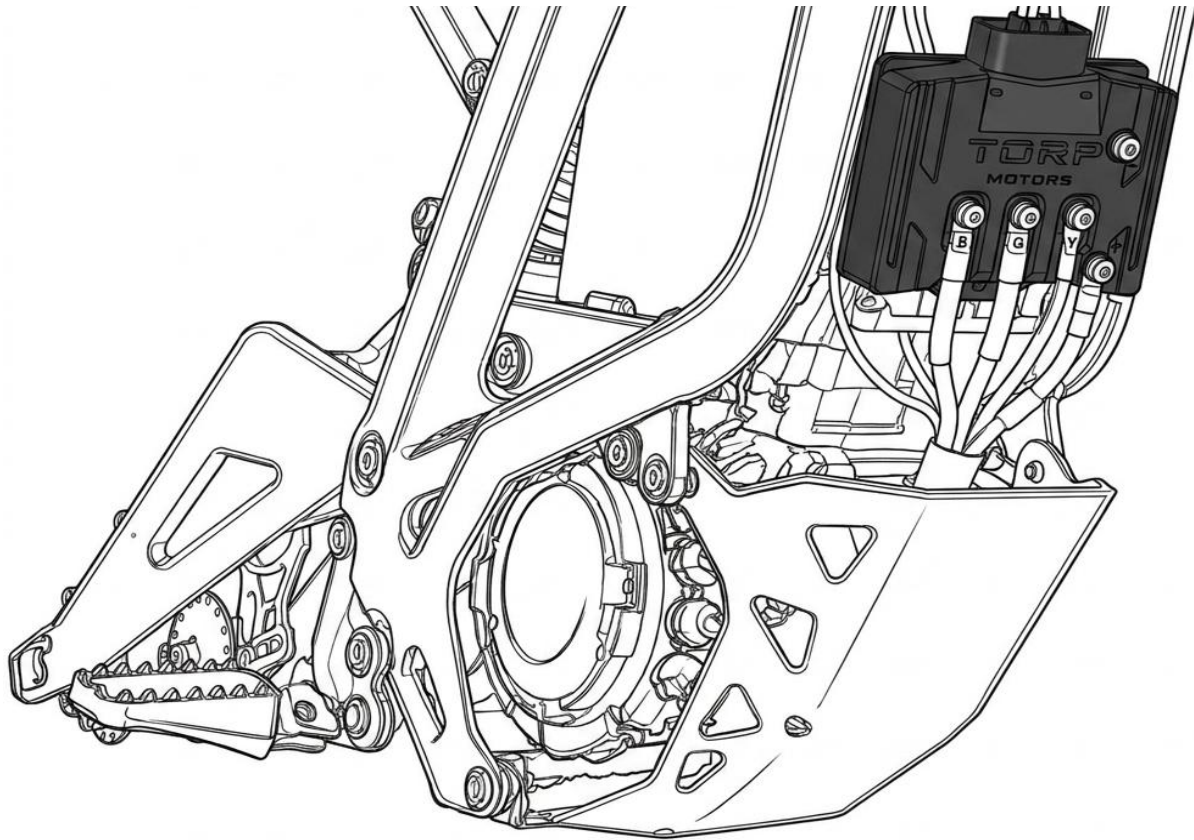


TC500 2.X CONTROLLER for SURRON LIGHT BEE

INSTALLATION MANUAL



This Product Manual covers hardware: installation, wiring, safety, setup and troubleshooting. App connection, configuration and calibration are described in the separate **TORP Controller App Manual**.

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SECTION 01

Introduction

The TORP TC500 is a plug-and-play controller upgrade for the SurRon Light Bee and compatible electric motorcycles. It requires no prior knowledge of electronics or programming, and everything needed for installation is included in the box.

The controller works with both versions of the stock display (L1 E and the off-road version), showing speed and distance. Additional data such as battery monitoring and settings is available through the TORP Controller app or the optional TORP Displays (sold separately).

COMPATIBILITY

Platform	Compatible motors
SurRon Light Bee / Segway X260	Stock Light Bee / X260 motor · TORP TM25 · Sotion 13 kW (Hall/Encoder, without PWM pin)

SECTION 02

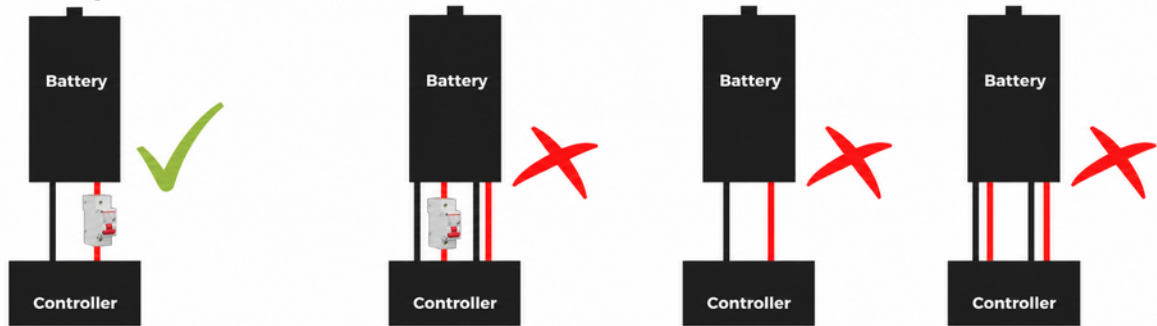
Important Safety Information

Read this section in full before installing or operating the controller.

WARNING Use only the supplied tools and screws. Using tools or screws that were not included, ignoring these instructions, or omitting the circuit breaker can cause serious injury and damage, and voids your 2-year warranty.

WARNING Always use the stock circuit breaker (fuse). The TC500 must always be operated with the stock SurRon / Segway circuit breaker (fuse) installed. Running the controller without it is dangerous, can cause serious damage, and voids your 2-year warranty.

Stock Configuration



IMPORTANT Professional installation recommended. Although the TC500 is designed for easy installation, TORP strongly recommends having it fitted by a qualified professional to ensure every component is connected correctly. Improper installation may damage the product and void the warranty.

Legal and liability notice. TORP controllers and motors are non-stock parts. Installing them changes your motorcycle from stock to non-stock, which may make it non-compliant with road-safety regulations and illegal for street use, and may affect insurance and warranty coverage. You are responsible for knowing and following all local laws. TORP d.o.o. accepts no responsibility for any damage, injury, or legal consequences.

SECTION 03

What's in the Box

- TC500 controller
- Wiring harness
- 5 phase screws with washers
- 2 hex keys and 4 bolts
- Stickers
- Plastic cover (shield)
- Short instructions



SECTION 04

Controller Identification

Each controller and its box carry a silver sticker with the key identification details:

- Serial number, Model, Hardware version, Bluetooth name, Bluetooth password

You will need the serial number for support requests to the TORP team, and the Bluetooth name and password when pairing with the TORP Controller app (see the App Manual). The Bluetooth password is also required to calibrate the controller before first use.

IMPORTANT Keep the sticker in place. Do not remove the sticker from the controller, and store this information in a safe place.

**SECTION 05**

Installation

5.1 Before you begin: drain the capacitors

1. Switch off the fuse.
2. Switch on the bike and wait for the capacitors to fully drain.



3. Remove the stock controller and the battery from the frame, then lower the skid plate that covers the wiring.

5.2 Apply dielectric grease to the main connector

Before installing the controller, protect the main connector against dirt and moisture:

1. Open the supplied dielectric grease packet.
2. Squeeze out all of the grease and spread it evenly over the connector pins.

WARNING Grease the main connector pins only. Never apply dielectric grease to the phase terminals or any other part of the controller.

NOTE If you ever unplug the main connector later, clean off the old grease with alcohol contact cleaner, let it dry, then reapply fresh dielectric grease.



5.3 Mount the controller

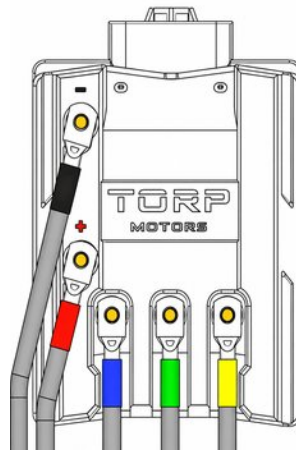
1. Position the controller so the holes on its back align with the upper holes on the bottom front of the frame.
2. Insert a screw into each hole and tighten using the smaller hex key and the smaller bolts.



5.4 Connect the power and phase wires

Five screws with washers are pre-installed on the controller. Remove them, then connect the wires exactly as shown below.

Wire	Connect to
Red battery wire	Positive (+) terminal
Black battery wire	Negative (-) terminal
Blue motor (phase) wire	Terminal B
Green motor (phase) wire	Terminal G
Yellow motor (phase) wire	Terminal Y



Tighten the bolts with washers using the **larger hex key**.

WARNING Tighten the phase bolts to **4 to 4.5 Nm**. Do not use electric or power fasteners; they can damage the controller. Damage caused by under-tightening, exceeding 4.5 Nm, or using tools other than those supplied is not covered by warranty.

5.5 Connect the remaining connectors

1. Connect the three smaller connectors to the bike's wiring, exactly the way the stock controller was connected.
2. Two additional yellow capped connectors are provided for the TORP displays and thumb throttle for regenerative braking (both optional accessories).

WARNING **Seat every connector fully.** All connectors must click when pressed together, especially the main connector. If connectors are not pressed together properly, dirt and moisture can enter and cause irreparable damage to the controller.



5.6 Install the protective shield

1. Place the lower part of the supplied protective shield into the skid plate.
2. Fasten the shield to the frame using the longer M6 screws and the larger hex key.



5.7 Reconnect the battery and power on

1. Put the battery back inside the frame.
2. Connect the battery to the battery power connector and to the 6-pin connector.
3. Turn the fuse back on.

WARNING Always operate the controller with the stock fuse installed.

SECTION 06

First-Time Setup

Before your first ride, configure the controller for your battery and calibrate the throttle and motor.

IMPORTANT Calibration is required. Throttle and motor calibration must be performed after the first installation and again after every firmware update. Calibration is carried out in the TORP Controller app. Follow the step-by-step procedure in the app and the TORP Controller App Manual.

During setup, select your battery type so the controller applies the correct voltage limits (see Section 07).

SECTION 07

Battery Compatibility

The TC500 2.X supports the battery types below. When you select your battery type during setup, the controller automatically applies optimal minimum and maximum voltage limits.

Battery type	Min voltage	Max voltage
Stock SurRon Light Bee / Segway X260	48.0 V	67.2 V
Custom 60 V	Set automatically	Set automatically
Custom 66 V	Set automatically	Set automatically
Custom 72 V	Set automatically	Set automatically
Custom 80 V	Set automatically	Set automatically

KEY LIMITS

- Maximum supported configuration: 22S battery pack.
- For any non-listed battery, the fully charged voltage must not exceed 92.4 V.
- The TC500 is NOT compatible with 88 V batteries.

WARNING Set voltage limits carefully. Setting the minimum voltage too low can over-discharge the battery. Stay within the preset values unless you fully understand the consequences or reach out to the battery developer.

SECTION 08

Temperature Sensor Compatibility

The controller supports several motor temperature-sensor types. Select the correct sensor for your motor (configured in the app). Using the wrong sensor type leads to inaccurate temperature readings and reduced motor protection.

Motor	Sensor type
Light Bee / X260	KTY 84/130
TORP TM25 / TM40 / TM50 / TM50 Pro	PT 1000
Ultra Bee	KTY 84/130
Talaria MX3 / MX4	KTY 84/130
Sotion Light Bee 13 kW	NTC 10K at 25 °C ($\beta = 3380$ K)
Sotion Ultra Bee 16 kW	NTC 10K at 25 °C ($\beta = 3380$ K)
Sotion Talaria 12 kW	NTC 10K at 25 °C ($\beta = 3380$ K)

NOTE TORP SENSORLESS TEMPERATURE PROTECTION

Torp Sensorless is an advanced and unique temperature protection feature. Instead of relying on a physical sensor in the motor that reads stator winding temperature, Sensorless monitors the rotor/magnet temperature inside the motor, where overheating can directly affect motor performance and reliability.

If motor temperature is not reading correctly, use SENSORLESS rather than DISABLED. Sensorless keeps thermal protection active, while DISABLED turns off all motor thermal protection.

SECTION 9

Troubleshooting: Warnings & Errors

The controller continuously monitors the system. Warnings let you keep riding (power may be gradually reduced); cutoff errors stop the bike until the issue is resolved.

09.1 Warnings (riding continues, power may reduce)

Warning	Meaning & action
KICKSTAND	Kickstand is down. Lift it to start riding.
CRASH SENSOR	Fall detected. Turn the bike off, wait a few seconds, then turn it back on.
TEMP CONTROLLER	Controller at its temperature limit. Power reduces until it cools.
TEMP MOTOR	Motor temperature rising. Power reduces gradually.
MOTOR TEMP SENSOR	Motor temperature sensor not connected. Power is limited as a precaution.
LOW VOLTAGE	Battery nearly drained, or voltage sagging under acceleration. Power reduces gradually.
LOW REGEN	The battery is nearly full. Regenerative braking is reduced.
BATTERY TEMP	Battery at its temperature limit. Power is reduced.
BMS TEMP	BMS discharge MOSFETs overheated. Power reduces gradually.

09.2 Cutoff errors (bike stops, action required)

Error	Meaning & action
CUTOFF LOW VOLTAGE	The battery was completely drained. Charge the battery.
OVERVOLTAGE	Battery voltage above 90 V. Check your battery setup.
UNDERVOLTAGE	Voltage dropped below the controller setting. Charge the battery.
OVERCURRENT	Motor current above the permitted limit. Contact support.
CONTROLLER OVERTEMP	The controller overheated. Let it cool before continuing.
MOTOR OVERTEMP	The motor overheated. Let it cool before continuing.
PHASE FET	Contact TORP support.
HALL SENSOR	Hall sensor not connected or faulty. Check the wiring.

Error	Meaning & action
HALL DISCONNECTED	Hall sensor disconnected while riding. Check the wiring.
THROTTLE PROBLEM	Throttle wiring issue detected and since cleared. Turn the bike off and on again.
THROTTLE #1	Throttle signal rises too fast: throttle (+) shorted to GND (-).
THROTTLE #2	Throttle not connected: throttle (+) wire may be broken.
THROTTLE #3	Throttle (+) and GND (-) shorted together.
THROTTLE #4	Throttle GND (-) not connected or broken.
THROTTLE #5	Throttle (+) shorted to the signal wire.
CUTOFF THROTTLE	Throttle was active while turning the bike on. Release the throttle at startup; if it persists, re-calibrate or check the wiring.
CUTOFF BATTERY TEMP	The battery overheated. The bike stops until it cools.
CUTOFF BMS TEMP	BMS MOSFET temperature at its limit. The bike stops until it cools.
WATER IN CONNECTOR (HW 1.4+)	Water in the main Torp connector.

WARNING Water in connector. If this error appears, turn the bike off, disconnect the main Torp connector and dry it fully, apply dielectric grease if there's no damage to the pins. If unsure, contact TORP support.

SECTION 10

Maintenance & Care

- Inspect the connectors periodically to confirm they remain clicked together and sealed.
- Always ride with the stock circuit breaker (fuse) installed.

SECTION 11

Support

For help, use the support form in the Contact section of the official TORP website. Support form: torpmotors.com/contact. Our team will get back to you as soon as possible.