2. Motor Wizard FOC

Submitted by frank on Thu, 2019-05-23 15:58

Configuration of your VESC® or VESC® based ESC using the VESC®-Tool Software.

In this tutorial we will configure a genuine VESC® motor controller in combination with a BLDC motor.
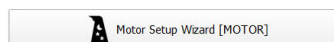We will run the motor in FOC mode and we will make use of Hall sensors.

Make sure to use the latest VESC-Tool version!
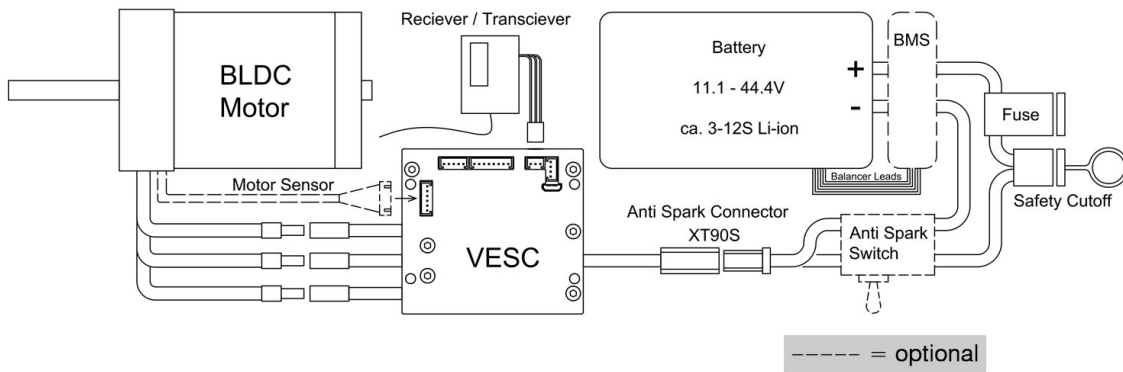Download from http://www.vesc-project.com/vesc_tool

The Motor Setup Wizard in detail

## Connect your VESC® according to the wiring digram shown in the manual.
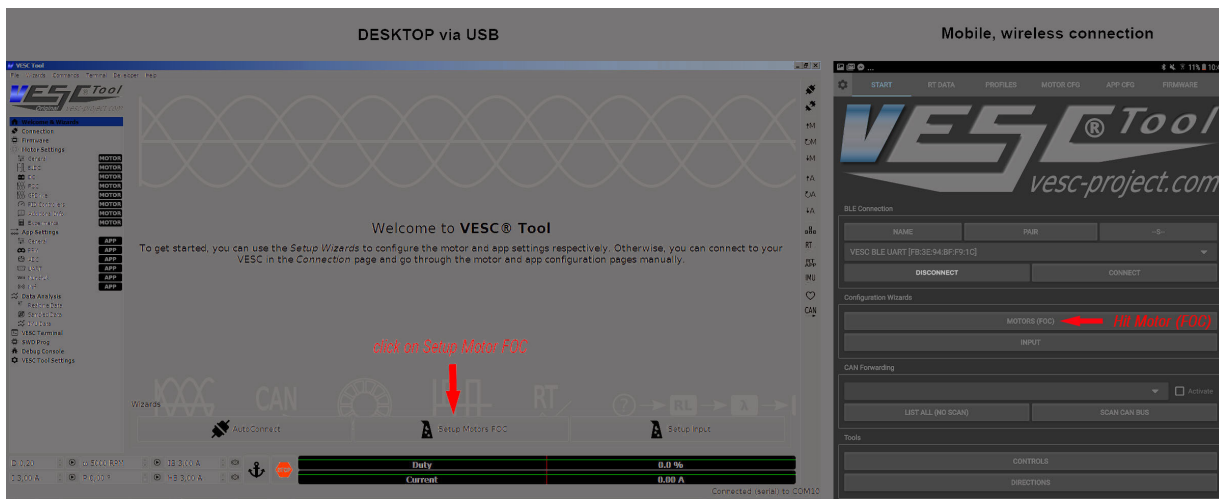

Setups using arrays of VESCs are configured in one hit, as long as they are interconnected via CAN cable

Connect your VESC® to your computer using a mini/micro USB cable.

Mini USB is used for HW 4.xx only. Some cheap micro USB cables are designed for charging your
phone and will not work properly! Try another cable if you experience any issues.

Run the VESC®-Tool software.
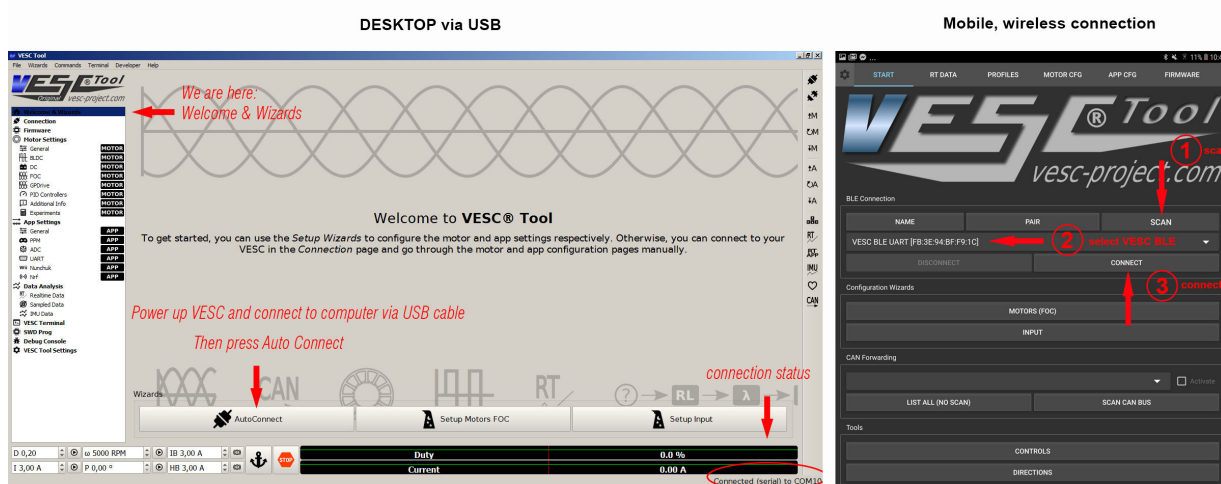
Lets choose the correct motor size and type:

Example: If you want to use the VESC as a controller for your electric skateboard or scooter, the 750g Medium Outrunner is 99% chance your motor to choose.

No matter if your motor is 6064 or 80100, the size category is still the Medium Outrunner. For other motor types and sizes, please choose accordingly.
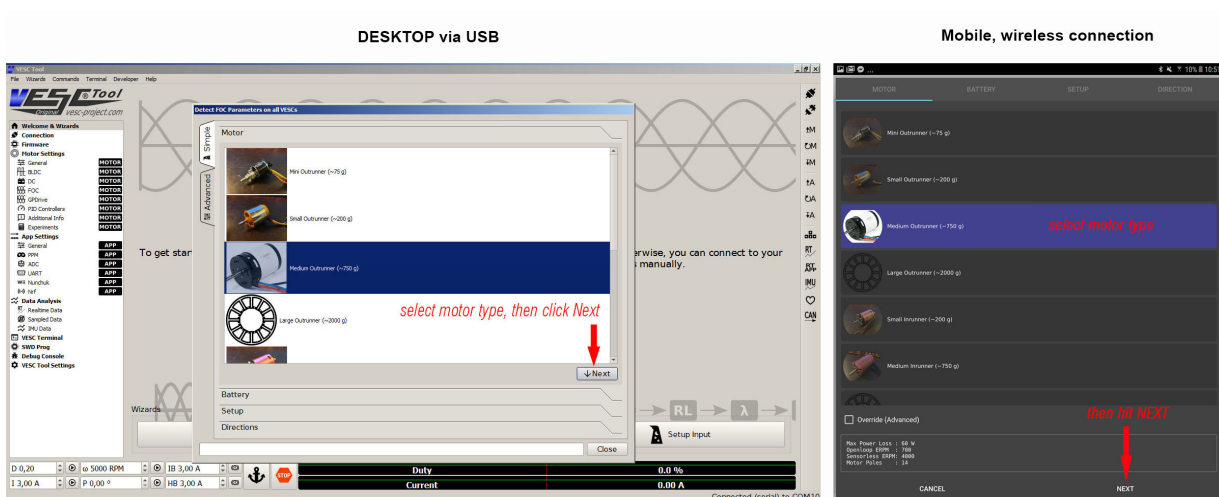

Now we will tell the VESC about your battery. This is important to get right!

If you discharge your battery below a certain voltage, **it will get damaged permanently**. LiPo packs or Lithium ion Batteries usually operate between 4.2V and 3.1V per cell. Do not allow your system to discharge them beyond 3.1V per cell! For this reason the VESC will measure your battery voltage and will start to softly cutoff the power at 3.4V per cell (Battery Voltage Cutoff Start) and it will perform a hard cutoff at 3.1V per cell (Battery Voltage Cutoff End).

You can also set custom values if your cells have different ratings. This can be done in **Motor Settings >>General** after finishing this Wizard or by activating the **advanced settings** in the Wizard.

IF YOUR BATTERY CAN'T HANDLE THE CURRENT DRAW OR REGEN CURRENTS YOUR MOTOR IS RATED FOR, YOU CAN ADJUST VALUES ACCORDINGLY IN THE *ADVANCED* OR *OVERRIDE* TAB!
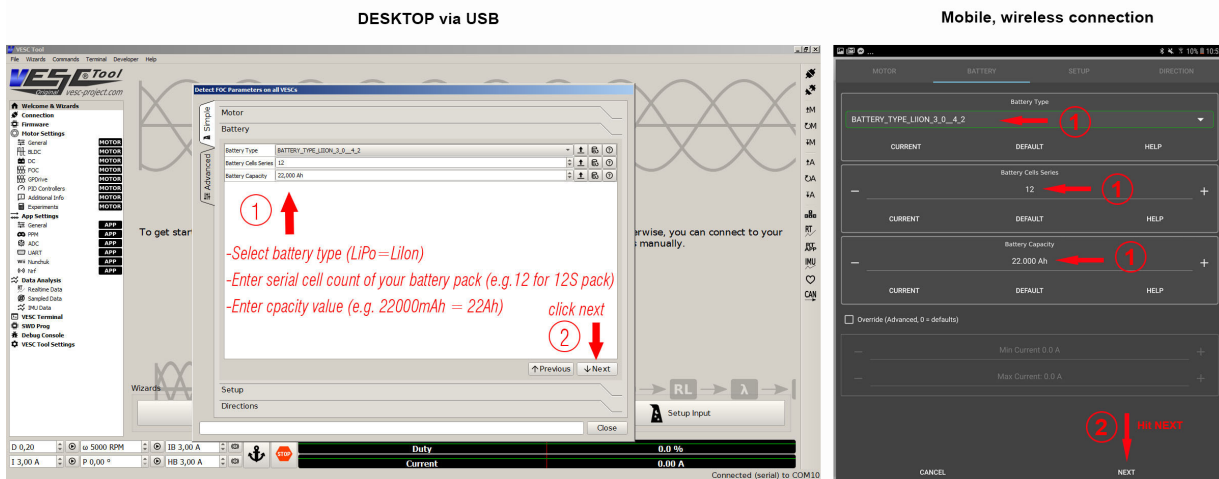

ADVANCED SETTINGS guide for less capable batteries:

Check your battery ratings and adjust accordingly. Please note: This is the value per VESC/Motor! If you run two VESCs on one battery, you need to cut your safe battery limits in half. -25A becomes -12.5A, 100A becomes 50A etc.

Current MIN is the value that is used during braking/regen (storage of energy into the battery). The motor operates as a generator and the VESC pushes a maximum of **X** Amps towards the battery during barking.

If your battery can only handle a burst charge of **X** Amps, you can limit the Amp flow here to protect your battery. Most batteries are rated for a charge current of **X** Amps, which refers to an extended charge period using a battery charger. Burst charge currents (for 10-30 seconds) are hard to find in data sheets but are usually higher than the constant charge currents. **Low Battery MIn values** result in weak brakes at speed! **A test for appropriate brake strength needs to be done at full speed.**

Curent MAX is the value your battery will get discharge with at full power. If your battery can't deliver more than **X** Amps safely, you can define a max value for current draw here.

Example for a single drive: We have a 12S 10000mAh LiPo battery that can deliver 100A constant current (10C rated battery), so a max of 100A is a safe setting. It is advisable to stay well below max ratings for certain batteries. Some vendors tend to overrate their batteries for marketing purpose! We choose 60A for our setup. In many cases **Motor Max** is below **Battery Max** and will limit the Amp flow to the **Motor MAX** value regardless.
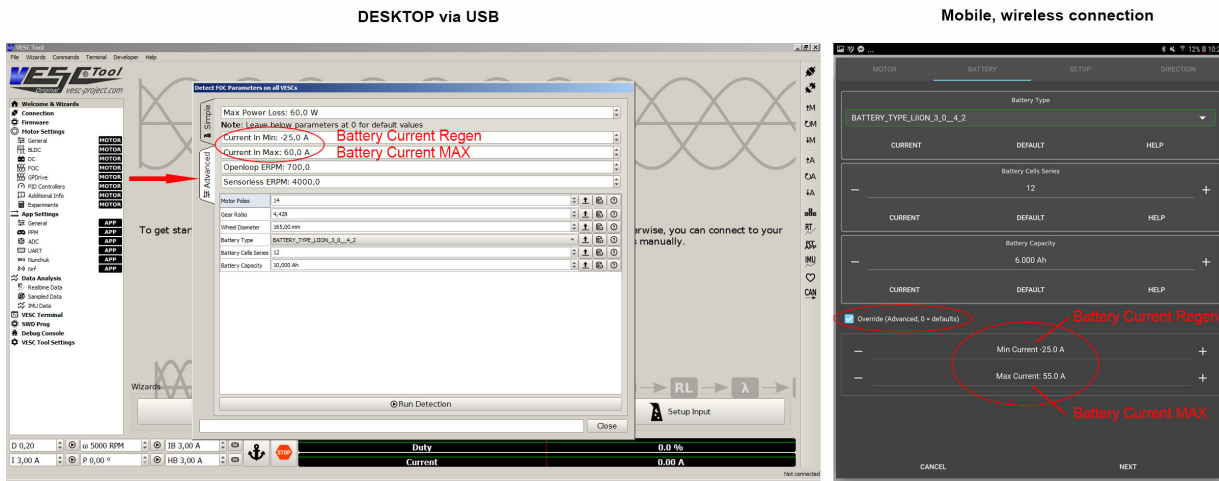
Gear ratio and wheel diameter:

If you want accurate real time data the VESC needs to know the gearing and wheel diameter. Once set, you will get very accurate feedback on the VESC-Tool App.

Speed, estimated range, Wh usage per Km and many more. It's worth fill in accurate parameters. Measure up your wheel accurately!
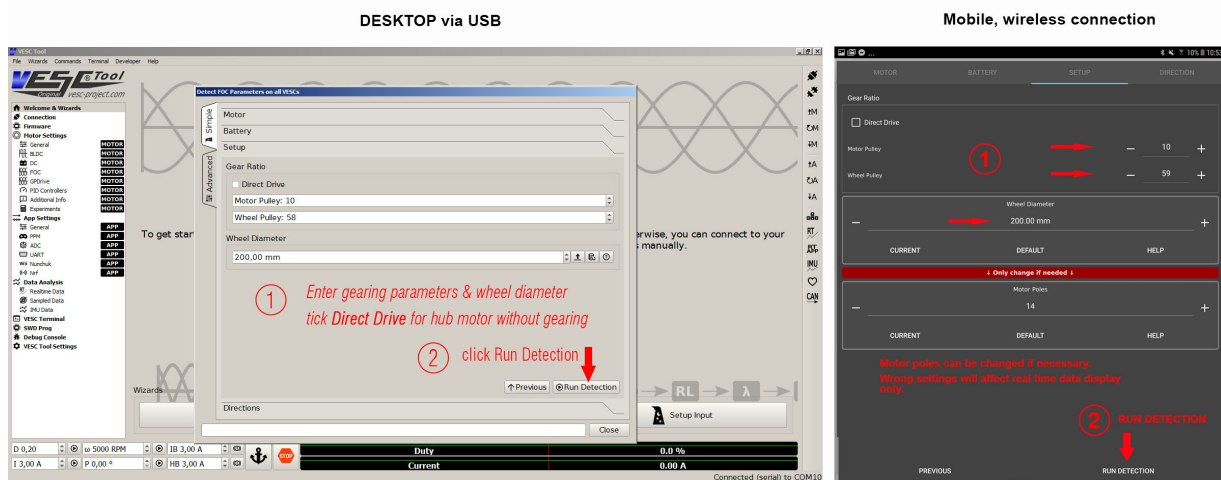
Here are some measurements for small pneumatic tires.

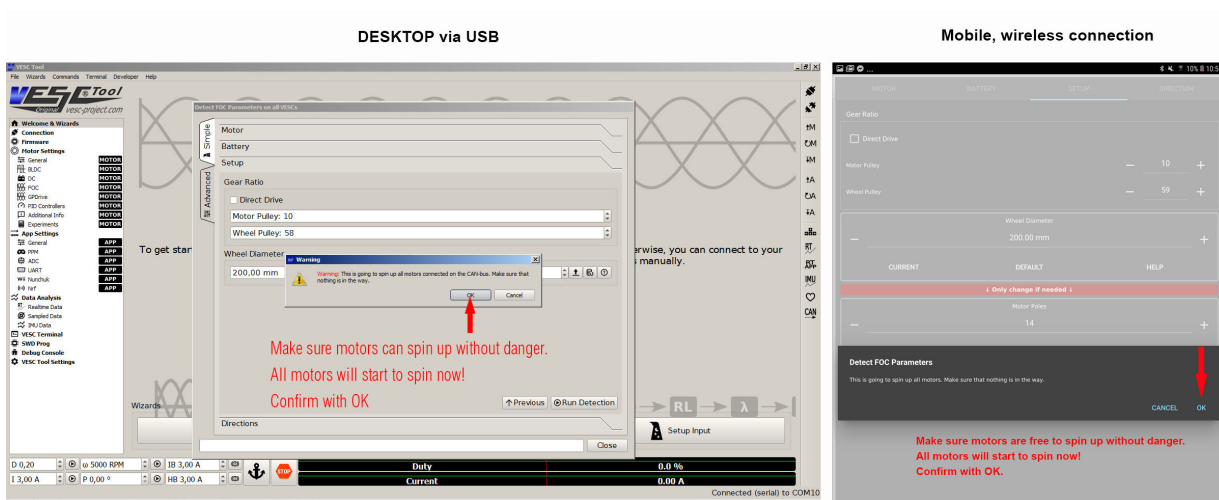6.5" pneumatic = 165mm diameter

7"pneumatic = 175mm diamater

8" pneumatic = 198mm diameter,

9" pneumatic = 222mm diamter

Wheels off the ground, propellors disassembled, fingers out of the way?

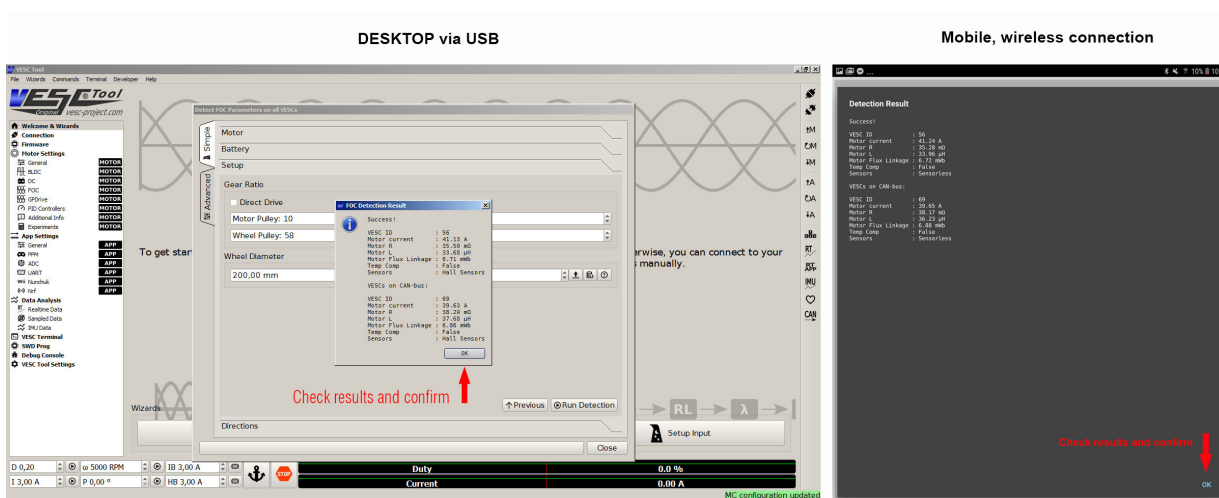It's time to spin up your motors!

After detection we can now check the results to be reasonable

Resistance OK? Motor current reasonable? Sensors detected? Similar values for both motors (if the same)?
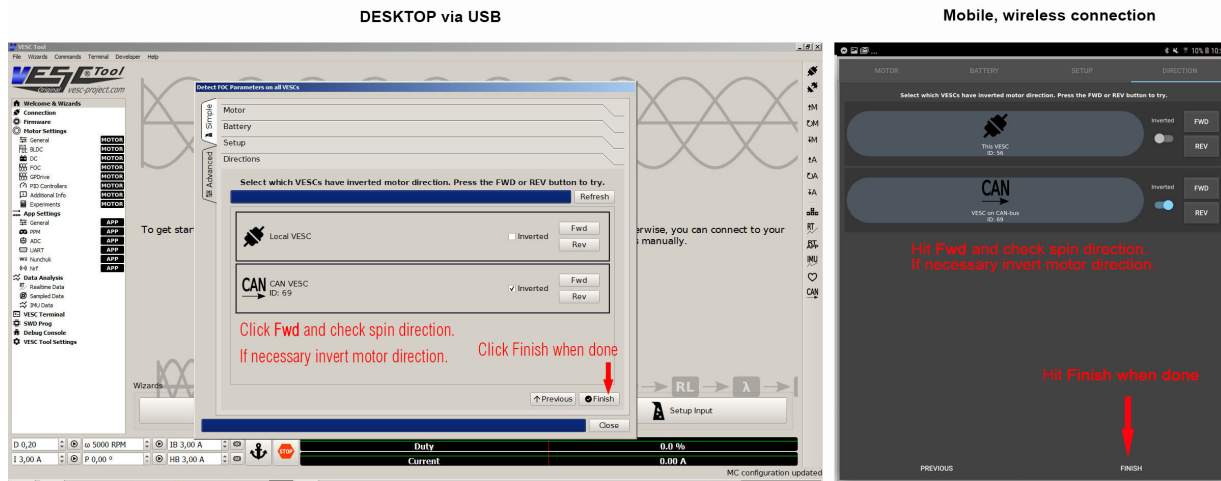
Click OK if everything looks good.

Everything spinning in the right direction?

Click on **Fwd** to spin the motor in forward direction. If it spins backwards, tick the **Inverted** check box

DESKTOP via USB   Mobile, wireless connection

Congratulations, you have finished the Motor Setup Wizard!

Please continue with the Input Setup Wizard.

Changing parameters after finishing the Wizard:

In the left Menu bar you can choose **Motor Settings >> General** to change the most basic values.

Changes only affect the connected VESC! Make sure you change values on all VESCs in an Array!

Connect to each VESC via USB or CAN Forward and change settings!

DESKTOP via USB   Mobile, wireless connection
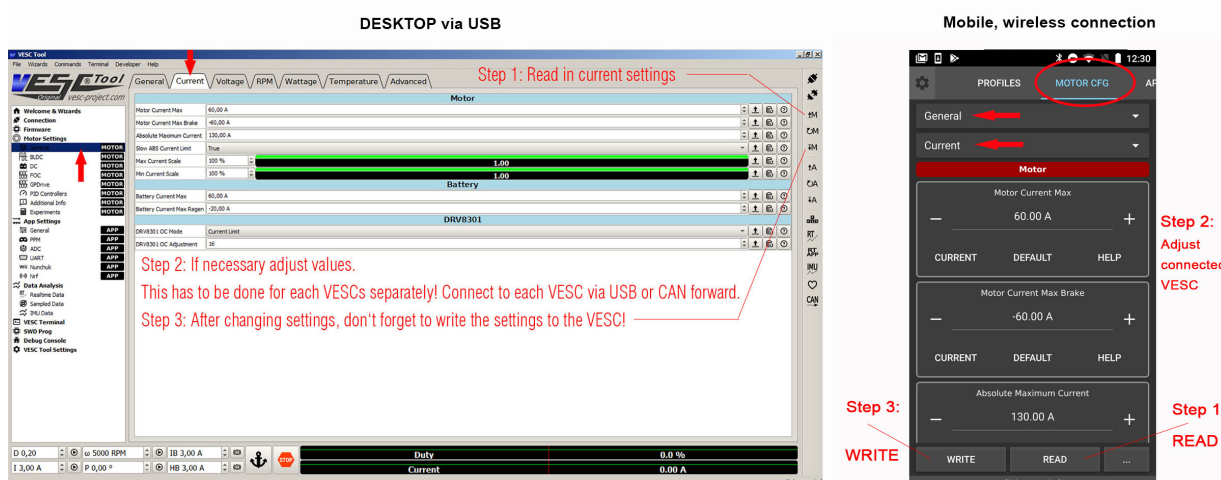
The following explanations will help you to configure your current limits correctly:

Motor Current Max: The maximum current your motor can handle (Ampere). Please refer to the motor specifications of your motor. You may use lower values to de-power your setup.

Example: Our motor can handle 40A, but we will only set it to 30A to get started. You can boost your settings once you feel comfortable. A safe approach towards higher values is highly recommended (e.g. start with 15-20A only).

Hint: This value can be greater than the *Battery Current Max* value, resulting in a higher motor power output at part throttle. At max throttle the *Battery Current Max* is the limiting value if set lower than *Motor Current Max*.

Motor Current Max Brake: The maximum current output you allow your motor to produce when operated as a generator. Electric vehicles may use the motor as a brake, generating energy when slowing down the vehicle. The energy produced will be stored in the battery. In this tutorial we will set the value to -30A to get started. The value should not be higher than the max. continuous current specification of the motor.

Hint: Higher values will result in stronger brakes if the *Battery Current Max Regen* settings allows the storage of the current generated.

Battery Current Max: The maximum continuous current your battery is rated for. Please refer to your battery specifications for safe settings. LiPo-pack batteries are usually C-rated. A 5800mAh, 25C rated battery can handle **5.8A x 25=145A max.** Manufacturers often overrate the batteries and cutting the value in half is recommend. We will use 72A max for safety reasons.

Hint: Since our Motor Current Max is set to 30A, we could use 30A for the battery as well. Technically there is no reason to use a higher value than the Motor Current Max.

Battery Current Max Regen: The maximum current you allow the VESC to push towards your battery or battery management system (if incorporated in your system) when braking. Battery Current Max Regen is important for **brake strength at speed!** Low settings result in weak brakes at speed! This value should not exceed the maximum burst charge current rating of your battery or capability of your battery management system. So lets set that to -30A for a skateboard with a big battery (e.g.12S4P LiIon)

‹ 1. Updating the Firmware   up   3. Input Wizard for PPM remote ›

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Popeye
Tue, 2019-06-11 11:48
permalink

Split the capacity Ah Value ?

Hello,

for the Point **enter capacity value:**

When I use 2 ESC´s with Can Bus should I then share the Ah value ?

Because I see it on some YouTube Videos , but I think it was with an older VESC Tool Version.

Thanks and best regards

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frank

Sun,
2019-06-
16 23:25
permalink

If you run multiple motors

If you run multiple motors/ESCs on one battery, you need to devide by numbers of motors. VESC-Tool can't know if you use a single battery for all ESCs, or separate batteries for each ESC.

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benjamin

Tue, 2019-
07-02
14:47
permalink

The capacity value for the

The capacity value for the battery should actually not be divided. Current and regen should.

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Ravi Kumar Jagannath

Sat, 2019-07-06 09:07
permalink

Can it be used to run PMSM motors?

Can the VESC 6 be used to run PMSM motors in the FOC mode.

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VinnyF

Tue,
2019-12-
10 02:05
permalink

Battery parameter

Im pretty new to this and Im having a hard time programming my dual 6.6 Fesc. I have the basics motor, wheel and pulley size correct. As far as the battery I dont know what info to put in for cells and capacity. Im running a 10s4p battery, 12000Ah, 30Q, 36V. I have the flipsky V2 pro remote and it keeps showing board is going in reverse instead of forward and the mph is not accurate. I have both motors checked as inverted and they both spin in the direction they are set for when using the remote. The remote works but it doesnt do anything on the vesc screen when you go to calibrate it. Any help would be greatly appreciated.

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jamalfayoumi

Tue, 2019-12-10
19:58
permalink

Trampa Motor 6376 - Difference in Motor Current

Hi, im also new here. while im setting up my 6376 trampa motors, the test result is giving me approximately 60 Amp for Motor Current. Noting that these motor listed peak power is 3800 Watts. can i increase the current more than 60 AMP to 75 AMP in VESC Tool without damaging the motors?

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ferreira dias
permalink

probleme de conections vesc et moteurs

Hello, I cannot update the vesc tool software. yet i just bought it today

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