RC PPM Control

1. Overview

This document provides a complete configuration tutorial for controlling AESC motor controllers via PPM signals from an RC transmitter. It covers hardware connection, software configuration, parameter debugging, and common issue resolution, helping users quickly achieve control of AESC using traditional RC transmitters.

PPM (Pulse Position Modulation) is a common signal protocol in RC systems, transmitting multi-channel control information through variations in pulse position. AESC supports receiving commands from PPM signal receivers to control motor speed, direction, etc.

Important Note: Before configuring RC PPM control, it is essential to first run the "Setup Motors FOC" wizard in VESC Tool to complete comprehensive detection and identification of motor parameters. This is the foundation for ensuring stable and safe motor operation.

2. Software Preparation

- **Download VESC Tool: https://vesc-project.com/vesc_tool**
- Scan the QR code below for download instructions:

Figure 1: AESC Configuration Tutorial QR Code

- Run the VESC Tool software.

3. Hardware Preparation

3.1.Required Components

- AESC Motor Controller (e.g., AESC V4, AESC V6.7, AESC V4 Pro, AESC V6.7 Pro)
- Brushless DC Motor (e.g., 5065, 6374, 63100)
- Lithium-ion Battery Pack / LiPo Battery Pack / Adjustable DC Power Supply (Voltage: 12V ~ 50.4V)
- PC
- USB Type-C
- PPM RC Transmitter + Receiver (Supports PPM output)

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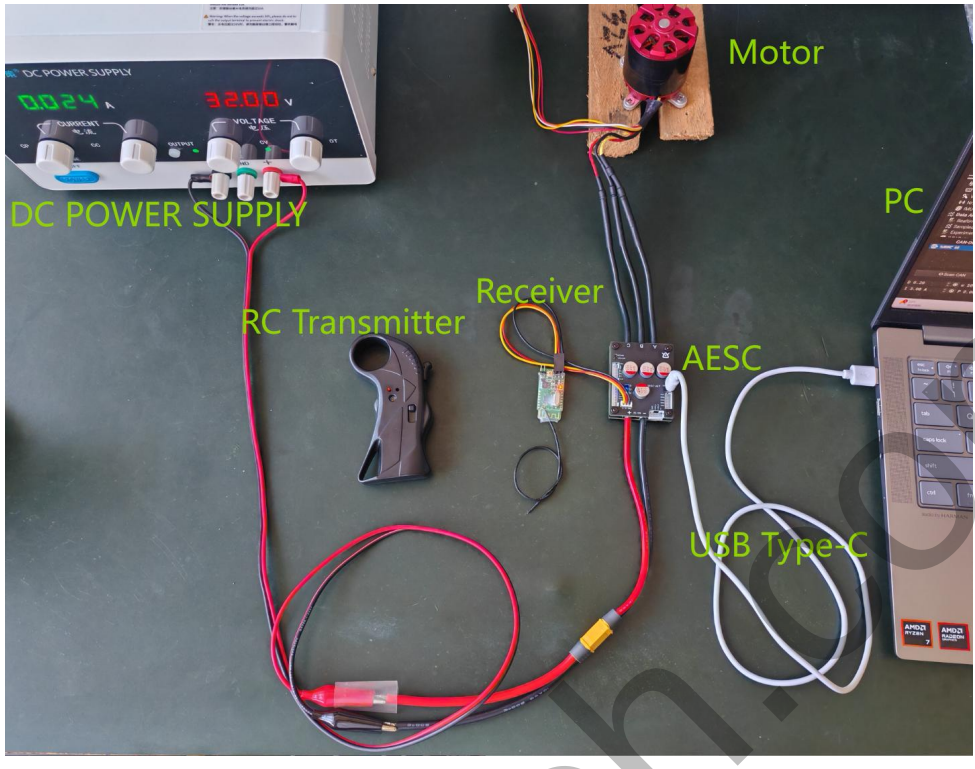

Figure 2: Hardware Connection Diagram

3.2. Hardware Connection

a. Power Off All Devices

• Before performing any connection operations, ensure all components are disconnected from power sources.

b. Connect Motor to AESC

• Connect the motor's three-phase wires (A, B, C) to the AESC's motor output terminals (A/B/C).

Note: The connection order of the motor phases does not affect functionality; incorrect rotation direction can be adjusted in VESC Tool.

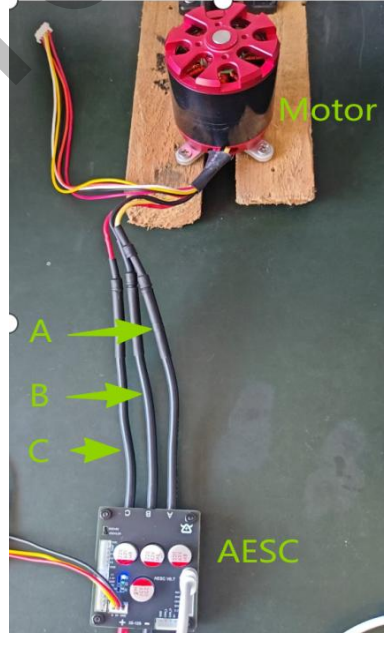

Figure 3: Motor Three-Phase Wires Connected to AESC

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c. Connect AESC to Computer

- Connect to Computer: Use a USB Type-C cable to connect the AESC to the computer for configuration or firmware updates.
- After connection, you should see the AESC's power indicator light up normally.

d. Connect RC PPM Receiver to AESC

- Connect the receiver's signal pin (e.g., "S" pin) to the "S" pin on the AESC's PPM interface.
- Connect the receiver's power pin (e.g., "VCC" pin) to the "5V" pin on the AESC's PPM interface.
- Connect the receiver's ground pin (e.g., "GND" pin) to the "GND" pin on the AESC's PPM interface.

e. Bind RC PPM Transmitter and Receiver

- Receiver Binding Mode: Typically, the receiver indicator blinks indicating it is in binding mode.
- Transmitter Binding Mode: In the transmitter's menu system, find the option named "Bind" or "Pairing" and select start. Menu structures vary; please refer to your transmitter's manual.
- Wait for Successful Binding: After a few seconds, the receiver's indicator will change from blinking to solid, indicating successful binding.

f. Check Power Compatibility

Before connecting the power source, ensure your power source (battery) is compatible with your AESC device and motor:

- **Voltage Check:** Confirm that your battery's nominal voltage and fully charged voltage are within the input voltage range specified in the AESC user manual. Exceeding the maximum voltage will cause permanent damage to the controller.
- **Current Check:** Ensure your battery can supply sufficient continuous current to meet the operational demands of the motor and AESC. The battery's current output (in Amps) should be greater than the maximum current you plan to draw.
- **Motor Compatibility:** The power source must be capable of driving your specific motor at the required voltage and current.

g. Connect Power Source to AESC

Warning: Mind the polarity! Connect the positive terminal (+) of the power source to the AESC's positive (+) input, and the negative terminal (-) to the negative (-) input. Reverse connection will permanently damage the controller.

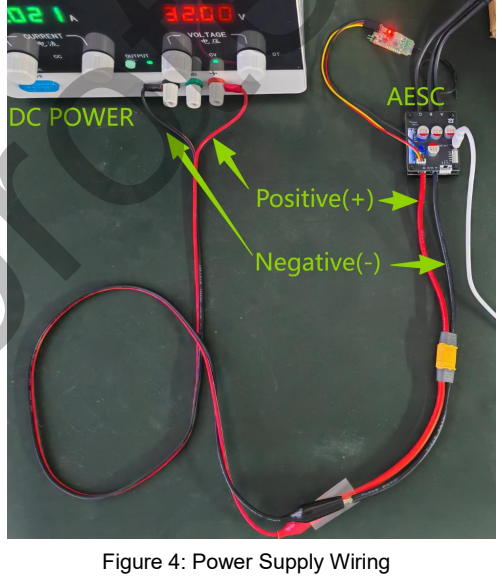

Figure 4: Power Supply Wiring

3.3.Final Connection Check

- **Visually recheck all connections:** Carefully verify the correctness and security of all connections, especially battery polarity.
- **Check wire security:** Ensure all cable connections are firm, with no looseness or potential short-circuit risks.

3.4.Power On

- After confirming all connections are correct, turn on the power supply to energize the AESC.

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4. PPM Input Configuration

4.1.Connection

a. Devices found.

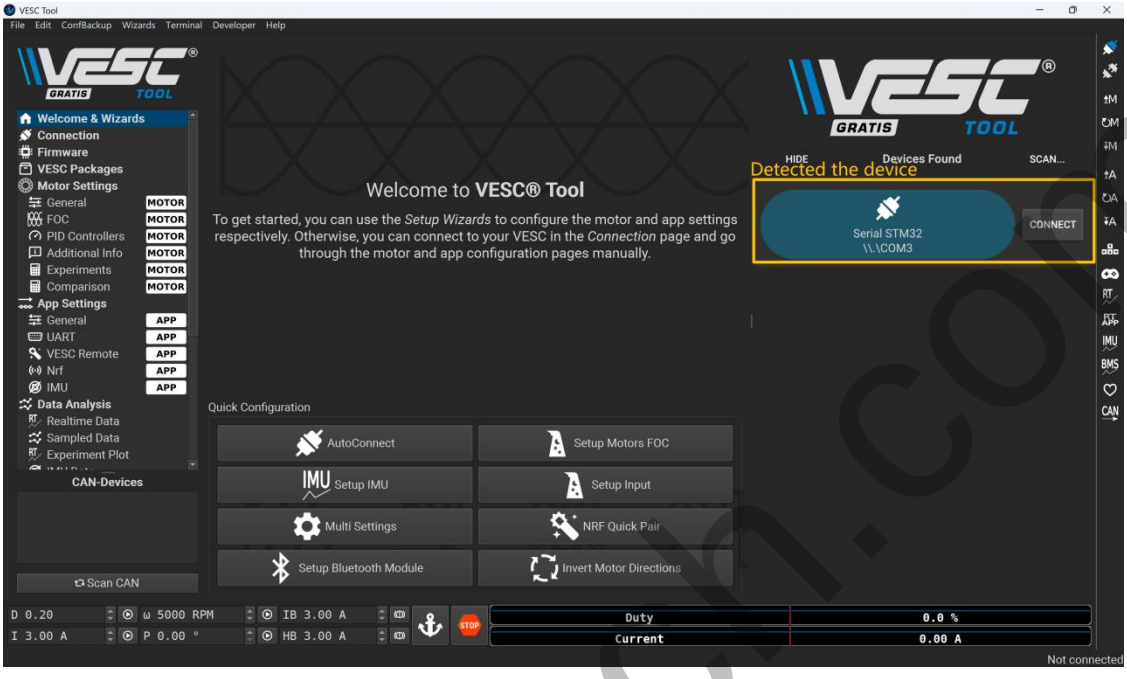

Figure 5: Detected the motor controller

b. Click "AutoConnect". A successful connection is indicated by the status "Connected (serial) to COM*" in the bottom-right corner.

Figure 6: Connection status

4.2.Configure PPM Input

a. Click“Setup Input”.

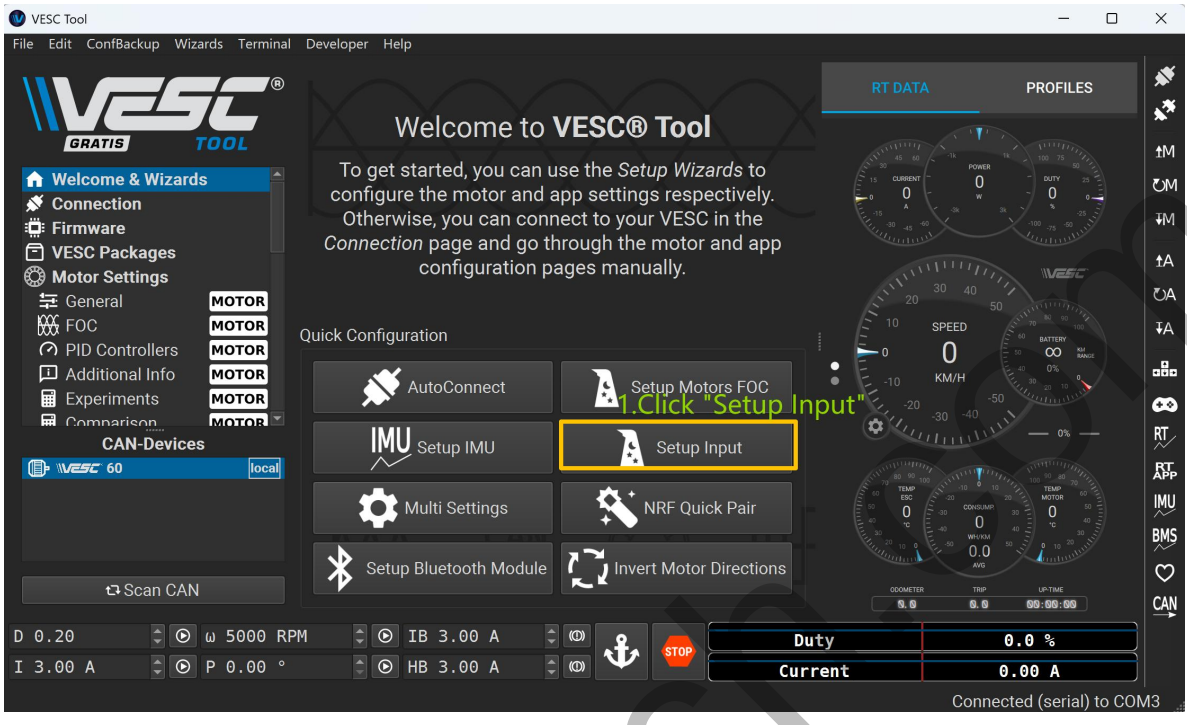

Figure 7: Click“Setup Input”

b. Click“Next”.

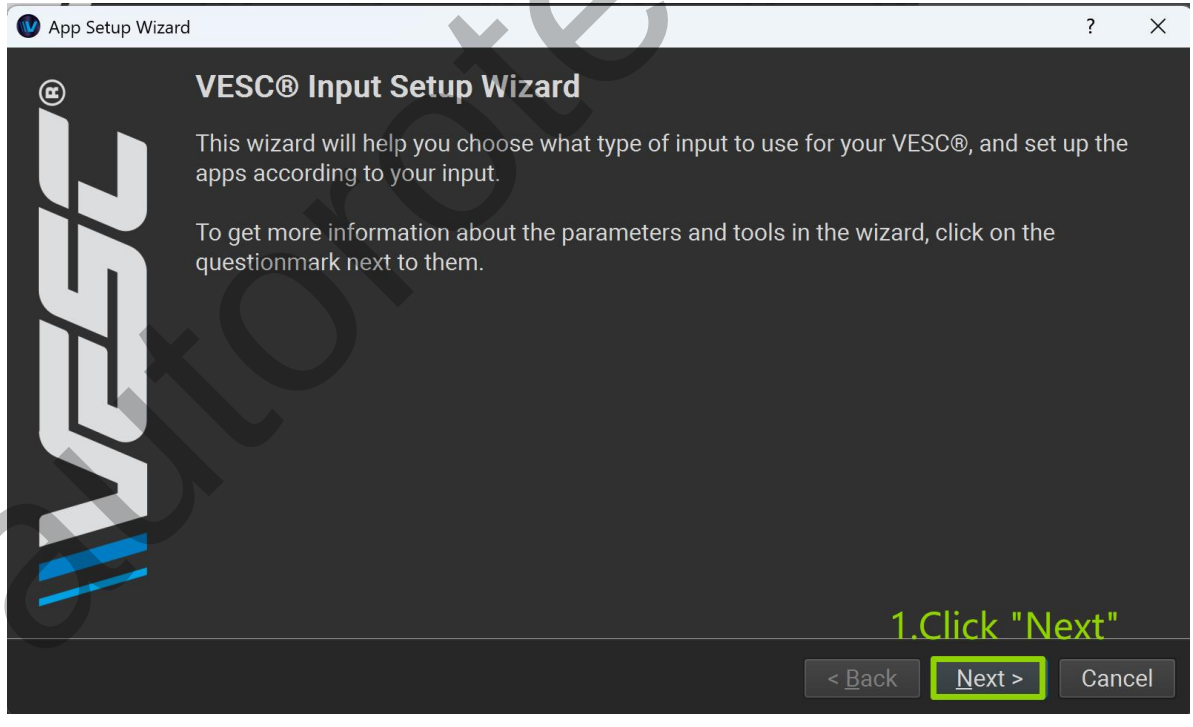

Figure 8: Click“Next”

c. Select "PPM", then click "Next".

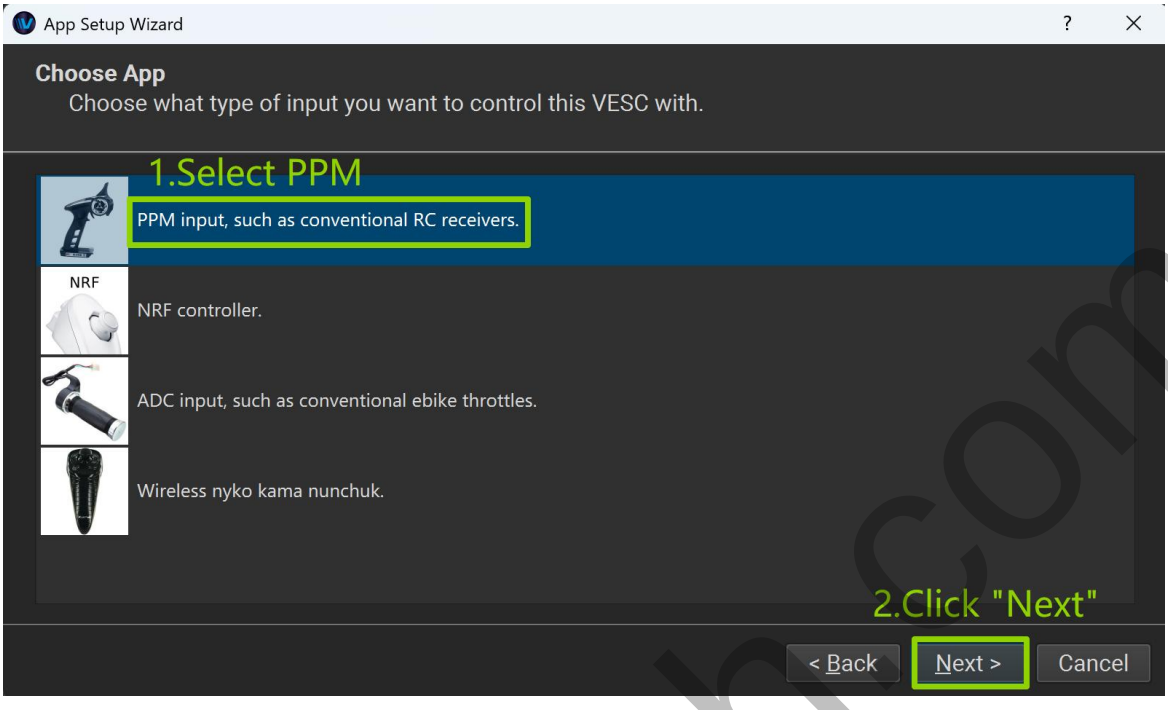

Figure 9: Select PPM Input

d. Choose the configuration mode based on your functional requirements (choose one):

- **Center Control Mode:** If you use a two-way joystick and require bidirectional control, refer to Figures 10-12 for Center Control Mode.
- **Unidirectional Control Mode:** If you only require forward motion, refer to Figures 13-14 for Unidirectional Control Mode.

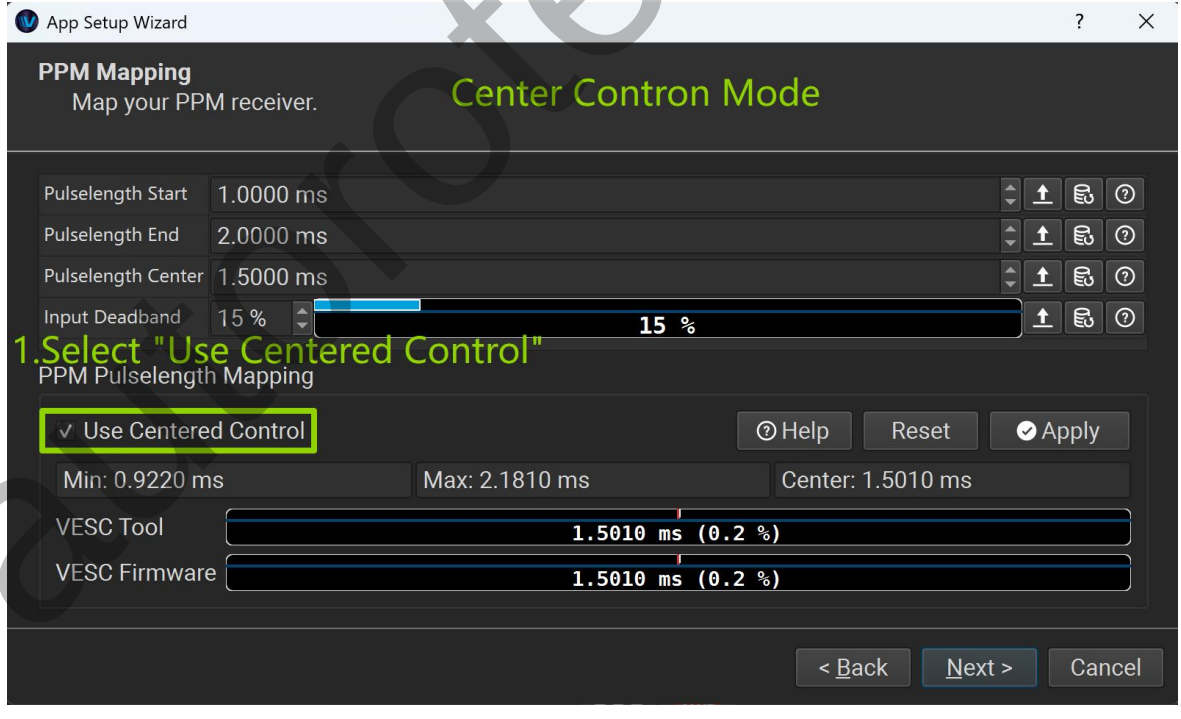

Figure 10: Select Center Control Mode

Push the stick all the way forward. The signal bar will settle at its highest reading. Note that for initial calibration, this highest reading may not be exactly 100%. If there is no response, verify the receiver connection and pairing.

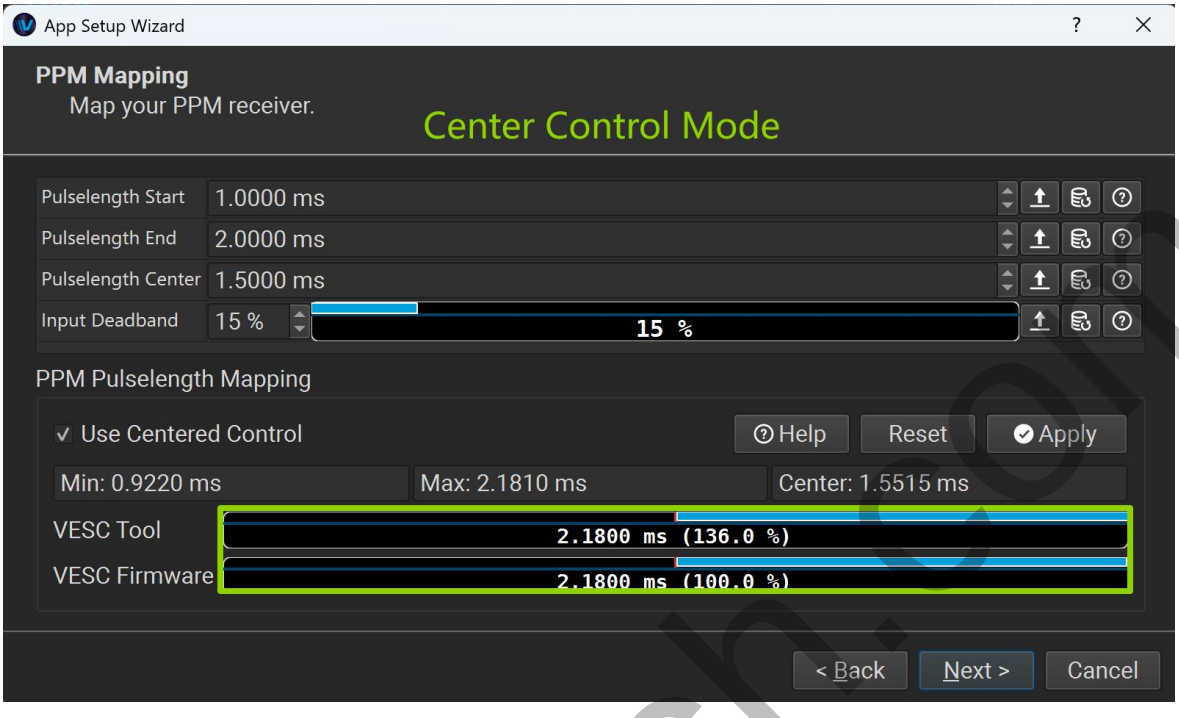

Figure 11: Center Control Mode Forward Configuration

Pull the stick all the way back. The signal bar will settle at its highest reading. Note that for initial calibration, this highest reading may not be exactly -100%.

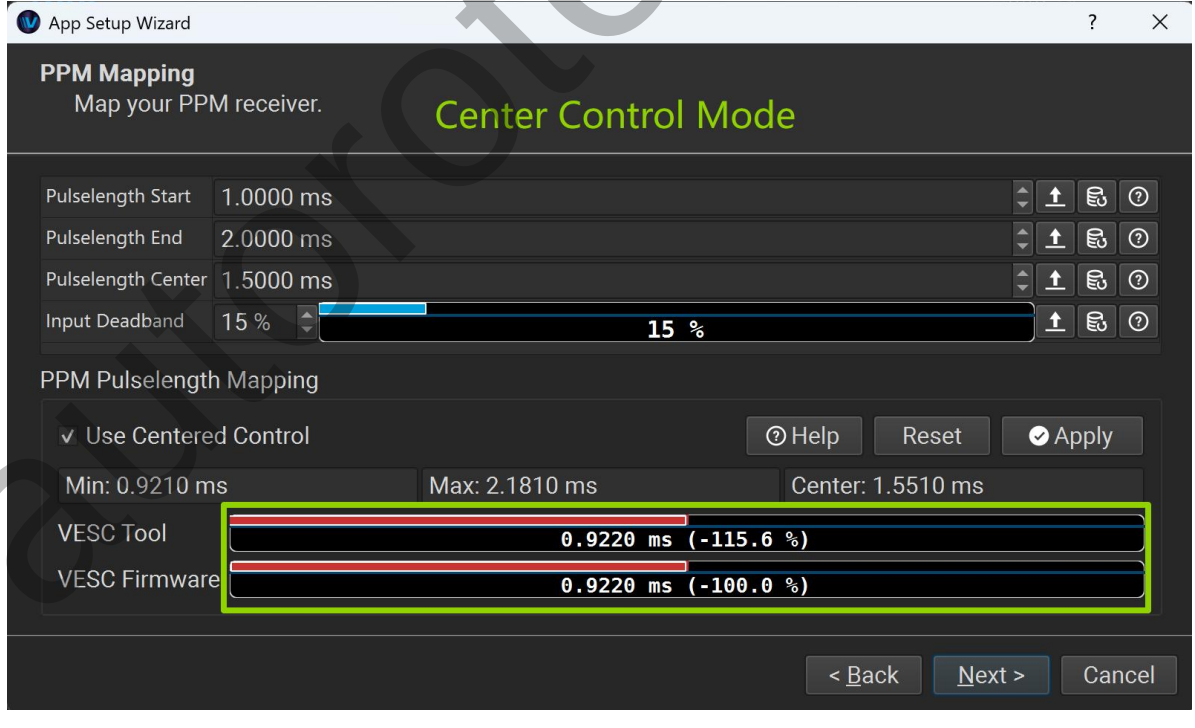

Figure 12: Center Control Mode Reverse Configuration

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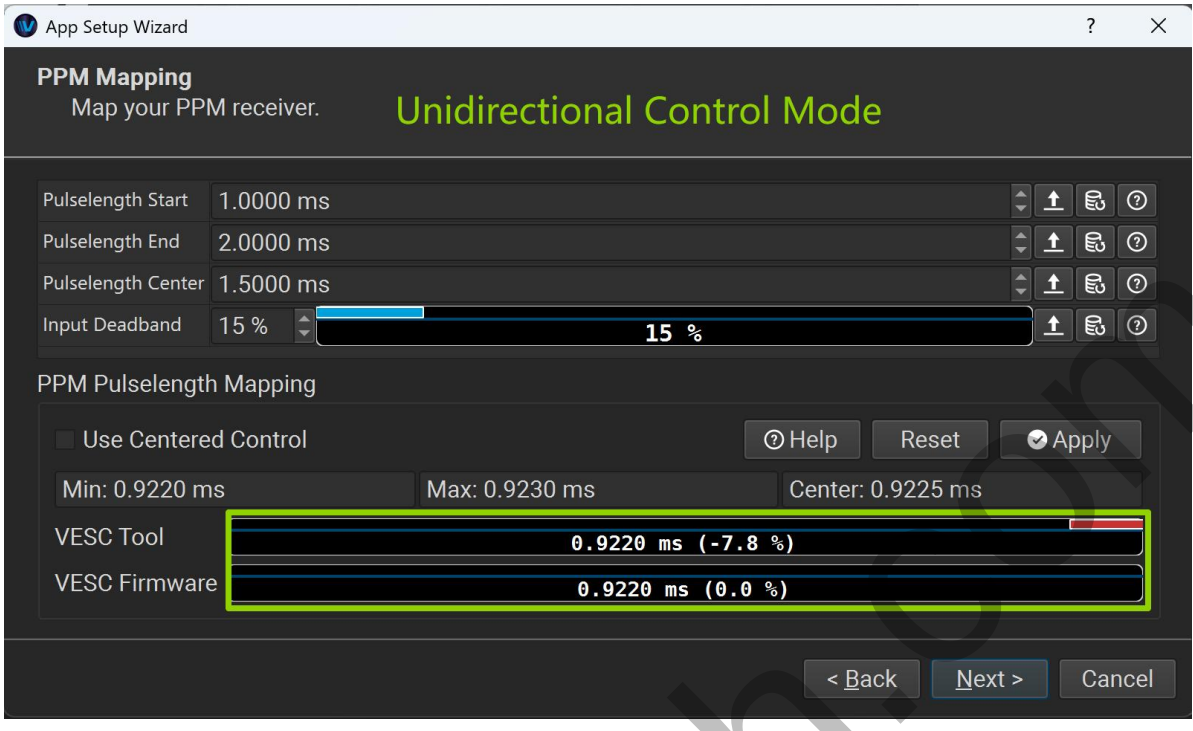

Figure 13: Unidirectional Control Mode

Push the stick all the way forward. The signal bar will settle at its highest reading. Note that for initial calibration, this highest reading may not be exactly 100%. If there is no response, verify the receiver connection and pairing.

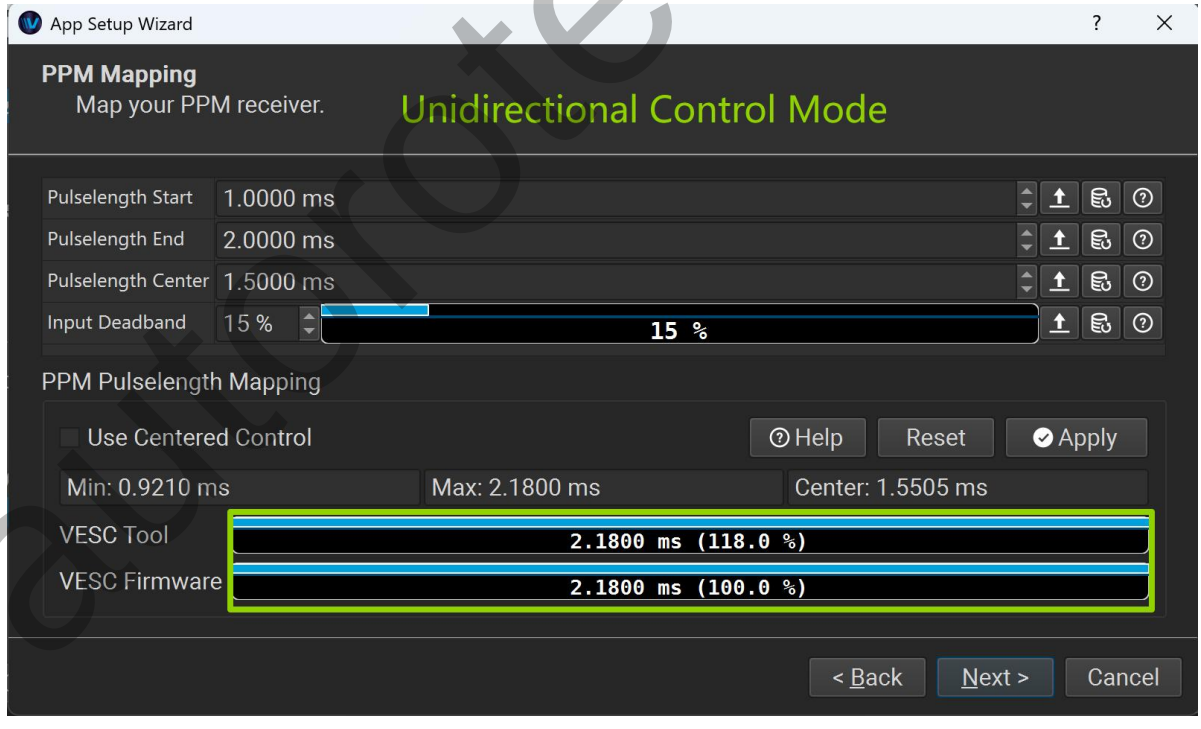

Figure 14: Unidirectional Control Mode Configuration

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e. Click "Apply" to save the current configuration.

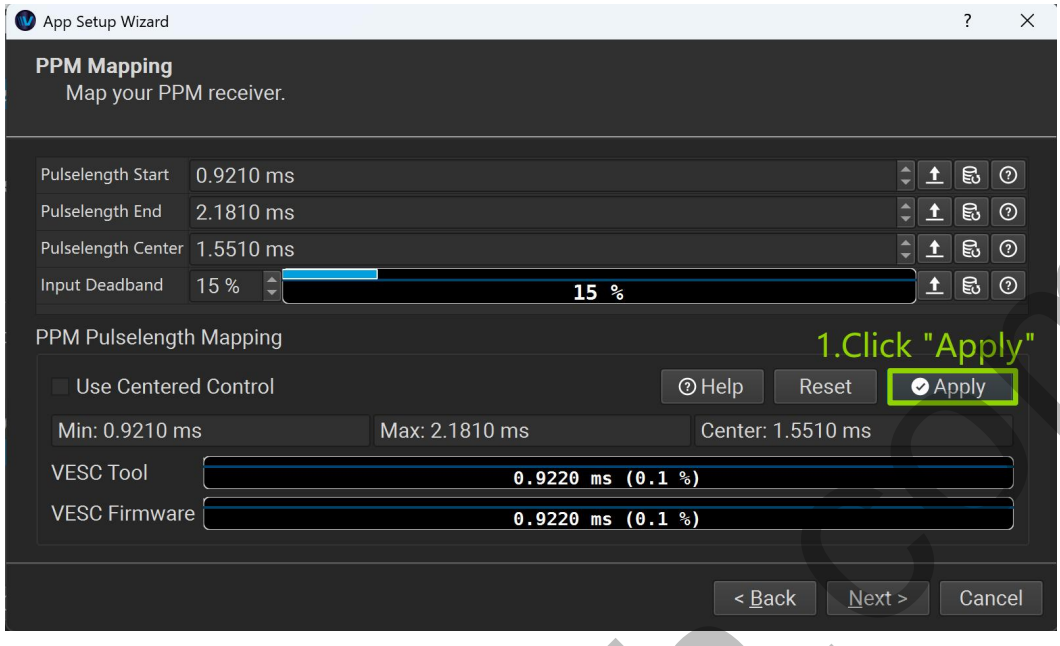

Figure 15: Click “Apply”

f. Verify the settings.

Center Control Mode:

- Push the transmitter stick fully forward; the signal progress bar should stabilize near 100%.
- Pull the transmitter stick fully backward; the signal progress bar should stabilize near -100%.

Unidirectional Control Mode:

- Push the transmitter stick fully forward; the signal progress bar should stabilize near 100%.

Note: If the signal progress bar value deviates significantly when the stick is at its maximum position, you can click "**Reset**" to reset parameters, click "**Apply**" to save, and then reconfigure your controller according to **step d**.

g. Click “Next”.

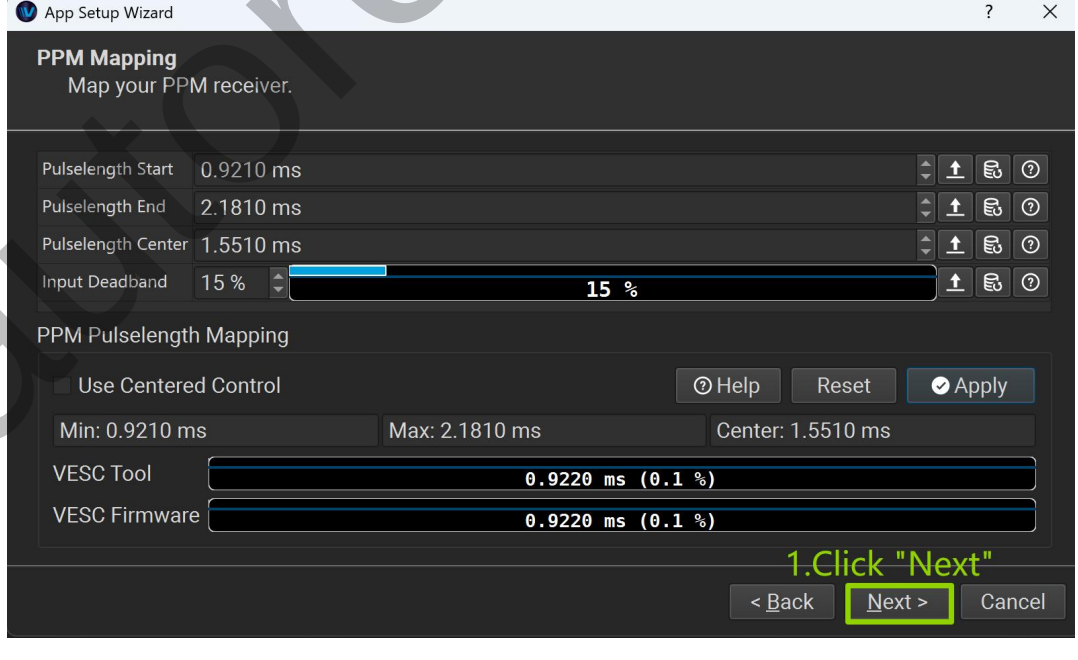

Figure 16: Click “Next”

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h. Select the control type based on your chosen control mode:

Center Control Mode:

• **Current:** Current Control. The motor is stationary when the transmitter stick is centered. When the stick moves away from center, the motor rotates forward or reverse based on the input settings.

• **Duty Cycle: Duty Cycle Control.** The motor is stationary when the transmitter stick is centered. When the stick moves away from center, the motor rotates forward or reverse based on the input settings.

Unidirectional Control Mode:

• **Current No Reverse:** Current Control. The motor is stationary when the transmitter stick is at the minimum position.

• **Duty Cycle No Reverse:** Duty Cycle Control. The motor is stationary when the transmitter stick is at the minimum position.

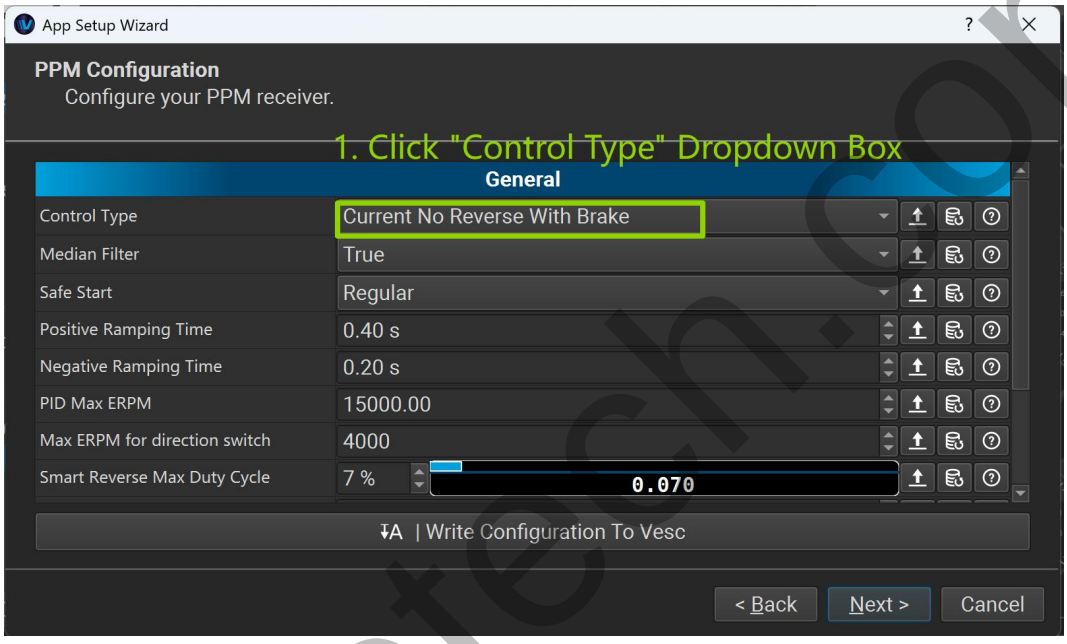

Figure 17: Click "Control Type" Dropdown Box

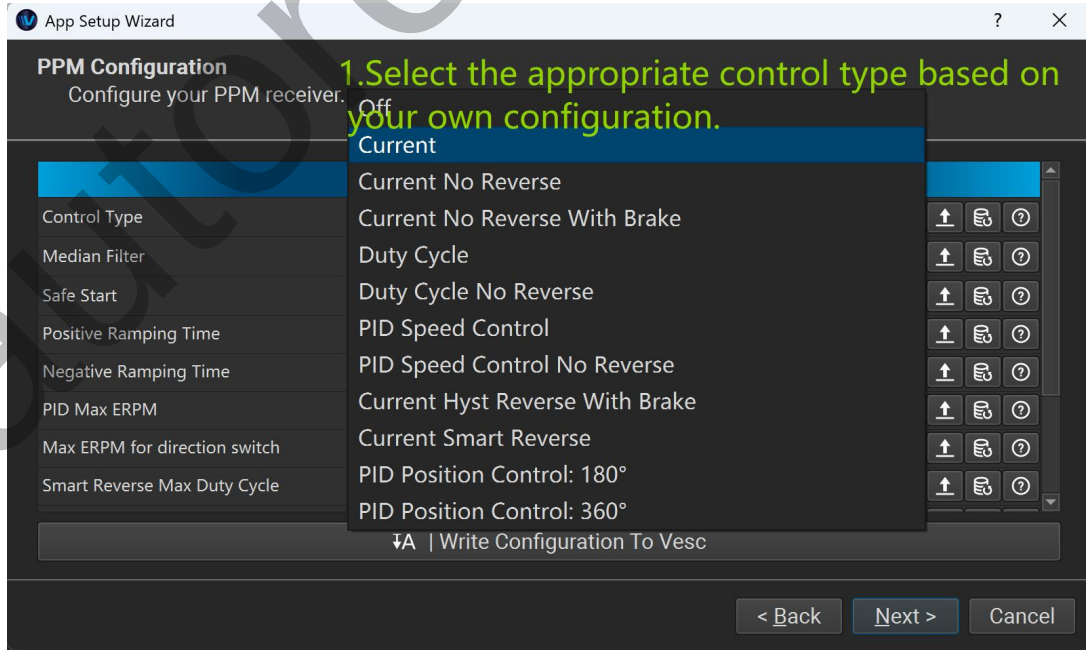

Figure 18: Select Control Type

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i. Save the configuration to the controller, then click "Next".

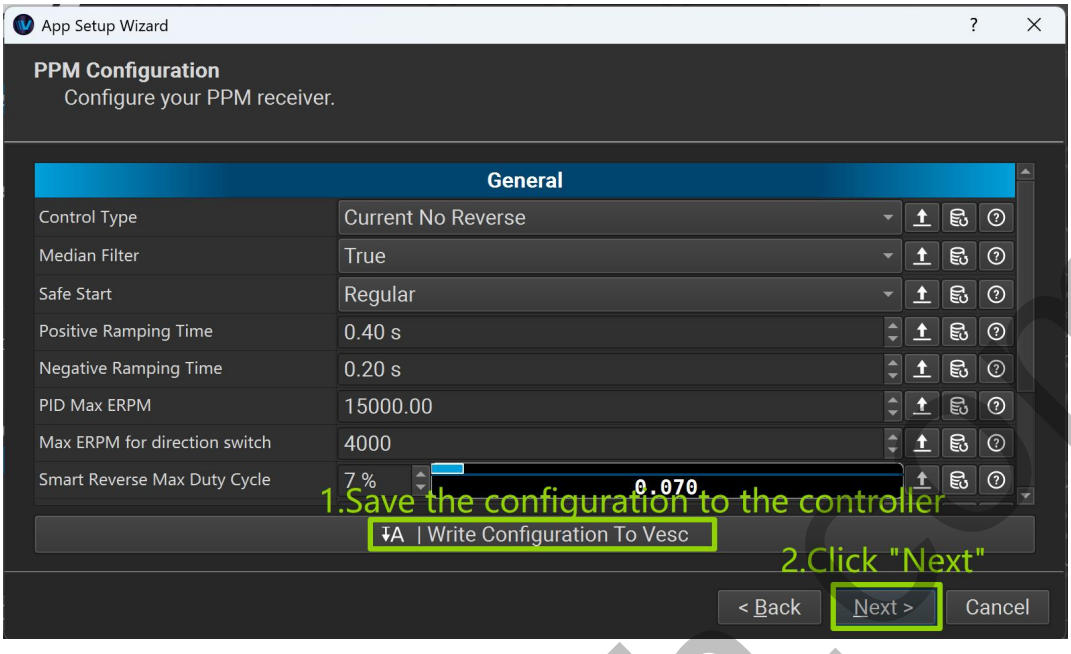

Figure 19: Save Configuration

j. Click "Finish" to complete the configuration.

Figure 20: Finish Configuration

k. If you have previously run the FOC wizard to complete motor parameter detection, you can now control the motor rotation via the RC PPM transmitter.

Note:

1. The motor will rotate when controlled by the transmitter. Ensure your safety.
2. Gradually increase the output when using the transmitter control to avoid excessively high starting speed.

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5. Troubleshooting

5.1. Transmitter No Response

- **Possible Cause 1:** Incorrect PPM signal wire connection.
- **Solution:** Check that the PPM signal wire is connected to the correct pin on the AESC.
- **Possible Cause 2:** Throttle endpoint not calibrated correctly.
- **Solution:** Re-perform the PPM input calibration process.
- **Possible Cause 3:** FOC setup wizard not run to complete motor parameter detection.
- **Solution:** Complete motor parameter detection by following the FOC configuration tutorial.

5.2. Motor Only Rotates in One Direction

- **Possible Cause 1:** Incorrect transmitter throttle mode setting.
- **Solution:** Check if the transmitter itself is set to unidirectional mode.
- **Possible Cause 2:** Incorrect AESC control mode setting.
- **Solution:** In VESC Tool's **"App Settings"** →**"PPM"**→**"General"**→ **"Control Type"** set it to a Center Control Mode option and save the configuration by clicking **"Write app configuration"**。

6. Contact & Support

For technical support,contact : Autoro.service@hotmail.com

Website : https://www.autorotech.com

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