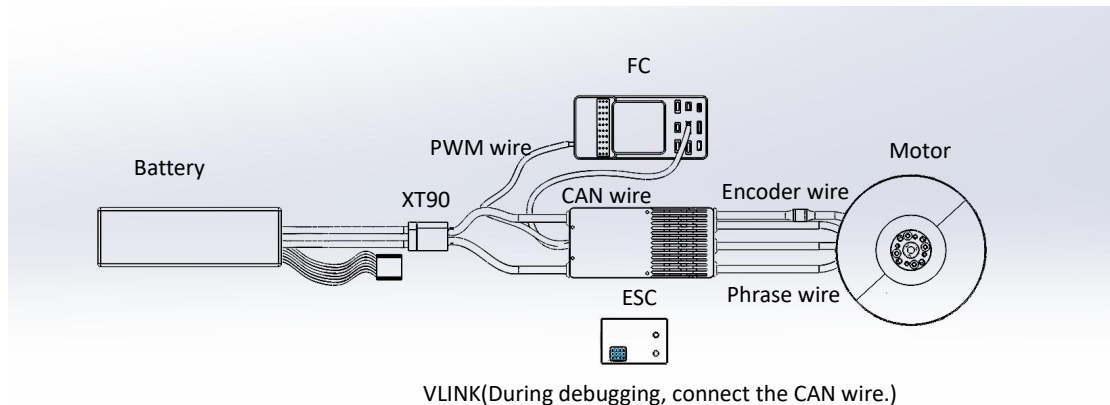
V-120A-14S	CAN bus (RS485 can be customized)	Fully Isolated	Support	Support(CAN)	5V/3.3V	50-500 Hz	1040-1940 us	Non-calibratable	Support (CAN+PWM)	Support ,Custom motor required	IP55 (customizable to IP67)
V-150A-14S	CAN bus (RS485 can be customized)	Fully Isolated	Support	Support(CAN)	5V/3.3V	50-500 Hz	1040-1940 us	Non-calibratable	Support (CAN+PWM)	Support ,Custom motor required	IP55 (customizable to IP67)
V-200A-14S	CAN bus (RS485 can be customized)	Fully Isolated	Support	Support(CAN)	5V/3.3V	50-500 Hz	1040-1940 us	Non-calibratable	Support (CAN+PWM)	Support ,Custom motor required	IP55 (customizable to IP67)

## 6. User Guide

### 6.1 Precautions

1. Do not exceed the recommended operating voltage range of the ESC, otherwise it may cause irreversible damage to the ESC.
2. This ESC throttle has been solidified and does not require throttle calibration. The throttle stroke is 1040-1940us.
3. The FOC ESC features braking effect and reverse voltage. Please ensure the use of power equipment capable of absorbing reverse voltage during ESC testing or flight to avoid damage to the ESC and power supply.
4. The ESC supports both PWM and CAN throttle modes, with the ability to set which mode takes priority while the other serves as a backup. Upon startup, the throttle must be connected to the ESC to ensure normal operation. The backup throttle mode only becomes effective if the primary throttle mode fails during operation. The factory default setting is PWM throttle priority. If you need to change to CAN throttle priority, please contact the manufacturer or use the upper computer for settings.
5. If using the rotor lock mode, it is strictly forbidden to change the connection order of the three-phase wires with the motor, and ensure that the encoder wires do not become detached.

### 6.2 Wiring diagram



- 1) The 2P-JR connector is the PWM throttle input line, with the white line as the throttle signal line and the black line as the ground wire.
- 2) The 3P-JR connector is the CAN throttle input line, with the green line as CANL, the yellow line as CANH, and the gray line as the ground wire.
- 3) The M6 aviation connector is the encoder wire, which can be connected to the motor encoder wire to enable the fixed-pitch function.

## 7. Normal Power-on Process

- 1) Turn on the radio and set the throttle stick to the minimum position.
- 2) Connect the system to the battery. When the motor emits a beep, it indicates that the system is ready, and the self-check is complete, making it ready for takeoff.

## 8. Protection Function Description

This series of ESCs is designed for industrial drones, with no low voltage protection and over-temperature protection.

### 1) Stall protection

When the ESC detects a motor stall, it will completely shut down the output after 2 seconds and repeatedly attempt to restart the motor. If the motor restart fails, please carefully check for faults and then power cycle the system to restore output.

### 2) Current Protection

40A/60A/80A: When the instantaneous current exceeds 200A, the ESC will immediately cut off the output. It will return to normal operation after being powered off and on again.

120A: When the instantaneous current exceeds 160A, the ESC will immediately cut off the output. It will return to normal operation after being powered off and on again.

150A: When the instantaneous current exceeds 280A, the ESC will immediately cut off the output. It will return to normal operation after being powered off and on again.

200A: When the instantaneous current exceeds 330A, the ESC will immediately cut off the output. It will return to normal operation after being powered off and on again.

### 3) Temperature Warning

When the MOSFET or capacitor temperature exceeds 110 ° C, a temperature warning message will be sent via the CAN communication interface. If the temperature continues to rise after the warning, it may cause irreversible damage to the electronic components. Please land immediately or reduce the throttle output.

### 4) Low voltage warning

This series of ESCs does not have low voltage protection. When the voltage drops below 18V, some electronic components of the ESC may malfunction. Please land promptly.

### 5) Throttle signal loss protection

When the ESC detects a loss of throttle signal and there is a backup throttle, the ESC will immediately respond to the backup throttle's output. When the ESC detects a loss of throttle signal but there is no backup throttle, the ESC will continue to output with the last received throttle signal for 2 seconds. If a throttle signal is received within those 2 seconds, the ESC will continue to respond. If no throttle signal is received within 2 seconds, the output will be shut down, and the ESC needs to be re-powered to restore functionality.

## 9. Common Faults and Alert Tones Description

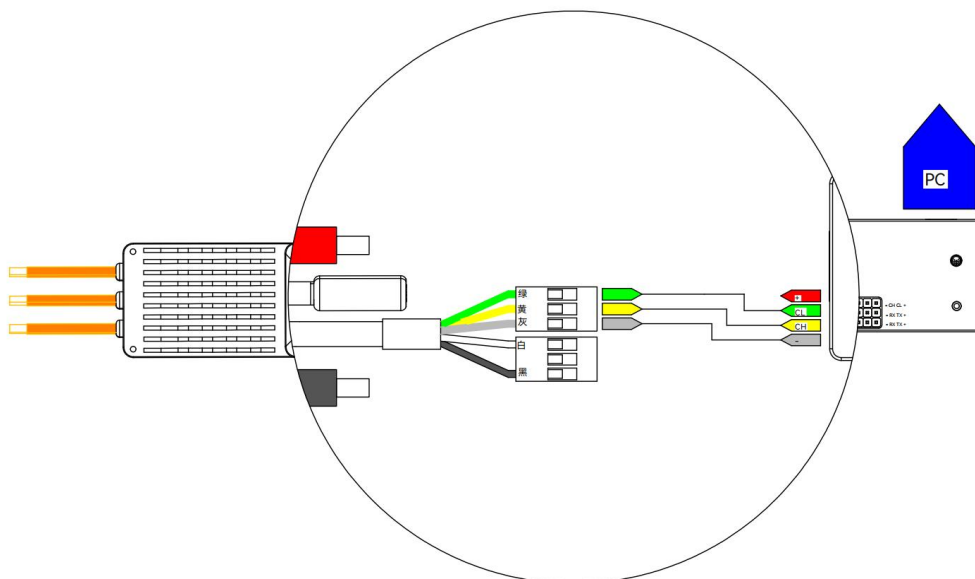
Fault Phenomena	Alarm	Possible cause	Solution
After powering on, the motor fails to start	Rapid single-tone "beep beep beep..."	Throttle not at zero position	Move the throttle to the lowest position or recalibrate the throttle range

After powering on, the motor fails to start	“Beep, beep, beep...” (with a 1-second interval between each beep)	The receiver's throttle channel is not outputting a throttle signal	<ol style="list-style-type: none"> <li>1. Check if the radio and receiver are paired correctly.</li> <li>2. Check if the throttle channel wiring is connected properly.</li> <li>3. Verify the ESC communication priority (factory default is PWM).</li> </ol>
The power supply voltage is either below 18V or above 63V.	"Beep beep, beep beep" (with 1-second intervals)	Battery voltage failure	Replace with a suitable fully charged battery
Motor stops or restarts in the air		Motor and ESC are incompatible	Replace the motor or change the propeller
During motor self-test, no sound, but the motor can rotate	During motor self-test, no sound, but the motor can rotate	Driver failure	<ol style="list-style-type: none"> <li>1. Replace the ESC</li> <li>2. Return to factory for repair</li> </ol>
Motor fails to start normally, accompanied by a "clicking" or "thumping" sound	During motor self-test, no sound, but the motor can not rotate	Motor phase missing	<ol style="list-style-type: none"> <li>1. Check phase line connections</li> <li>2. Check the motor</li> <li>3. If the motor and connections are fine, contact after-sales service for factory repair</li> </ol>

## 10.Setting the ID via the upper computer

By default, the ESC is set to ID 1, throttle channel 1, and bus rate 1MHz from the factory, unless otherwise specified. This feature requires the separately purchased V-link to use.

### 10.1 Connection





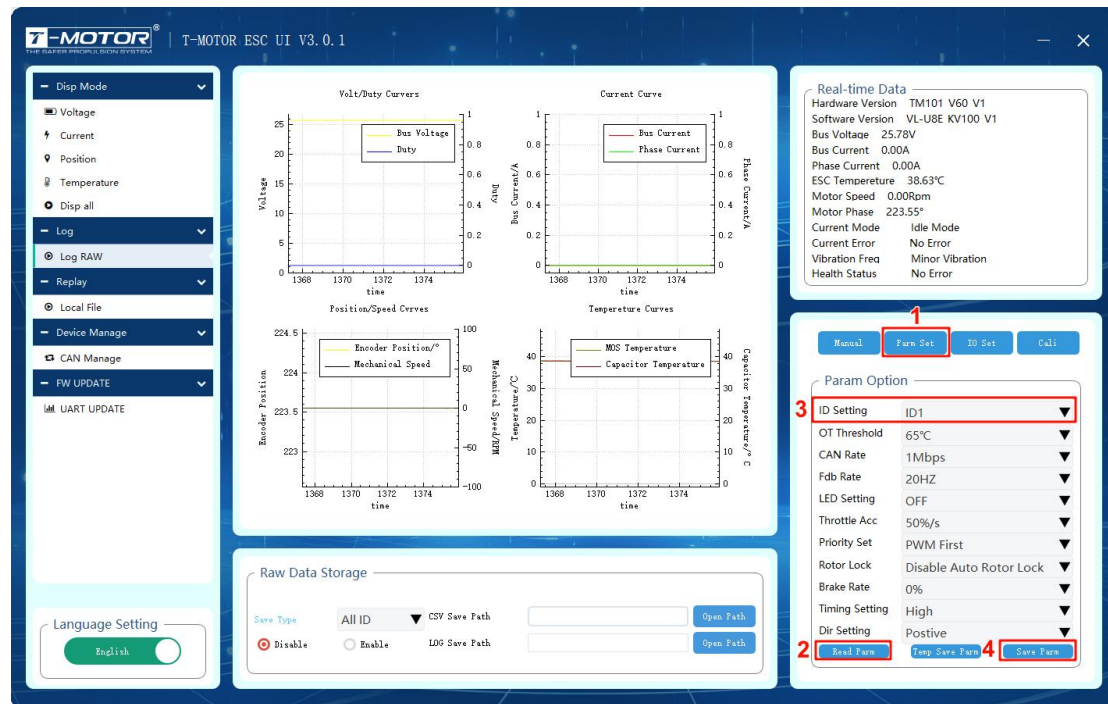
ESC---->V-Link “Green Yellow Gray” ----> “CL CH -”

Connect the V-Link to the computer via USB.

When changing the ID, please remove the propeller to avoid potential hazards.

For the same aircraft, different ESCs must have different IDs and throttle channels. Otherwise, when using CAN functionality, different ESCs with the same ID will be recognized as a same ESC.

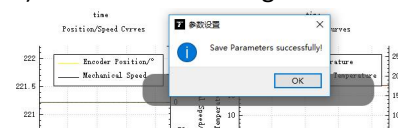
## 10.2 Operation



- 1) Click "Parameter Settings."
- 2) Click "Read Parameters." If successful, the following prompt will appear:

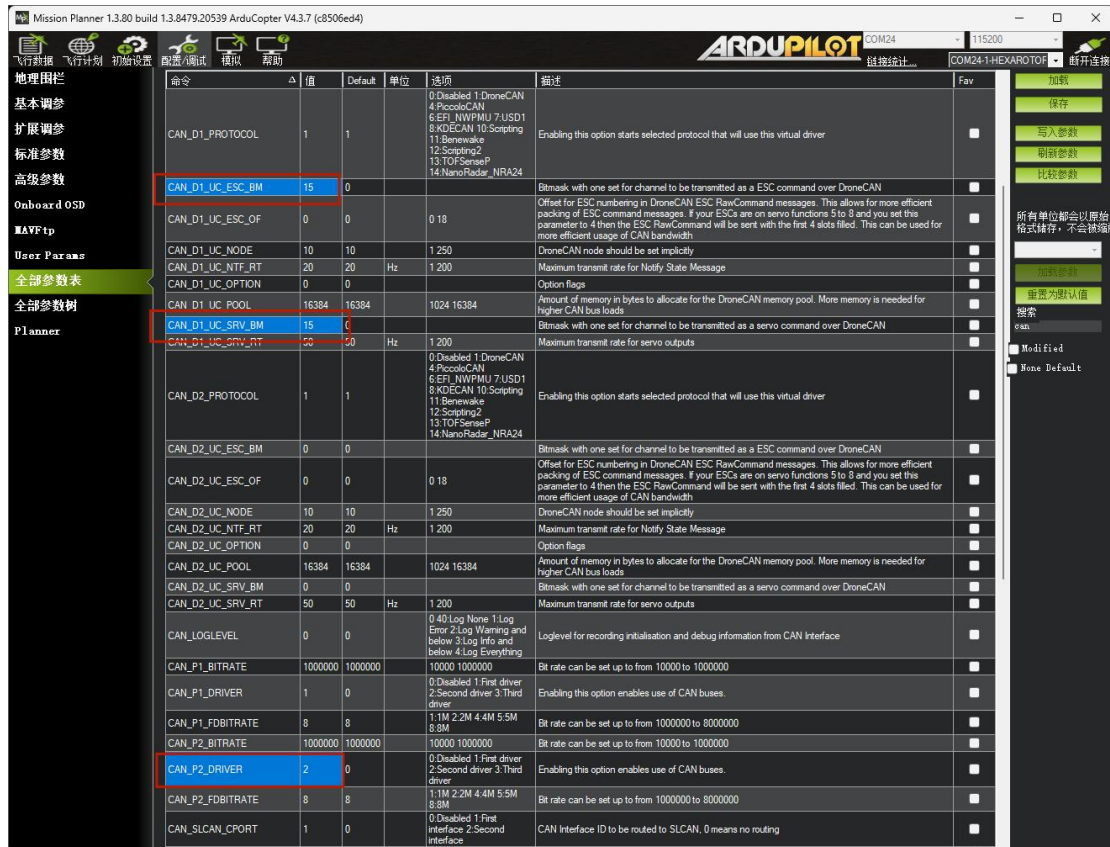


- 3) Click "ID Settings" and select the ID you want to change.
- 4) Click "Save Settings." If the save is successful, the following prompt will appear:



**⚠:Warning! When changing the ID, please remove the propellers to avoid potential hazards. Within the same aircraft, each ESC should be set to a different ID to prevent issues such as throttle control conflicts.**

11.Set the ID in PX4 flight controller



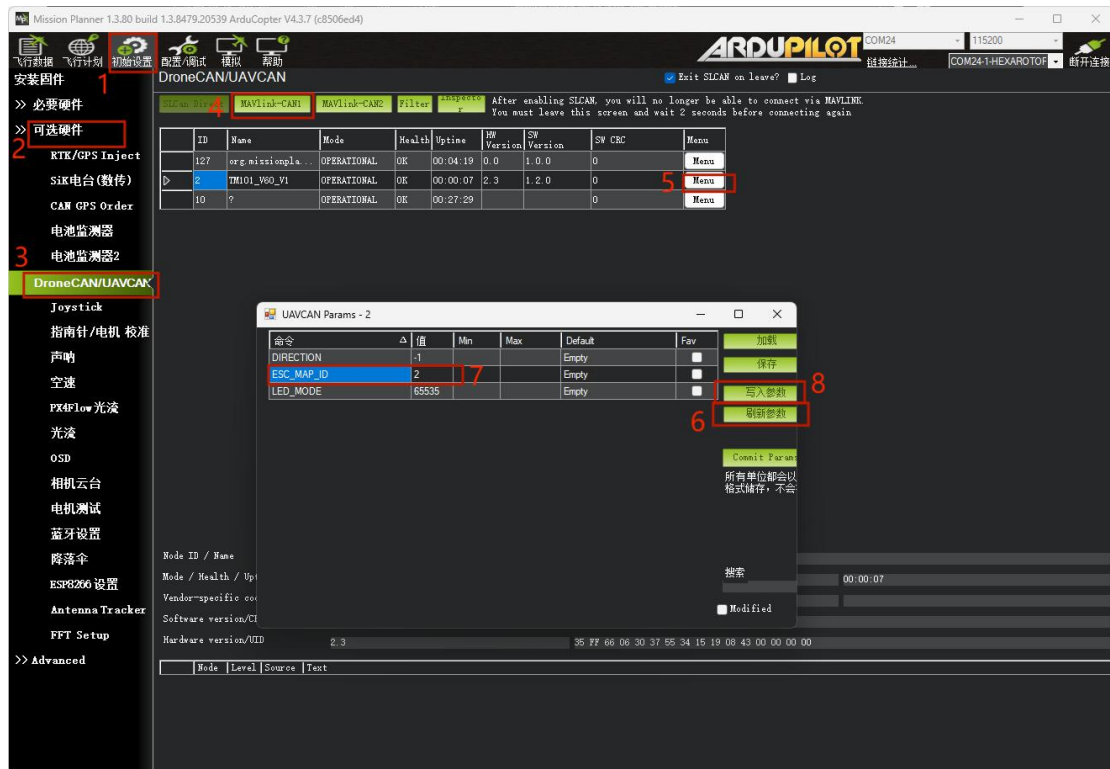
Note! Before using the flight controller to control the ESC, you need to make some simple settings:

Set the value of CAN\_D1\_UC\_ESC\_BM to 15.

Set the value of CAN\_D1\_UC\_SRV\_BM to 15.

Set the value of CAN\_P2\_DRIVER to 2

(Current Mission Planner version: 1.3.8479.20539, Flight Controller firmware version: V4.3.7)



- (1)Click on "Initial Setup".
- (2)Click on "Optional Hardware".
- (3)Click on "DroneCAN/UAVCAN".
- (4)Click on "MAVlink-CAN1" to search for the CAN device connected to the flight controller.

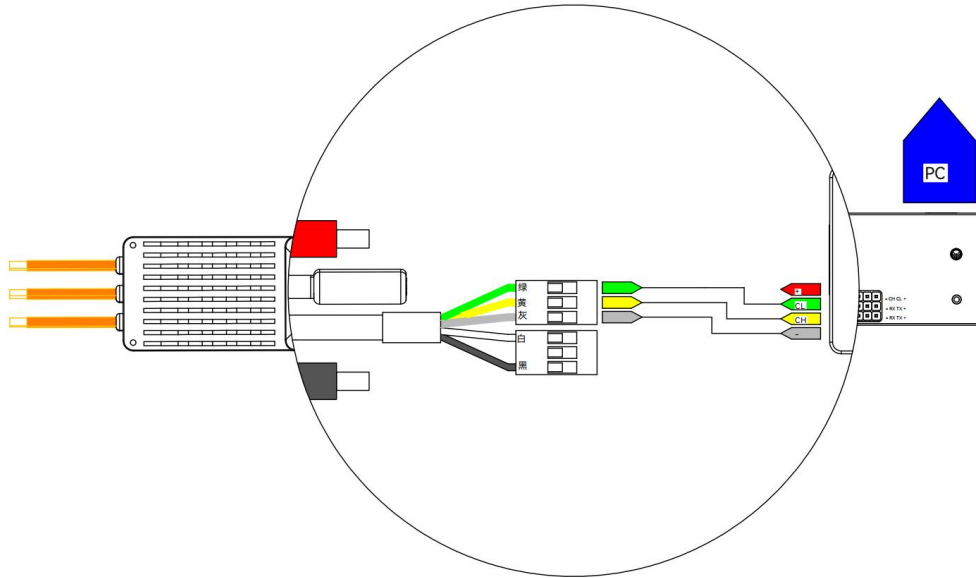
**Note!** If the ESC's CAN wire is connected to the flight controller's CAN1 port, click "MAVlink-CAN1". If the ESC's CAN wire is connected to the flight controller's CAN2 port, click "MAVlink-CAN2".

- (5)Select the ESC you want to set, click on "Menu", then click on "Parameters" to open the ESC parameter interface.
- (6)Click on "Refresh Parameters".
- (7)Modify "ESC\_MAP\_ID" and change the value to the desired ESC ID.
- (8)Click on "Write Parameters" to complete the ESC ID modification.

**⚠: Warning!** When changing the ID, please remove the propeller to avoid potential danger. Multiple ESCs in the same aircraft should have different IDs to prevent throttle control issues.

## 12.Rotation direction setting

### 12.1 Connection



ESC---->V-Link “Green Yellow Gray” ----> “CL CH -”

Connect the V-Link to the computer via USB.

When changing the ID, please remove the propeller to avoid potential hazards.

For the same aircraft, different ESCs must have different IDs and throttle channels. Otherwise, when using CAN functionality, different ESCs with the same ID will be recognized as a same ESC.

## 12.2 Operation

(1)Click on "Parameter Settings".

(2)Click "Read Parameters". If the read is successful, the following prompt will appear:



(3)Click on "Rotation Direction Setting" and select the desired rotation direction for modification.

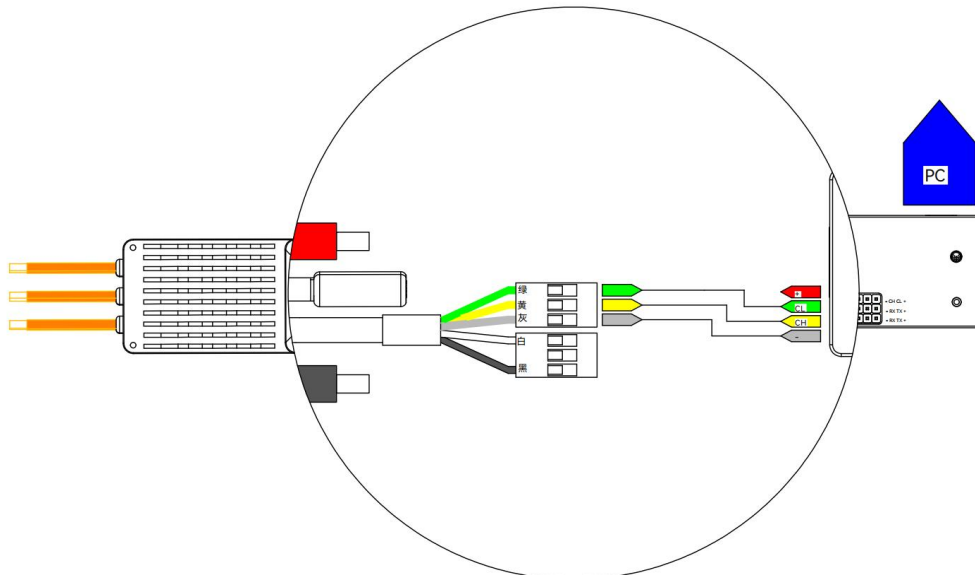
(4)Click "Save Settings". If the save is successful, the following prompt will appear:



**⚠ Warning! When changing the motor rotation direction, it's necessary to check the propeller rotation direction of that motor.**

## 13 Encoder Calibration

### 13.1 Connection



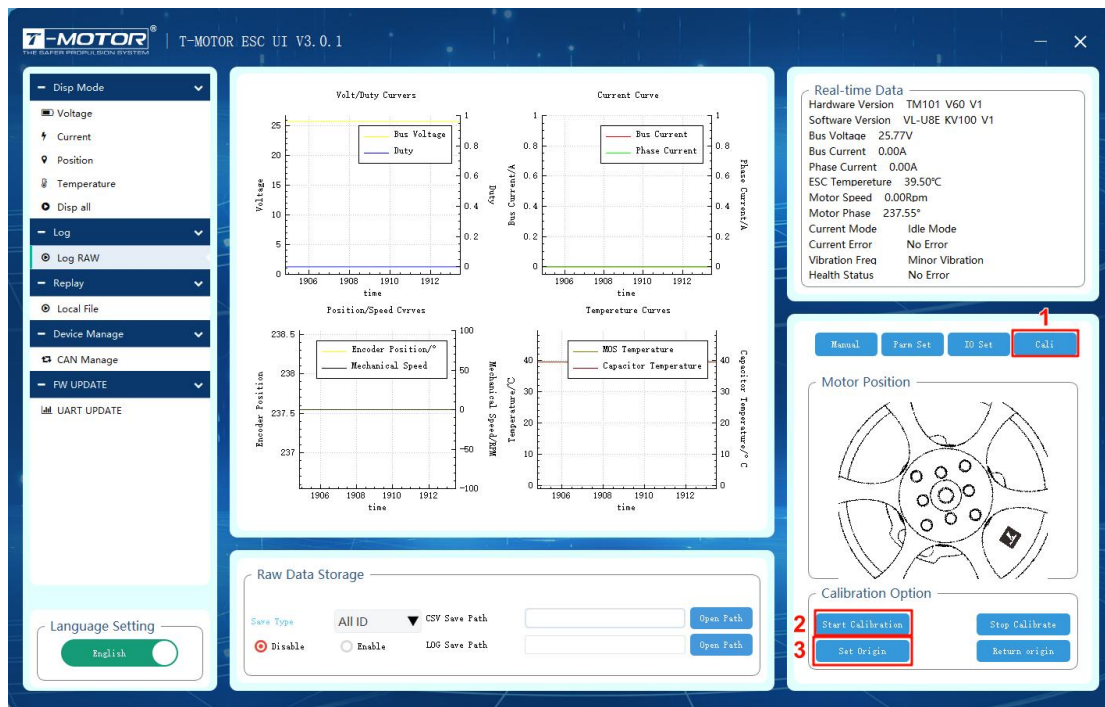
ESC---->V-Link      “Green Yellow Gray” ----> “CL CH -”

Connect the V-Link to the computer via USB.

When changing the ID, please remove the propeller to avoid potential hazards.

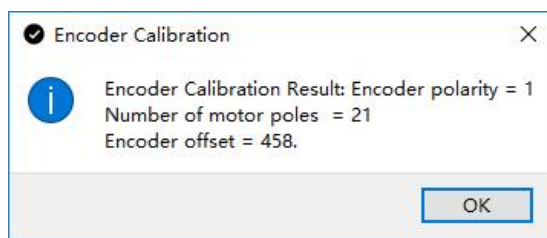
For the same aircraft, different ESCs must have different IDs and throttle channels. Otherwise, when using CAN functionality, different ESCs with the same ID will be recognized as a same ESC.

### 13.2 Operation



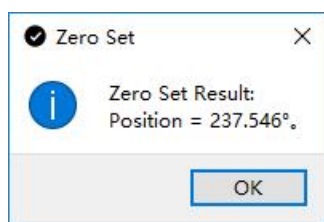
(1)Click on "Calibrate".

(2)Click on "Start Calibration". If the calibration is successful, the following prompt will appear:



**⚠ Warning! When clicking "Start Calibration", the motor will rotate slowly. Do not install the propeller to avoid unnecessary risks.**

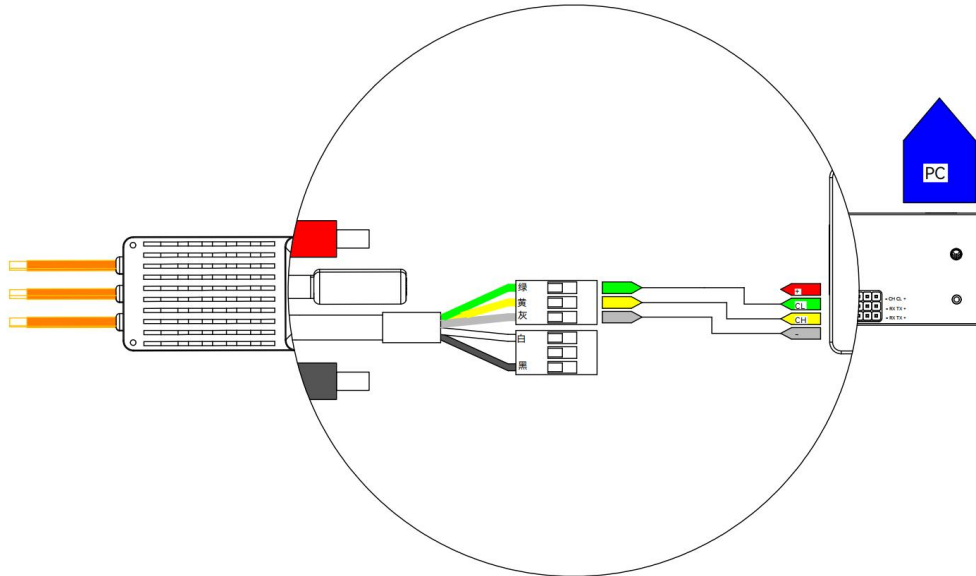
(3)Click on "Set Home", and if the setting is successful, the following prompt will appear:



**⚠: Warning! After completing encoder calibration, it's strictly forbidden to change the connection sequence of the three-phase wires, and ensure that the three-phase wires and encoder wires are connected properly.**

## 14.Rotor lock configuration

### 14.1 Connection



ESC---->V-Link “Green Yellow Gray” ----> “CL CH -”

Connect the V-Link to the computer via USB.

When changing the ID, please remove the propeller to avoid potential hazards.

For the same aircraft, different ESCs must have different IDs and throttle channels. Otherwise, when using CAN functionality, different ESCs with the same ID will be recognized as a same ESC.

## 14.2 Operation

Real-time Data

Hardware Version	TM101 V60 V1
Software Version	VL-U8E KV100 V1
Bus Voltage	25.73V
Bus Current	0.00A
Phase Current	0.00A
ESC Temperature	40.00°C
Motor Speed	0.00Rpm
Motor Phase	28.23°
Current Mode	Idle Mode
Current Error	No Error
Vibration Freq	Minor Vibration
Health Status	No Error

NODE ID	ESC ID	UPDATE TIME	HW ID	SW ID	Voltage
1	1	18:07:02 815	317695234	0	0V

Param Option

ID Setting	ID1
OT Threshold	65°C
CAN Rate	1Mbps
Fdb Rate	20HZ
LED Setting	OFF
Throttle Acc	50%/s
Priority Set	PWM First
Rotor Lock	Disable Auto Rotor Lock
Brake Rate	0%
Timing Setting	High
Dir Setting	Positive

(1)Click "Parameter Settings".

(2)Click "Read Parameters". If the read is successful, the following prompt will appear:

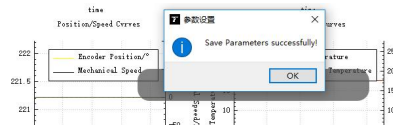
"Attention!"Disable motor idle stop lock: When the duty cycle is 0, the motor will not automatically enter the motor idle stop lock mode, but you can send any position command to control the motor. The motor will be fixed at the commanded position.

Enable rotor lock: When the duty cycle is 0, the motor will automatically enter the rotor lock mode. The motor will be fixed at the set origin position and cannot be controlled by position commands.



(3)Click "Save Settings". If the save is successful, the following prompt will appear:

**⚠: Warning! When using the motor idle stop lock function for the first time, ensure that the encoder is calibrated correctly, and the connection of the three-phase wires and encoder wires is secure. Do not install the propeller during this process.**

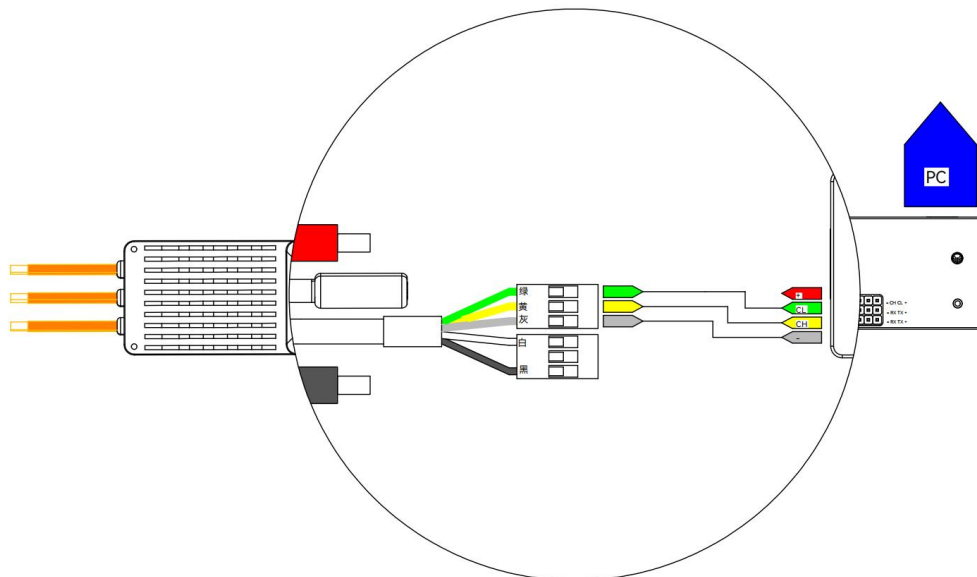


## 15.Firmware Upgrade

Firmware upgrade functionality requires V-link, a USB data cable, and the ground control software package. It supports simultaneous upgrades of multiple ESCs.

Note: The ground control software package can be obtained from the place of purchase, T-MOTOR's official website, sales, or after-sales service.

### 15.1 Connection



ESC---->V-Link “Green Yellow Gray” ----> “CL CH -”

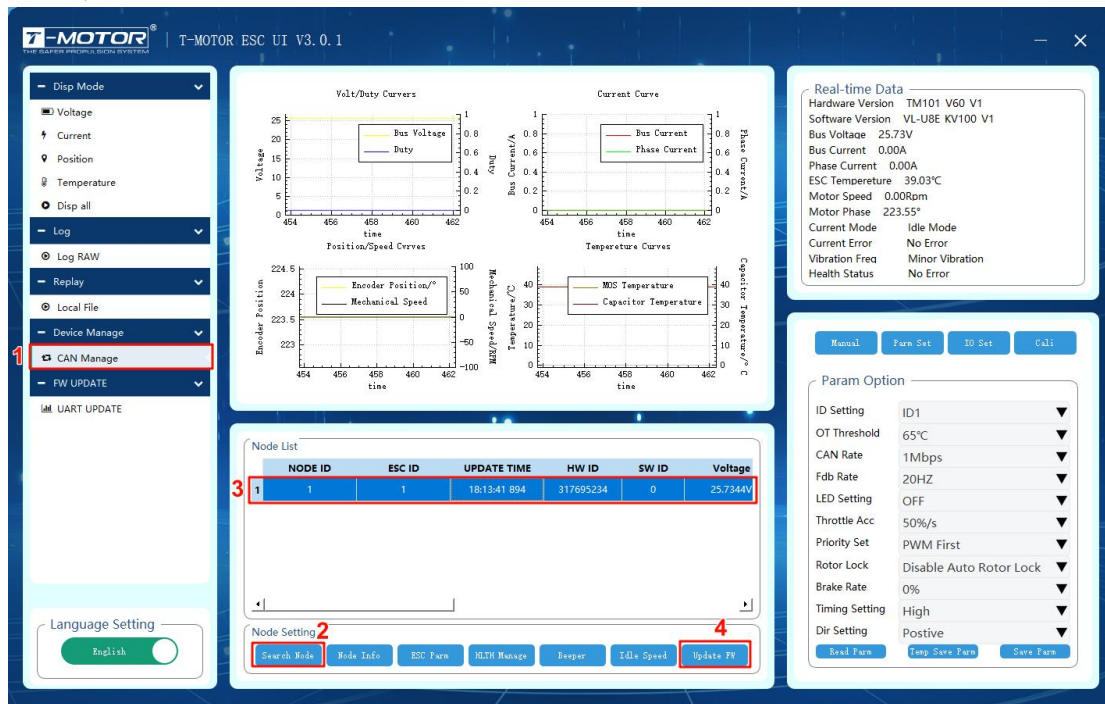
Connect the V-Link to the computer via USB.

When changing the ID, please remove the propeller to avoid potential hazards.

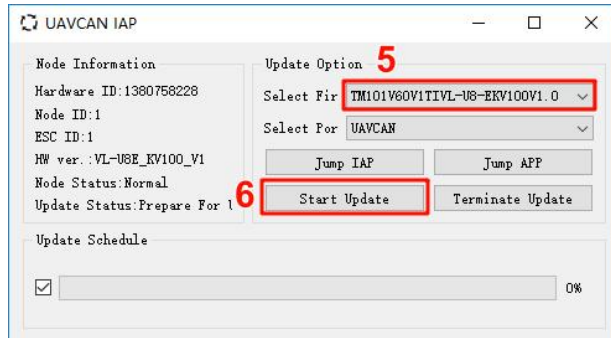
For the same aircraft, different ESCs must have different IDs and throttle channels. Otherwise, when using CAN functionality, different ESCs with the same ID will be recognized as a same ESC.



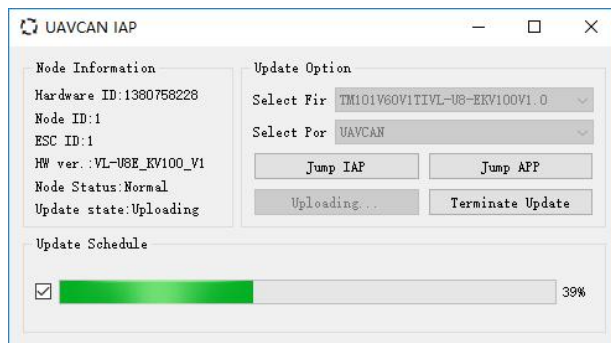
## 15.2 Operation



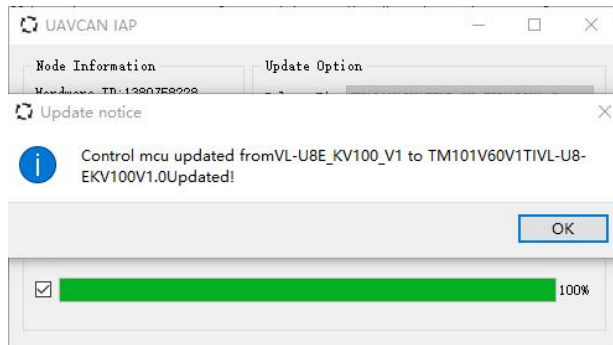
- 1) Click "CAN Device Management";
- 2) Click "Search Nodes";
- 3) Select ESC;
- 4) Click "Upgrade Node Firmware"



- 5) Select the corresponding firmware;
- 6) Click "Start Upgrade";
- 7) Power cycle the ESC;



- 8) Wait for the progress bar to complete;



- 9) The update is complete when a prompt appears;
- 10) Click on the "ok", Power cycle the ESC, and check version update correctly.

## 16.CAN protocol related

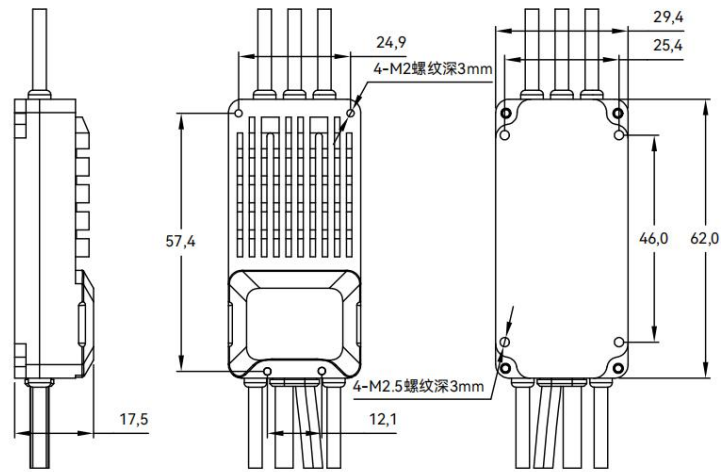
The ESC used in this system adopts the DroneCAN protocol, which allows for the setting and modification of ESC parameters through T-MOTOR-Link or DroneCAN TOOL. The ESC firmware can only be updated through T-MOTOR-Link at the moment, and updating firmware through other devices is not currently supported.

The ESC firmware can only be updated via T-MOTOR-Link; other devices are not currently supported for firmware updates.

User references the "TM\_UAVCAN\_V2.2" protocol for the ESC's CAN protocol, with source code available at

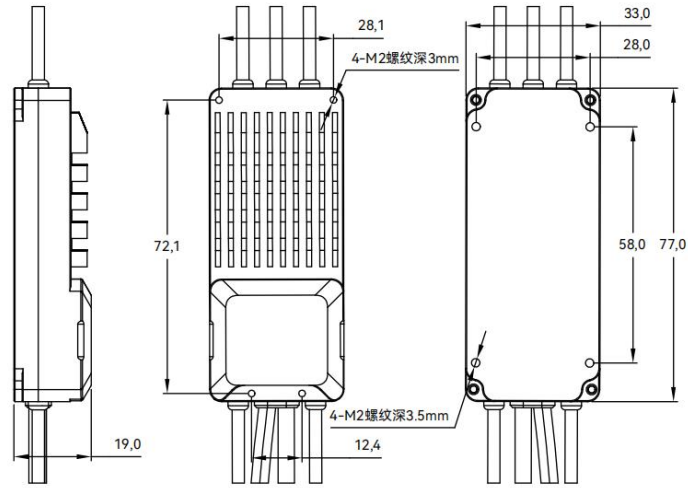
<https://github.com/dronecan/DSDL/tree/master/com/tmotor/esc>




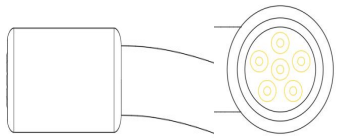
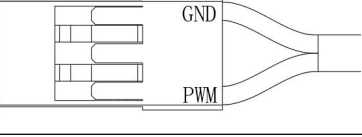
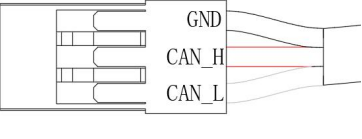
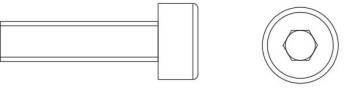
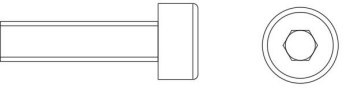
# V-40A-14S



Serial number	Component name	Description	Unit	Quantity	Diagram
①	Power supply positive	silicone wire-Red-14AWG-150mm	PCS	1	
②	Power supply negative	silicone wire-Black-14AWG-150mm	PCS	1	
③	Three-phase	silicone wire-Orange-16AWG-65mm	PCS	3	
④	Encoder	UL2547-24AWG*5C-Black-300mm-5-M6-6-core aviation plug female	PCS	1	
⑤	PWM Wire	Shielded wire-Black-300mm-1-JR-3P-Black-Blank-White	PCS	1	
⑥	CAN Wire	Shielded wire-Black-300mm-1-JR-3P-Green-Yellow-Gray	PCS	1	
⑦	ESC mounting hole 1	M2.5 threaded hole, depth 4mm	PCS	4	
⑧	ESC mounting hole 2	M3 threaded hole, depth 4mm	PCS	4	

# V-60A-14S



Serial number	Component name	Description	Unit	Quantity	Diagram
①	Power supply positive	Silicon-Red-14AWG-160mm	PCS	1	
②	Power supply negative	silicone wire-Black-14AWG-160mm	PCS	1	
③	Three-phase	silicone wire-Orange-16AWG-60mm	PCS	3	
④	Encoder	UL2547-24AWG*5C-Black-300mm-5-M6-6-core aviation plug female	PCS	1	
⑤	PWM Wire	Shielded wire -Black-300mm-1-JR-3P-Black-Blank-White	PCS	1	
⑥	CAN Wire	Shielded wire -Black-300mm-1-JR-3P-Green-Yellow-Gray	PCS	1	
⑦	ESC mounting hole 1	M2.5 threaded hole, depth 4mm	PCS	4	
⑧	ESC mounting hole 2	M3 threaded hole, depth 4mm	PCS	4	

Serial number	Component name	Description	Unit	Quantity	Diagram
①	Power supply positive	silicone wire-Red-12AWG-180mm	PCS	1	
②	Power supply negative	silicone wire-Black-12AWG-180mm	PCS	1	
③	Three-phase	silicone wire-Orange-14AWG-110mm	PCS	3	
④	Encoder	UL2547-24AWG*5C-Black-450mm-5-M6-6-core aviation plug female	PCS	1	
⑤	PWM Wire	Shielded wire -Black-450mm-1-JR-3P-Black-Blank-White	PCS	1	
⑥	CAN Wire	Shielded wire -Black-450mm-1-JR-3P-Green-Yellow-Gray	PCS	1	
⑦	ESC mounting hole 1	M2.5 threaded hole, depth 4mm	PCS	4	

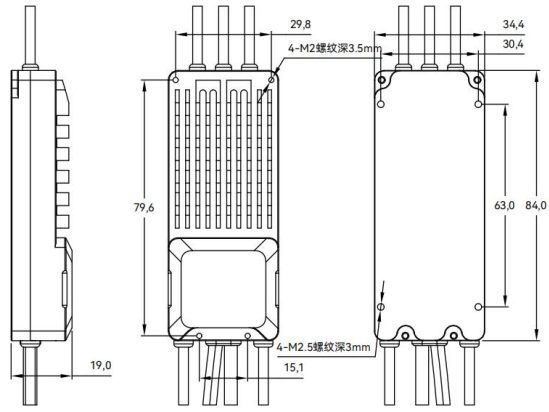
⑧

ESC  
mounting  
hole 2

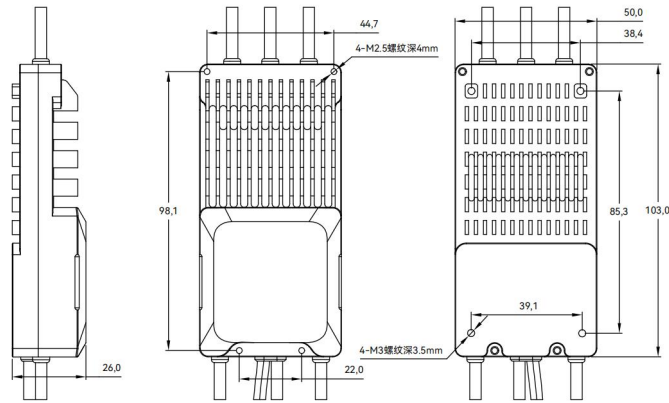
M3 threaded hole depth 4mm

PCS

4

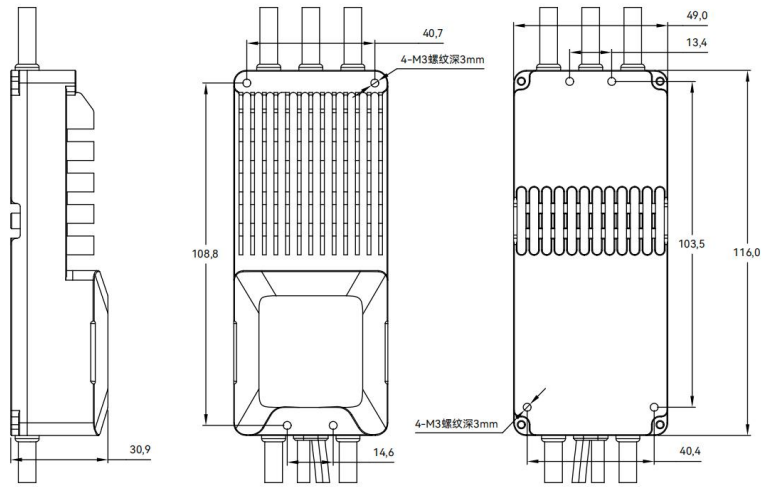


# V-120A-14S






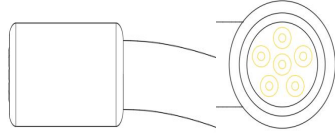
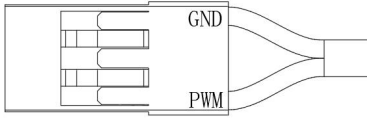
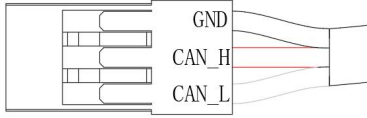
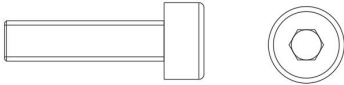
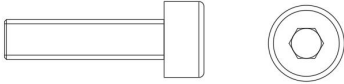
Serial number	Component name	Description	Unit	Quantity	Diagram
①	Power supply positive	silicone wire-Red-12AWG-120mm	PCS	1	
②	Power supply negative	silicone wire-Black-12AWG-120mm	PCS	1	
③	Three-phase	silicone wire-Orange-12AWG-75mm	PCS	3	
④	Encoder	UL2547-24AWG*5C-Black-420mm-5-M6-6-core aviation plug female	PCS	1	
⑤	PWM Wire	Shielded wire -Black-470mm-1-JR-3P-Black-Blank-White	PCS	1	
⑥	CAN Wire	Shielded wire -Black-470mm-1-JR-3P-Green-Yellow-Gray	PCS	1	
⑦	ESC mounting hole 1	M2.5 threaded hole, depth 4mm	PCS	4	
⑧	ESC mounting hole 2	M3 threaded hole, depth 4mm	PCS	4	

# V-150A-14S

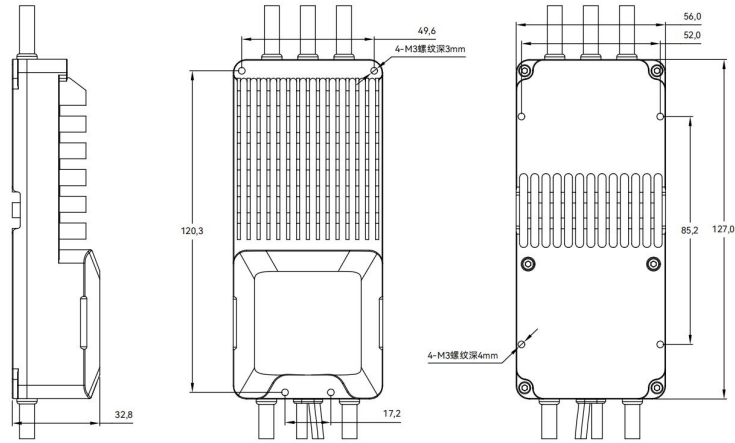


Serial number	Component name	Description	Unit	Quantity	Diagram



①	Power supply positive	silicone wire-Red-10AWG-130mm	PCS	1	
②	Power supply negative	silicone wire-Black-10AWG-130mm	PCS	1	
③	Three-phase	silicone wire-Orange-10AWG-100mm	PCS	3	
④	Encoder	UL2547-24AWG*5C-Black-400mm-5-M6-6-core aviation plug female	PCS	1	
⑤	PWM Wire	Shielded wire -Black-465mm-1-JR-3P-Black -Blank-White	PCS	1	
⑥	CAN Wire	Shielded wire -Black-465mm-1-JR-3P-Green -Yellow-Gray	PCS	1	
⑦	ESC mounting hole 1	M3 threaded hole, depth 3mm	PCS	4	
⑧	ESC mounting hole 2	M3 threaded hole, depth 4mm	PCS	4	

# V-200A-14S



Serial number	Component name	Description	Unit	Quantity	Diagram
①	Power supply positive	silicone wire-Red-10AWG-1140mm	PCS	1	
②	Power supply negative	silicone wire-Black-10AWG-1140mm	PCS	1	
③	Three-phase	silicone wire-Orange-10WG-205mm	PCS	3	
④	Encoder	UL2547-24AWG*5C-Black-395mm-5-M6-6-core aviation plug female	PCS	1	
⑤	PWM Wire	Shielded wire -Black-770mm-1-JR-3P-Black-Blank-White	PCS	1	
⑥	CAN Wire	Shielded wire -Black-770mm-1-JR-3P-Green-Yellow-Gray	PCS	1	
⑦	ESC mounting hole 1	M3 threaded hole, depth 3mm	PCS	4	
⑧	ESC mounting hole 2	M3 threaded hole, depth 4mm	PCS	4	

