

VESC 6 MkVI Testing



Author: Mohammed Azab

Date: 20 Feb 2025

Version: 1.0

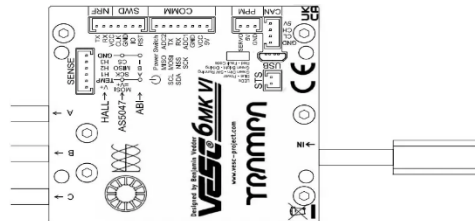
Table of Contents

- I. Introduction
- II. Prerequisites
- III. Software Setup
- IV. Motor Configuration
- V. Battery Configuration
- VI. Running the Motor Test
- VII. Control Mode Testing
- VIII. Data Logging & Performance Analysis
- IX. Performance Testing
- X. Troubleshooting
- XI. Safety Precautions
- XII. Conclusion
- XIII. References

1. Introduction

What is VESC?

VESC (Vedder Electronic Speed Controller) is an open-source ESC (Electronic Speed Controller) designed for brushless motors, offering extensive configurability, real-time monitoring, and customization via the VESC Tool software. Developed by Benjamin Vedder, VESC is widely used in electric skateboards, robotics, RC vehicles, and other high-performance motor applications.

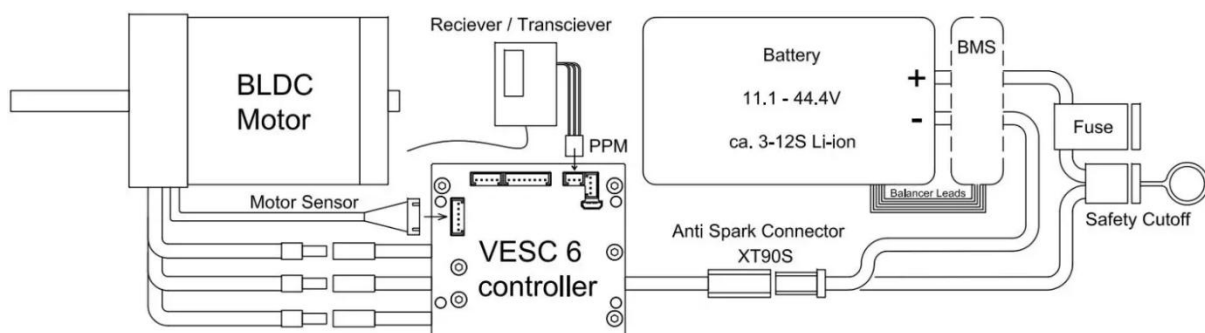


This document details the process of testing a VESC 6 MkVI using the VESC Tool, ensuring proper motor functionality, verifying sensor feedback, and optimizing performance for a Velineon 3500 motor paired with a 7200mAh high-performance LiPo battery.

2. Prerequisites

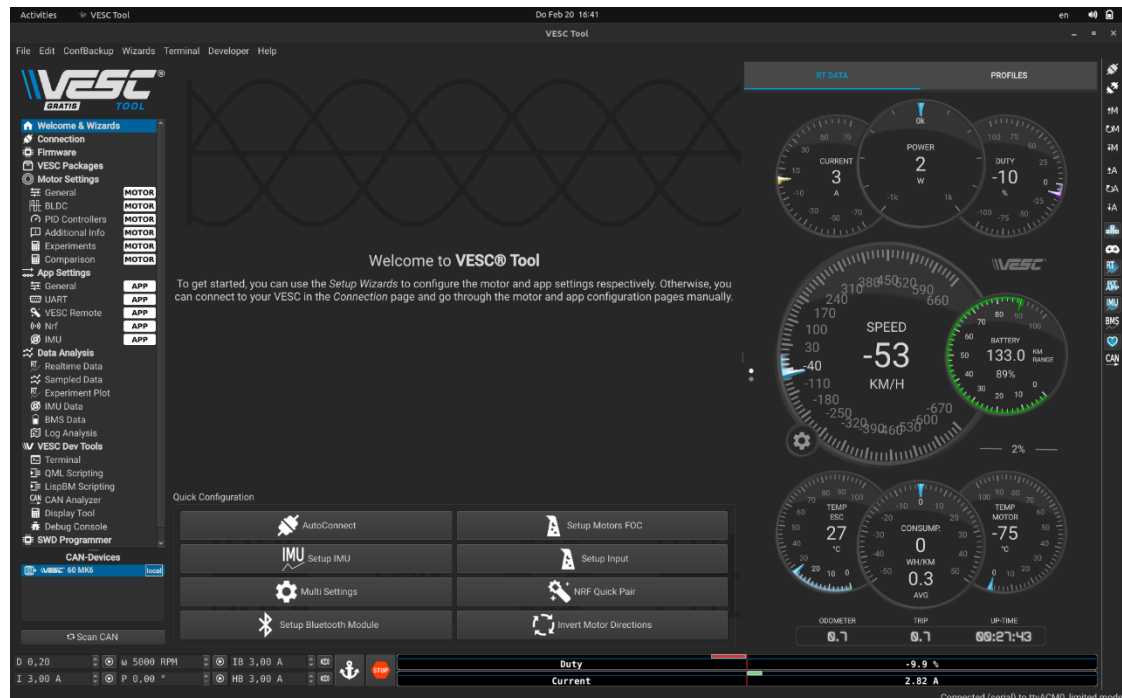
Hardware / Components Used:

- VESC Controller (VESC 6 MKVI)
- Brushless Motor: Velineon 3500 (Traxxas Ultimate Slash 4x4)
- Battery Pack (7200mAh 2S LiPo)
- Computer with VESC Tool installed
- USB-C Cable (for VESC connection)



Software:

- VESC Tool (download from [VESC Project](https://vesc-project.com/))
- Latest VESC Firmware



Wiring Connections:

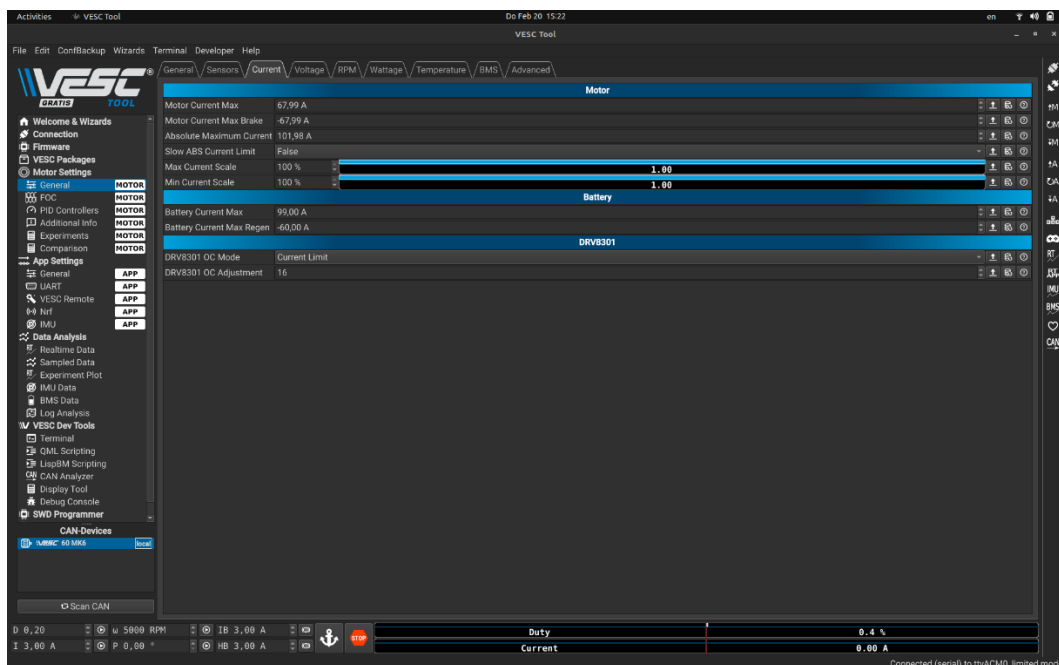
1. Connect the motor phase wires to the VESC motor output.
2. Connect the battery to the VESC's power input.
3. Use a power management circuit if additional safety is required.
4. Plug the USB cable into the VESC and connect it to the computer.
5. Ensure sensor wires (if using a sensored motor) are properly attached.

3. Software Setup

1. Download and install VESC Tool from the official website.
2. Open VESC Tool and connect the VESC via USB.
3. Power on the VESC and motor system.
4. Click on **Auto Connect** to establish communication with the VESC.

4. Motor Configuration

1. Navigate to **Motor Setup Wizard**.
2. Select motor type:
 - **Sensorless or Sensored BLDC** for the Velineon 3500.
3. Run the detection process, where VESC Tool will:
 - Identify motor resistance & inductance
 - Calculate KV rating
 - Measure motor flux linkage
4. Apply the detected values and save the configuration.



Detection Result

Success!

```
VESC ID           : 61
Motor current      : 67.99 A
Motor R            : 7.20 mΩ
Motor L            : 2.87 μH
Motor Lq-Ld        : 0.28 μH
Motor Flux Linkage : 0.00 mWb
Temp Comp          : False
Sensors            : Sensorless
```

5. Battery Configuration

1. Go to **Battery Settings**.
 2. Set:
 - **Battery Type:** LiPo
 - **Capacity:** 7200mAh
 - **Cell Count:** 2S (7.4V)
 - **Voltage Cutoff Limits:**
 - Soft Cutoff: 3.4V per cell
 - Hard Cutoff: 3.2V per cell
 3. Save the configuration.
-

6. Running the Motor Test

1. Secure the motor in place to avoid movement.
 2. Click **Start Motor Test** in the VESC Tool.
 3. Observe RPM, current draw, and temperature.
 4. Ensure the motor runs smoothly with no abnormal noises.
 5. If issues arise, rerun motor detection or adjust parameters.
-

7. Control Mode Testing

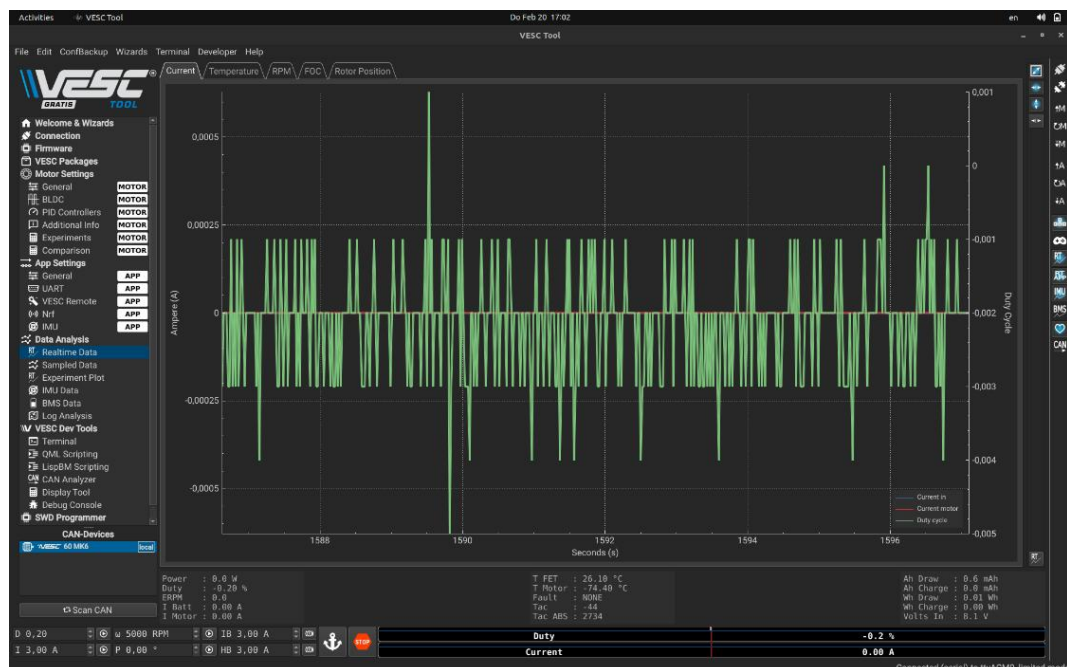
1. Navigate to **App Settings** and select control mode:
 - **PPM** (for Remote Control)
 - **UART** (for external controllers)
 - **FOC Open Loop** (for debugging)
 2. Test throttle response via **Realtime Data** tab.
 3. Adjust settings if necessary.
-

8. Data Logging & Performance Analysis

- Enable **RT Data Logging** to record real-time performance.
 - Use **Graphing Tools** in VESC Tool for analysis.
 - Check **Faults** if any error messages appear.
 - Adjust motor/battery limits as needed for optimal performance.
-

9. Performance Testing

1. Use **Realtime Data Monitoring** to check:
 - Motor RPM
 - Current Draw
 - Temperature
 - Battery Voltage & Amps
2. Perform low-speed and high-speed tests under load.
3. Check for thermal throttling or overcurrent issues.
4. Adjust **Current Limits**, **ERPM Limits**, and **Duty Cycle** if needed.



10. Troubleshooting

Issue	Possible Cause	Solution
No Motor Response	Loose connection	Check all wiring
Overcurrent Fault	High current settings	Reduce current limits
Overheating	Poor cooling	Ensure proper ventilation
Sudden Cutoffs	Battery voltage drop	Adjust voltage limits

11. Safety Precautions

- Always secure the motor before running tests.
- Avoid exceeding battery discharge limits.
- Regularly check VESC temperatures.
- Do not connect battery polarity in reverse.

12. Conclusion

After configuring and testing the VESC with the Velineon 3500 and 7200mAh LiPo battery, the motor performed as expected, with smooth acceleration and proper response. Further optimizations may be needed based on specific driving conditions.

Next Steps:

- Fine-tune **PID settings** for better efficiency.
- Experiment with **FOC mode** for quieter operation.
- Implement **data logging** for performance tracking.

13. References

- [VESC Official Documentation](#)
- [Traxxas Velineon 3500 Specs](#)