

## **IPET-15 Product Specification & Operation Guide**

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## I5 Integrated Propulsion System Specification

### 1. Introduction

The I series product is an integrated propulsion system developed for high-performance multi-rotor drones, designed with features of long endurance, high efficiency, high reliability, and low noise. The integrated design merges components seamlessly, compared to individual products.

### Notes

- This series of propulsion systems is unique and requires strict matching of motor parameters. The firmware is exclusive, meaning one firmware version is only suitable for one specific motor + propeller combination. It cannot be compatible with multiple combinations simultaneously. Contact the manufacturer if usage is needed.
- It is not recommended to change the propeller for the propulsion system combo. Improper combinations may trigger ESC protection, rendering it unusable.
- Do not install propellers during ground tests to avoid unnecessary danger.
- Before connecting the ESC to related components, ensure good insulation at the contact ends. Short circuits will damage the ESC
- Please ensure that all components are connected carefully and securely. Poor contact may result in an inability to properly control the aircraft, or lead to equipment damage and other unforeseeable circumstances.

The I5 Integrated Propulsion System is designed for drones with the following specifications:  
 4-axis (takeoff weight ranging from 6 to 8 kg) or  
 5- 6-axis (takeoff weight ranging from 9 to 12 kg).

## 2. Parameters

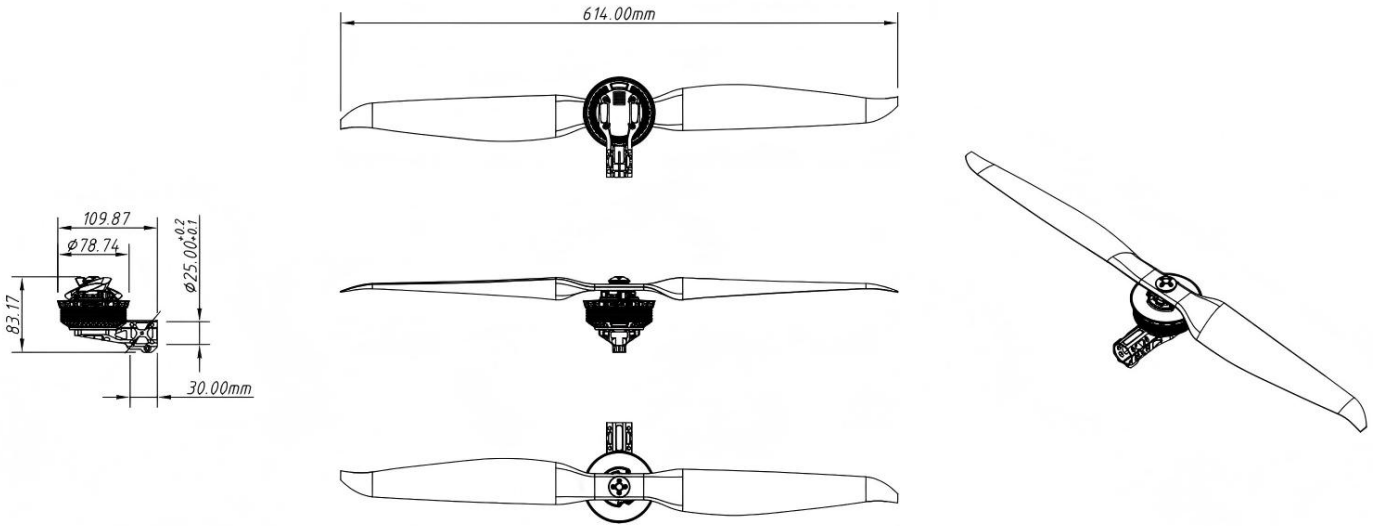
System Parameters	Model	I5 KV135
	Configuration	I5 Motor+8S FOC 25A ESC+I24 Propeller
	Recommended Battery	8S(LiPo)
	Max Thrust (kg)	4.2
	Recommended Takeoff Weight(kg)	6-8
	Rated Thrust Efficiency (g/w)	(1.5kg) 13
	Carbon Tube Diameter(mm)	25
	Total Weight with Wires(g)	350±2%
	Protection Rating	IP46
	Operating Temperature(°C)	-30~50
	Wire Length (mm)	450±5
	Wire Specifications	Power Wire: 20# Silver-Plated Red & Black Signal Wire: 5P PTFE Wire
Motor	KV (RPM/V)	135
	Single Box Motor Packaged Unit Weight (g)	500g
ESC Parameters	Throttle Range(μs)	1040-1940 (Fixed)
	Protocol	Drone CAN、 UAV CAN
	Control Method	PWM/CAN
	Max Voltage(V)	32V
	Max Continuous Current (A)	5.5 (Open environment, ≤60°C)
	Peak Current (A)	18 (Open environment, ≤60°C)
Propellers Parameters	Model	I24
	Length(mm/inch)	614/24
	Single Box Propeller Packaged Unit Weight (g)	305

### 3. Test Data

I5 KV135+8S FOC 25A+I30				Ambient Temp:	33°C
Throttle (%)	Thrust A (gf)	Voltage A (V)	Current A (A)	Motor Efficiency A (%)	Overall Efficiency A (gf/W)
30	404.05	32.00	0.62	73.34	20.35
35	597.47	31.99	1.03	77.14	18.18
40	826.94	31.98	1.58	79.39	16.37
45	1069.47	31.96	2.28	80.61	14.69
50	1347.21	31.95	3.16	81.31	13.36
55	1647.85	31.93	4.20	81.50	12.28
60	1963.93	31.90	5.42	81.42	11.36
65	2292.80	31.87	6.81	81.14	10.57
70	2644.71	31.84	8.44	80.55	9.85
75	3006.93	31.81	10.29	79.88	9.18
80	3340.81	31.77	12.18	79.21	8.63
85	3694.40	31.73	14.36	78.21	8.11
90	4135.90	31.67	17.45	76.27	7.48
95	4223.10	31.65	18.14	75.68	7.35
100	4214.00	31.65	18.10	75.58	7.36

The above data are measured by a professional laboratory test bench for reference in selection.

## 4. Appearance and mounting structure (mm)

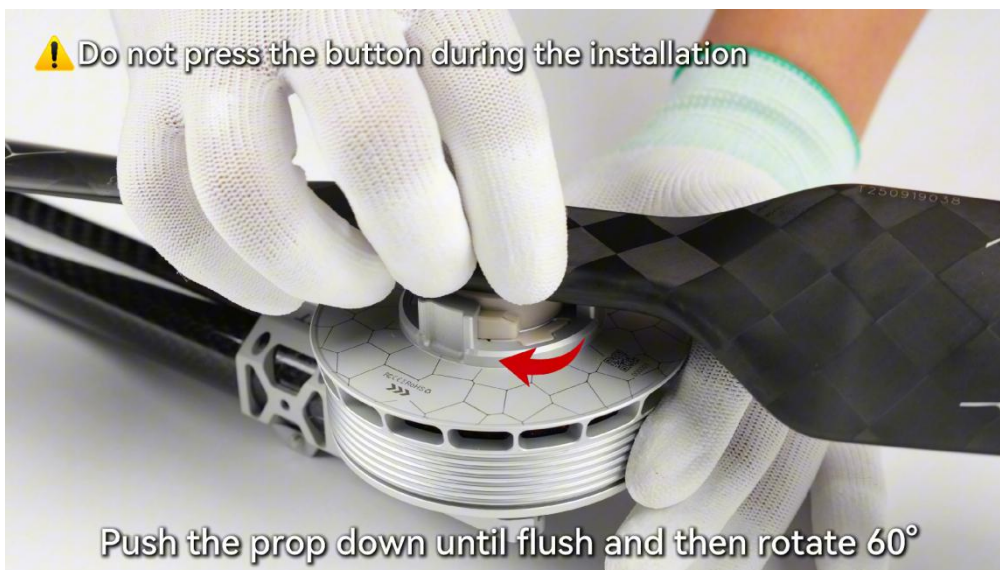


## 5. Quick-Release System Guide

### 5-1. Installation Steps



Step 1: Distinguishing between CCW and CW Propellers



Step 2: Align the propeller with the base, press it down to the bottom, then rotate it 60°



Step 3: A "click" sound indicates the propeller is successfully installed

## 5-2: Disassembly Instructions



Step 1: Hold the propeller and press the button downwards



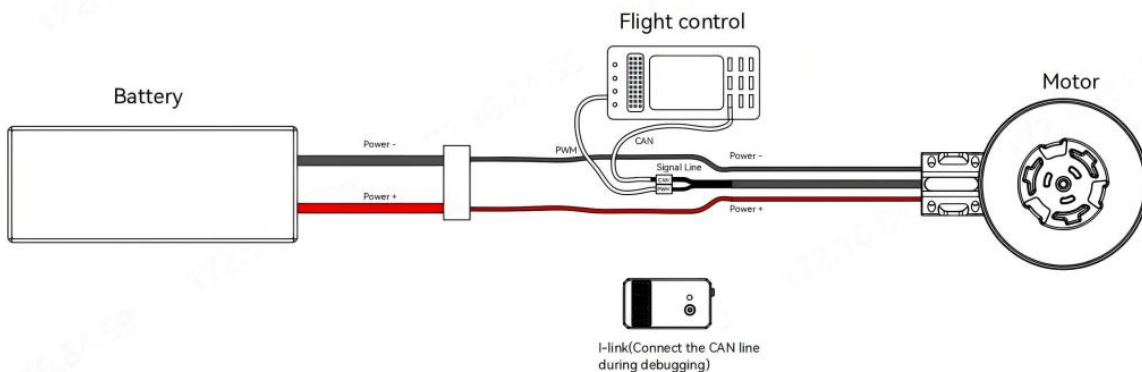
Step 2: Rotate 60° while pressing, then release the button to remove the propeller

## 6. User Guide

### 6-1:Notes:

- Do not exceed the ESC's recommended operating voltage range, otherwise, it may cause irreversible damage to the ESC.
- The throttle for this ESC is fixed and does not require calibration. The throttle range is 1040-1940 $\mu$ s.
- The FOC ESC has a braking effect and generates back EMF. Please ensure you use a power supply capable of absorbing back EMF during ESC testing or flight to avoid damaging the ESC and power supply.
- The ESC supports both PWM and CAN throttle modes. One mode is set as the primary mode, and the other serves as a backup. Upon startup, the throttle signal must be connected to the ESC via the primary mode to ensure normal operation. The backup throttle only becomes effective if the primary throttle signal is lost during operation. The default factory setting is PWM throttle priority mode. To change it to CAN throttle priority mode, please contact the manufacturer or configure it via the PC software.

### 6-2: Wiring Method



- 1) Red: Positive; Black: negative
- 2) 2P-JR connector: PWM throttle input; white: signal; black: ground.
- 3) 3P-JR connector: CAN throttle input; green: CAN Low; yellow: CAN High; gray: ground.

## 7. Startup Process

- 1) Turn on the remote control and move the throttle stick to the lowest point.
- 2) Connect the system to the battery. The motor will emit a beep, indicating the system is ready and the self-check is complete, and it is ready for takeoff.

## 8. Protection Functions

### **Startup Protection:**

When powered on normally, the ESC first initiates a self-check. If successful, it will beep normally and is ready to run. If the self-check fails, it cannot start.

### **Stall Protection:**

When the ESC detects a motor stall, it will completely cut off output after 5 seconds and report a fault. If the stall fault is cleared, returning the throttle to zero and then outputting again can restart the motor.

### **Current Protection:**

When an instantaneous current anomaly exceeds 120A, the ESC will attempt to restart three times. If the ESC is still in an overcurrent state on the fourth attempt, it will completely shut down output. Restoring power will return it to normal.

### **Temperature Warning:**

When the MOS or capacitor temperature exceeds 110°C, a temperature alarm will be sent via the CAN communication interface. After the throttle is returned to zero, the Navigation light will flash yellow three times, with a 1-second interval between flashes. After 2 seconds, the flash cycle repeats. The motor will also emit a long "Beep...Beep...Beep..." (with a 2-second interval between each beep). If the temperature exceeds 130°C, the ESC may burn out. Please land immediately upon receiving the warning.

### **Throttle Signal Loss Protection:**

When the ESC detects throttle loss and a backup throttle is available, it will immediately respond to the backup throttle output.

When the ESC detects throttle loss without a backup throttle, it will continue outputting based on the last received throttle for 2 seconds. If the throttle signal is received within 2 seconds, it will resume normal response. If no signal is received within 2 seconds, the output is cut off. Power must be cycled to restore operation.

## 9. Common Faults and Alert Tones Description

Fault Phenomenon	Alarm	Possible Cause	Solution
Motor fails to start after power-up	Rapid single-tone "beeepp beep beep..."	Throttle not at zero position	Move the throttle stick to the lowest position.
Motor fails to start after power-up	"beep, beep, beep_" (1-second intervals)	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 above 63V.	"beep, beep, beep_" (1-second intervals)	Input battery voltage is too high.	Replace with a suitable, fully charged battery with voltage below 63V.
ESC LED indicator flashing	"beep, beep, beep_" (2-second intervals)	Secondary fault detected after landing.	Identify issues through electrical health management

## 10. Setting the ID via the PC software

### Notes:

- Disconnect the propeller during setup to avoid hazards.
- On the same drone, different ESCs must have unique IDs; otherwise, those with the same ID will be recognized as a single ESC when using CAN functions.
- By default, the ESC factory settings are: ID = 1, throttle channel = 1, and baud rate = 1 MHz.
- This feature requires the purchase of I-link.



## 11-1: Connection (This procedure applies to the setup of all subsequent functions.)

- ESC---->I-Link; “Green Yellow Gray”----> “CAN LOW CAN HIGH -”
- Connect the I-Link to the computer via USB.

## 11-2: Operation

**IPET SYSTEM**

Bus Voltage	47.78V
Bus Current	0.00A
Phase Current	0.00A
MOS Temperature	16.66°C
Motor Temperature	00.00°C
Motor Speed	0.00Rpm
Current Phase	35.99°
Current Mode	Unknown Mode
Current Error	No Error
Health Status	No Error
Hardware Version	TM400_V40_V1
Software Version	I7_KV80_V1

Control Param Cali

ID Setting Fdb Rate  
ID1 0HZ

Priority Set LED Setting  
PWM First OFF  
CAN RL Dir Setting  
OFF Postive

Rotor Lock Disable Auto Rotor Lock

Navigation light Turn off the fault prompt

Read Param Save Param

Data Log Data Playback Firmware Update Devices Manage

Search Node Node Info HLTH Manage Update FW

NODE ID	ESC ID	UPDATE TIME	HW ID	SW ID	Voltage	Current	Temperature	Power up time
1	1	09:29:11 297	3032487195	0	47.7813V	0A	16.6563°C	12635s

- 1) Click "Device Management" (If a node already exists, skip steps 1-3).
- 2) Click "Search Node".
- 3) The node information will be displayed.
- 4) Click the "Parameters" button. If the read is successful, the following prompt will appear.
- 5) Click "Read Parameters". If the read is successful, the following prompt will appear.



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



## 11. Rotation direction setting

### Notes:

- Disconnect the propeller during setup to avoid hazards.
- On the same drone, different ESCs must have unique IDs; otherwise, those with the same ID will be recognized as a single ESC when using CAN functions.
- By default, the ESC factory settings are: ID = 1, throttle channel = 1, and baud rate = 1 MHz.
- This feature requires the purchase of I-link.

## 11-1: Operation

The screenshot displays the IPET SYSTEM control interface. On the left, there is a status panel with the following data:

- Bus Voltage: 47.78V
- Bus Current: 0.00A
- Phase Current: 0.00A
- MOS Temperature: 18.88°C
- Motor Temperature: 00.00°C
- Motor Speed: 0.00Rpm
- Current Phase: 35.99°
- Current Mode: Unknown Mode
- Current Error: No Error
- Health Status: No Error
- Hardware Version: TM400\_V4Q\_V1
- Software Version: I7\_KV80\_V1

Below the status panel are three buttons: "Control", "Param" (highlighted with a red box and a red circle 1), and "Cali". Under "Param", there are several settings:

- ID Setting: ID1
- Fdb Rate: 20HZ
- Priority Set
- LED Setting
- PWM First
- CAN RL: OFF
- Dir Setting: Positive (highlighted with a red box and a red circle 3)
- Rotor Lock: Disable
- Navigation light: Turn off

At the bottom of the "Param" section are two buttons: "Read Param" (highlighted with a red box and a red circle 2) and "Save Param" (highlighted with a red box and a red circle 4). Below these are buttons for "Data Log", "Data Playback", "Firmware Update", and "Devices Manage".

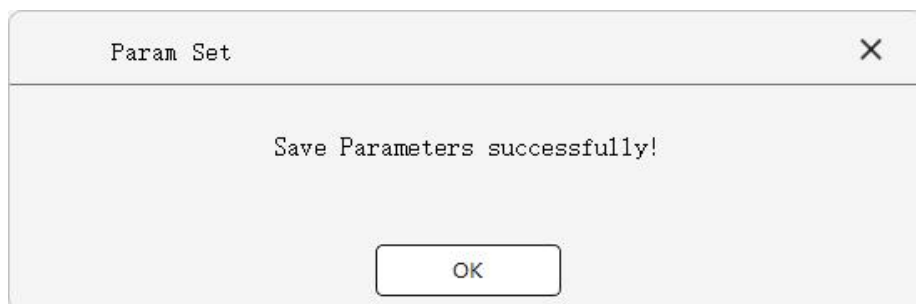
On the right side of the interface, there are several monitoring graphs for Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. Below the graphs is a "Node List" table:

NODE ID	ESC ID	UPDATE TIME	HW ID	SW ID	Voltage	Current	Temperature	ower up tim
1	1	09:29:11 297	3032487195	0	47.7813V	0A	16.6563°C	12635s 4

- 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:



## 12. LED Color Setting

### Notes:

- Disconnect the propeller during setup to avoid hazards.
- On the same drone, different ESCs must have unique IDs; otherwise, those with the same ID will be recognized as a single ESC when using CAN functions.
- By default, the ESC factory settings are: ID = 1, throttle channel = 1, and baud rate = 1 MHz.
- This feature requires the purchase of I-link.

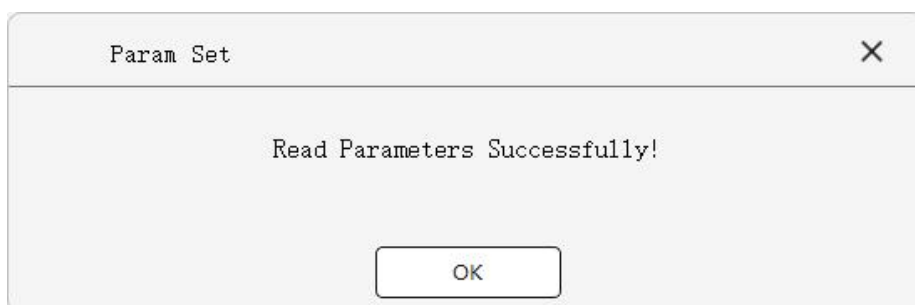
### 12-1: Operation

The screenshot shows the IPET SYSTEM interface. On the left, there is a status panel with various system metrics. Below it, the 'Param' tab is selected, showing 'LED Setting' set to 'White'. The 'Read Param' button is highlighted with a red box and a circled '2'. The 'Save Param' button is also highlighted with a red box and a circled '4'. A red box around the 'LED Setting' dropdown is labeled with a circled '3'. The right side of the interface features a multi-axis graph showing Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. Below the graph is a 'Node List' table with the following data:

NODE ID	ESC ID	UPDATE TIME	HW ID	SW ID	Voltage	Current	Temperature	ower up tim
1	1	09:29:11 297	3032487195	0	47.7813V	0A	16.6563°C	12635s 4

1) Click on "Parameter Settings".

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



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



## 13. Throttle Priority Setting

### Notes:

- Disconnect the propeller during setup to avoid hazards.
- On the same drone, different ESCs must have unique IDs; otherwise, those with the same ID will be recognized as a single ESC when using CAN functions.
- By default, the ESC factory settings are: ID = 1, throttle channel = 1, and baud rate = 1 MHz.
- This feature requires the purchase of I-link.

### 13-1: Operation

The screenshot displays the IPET SYSTEM software interface. On the left, there is a status panel with various system metrics. Below it are three tabs: "Control", "Param" (highlighted with a red box and a red circle 1), and "Call". Under the "Param" tab, there are two columns of settings. The "Priority Set" column has "PWM First" selected (highlighted with a red box and a red circle 3). The "LED Setting" column has "White" selected. At the bottom of the settings are two buttons: "Read Param" (highlighted with a red box and a red circle 2) and "Save Param" (highlighted with a red box and a red circle 4). Below the settings is a "Data Log" section with buttons for "Data Log", "Data Playback", "Firmware Update", and "Devices Manage". On the right side of the interface is a large graph area with multiple y-axes and a common x-axis. The graph shows real-time data for Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. Below the graph is a "Node List" table.

NODE ID	ESC ID	UPDATE TIME	HW ID	SW ID	Voltage	Current	Temperature	ower up tim
1	1	09:29:11 297	3032487195	0	47.7813V	0A	16.6563°C	12635s 4

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



- 3) Click "Throttle Priority Settings" and select the throttle priority you wish to change.
- 4) Click "Save Settings". If the save is successful, the following prompt will appear:



## 14. Navigation light Alarm Settings

### Notes:

- Disconnect the propeller during setup to avoid hazards.
- On the same drone, different ESCs must have unique IDs; otherwise, those with the same ID will be recognized as a single ESC when using CAN functions.
- By default, the ESC factory settings are: ID = 1, throttle channel = 1, and baud rate = 1 MHz.
- This feature requires the purchase of I-link.

### 14-1: Operation

The screenshot displays the IPET SYSTEM control interface. On the left, there is a status panel with various system metrics and a parameter settings section. The parameter settings section includes tabs for Control, Param (highlighted with a red circle 1), and Cali. Below the tabs are several configuration options such as ID Setting, Fdb Rate, Priority Set, LED Setting, CAN RL, Dir Setting, Rotor Lock, and Navigation light. The Navigation light dropdown menu is open, showing the option 'Turn off the fault prompt' (highlighted with a red circle 3). Below this menu are 'Read Param' (highlighted with a red circle 2) and 'Save Param' (highlighted with a red circle 4) buttons. At the bottom of the parameter settings section are buttons for Data Log, Data Playback, Firmware Update, and Devices Manage.

In the center, there is a large graph area with multiple data series plotted against time. The graph shows Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. The graph area has checkboxes for each data series, all of which are checked.

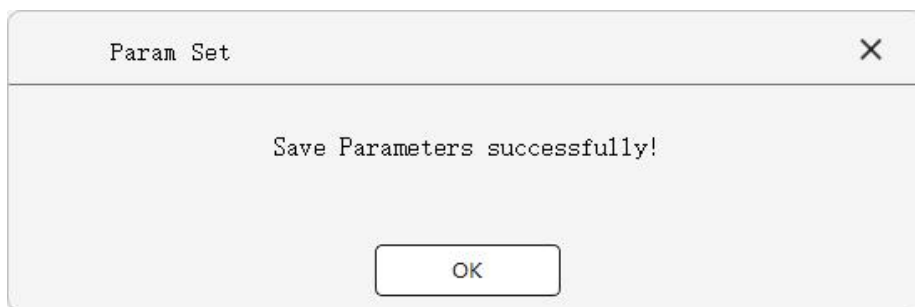
At the bottom of the interface, there is a Node List table with the following data:

NODE ID	ESC ID	UPDATE TIME	HW ID	SW ID	Voltage	Current	Temperature	ower up tim
1	1	09:29:11 297	3032487195	0	47.7813V	0A	16.6563°C	12635s 4

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



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



## 15. Firmware Update

### Notes:

- Firmware upgrade requires an I-link, a USB cable, and PC software. Multiple ESCs can be upgraded simultaneously.
- Obtain the PC software from the purchase source — Leave a message on IPET official website, sales, or after-sales service.

### 15-1: Operation

The screenshot shows the IPET SYSTEM software interface. On the left, there is a status panel with the following data:

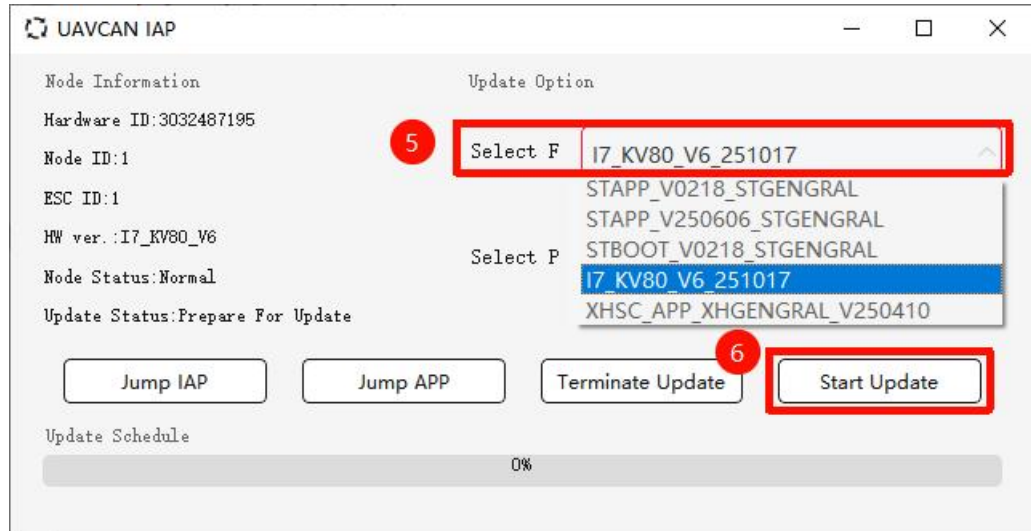
Bus Voltage	47.78V
Bus Current	0.00A
Phase Current	0.00A
MOS Temperature	20.88°C
Motor Temperature	00.00°C
Motor Speed	0.00Rpm
Current Phase	35.99°
Current Mode	Unknown Mode
Current Error	No Error
Health Status	No Error
Hardware Version	TM400_V40_V1
Software Version	I7_KV80_V1

Below the status panel are control buttons: Control, Param, Cali. Further down are settings for ID Setting, Fdb Rate, Priority Set, LED Setting, PWM First, White, CAN RL, Dir Setting, Rotor Lock, and Navigation light. At the bottom left, there are buttons for Data Log, Data Playback, Firmware Update, and Devices Manage. The Devices Manage button is highlighted with a red box and a red circle with the number 1.

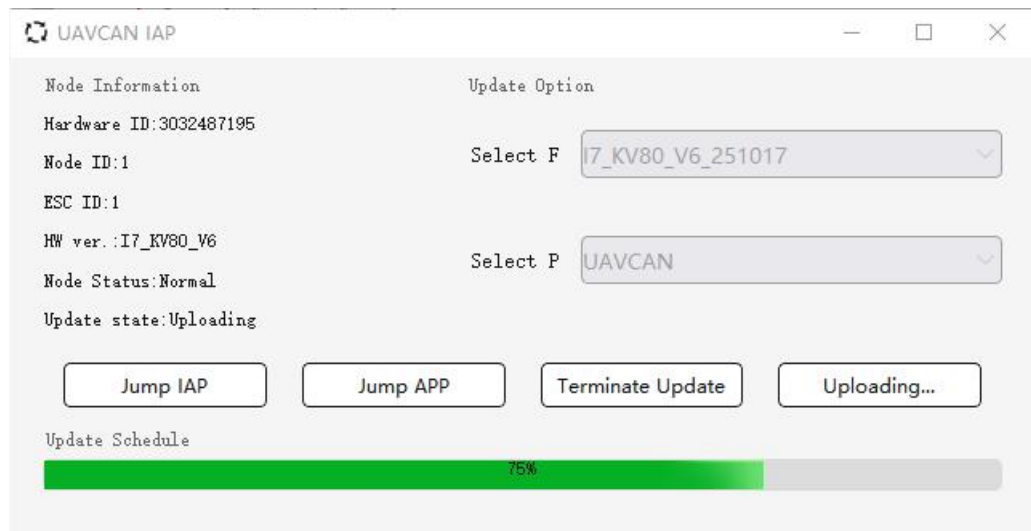
The central graph area displays several plots: Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. Below the graphs are checkboxes for each plot, all of which are checked. A red box with the number 2 highlights the Search Node button. A red box with the number 3 highlights the first row in the Node List table. A red box with the number 4 highlights the Update FW button.

NODE ID	ESC ID	UPDATE TIME	HW ID	SW ID	Voltage	Current	Temperature	ower up tim
1	1	09:29:11 297	3032487195	0	47.7813V	0A	16.6563°C	12635s

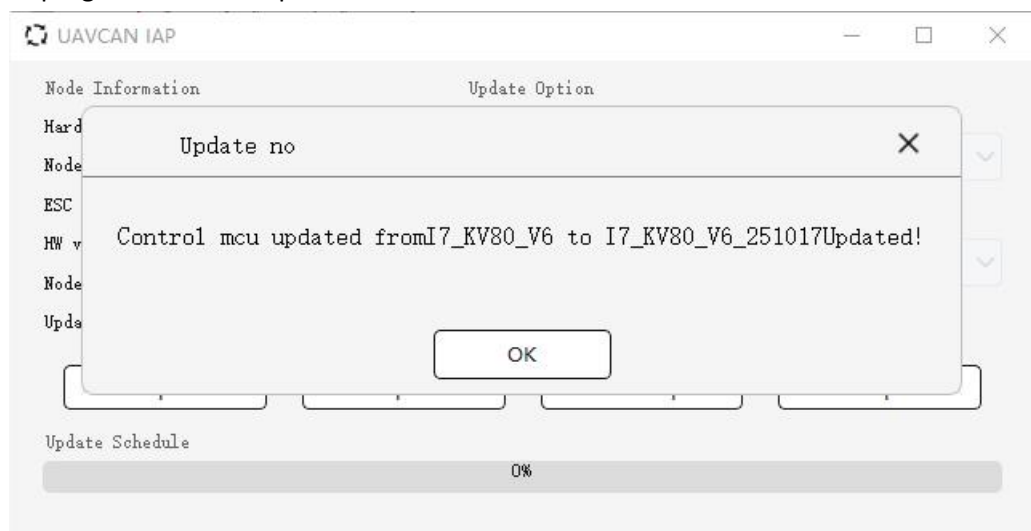
- 1) Click "Device Management".
- 2) Click "Search Nodes".
- 3) Select ESC.
- 4) Click "Upgrade Node Firmware"



- 5) Select the corresponding firmware
- 6) Click "Start Upgrade".
- 7) Power on the ESC.



- 8) Wait for the progress bar to complete.



## 16. Frequently Asked Questions

- 1) This series of propulsion systems is unique and requires strict matching of motor parameters. The firmware is exclusive, meaning one firmware version is only suitable for one specific motor + propeller combination. It cannot be compatible with multiple combinations simultaneously. Contact the manufacturer if usage is needed.
- 2) It is not recommended to change the propeller for the propulsion system combo. Improper combinations may trigger ESC protection, rendering it unusable.
- 3) Do not install propellers during ground tests to avoid unnecessary danger.
- 4) To change the motor's rotation direction, you can configure it via the PC software.
- 5) Ensure the propeller is installed only when its markings match those on the motor.
- 6) Do not exceed the ESC's recommended operating voltage range, otherwise, it may cause irreversible damage to the ESC.
- 7) The throttle for this ESC is fixed and does not require calibration. The throttle range is 1040-1940 $\mu$ s.
- 8) The FOC ESC has a braking effect and generates back EMF. Please ensure you use a power supply capable of absorbing back EMF during ESC testing or flight to avoid damaging the ESC and power supply.
- 9) The ESC supports both PWM and CAN throttle modes. One mode is set as the primary mode, and the other serves as a backup. Upon startup, the throttle signal must be connected to the ESC via the primary mode to ensure normal operation.
- 10) The backup throttle only becomes effective if the primary throttle signal is lost during operation. The default
- 11) factory setting is PWM throttle priority mode. To change it to CAN throttle priority mode, please contact the manufacturer or configure it via the PC software.
- 12) For quick-release components, both snaps must spring back to the calibrated position to achieve the best positioning effect. If they become stuck and do not pop up, try tightening them further.