

## **IPET-I5 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

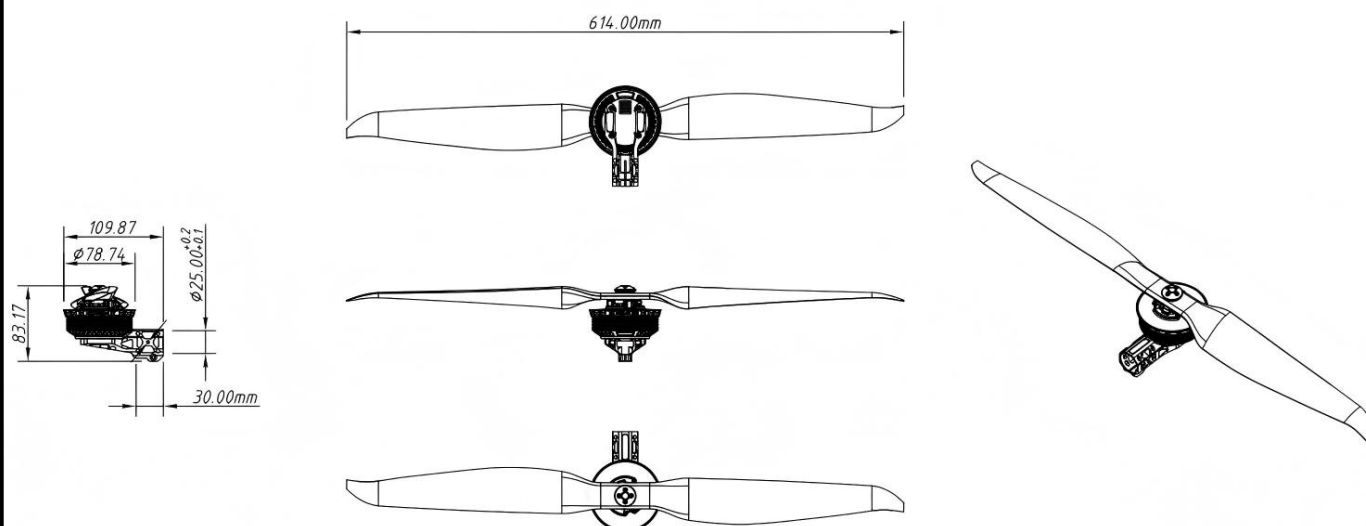
|                       |                                               |                                                                        |
|-----------------------|-----------------------------------------------|------------------------------------------------------------------------|
| System 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<br>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<br>Temp:          | 33°C                           |
|-------------------------|---------------|---------------|---------------|---------------------------|--------------------------------|
| Throttle (%)            | Thrust A (gf) | Voltage A (V) | Current A (A) | Motor Efficiency A<br>(%) | Overall Efficiency A<br>(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)

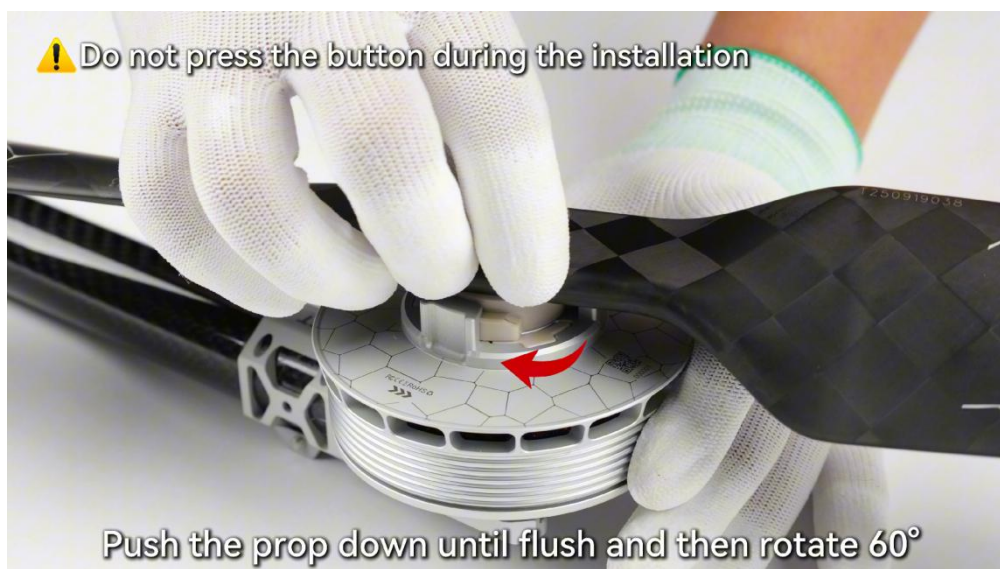
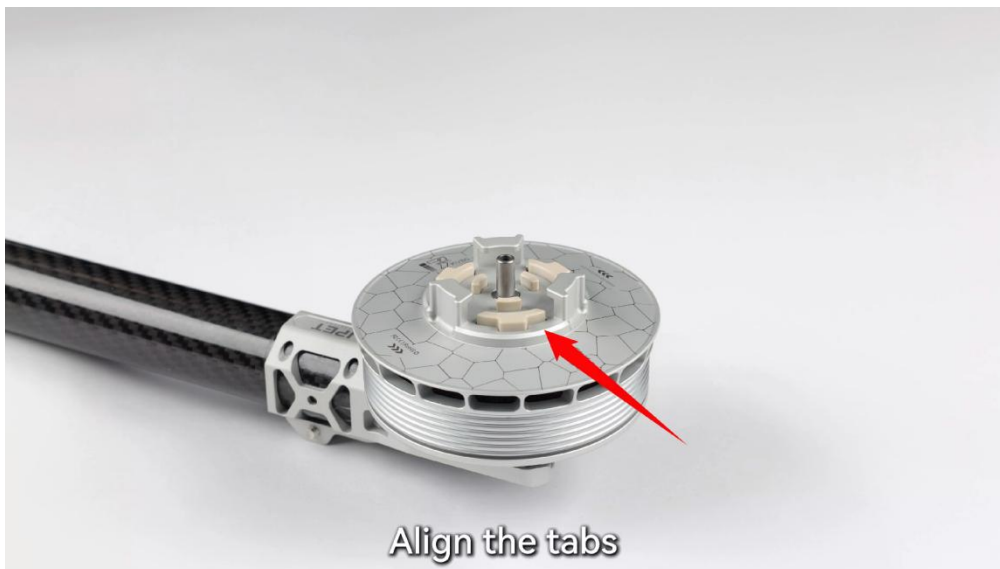


## 5. Quick-Release System Guide

### 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



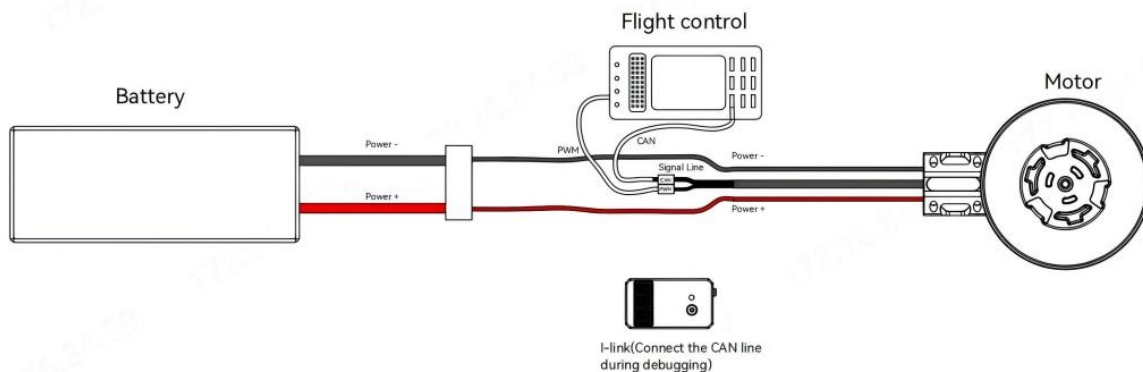
Step 2: Rotate 60° while pressing, then release the button to remove the propeller

## 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<br>"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_"<br>(1-second intervals) | The receiver's throttle channel is not outputting a throttle signal | 1. Check if the radio and receiver are paired correctly.<br>2. Check if the throttle channel wiring is connected properly.<br>3. Verify the ESC communication priority (factory default is PWM). |
| The power supply voltage is above 63V. | "beep, beep, beep_"<br>(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_"<br>(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


— X

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

4

6

ID Setting ID1 Fdb Rate 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

5 Read Param Save Param 7

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Data Log Data Playback Firmware Update Devices Manage

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Search Node Node Info HLTH Manage Update FW

Node List

| 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, a sidebar contains a 'Control' tab (highlighted with a red circle 1), a 'Param' tab, and a 'Cali' tab. Below these are various settings including ID Setting (ID1), Fdb Rate (20HZ), Priority Set, LED Setting, PWM First, CAN RL, Rotor Lock, and Navigation light. A 'Dir Setting' dropdown menu is open, showing 'Positive' (highlighted with a red circle 3) and 'Negative' options. At the bottom of the sidebar are 'Read Param' (highlighted with a red circle 2) and 'Save Param' (highlighted with a red circle 4) buttons. The main area features a top status bar with real-time 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\_V40\_V1), and Software Version (I7\_KV90\_V1). Below this is a large graph area with multiple plots: Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. At the bottom of the main area 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 software interface. On the left, a status panel displays various system metrics. In the center, there are several real-time graphs for Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. On the right, the 'Param' (Parameter Settings) panel is active, showing settings for ID, Fdb Rate, Priority Set, PWM First, CAN RL, Dir Setting, Rotor Lock, and Navigation light. The 'LED Setting' is highlighted in the 'PWM First' dropdown menu. At the bottom of the 'Param' panel, there are 'Read Param' and 'Save Param' buttons. A 'Node List' table is also visible at the bottom right.

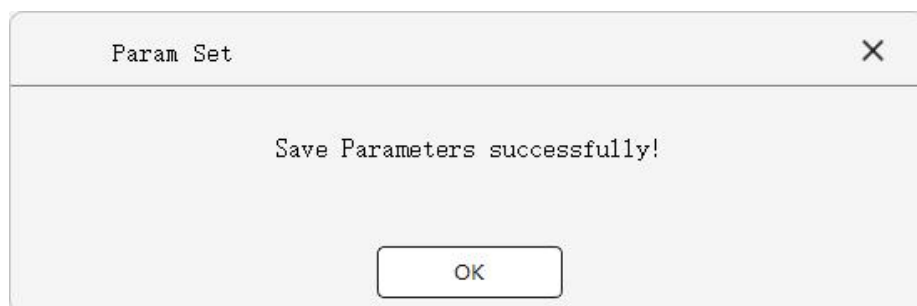
| NODE ID | ESC ID | UPDATE TIME  | HW ID      | SW ID | Voltage  | Current | Temperature | ower up tim |
|---------|--------|--------------|------------|-------|----------|---------|-------------|-------------|
| 1       | 1      | 09:29:11 297 | 3032487195 | 0     | 47.7813V | 0A      | 16.6563°C 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

1) Click 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

- 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:

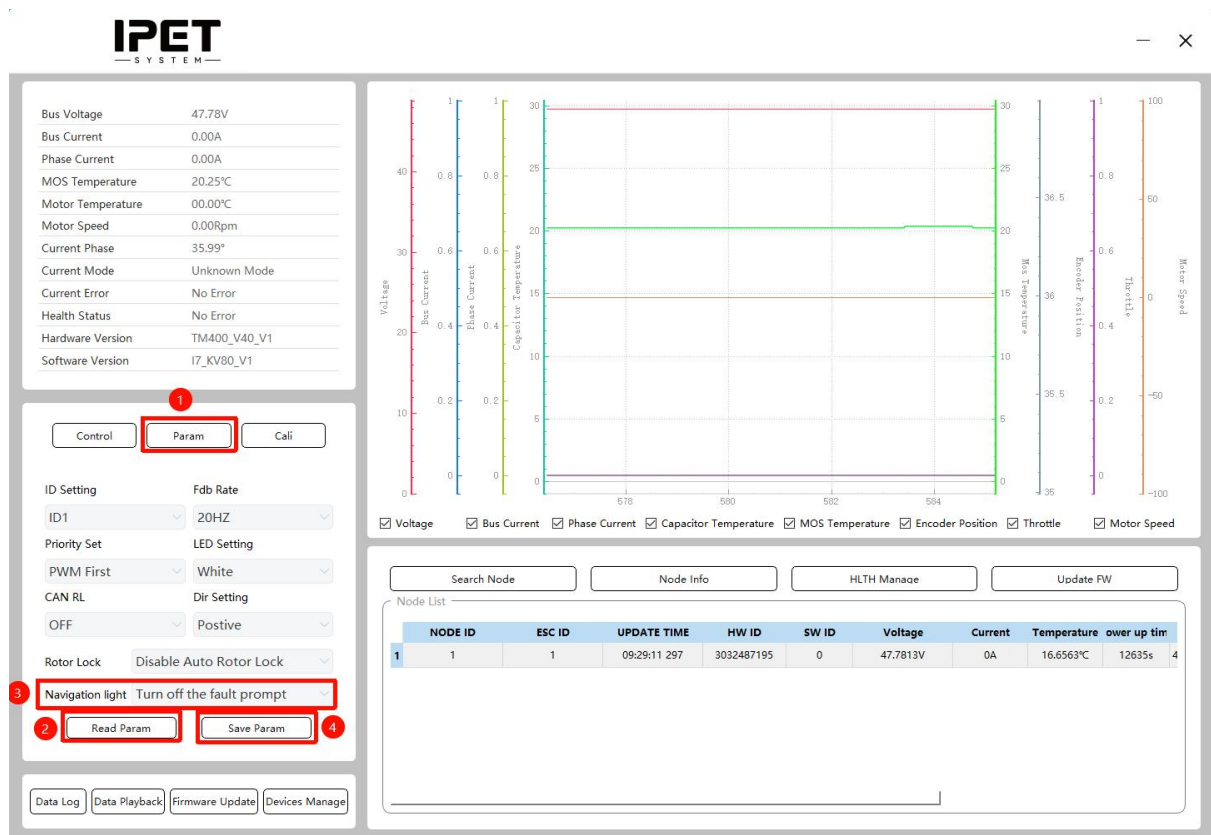


## 14. Navigation light Alarm Settings

### 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



- 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

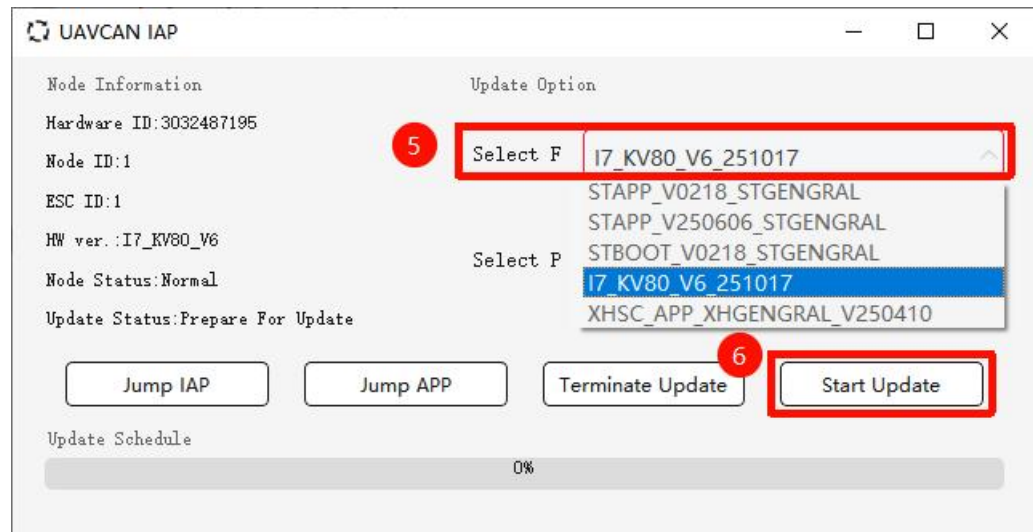
The screenshot shows the IPET SYSTEM software interface. On the left, there's a sidebar with system parameters and control options. The main display area shows graphs for Voltage, Bus Current, Phase Current, Capacitor Temperature, MOS Temperature, Encoder Position, Throttle, and Motor Speed. Below the graphs is a 'Node List' table. The bottom navigation bar includes buttons for Data Log, Data Playback, Firmware Update, and Devices Manage.

Red boxes and numbers 1-4 highlight the steps for upgrading firmware:

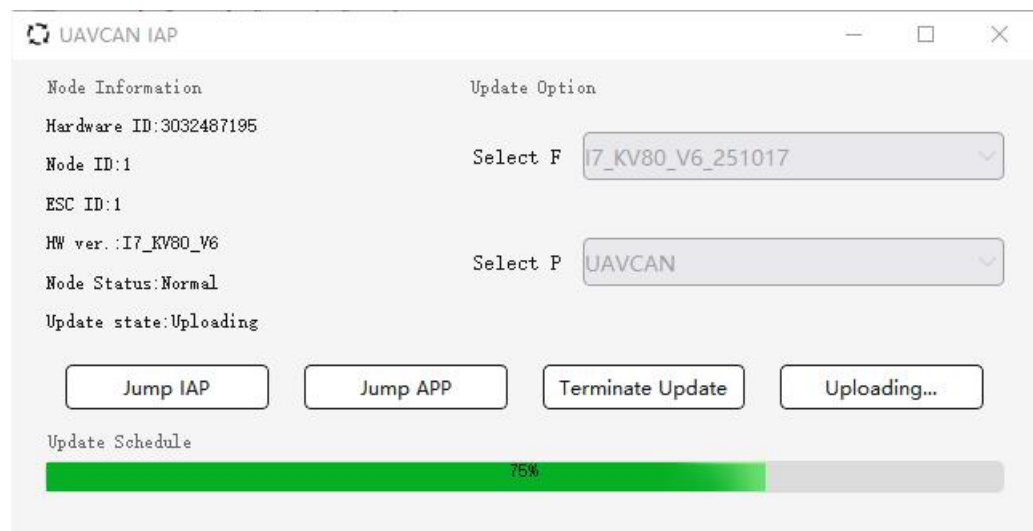
1. Click "Device Management" in the bottom navigation bar.
2. Click "Search Nodes" in the Node List section.
3. Select the ESC (Node ID 1) in the Node List table.
4. Click "Update FW" in the Node List section.

| 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      |

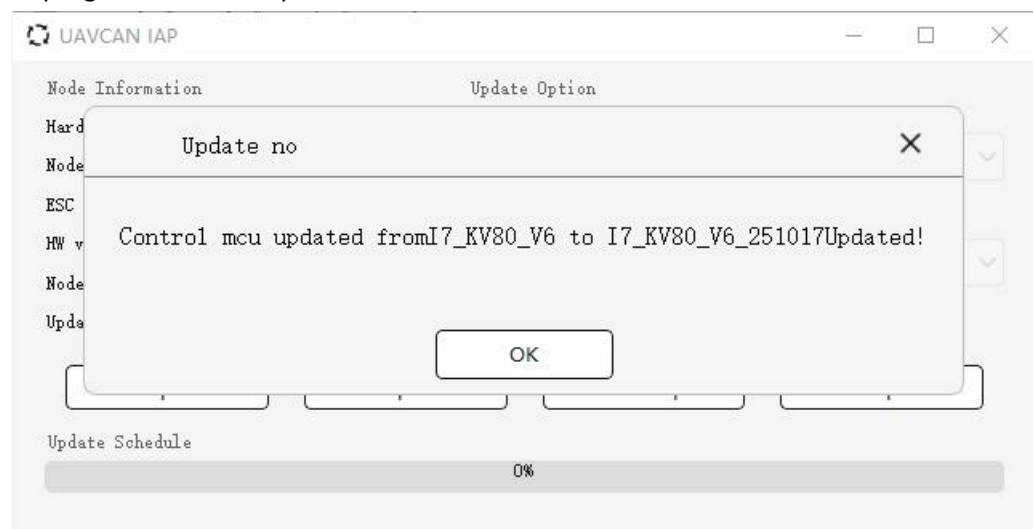
- 1) Click "Device Management".
- 2) Click "Search Nodes".
- 3) Select ESC.
- 4) Click "Upgrade Node Firmware"



- 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.