# Reflex Drive

## RD T-Pro ESC 65A - Product Specification


TRAPEZOIDAL TECHNOLOGY

Over current Protection

Startup Protection

Over Temperature Protection

Stuck Rotor Protection

## Product Description:

RD T-Pro ESC 65A is an advanced Electronic Speed Controller (ESC) designed for high-performance applications. **Made in India**, this model significantly enhances thermal and current handling capabilities. Housed in a sleek and durable Aluminum enclosure, the ESC offers excellent heat dissipation and protection against harsh environmental conditions.

# Technical Specification

| S. No. | Parameter | Value | Remarks |
|---|---|---|---|
| 1. | Input Voltage | 4 - 14S LiPo | - |
| 2. | Continuous Current | 65A (60min , With Active Cooling) | Tested in 12.5 m/s continuous airflow and 28℃ ambient Temperature |
| 3. | Peak Current | 75A (120s, With Active Cooling) | If OTP is inactive |
| 4. | BEC Output Voltage | No | - |
| 5. | Operating Ambient Temperature | (-20℃) ~(+ 65℃) | - |
| 7. | Standby current (24V) | ≤ 25mA | - |
| 8. | Throttle Range (Can't be calibrated) | 1050us ~ 1950us | Fixed Range |
| 9. | Recommended Throttle refresh frequency | 50Hz | - |
| 10. | Throttle I/P mode | PWM only | - |
| 11. | Over Temperature Protection | Yes | - |
| 12. | Overcurrent Protection | Yes | - |
| 13. | Stuck Rotor Protection | Yes | - |
| 14. | Waterproof Rating | IP56 | - |
| 15. | Startup Protection | Yes | - |
| 16. | Invert Motor Spin | Yes | Configured using RD GUI |
| 17. | Telemetry | Yes | Voltage, Current, PCB Temperature, Motor eRPM |
| 18. | Braking Feature | No | - |

## Wire and Enclosure Specification

| Seq. | Item | Wire colors / Size | Length | Remarks |
|---|---|---|---|---|
| 1 | Input cables | Silicone wires-red/black-**12AWG** | 10cm | ±1cm |
| 2 | Output cables | Silicone wires-black(x3) -**14AWG** | 12cm | ±1cm |
| 3 | Signal wires | Silicone wires - black , white(2P) 2P-JR | 22cm | ±1cm |
| 4 | Telemetry wires | Silicone wires - black , red(2P) 2P-JR | 25cm | ±1cm |

## Dimensions & Weight

| Seq. | Item | Requirement | Remarks |
|---|---|---|---|
| 1 | Length | 79mm | ±1mm |
| 2 | Width | 38mm | ±1mm |
| 3 | Height | 24.5mm | ±1mm |
| 7 | Weight(Incl. ESC with wire) | 135g | ±1g |

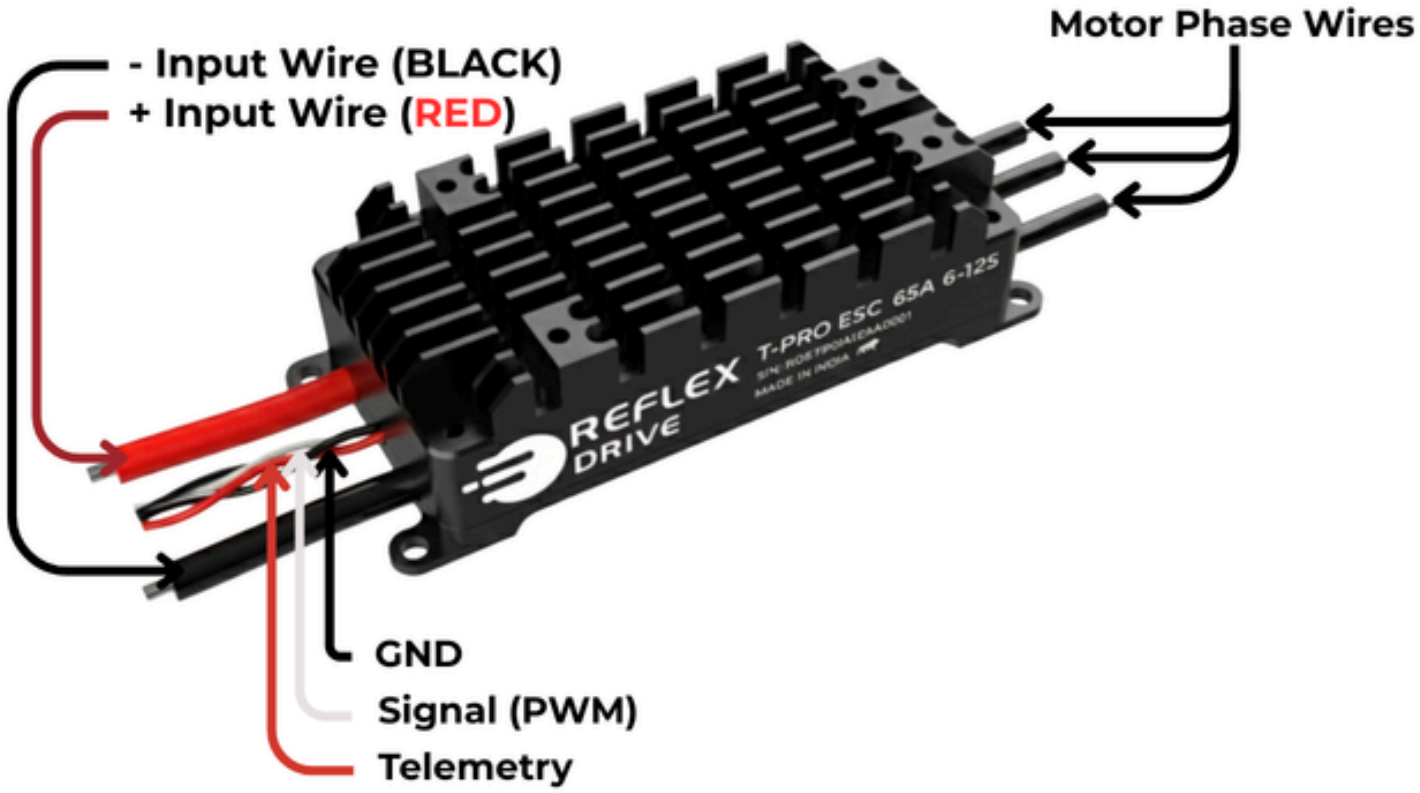
## Precautions

- Do not exceed the recommended operating voltage range of the ESC, otherwise it may cause irreversible damage to the ESC.
- This ESC throttle has been solidified and does not require throttle calibration. The throttle stroke is 1050-1950us.
- Ensure adequate cooling for the ESC. Avoid enclosing it in airtight spaces. Overheating can reduce performance and may permanently damage components.
- Do not expose the ESC to water, oil, dust, or conductive particles unless it is properly sealed or coated. This can cause short circuits or corrosion.
- Always double-check battery connections. Reverse polarity can instantly damage the ESC.
- Only use batteries within the specified voltage and current ratings (e.g., LiPo with proper cell count). Over-voltage or unstable supply can damage the ESC.
- Loose connectors or poor soldering may cause arcing, noise, or intermittent failure. Ensure all connections are firm and reliable.

## Protection Function Description

- **Stuck Rotor protection**
  - The ESC performs a single startup attempt and terminates operation if no rotor movement is detected. Restart is permitted only after the throttle is reset to minimum. Persistent failure indicates a possible motor or mechanical fault.
- **Over Current Protection:**
  - When the ESC output current exceeds the rated Peak current limit of 75A, The ESC gradually reduces the output current to the rated limit of 77 A immediately.
- **Over Temperature Protection**
  - When the ESC PCB temperature exceeds 85°C, The ESC gradually reduces the max output current to ⅔ of max rated current of ESC (47A) and ESC current will not exceed 47A. This reduction helps lower the temperature and prevent damage to the ESC components. Power cycle the ESC to continue the normal operation.
- **Low voltage and High voltage protection**
  - This ESC does not provide under-voltage or over-voltage protection. Operation below 18V or above 63V may cause abnormal behavior or malfunction. Ensure operation within specified limits. Immediate landing is recommended in UAV applications if voltage deviates from this range.
- **Throttle signal loss protection**
  - Motor output is disabled immediately upon loss of the throttle input signal.

## Wiring Diagram:

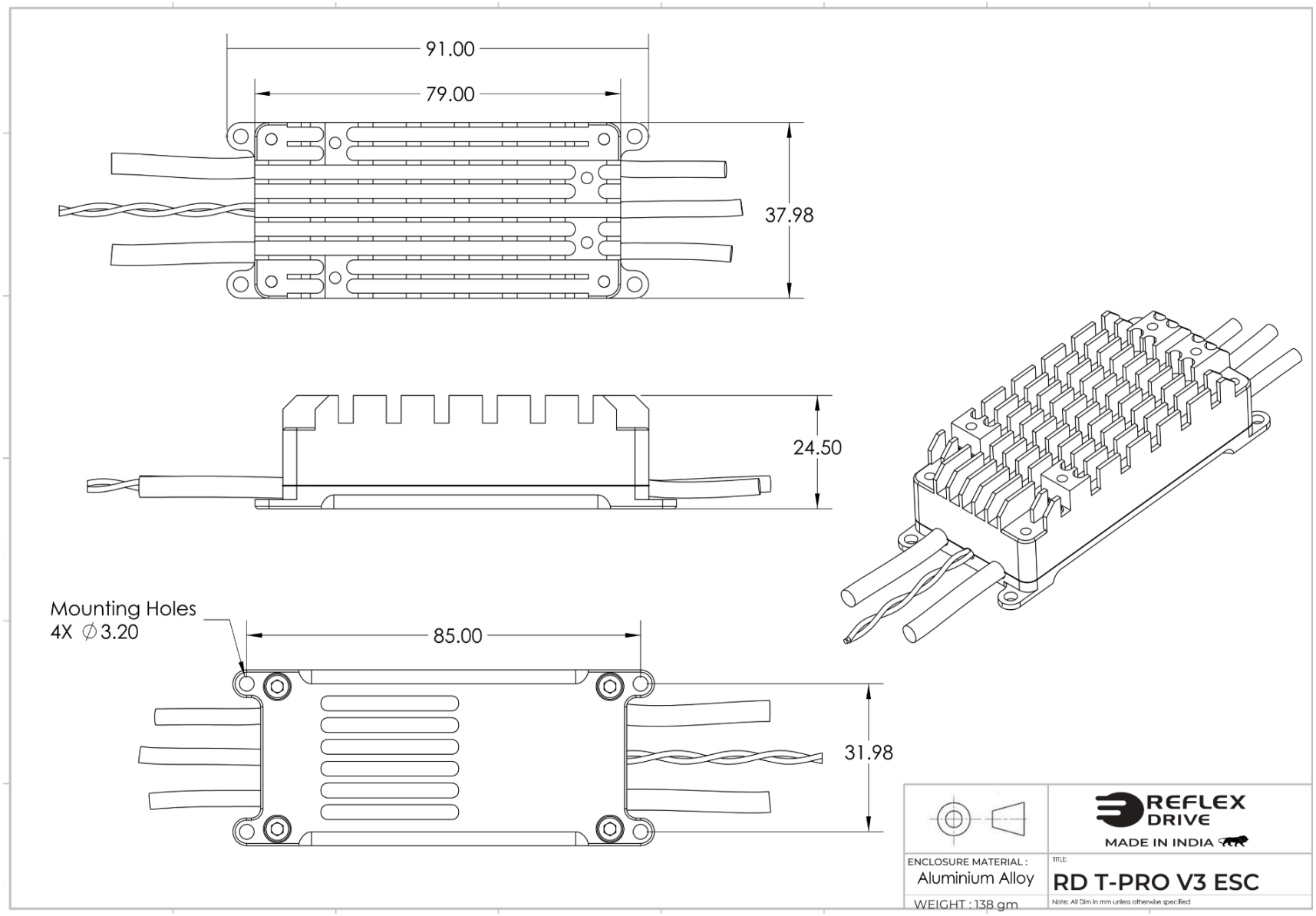



**Wire Gauge (AWG)**

1) **Input Wire: 12 AWG**
2) **Motor Phase Wires: 14 AWG**

**Note:** The ESC uses a single Dupont 2.54mm 3-pin female connector to carry all control and telemetry output signals. In this configuration, the Signal input (white) wire is on one end, Telemetry (red) is in the middle, and Ground (black) is on the opposite end. This eliminates the need for soldering and ensures broad compatibility with standard 2.54mm header interfaces.

## Engineering Drawing:



## Common Faults and Alert Tones Description

| Fault Phenomena | Alarm | Possible Cause | Solution |
|---|---|---|---|
| After powering on, the motor fails to start | “Beep, beep, beep...” (with a 2-second interval between each beep) | The receiver's throttle channel is not outputting a throttle signal | • Check if the radio and receiver are paired correctly.<br>• Check if the throttle channel wiring is connected properly.<br>• Verify the ESC communication priority (factory default isPWM). |

# REFLEX ESC CONFIG INSTALLATION

**Reflex ESC Config is a desktop-based software utility designed by Reflex Drive to help users view, tune important ESC parameters, and flash firmware.**
**Note:** All the ESCs come pre-installed with the latest firmware, so users don't need to request it separately.

Reflex ESC Config software is available upon request at hello@reflexdrive.in for updates and parameter adjustments. **Customization options are available for OEMs only.**

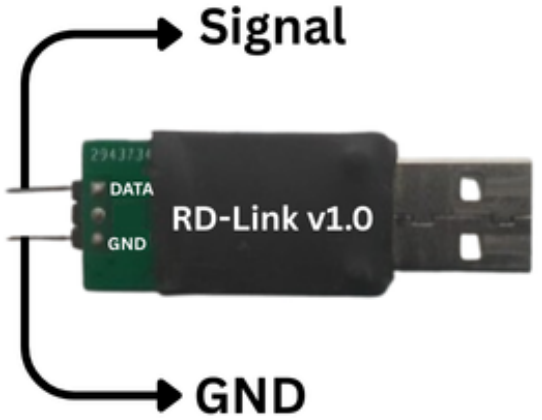
**Reflex ESC Config Version: PFWENL-2025-v1.0.1**

**System Requirements**
Operating System: Windows 10 or Later
Interface: RD Link v1.0

**Installation Process**
1) Run the installer
2) Allow Permissions: If Windows prompts “Do you want to allow this app to make Changes? “, click “Yes”.
3) Accept the License Agreement: select “I Agree” and Press “Next”.
4) Read Information: A note about software will appear, Read it and click “Next”.
5) Check “Create Desktop Shortcut” and press “Install”
6) Once installed, click “Finish” to launch Reflex ESC Config.

**Note:** This version (PFWENL-2025-v1.0.1) includes only essential parameters such as Motor KV, Motor Poles, Max PWM, Min PWM, PWM Telemetry, and Invert Motor Spin, along with firmware flashing support.

**IMPORTANT**
We recommend using the **latest available release** of the software for best performance, compatibility, and access to new features.




**ESC PROGRAMMING AND FIRMWARE UPDATE**

The ESCs interface with Reflex ESC Config through **RD-Link v1.0** developed by Reflex Drive.

Communication occurs over signal wire: the **signal wire connects to RD-Link's Data Pin**, and the ground wire to GND. The ESCs use a 2.54mm Dupont connector, fully compatible with RD-Link. The wiring diagram is provided.

⚠ Ensure all connections are correct and the ESC is  powered on; otherwise, Reflex ESC Config will display a connection error.
⚠ Always save settings and complete any configuration operations, then close the Reflex ESC Config software before unplugging. Unplugging during flashing may result in incomplete flashing, corrupt the firmware, and render the ESC unusable.
⚠ The ESC can be powered with just the minimum rated voltage for flashing firmware or adjusting parameters. Supplying full operational voltage or load is not necessary for these procedures.

**IMPORTANT:** Only firmware files provided by Reflex Drive are supported. Any attempt to tamper with or flash unauthorized firmware may result in failure and device malfunction. Reflex Drive assumes no responsibility for such actions.

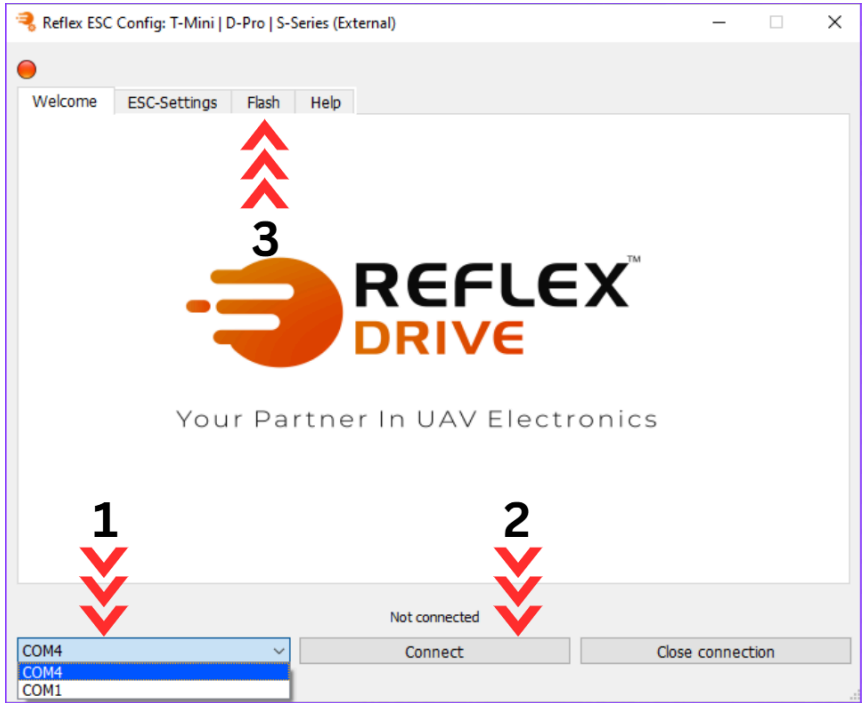
## FIRMWARE FLASHING STEPS

**Launch the software:** Open Reflex ESC Config (Latest Version).
You'll start on the Welcome Tab. **Follow the chronological order as shown in the image.**

**1) Select COM Port**
Use the dropdown to select the correct COM port. If you're unsure of the port number, check your system's Device Manager.

**2) Connect to ESC**
Click the "Connect" button — the connection status should update to "Connected."

**3) Go to the Flash Tab**
Click the "Flash" tab on top. You'll see buttons to select and flash firmware.




**Note: The Revert button (bottom-right corner)** restores the settings that were present at the time of the latest connection. Revert Button is disabled after a fresh firmware flash.

**4) Select Firmware**
Click “Select Firmware” and choose the firmware file provided by Reflex Drive.
Make sure you are using the latest firmware version compatible with your ESC.

**5) Save Settings**
Before flashing, ensure appropriate settings are saved.

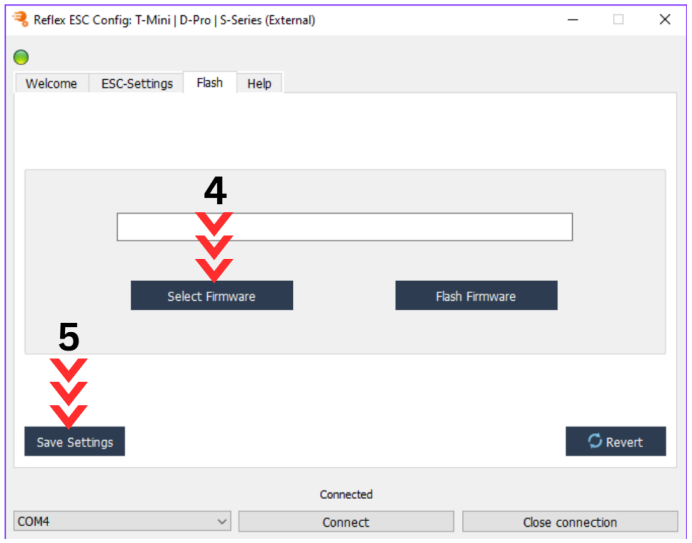
**6) Start Flashing**
Click "Flash Firmware" to start.

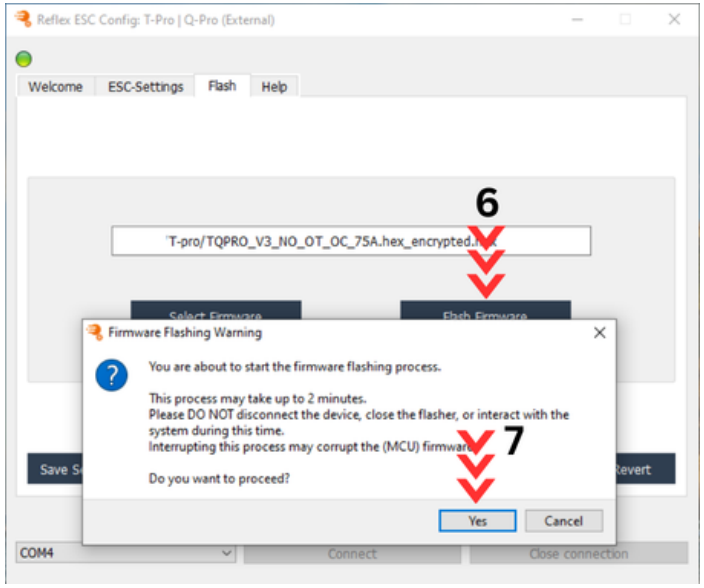
**7) Firmware Flashing Warning**
Click “Yes” to confirm. "Firmware Flashed successfully" will appear when done, verify and disconnect to complete the firmware update.

**8) Procedure to Resolve Flash Failure During ESC Firmware Flashing**

⚠ Do not disrupt power or connection to The ESC or PC during the flashing process, or corruption of the firmware and permanent failure may occur.

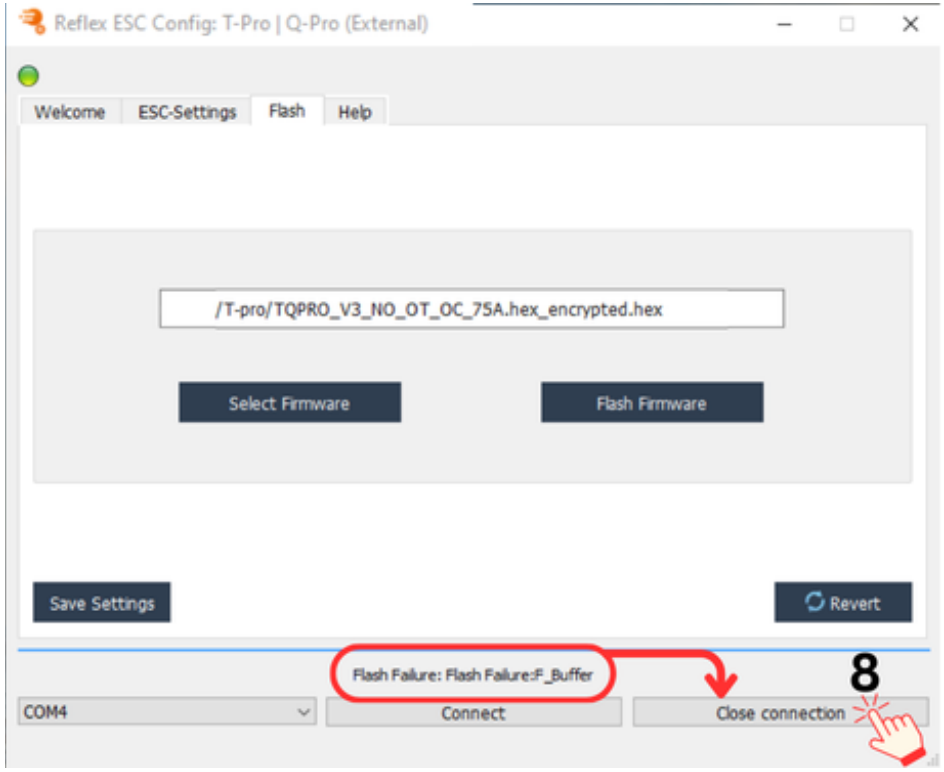
⚠ Always close and relaunch the tool if you are going to **flash a different firmware version.** The current flashing method uses **batch flashing—**once settings are saved the first time, the same settings are applied to every flash to avoid the hassle of saving them every time.



## Step-by-Step Process

1. If the error **“Flash Failure: F_Buffer”** appears during firmware flashing, stop the flashing process immediately.
2. Click on **“Close Connection”** in the ESC configuration software.
3. Wait for the status to show **Disconnected**.
4. Select the correct **COM Port** again if required.
5. Click on **“Connect”** to reconnect the ESC.
6. Ensure the connection indicator turns **Green (Connected)**.
7. Select the firmware file again if necessary.
8. Click on **“Flash Firmware”** to restart the flashing process.
9. Wait until the flashing process **completes successfully.**

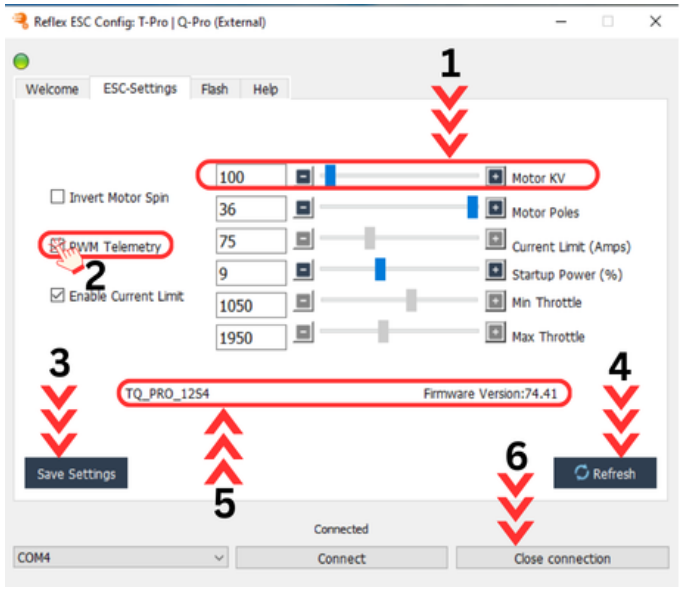



# ESC SETTINGS TAB

The ESC Settings Tab allows both real-time inspection and modification of core ESC parameters.

**Process:**
**A)** Modify values in the respective fields.
**B)** Click “Save Settings” to save settings to The ESC
**C)** Use “Refresh” anytime to reload the latest values directly from the ESC.

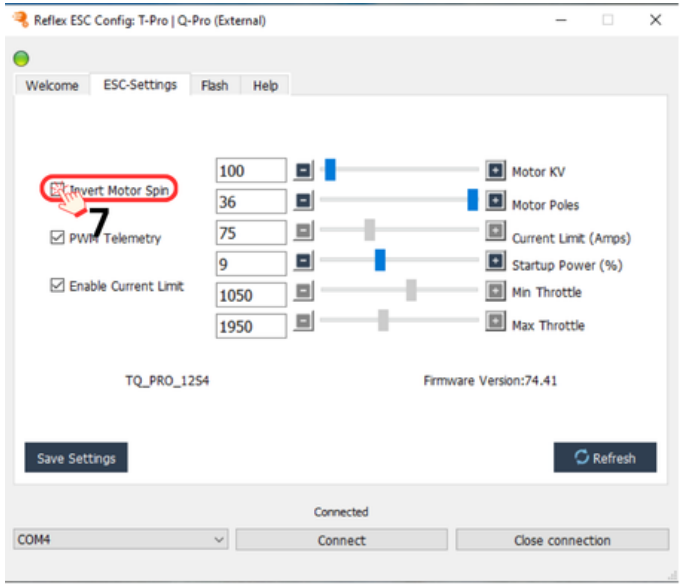
**As shown in the image, the steps to save settings are clearly indicated. (1-4)**




**Note:** The highlighted portion shows key interface elements. Section 1 includes a display, slider, and adjustment buttons for the same parameter. Section 2 features an enable/disable checkbox, while Section **5 displays the current firmware name and version** and section **6 close connection** of ESC from GUI.

### 7) Motor Direction Inversion (Optional Setting)

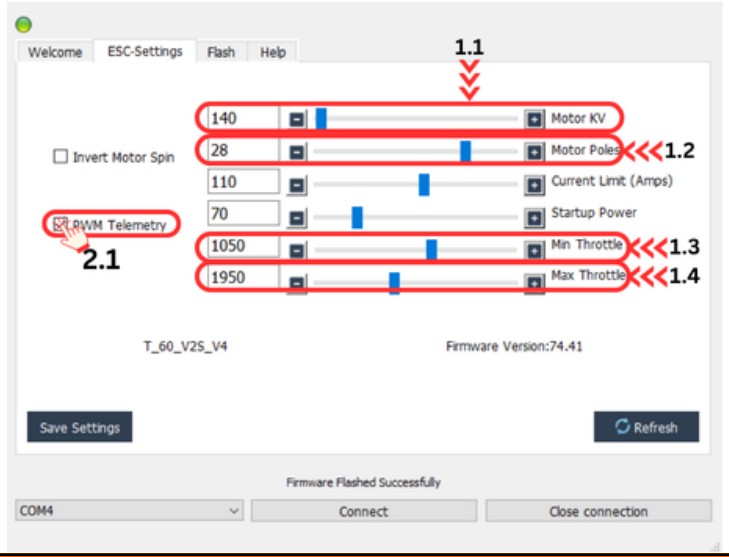
1. If the **motor rotation direction needs to be reversed**, open the **ESC-Settings** tab in the GUI.
2. Locate the “**Invert Motor Spin**” option.
3. **Enable (check) the “Invert Motor Spin” checkbox** to reverse the motor rotation direction.
4. After enabling the option, click “**Save Settings**” to apply the changes to the ESC.




**Tip:** Use this option only when the **motor rotation direction is opposite to the required direction** for the application.

**Tip:** Always use the **Refresh button to verify saved settings**. After modifying parameters, close (Button Marked 6) and reconnect the software to ensure all changes are fully applied.

⚠ **To ensure safe operation, some settings are fixed in the firmware and not user-configurable, as incorrect changes may pose risks. OEMs may request access to the full version, but must have a clear understanding of the implications.**




## EDITABLE PARAMETERS

**Tip:** Always match motor poles and KV correctly to avoid wrong Telemetry or unstable control.

| 1.1. Motor KV | |
|---|---|
| **Motor KV** refers to the number of revolutions per minute (RPM) a motor produces per volt of applied voltage under no-load conditions. | |
| **Range** | 20-10220 |
| **Increment** | Pressing '+' increases the value by 40 units. |

| 1.2. Motor Poles | |
|---|---|
| **Motor Poles** refers to the number of magnetic poles (north and south) in the motor's rotor. This value affects the motor's electrical frequency and determines its relationship between electrical RPM and mechanical RPM. | |
| **Range** | 2-36 |
| **Increment** | Pressing '+' increases the value by 1 unit. |

**Tip:** Invert Motor Spin allows you to reverse motor direction without changing phase wires, making the process quick and hassle-free.

| 2.1. PWM Telemetry | |
|---|---|
| **PWM Telemetry** activates the transmission of telemetry data from the ESC. This feature allows the ESC to send real-time information such as motor speed, temperature, voltage, and current back to the controller or monitoring device, enabling more precise monitoring and diagnostics during operation. | |
| **Enable** | Activates telemetry data transmission |
| **Disable** | Telemetry data transmission is turned off. |

## TROUBLESHOOTING

| Problem | Solution |
|---|---|
| COM Port not detected | Reconnect the RD-Link, restart app, or check Device Manager |
| Flash Failed | Verify firmware file, ESC power, and that correct COM port is selected |
| Wrong Firmware | Use only official firmware files for your ESC model |

**IMPORTANT**
To avoid potential issues, ensure there are no interruptions—whether power loss or connection drops—during the flashing process. While most ESCs can be recovered with a power cycle and re-flashing, successful recovery is not guaranteed.

## AFTER SALE MAINTENANCE

If your ESC is damaged, please contact Reflex Drive support before attempting any repair or replacement. Only use the ESC after receiving confirmation. Do not install unofficial components, as this may affect performance or void the warranty.

## SUPPORT

For any questions, technical support, or product-related assistance, feel free to reach out to us at: **hello@reflexdrive.in**, call us at **+91 9151118036**

Visit our website at **www.reflexdrive.in** for the latest product releases, firmware updates, and helpful resources tailored to your needs. Explore new offerings and stay informed to get the most out of your Reflex Drive experience.