

MY19 TURBO LEVO FSR TECH & SERVICE

YOUR WORKBOOK

Dear Specialized Retailer and Specialized Employee,

we are excited to present the all-new Levo FSR! The first generation Levo was class leading already and with the second generation we've improved about every aspect of the bike. When riding the all-new Levo, you will feel that this is not just a bold statement.

Everyone agrees that excitement for a bike is ideally created by actual riding - so be encouraged to ride the Levo on the trails you love so that you can share your passion with others. However, you also need to be prepared from technical point of view.

You are going to be the primary source for your customers when it comes to building the bike, maintaining and servicing it.

This Tech & Service Workbook should be your source of knowledge for all technical aspects around the all-new Levo. It covers the whole spectrum, from building the bike to swapping parts and solving issues. If used well, it enables you to be more successful with the new Levo FSR from a sales and service perspective. Note that there is a dedicated Features, Benefits & Guidelines Workbook that is of particular value to everyone seeing to the sales side.

Here are our seven asks for using this Workbook:

1. Keep it within your business - this document is meant to support Turbo Retailers and Specialized staff
2. Share it with all technicians and Rider Care staff
3. Save it to your PC so that you can access it quickly (digital use preferred over printing)
4. Go over it at least once in its entirety so that you know the breadth
5. Use the clickable table of contents to find your desired topic
6. Use the search function (Ctrl+f) to scan the document for key words
7. Use it to host product presentations to your teams and colleagues

We wish you lots of success with the all-new Levo and many joyful moments out on the trails! - The Specialized Turbo Team

MY19 TURBO LEVO FSR TECH & SERVICE



1. Turbo Levo Components
2. Basic Theory of Operation
3. Bike Building
4. All Cabling & Wiring
5. Turbo Connect Unit
6. Speed Sensor
7. Motor-Battery-Cable
8. Trail Remote
9. Dropper Post
10. Shifting
11. Rear Brake
12. Battery
13. Charger
14. Motor
15. Firmware Updates
16. Diagnosis & Troubleshooting
17. Maintenance Tips
18. Service Parts
19. Service Check-In

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Let us start by looking at how the Specialized E-Bike System is set up.

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SPECIALIZED E-BIKE SYSTEM COMPONENTS

Specialized 2.1 Motor



Speed Sensor and Magnet



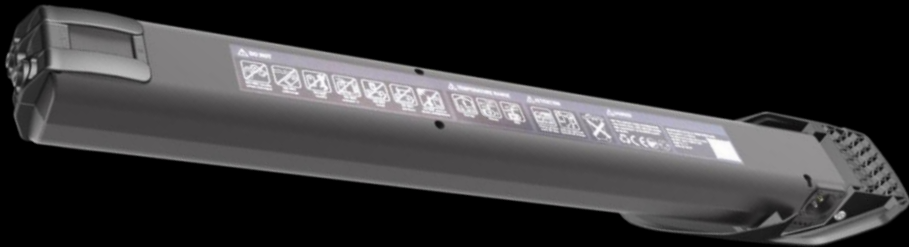
TCU (Turbo Connect Unit)



Trail Remote / Remote



Battery



Motor-Battery-Cable



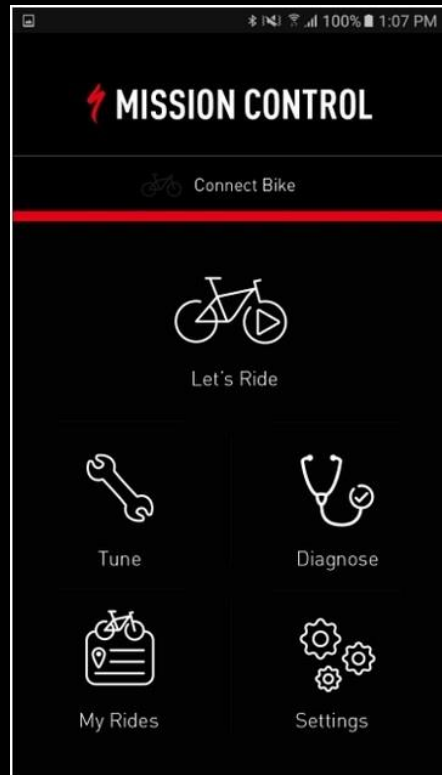
Turbo Charger



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E-BIKE SYSTEM COMPONENTS - OPTIONS

Mission Control App



TCD (Turbo Connect Display)

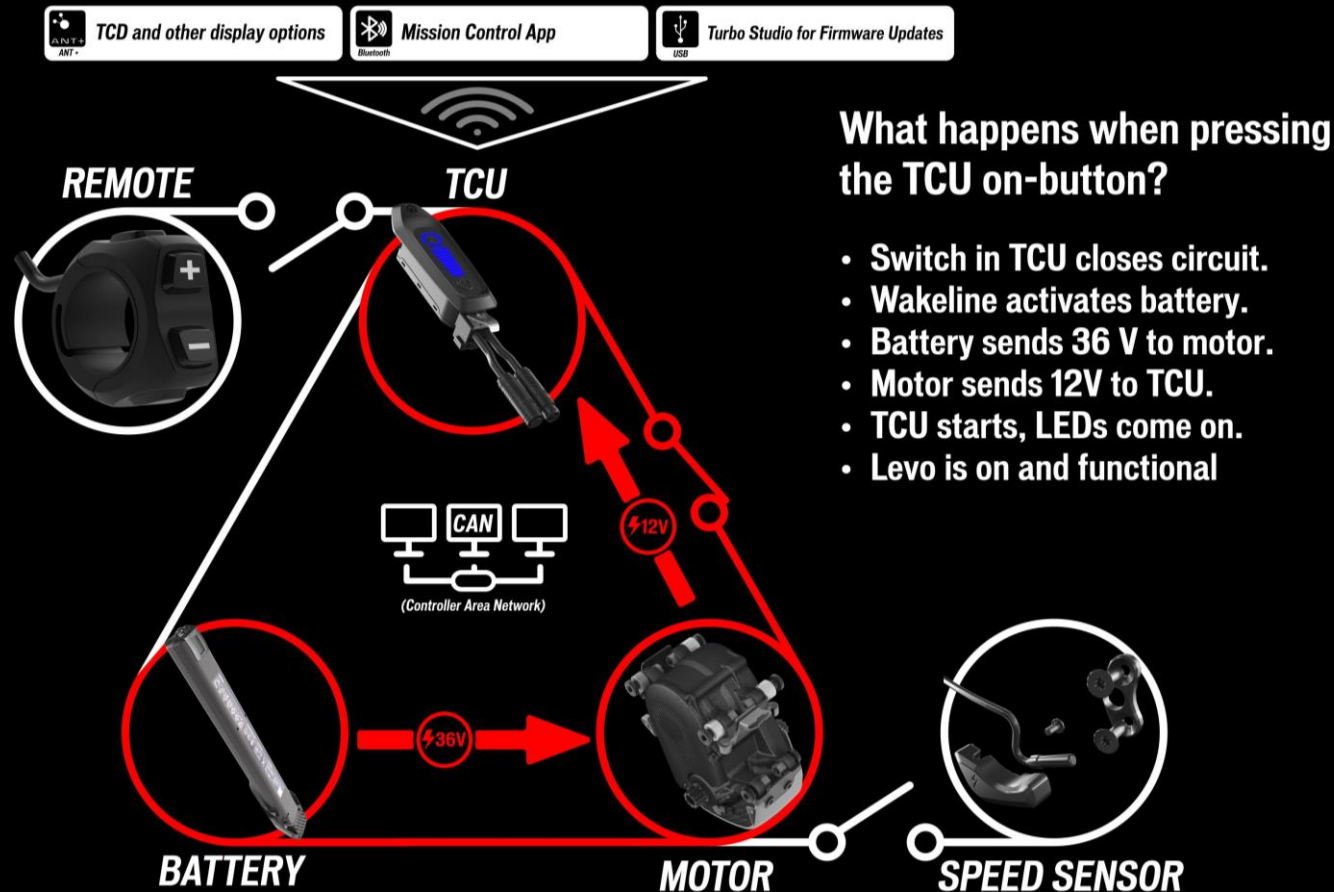


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Basic Theory of Operation

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MY19 LEVO FSR - BASIC THEORY OF OPERATION



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BASIC THEORY OF OPERATION - CONDITIONS FOR MOTOR SUPPORT

All components are connected and functional

BATTERY - Needs to be sufficiently charged

MC APP - Peak Power/Support must be high enough to feel support in selected riding mode

TCU - Must be turned on and set to a support mode

BIKE SPEED - Motor must get signal from Speed Sensor and bike speed must be > 0 / < 25 kph

RIDER - Must apply torque to pedals

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Bike-Building-Tips

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BIKE BUILDING

Unboxing and building tips

1. Refer to the Levo Manual for setup tips, battery removal/installation, torque values etc.
2. Remove the yellow Peel-Me sticker from the frame and stick it onto the last page of manual
 - Tip: for correct association bike/manual later, put manual in a transparent plastic bag and write the last 5 digits of the WSBC number on it - when handing out bike, you can find the needed manual easily
3. For installation of seatpost, refer to guideline in dropper post chapter
4. Fully charge battery
5. Connect the bike to a Windows PC and run updates if available (see chapter Firmware Updates)
6. Check all electronical and mechanical functions and test ride

Before handover to rider

1. Check for firmware updates again (especially if bike has been on sales floor for longer)
2. Make sure battery is fully charged
3. Run functional test again and test ride

Note: Rider handover should of course include all needed steps like saddle height, suspension setup, cockpit adjustment, tire pressure, etc.



PEEL AND STICK ON LAST PAGE OF
TURBO USER MANUAL



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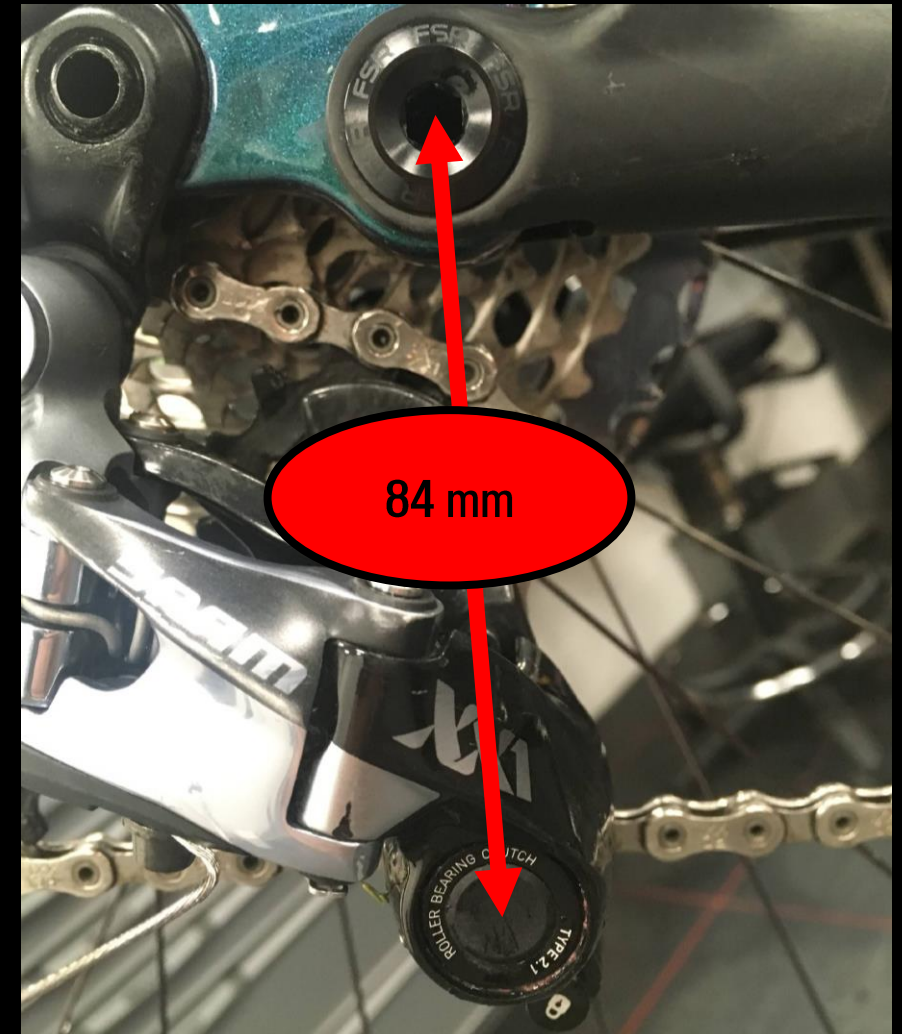
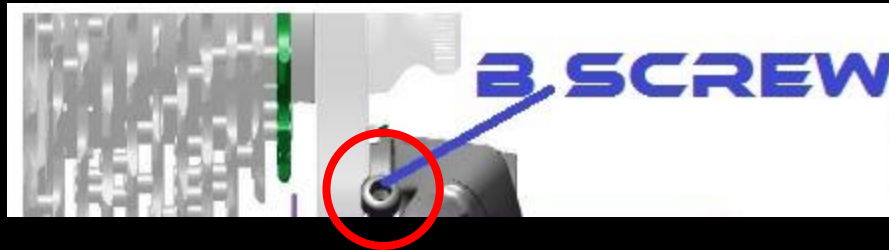
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BIKE BUILDING

Ideal B-Screw Rear Derailleur Adjustment:

- For best chain retention when shifting down to smallest cog, adjust the tension of the B-screw (SRAM) so that the distance measured as shown is 84mm with the chain on the 10t cog
- Make sure the upper pulley does not touch biggest cog when shifting up (should run noise-free).



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BIKE BUILDING

Battery rubber washer:

- Separate batteries ship with a protection rubber washer between rock guard and battery housing
- Washer **MUST NOT** be installed in bike
- Washer is not there when battery gets shipped in bike

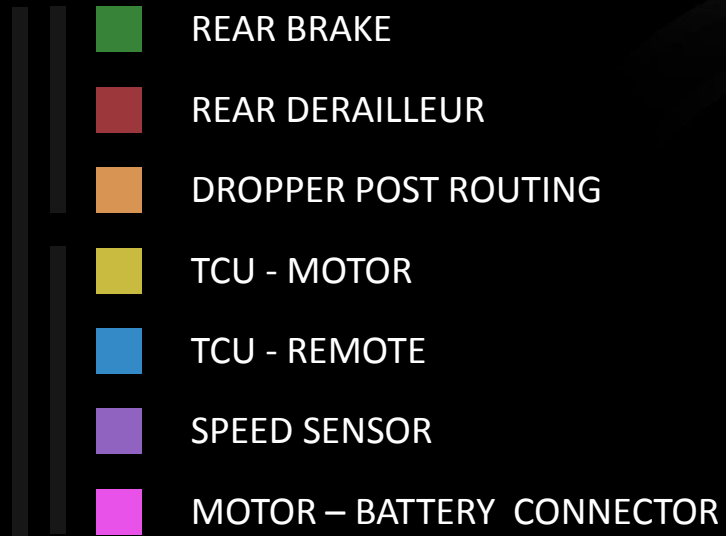


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Cabling & Wiring

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COMPLETE CABLE ROUTING



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ELECTRONIC CABLE ROUTING

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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NON ELECTRONIC CABLE ROUTING

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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REAR BRAKE

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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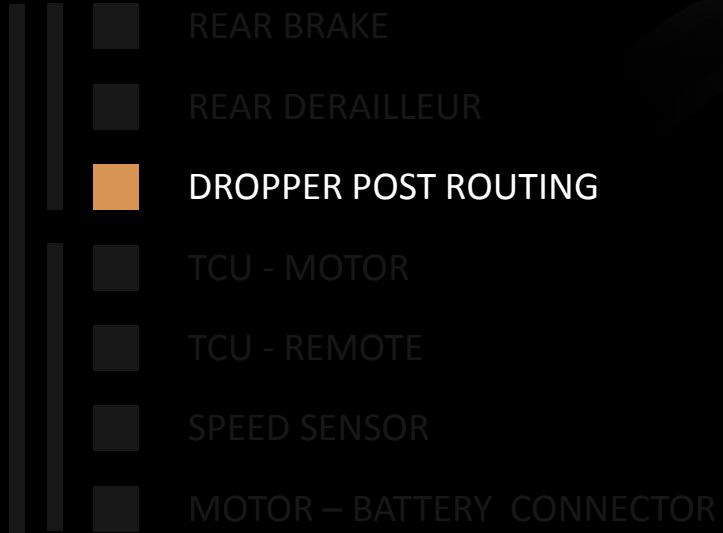
REAR DERAILLEUR

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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REMOTE DROPPER POST



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TURBO CONTROL UNIT - MOTOR

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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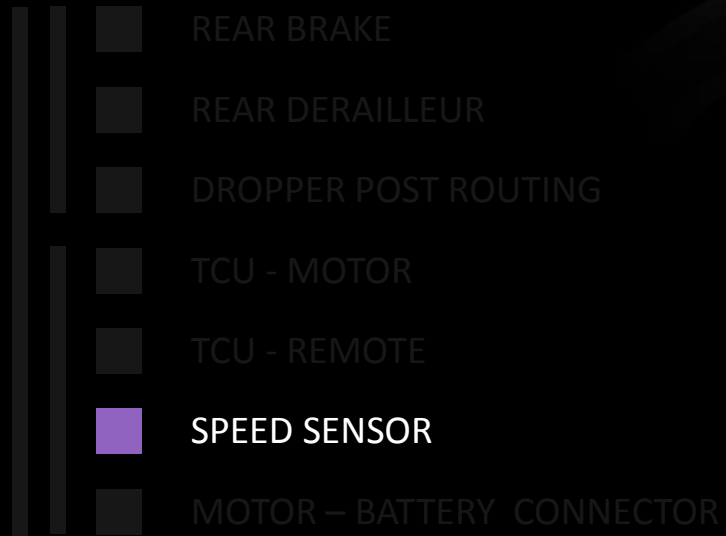
TURBO CONTROL UNIT - REMOTE

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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SPEED SENSOR



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MOTOR - BATTERY CONNECTOR

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR**



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CABLING & WIRING

Order & Operation

1. Install Turbo Connect Unit cable (w/o display at first)
2. Install Speed Sensor wire
3. Install dropper post cable
4. Install shift cable (insert at motor area first)
5. Install rear brake (through chainstay at caliper)
6. Install motor (connecting order: TCU, Speed Sensor, motor-battery-cable)
7. Install battery

Notes

- Best assembly order for electronic components, brakes, dropper post and shifting
- Useful when a Levo needs to be assembled from frame up
- Starting point: fork and cockpit are installed



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CABLING & WIRING - ORDER

**Install Turbo Connect Unit cable
(w/o display at first)**



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CABLING & WIRING - ORDER

Install Speed Sensor wire



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CABLING & WIRING - ORDER

Install dropper post cable



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CABLING & WIRING - ORDER

**Install shift cable
(insert at motor area first)**



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CABLING & WIRING - ORDER

**Install rear brake
(through chainstay at caliper)**



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CABLING & WIRING - ORDER

**Install motor
(connecting order: TCU, Speed Sensor,
motor-battery-cable)**



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CABLING & WIRING - ORDER

Install battery



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HOUSING LENGTH - OVERVIEW

MY19 Levo FSR Frame	Size	Shifter housing (mm)	Dropper post housing (mm)
Full alloy	S	1650	1700
	M	1700	
	L	1700	
	XL	1750	
Alloy/carbon and full carbon	S	1640	
	M	1690	
	L	1690	
	XL	1740	

- The shown data represents the housing lengths as installed at production for default bike configuration (stem, bar, spacers, etc.)
- Dropper post housing lengths are uniform since posts need to be set up by retailer
- Brake hose lengths are pre-defined; if renewed, the standard length has to be adjusted to bike setup

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The Turbo Connect Unit

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TURBO CONNECT UNIT (TCU)

Key Functions

- Main control unit for bike
- Controls bike (on/off - see/switch modes, see battery state of charge)
- Shows error codes through LED combinations
- Connects to display options via Bluetooth and ANT+
- Connects to PC via Micro USB cable for firmware updates
- Stores bike data like mode settings and WSBC number
- Labelled with pairing code for Bluetooth connection (Mission Control App)
- Installed CR1620 coin cell keeps time setting
- Can be reset to default settings (modes etc.)



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TURBO CONNECT UNIT (TCU)

Factory Reset

For restoring factory settings and as early troubleshooting step, perform a factory reset on the TCU as follows:

- Bike is off
- Press the S-button and keep it pressed
- Press the On-button and release it when the TCU starts
- Still keep the S-button pressed until the TCU goes off and reboots

The following data will be reset to default:

Support, Peak Power, Dark Mode, Acceleration Response, Shuttle Mode and button beeper

The following data will NOT be reset:

Wheel circumference (stored in motor)



At demo events, a Factory Reset would not reset the speed limit of a hacked bike. This still needs to be done through MC App

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TURBO CONTROL UNIT - MOTOR

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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TURBO CONTROL UNIT - REMOTE

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

ORDER & OPERATION

1. **Prep:** Power bike off, remove TCU, disconnect remote and TCU cable, remove left crank and motor cover; Alloy bikes: remove front shock bolt and lower front of shock; protect downtube/seat tube, remove upper cable routing clips in sidearm
2. Before removing TCU wire: attach brake cable to it so that its head exits the motor area when wire is pulled out from below. This serves as a guide for re-installation
3. Pull out wire-brake-cable-assembly (brake cable head exits motor area)
4. Remove old TCU wire from brake cable
5. Fix round connector of new TCU wire to brake cable head, using tape
6. Pull up TCU wire through frame/sidearm and out the opening in the top tube
7. Remove brake cable and tape; wire connectors (color coded), fix TCU to frame (0.8 Nm) Alloy bikes: reinstall cable clips in sidearm, wiring TCU cable through upper channels; arrange other housings and retighten clips to 1 Nm; reinstall shock, tighten bolt to 10 Nm
8. Reinstall motor cover (1 Nm), crank (40 Nm), run functional test

Note: If no Turbo Connect wire is installed, insert brake cable first into frame to have a guide

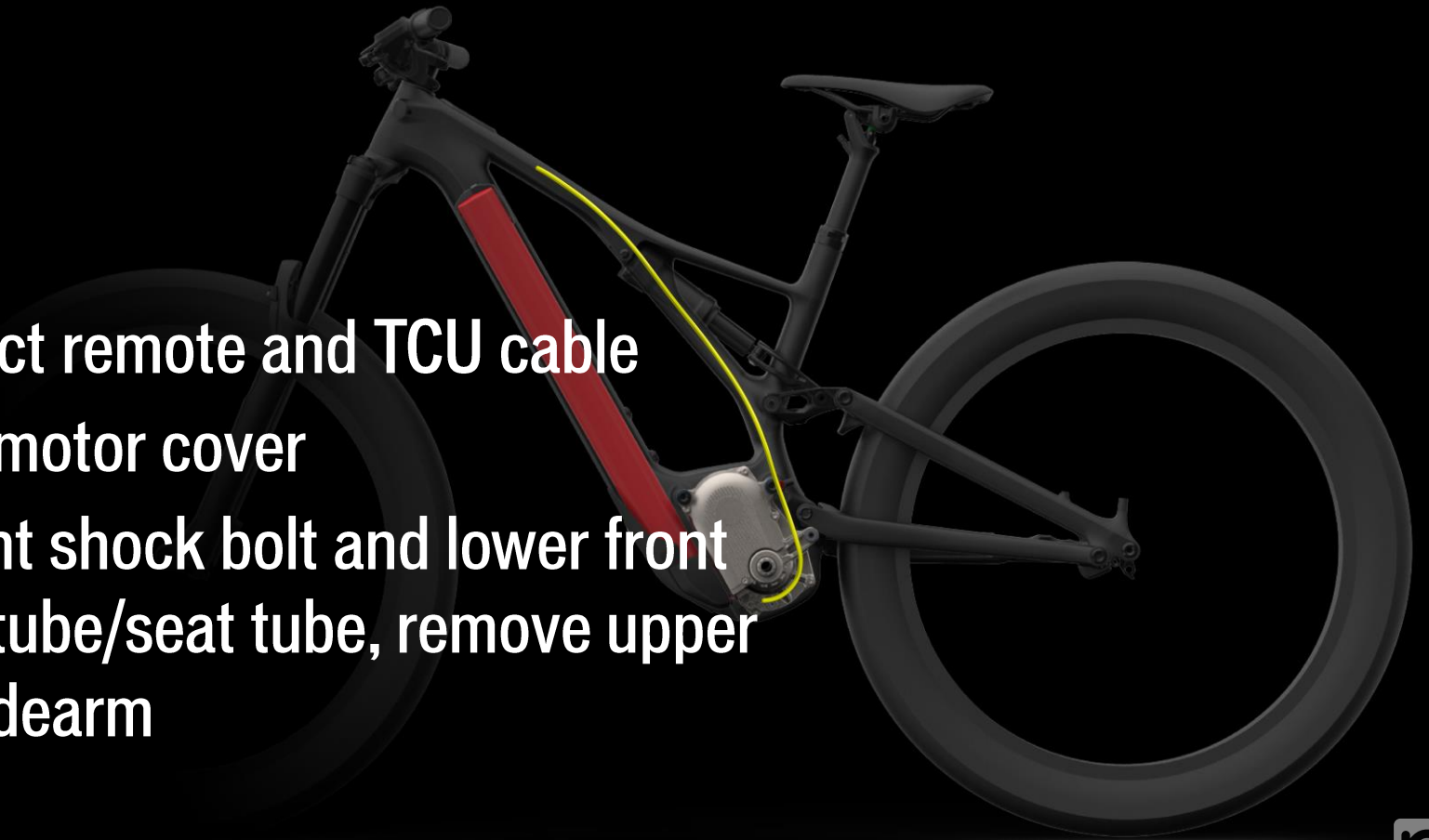


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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

Prep:

- Power bike off
- Remove TCU, disconnect remote and TCU cable
- Remove left crank and motor cover
- Alloy bikes: remove front shock bolt and lower front of shock; protect downtube/seat tube, remove upper cable routing clips in sidearm



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

Before removing TCU wire: attach brake cable to it so that its head exits the motor area when wire is pulled out from below. This serves as a guide for re-installation



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

Pull out wire-brake-cable-assembly (brake cable head exits motor area)



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

Remove old TCU wire from brake cable



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

Fix round connector of new TCU wire to brake cable head, using tape



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

**Pull up TCU wire through frame/sidearm
and out the opening in the top tube**



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

- Remove brake cable and tape; wire connectors (color coded), fix TCU to frame (0.8 Nm)
- Alloy bikes: reinstall cable clips in sidearm, wiring TCU cable through upper channels; arrange other housings and retighten clips to 1 Nm; reinstall shock, tighten bolt to 10 Nm
- Reinstall motor cover (1 Nm), crank (40 Nm), run functional test



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TURBO CONNECT UNIT - REMOVAL & INSTALLATION

Notes:

If no Turbo Connect wire is installed, insert brake cable first into frame to have a guide



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The Speed Sensor

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SPEED SENSOR

Key Functions

- Acts as a switch (not part of CAN communication)
- Connected to motor
- Sends motor signal when magnet on wheel passes receiver in dropout
- For motor to support, signal must reach motor **AND** rider needs to apply torque to pedals (exception: 6 km/h walk assist)



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SPEED SENSOR

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR**
- MOTOR – BATTERY CONNECTOR



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SPEED SENSOR REMOVAL & INSTALLATION

ORDER & OPERATION

Prep: Power bike off, remove rear wheel, remove left dropout chainstay pivot bolt, take left crank and motor cover off, unplug Speed Sensor from motor

1. Unscrew Speed Sensor bracket and remove Speed Sensor cable from it by hand or carefully using needle nose pliers - do not pull at cable
2. Gently pull out cable from motor area; if you feel resistance or cable is stuck, push cable back and gently pull while rotating wire between your finger
3. Feed the new Speed Sensor cable through the entry hole in the chainstay and push it through till it exits at drop out; rotating wire between fingers can help when cable is stuck
4. Place magnet/wire in bracket and secure it to frame with 2.0 Nm; plug connector into motor and arrange all excess cable
5. Reassemble bike, applying correct torque to all bolts: chainstay pivot 20 Nm, rear wheel 15 Nm, motor cover 1 Nm, crank 40 Nm



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SPEED SENSOR REMOVAL & INSTALLATION

Prep:

- Power bike off
- Remove rear wheel
- Remove left dropout chainstay pivot bolt
- Take left crank and motor cover off
- Unplug Speed Sensor from motor by hand or carefully using needle nose pliers – do not pull at cable



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SPEED SENSOR REMOVAL & INSTALLATION

**Unscrew Speed Sensor bracket and remove
Speed Sensor cable from it by hand**



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SPEED SENSOR REMOVAL & INSTALLATION

Gently pull out cable from motor area; if you feel resistance or cable is stuck, push cable back and gently pull while rotating wire between your finger



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SPEED SENSOR REMOVAL & INSTALLATION

Feed the new Speed Sensor cable through the entry hole in the chainstay and push it through till it exits at drop out; rotating wire between fingers can help if cable is stuck



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SPEED SENSOR REMOVAL & INSTALLATION

Place magnet/wire in bracket and secure it to frame with 2 Nm; plug connector into motor and arrange all excess cable



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SPEED SENSOR REMOVAL & INSTALLATION

**Reassemble bike, applying correct torque to all bolts:
chainstay pivot 20 Nm, rear wheel 15 Nm, motor
cover 1 Nm, crank 40 Nm**



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SPEED SENSOR REMOVAL & INSTALLATION

Test bike functionality



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The Motor-Battery-Cable

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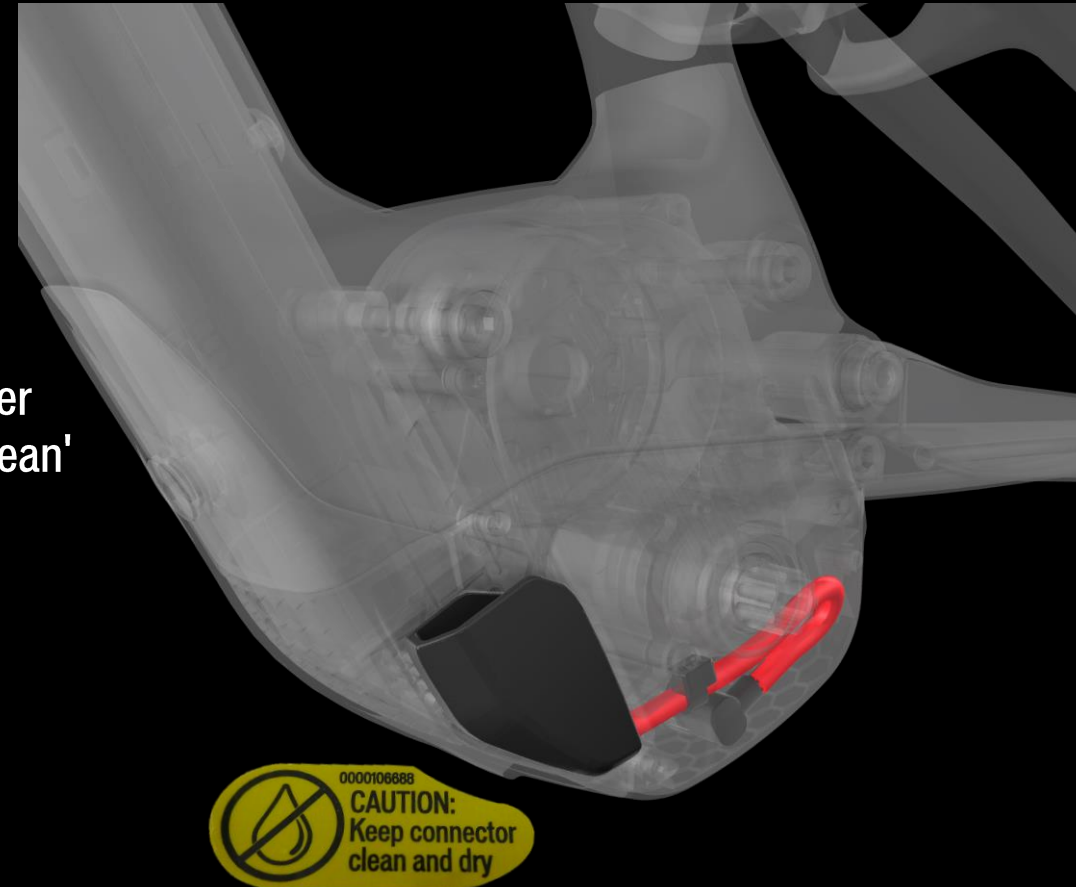
MOTOR-BATTERY-CONNECTOR

Key Functions

- Supplies power from the battery to the motor
- Is part of the bike data communication (CAN)
- Large loop inside the motor for proper length adjustment (stress relief, easy attachment, secure fixation)
- Zip tie around cable for strain relief; needs to sit inside motor cover
- Yellow CAUTION sticker on main plug, inside cover: 'Keep dry / clean'



Bike must be off before plugging/unplugging battery connector
Keep connector clean and dry



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MOTOR-BATTERY-CONNECTOR

Cover installation

Whenever you change the motor-battery-connector, install the cover, including the metal bracket



Without the cover on the motor-battery-cable, there is no stable battery connection



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MOTOR-BATTERY-CONNECTOR

Specific version for 2.1 motor

- Be aware that all MY19 Levo FSR bikes require the updated motor-battery-cable for the 2.1 motor
- It has a 90° connector and 4 hair pins



Do not install the 90° cable on any 1.x motor and do not install 0° cables on the 2.1 motor



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MOTOR-BATTERY-CONNECTOR

Maintenance tips

- Always power bike off before unplugging/plugging
- Leave battery installed and battery plug connected when washing - make sure connectors are dry/clean before turning on
- If battery is removed for washing or bike transport, protect battery plug with plastic bag
- Use a soft brush if you need to clean the connectors



Following these tips pays off: Most bike issues are related to incorrect use of cables and connectors



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The Trail Remote

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TRAIL REMOTE

Key Functions

- Allows quick, safe and easy mode switching (+ / -)
- Activates 6 km/h walk assist (lower button)
- Enables switching into Turbo mode (top S-button)
- Acts as a switch (not part of CAN communication)
- Connected to TCU
- Not needed for functional bike



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TURBO CONTROL UNIT - TRAIL REMOTE

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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TRAIL REMOTE REMOVAL & INSTALLATION

Prep: Power bike off, remove left grip, unscrew cable entry port in head tube; unscrew TCU and disconnect remote cable from it (wire running to cockpit, black connector)

1. Pull remote wire out of frame and remove remote from handlebar
2. Slide new remote on handlebar and connect it to TCU to test it before final installation
3. Disconnect remote and wire it through cable port entry in headtube
4. Connect remote cable to TCU
5. Reinstall TCU (0.8 Nm) and cable entry port (carbon frames 0.8 Nm, alloy frames 1.0 Nm)
6. Set up cockpit by adjusting/locking grip and remote (0.8 Nm max.), fix remote cable to brake housing, using the clips; run functional test



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TRAIL REMOTE REMOVAL & INSTALLATION

Prep:

- **Power bike off**
- **Remove left grip**
- **Unscrew cable entry port in head tube**
- **Unscrew TCU and disconnect remote cable from it
(wire running to cockpit, black connector)**



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TRAIL REMOTE REMOVAL & INSTALLATION

Pull remote wire out of frame and remove remote from handlebar



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TRAIL REMOTE REMOVAL & INSTALLATION

**Slide new remote on handlebar and connect it to TCU
to test it before final installation**



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TRAIL REMOTE REMOVAL & INSTALLATION

Disconnect remote and wire it through cable port entry in headtube



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TRAIL REMOTE REMOVAL & INSTALLATION

Connect remote to TCU



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TRAIL REMOTE REMOVAL & INSTALLATION

Reinstall TCU (0.8 Nm) and cable entry port (carbon frames 0.8 Nm, alloy frames 1.0 Nm)



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TRAIL REMOTE REMOVAL & INSTALLATION

- Set up cockpit by adjusting/locking grip and remote, fix remote cable to brake housing, using the clips
- Run functional test



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FACT Frames: Dropper Post Housing Removal & Installation

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REMOTE DROPPER POST

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



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FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Prep: Power bike off, fix bike in work stand: carefully clamp bike on top tube at seat tube junction

1. Remove left crank and motor cover; unbolt TCU, take it out (leave cables connected)
2. Remove dropper post cables/housing and seatpost itself (cutting cable at lever is easiest)
3. Cut new dropper post housing to correct length
4. Pre-bend housing for easier insertion: insert new housing from motor area up through Side Arm so that it exits the drive-side top tube cable entry port; use TCU cutout to guide housing through cable entry ports (note: you can also insert a shift cable through TCU and have it exit at motor area if you want a guide)
5. Pre-bend housing for easier insertion: push up housing at drive side of Shadow Loop and up through seat tube till it sticks out
6. Grab housing at both ends and slide it in/out to check if it is moving freely (if not, redo)
7. Route dropper post cable through housing and set up seatpost (follow seatpost assembly instructions)
8. Reassemble motor cover (1 Nm), crank (40 Nm), TCU (0.8 Nm), set up cockpit, run functional test



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FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Prep:

- Power bike off
- Fix bike in work stand: carefully clamp bike on top tube at seat tube junction



LEVO TECH & SERVICE

FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

- Remove left crank and motor cover
- Unbolt TCU, take it out (leave cables connected)



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FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Remove dropper post cables/housing and seatpost itself (cutting cable at lever is easiest)



LEVO TECH & SERVICE

FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

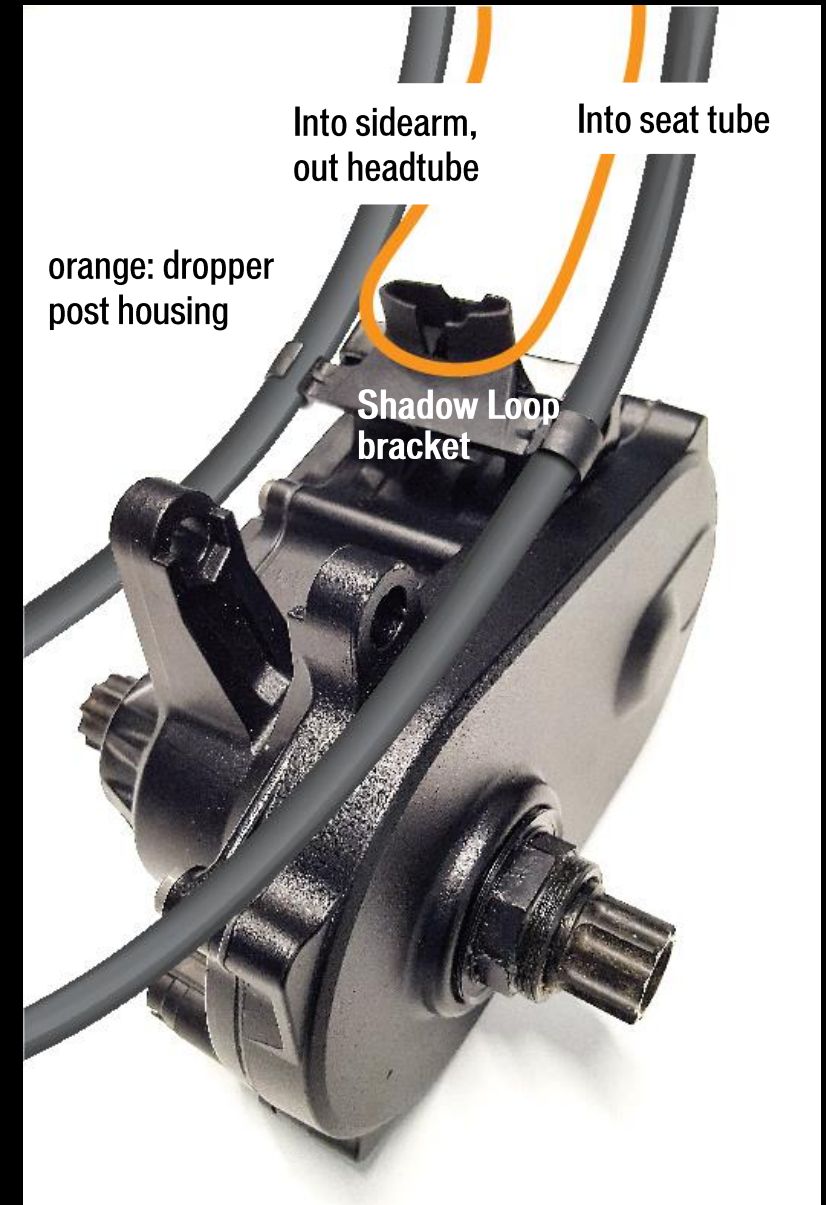
Cut new post housing to correct length



LEVO TECH & SERVICE

FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

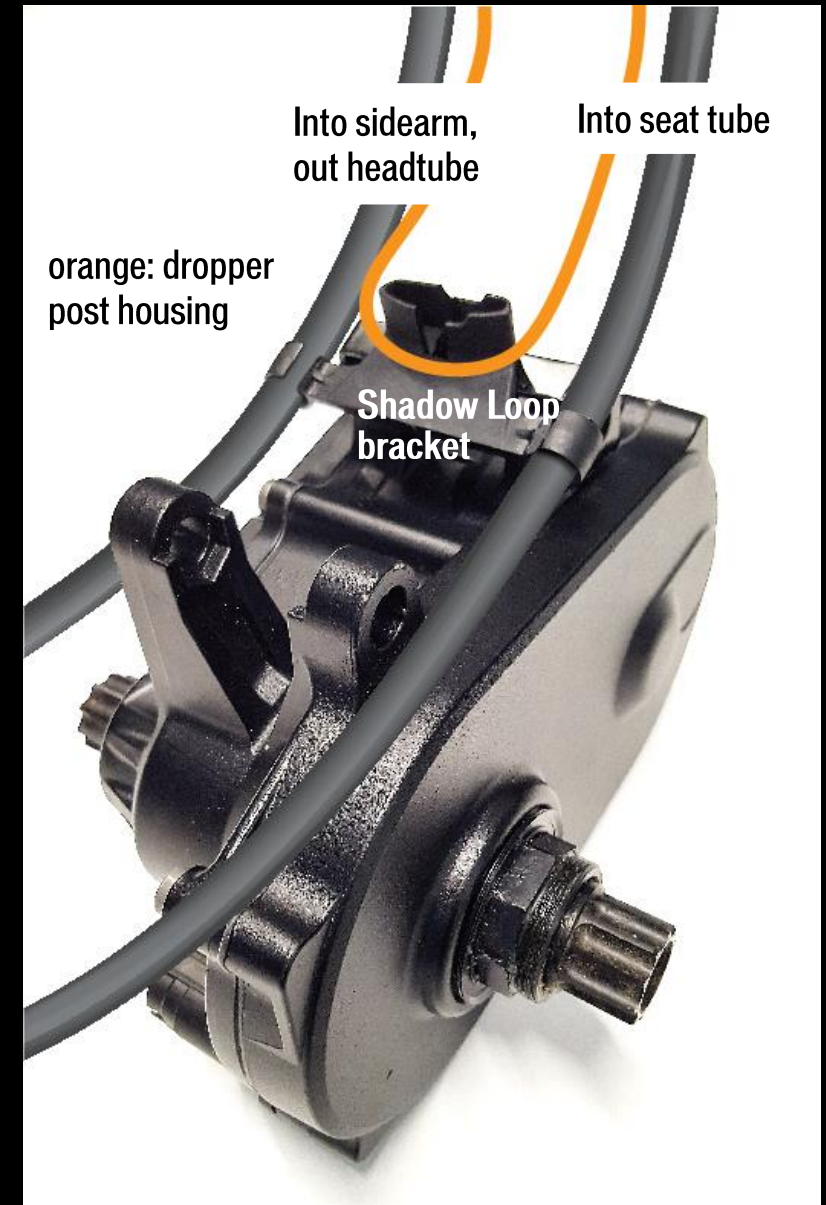
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- Insert new housing from motor area up through Side Arm so that it exits the drive-side top tube cable entry port
- Use TCU cutout to guide housing through cable entry ports
- Note: you can also insert a shift cable through TCU and have it exit at motor area if you want a guide



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FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Pre-bend housing for easier insertion: push up housing at drive side of Shadow Loop and up through seat tube till it sticks out



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FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Grab housing at both ends and slide it in/out to check if it is moving freely (if not, redo)



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FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Route dropper post cable through housing and set up seatpost (follow seatpost assembly instructions)



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FACT FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Reassemble parts:

- **Motor cover (1 Nm)**
- **Crank (40 Nm)**
- **TCU (0.8 Nm)**
- **Set up cockpit**
- **Run functional test**



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Alloy Frames: Dropper Post Housing Removal & Installation

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REMOTE DROPPER POST

- REAR BRAKE
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ALLOY FRAMES: COMMAND POST ROUTING REMOVAL & INSTALLATION

Prep: Power bike off, fix bike in work stand: carefully clamp bike on top tube at seat tube junction

1. Remove left crank and motor cover; unbolt TCU, take it out (leave cables connected)
2. Remove front shock bolt and lower front shock; protect downtube and other contact areas (step 3 is even easier with shock fully removed - hold up rear triangle by fixing it to main frame with a toe strap through wheel)
3. Unbolt cable routing clips in sidearm: loosen screw of lower one, turn two upper ones by 90°
4. Remove dropper post cables/housing and post itself (cutting cable at lever is easiest)
5. Cut new housing to correct length
6. Pre-bend housing for easier insertion: insert new housing at open Side Arm down into the non-drive side of the Shadow Loop so that housing exits motor area (note: you can also insert a shift cable through TCU and have it exit at motor area if you want a guide)
7. Pre-bend housing for easier insertion: push up housing at drive side of Shadow Loop and up through seat tube till it sticks out
8. Route housing through top tube so that it exits the drive-side top tube cable entry port (use TCU cutout to guide housing)
9. Route dropper post cable through housing and set up seatpost (follow manufacturer's assembly instructions)
10. Clamp seatpost at minimum insertion mark (5 Nm)
11. Pull all extra housing from the motor area - pull on cable at handlebar
12. Align and tighten Side Arm cable guides (1 Nm)
13. Reassemble shock (10 Nm upper eyelet / 23 Nm lower), motor cover (1 Nm), crank (40 Nm), TCU (0.8 Nm), set up cockpit, run functional test



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Prep:

- Power bike off
- Fix bike in work stand: carefully clamp bike on top tube at seat tube junction



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

- Remove left crank and motor cover
- Unbolt TCU, take it out (leave cables connected)



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

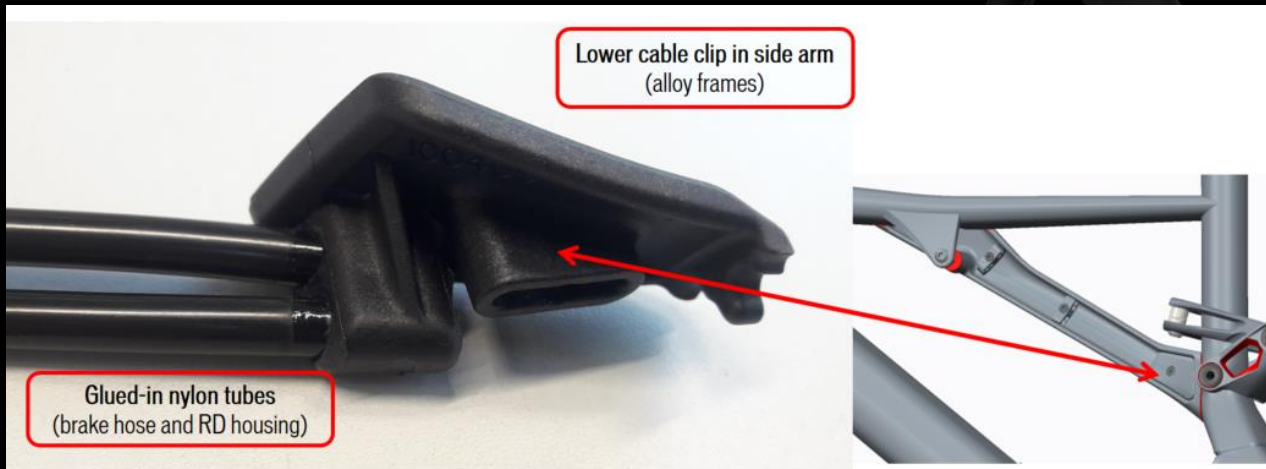
- Remove front shock bolt and lower front of shock
- Protect downtube and other contact areas
- Optional for easier access to cable clips in sidearm: fully remove shock and hold up rear triangle by fixing it to main frame with a toe strap through wheel



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

- Unbolt cable routing clips in sidearm
- Turn two upper ones by 90°
- Loosen screw of lower one, turn two upper ones by 90°



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

**Remove Dropper Post cables/housing and CP
itself (cutting cable at lever is easiest)**



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

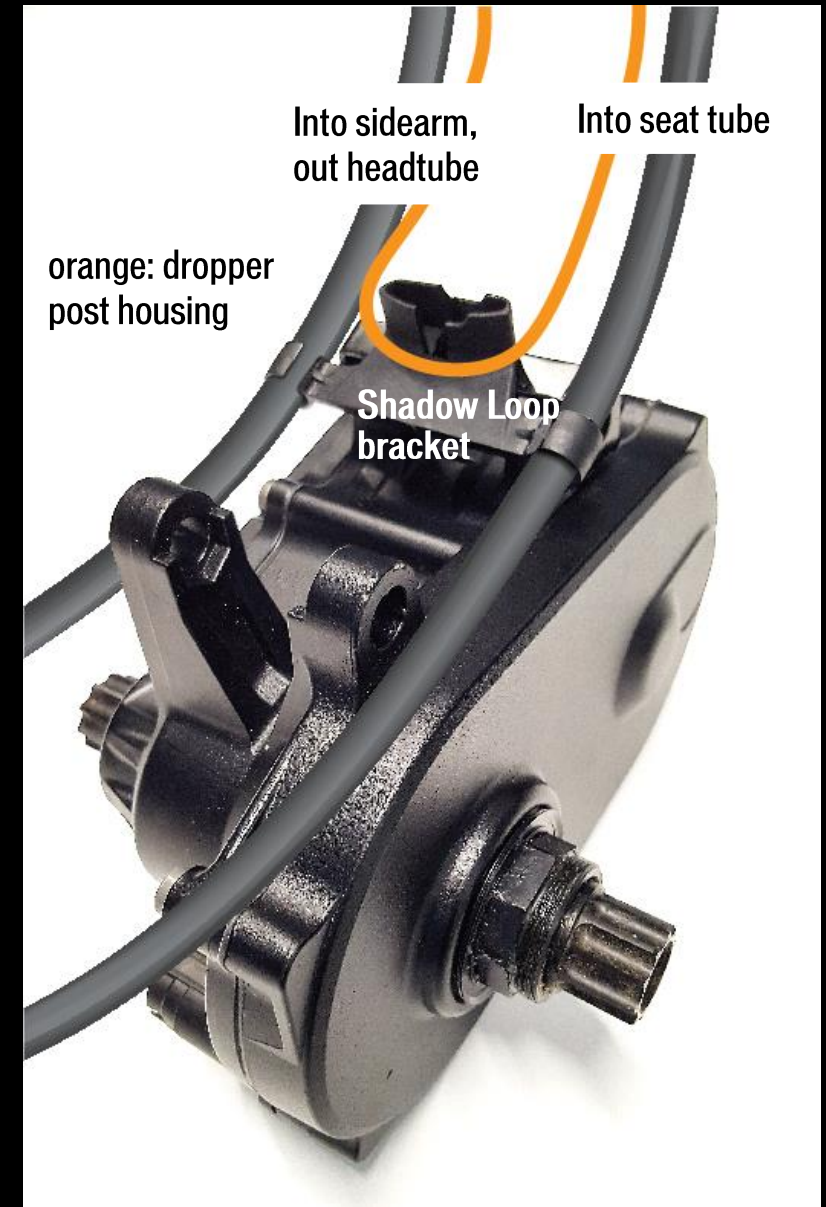
Cut new housing to correct length



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

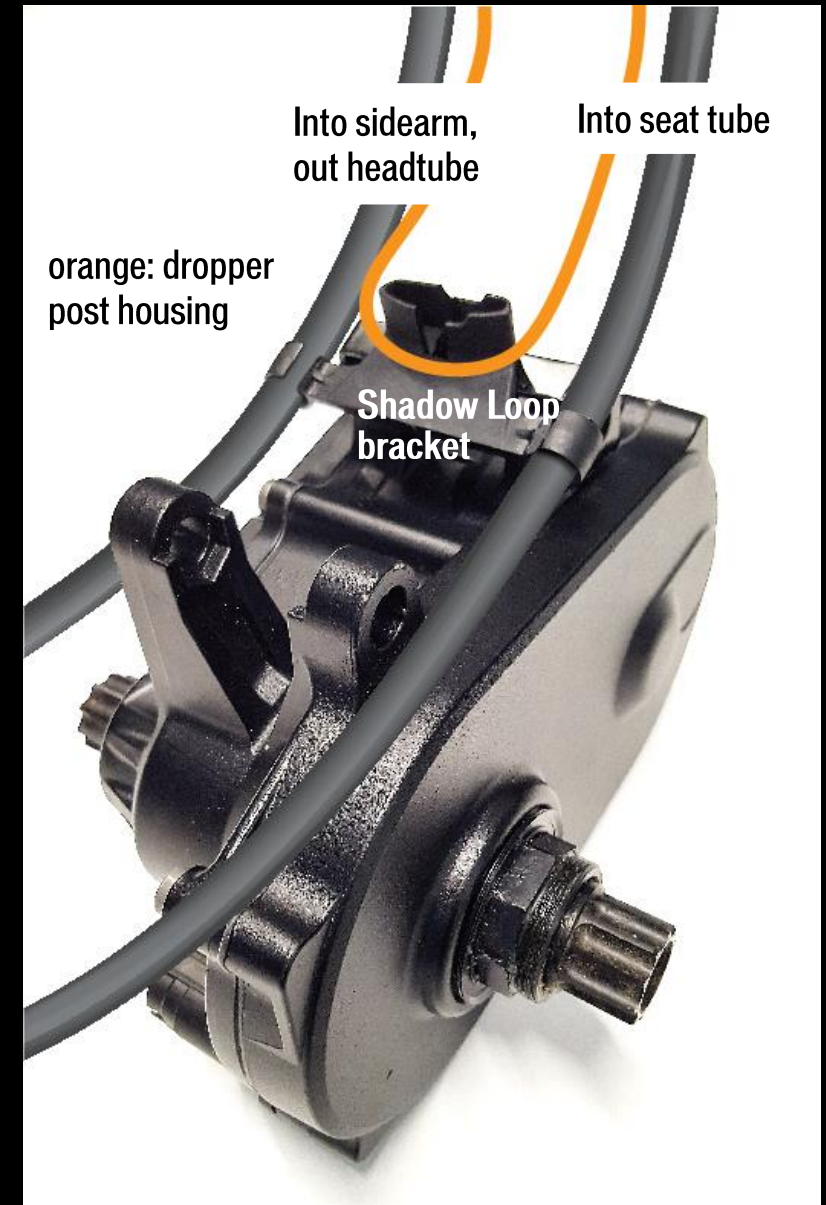
- Pre-bend housing for easier insertion
- Insert new housing at open Side Arm down into the non-drive side of the Shadow Loop so that housing exits motor area
- Note: you can also insert a shift cable through TCU and have it exit at motor area if you want a guide



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

- Pre-bend housing for easier insertion
- Push up housing at drive side of Shadow Loop and up through seat tube till it sticks out



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

- Route housing through top tube so that it exits the drive-side top tube cable entry port
- Use TCU cutout to guide housing through cable entry ports



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

- Route dropper post cable through housing and set up seatpost
- Follow manufacturer's assembly instructions



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Clamp seatpost at minimum insertion mark (5 Nm)



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ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

**Pull all extra housing from the motor area – pull
on cable at handlebar**



LEVO TECH & SERVICE

ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Align and tighten Side Arm cable guides (1 Nm)



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ALLOY FRAMES: DROPPER POST ROUTING REMOVAL & INSTALLATION

Reassemble parts:

- Shock (10 Nm, upper eyelet / 23 Nm lower eyelet)
- Motor cover (1 Nm)
- Crank (40 Nm)
- TCU (0.8 Nm)
- Set up cockpit
- Run functional test



MY19 TURBO LEVO FSR

FACT Frames: Shift Housing Removal & Installation

LEVO TECH & SERVICE

REAR DERAILLEUR

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



LEVO TECH & SERVICE

FACT FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

Prep: Fix bike in repair stand, clamping it at outer seatpost

1. Remove installed shift cable and housing (you can pull out housing easily from headtube)
2. Cut housing to correct length, insert it at motor area first and push it up the nylon tube through sidearm further on into the top tube so that you can guide it out the head tube cable entry (removing TCU can help feed cable through port)
3. Slide housing through nylon tube in chainstay
4. Loop in motor area: be careful when straightening the loop not to kink it
5. Fine-tune housing length (if required), run shift cable, connect, adjust shifting



LEVO TECH & SERVICE

FACT FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

Prep:

Fix bike in repair stand, clamping at outer seatpost



LEVO TECH & SERVICE

FACT FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Remove installed shift cable and housing
- You can pull out housing easily from headtube



LEVO TECH & SERVICE

FACT FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Cut housing to correct length
- Insert it at motor area first and push it up the nylon tube through sidearm further on into the top tube
- Guide housing out the head tube cable entry
- Removing TCU can help feed cable through port



LEVO TECH & SERVICE

FACT FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Slide housing through nylon tube in chainstay
- Loop in motor area: be careful when straightening the loop not to kink it



LEVO TECH & SERVICE

FACT FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Fine-tune housing length, if required
- Run shift cable, connect, adjust shifting
- Do not forget re-clipping housing at cockpit



MY19 TURBO LEVO FSR

Alloy Frames: Dropper Post Housing Removal & Installation

LEVO TECH & SERVICE

REAR DERAILLEUR

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

Prep: Fix bike in repair stand, clamping it at outer seatpost

1. Remove shock without letting rear end drop and fix rear triangle to frame with toe strap: protect frame/rear end contact area
2. Unbolt cable routing clips in sidearm: turn two upper ones by 90°, loosen lower one
3. Remove shift cable and housing: you can pull out housing easily from headtube
4. Cut housing to correct length and insert it through chainstay opening at dropout so that it exits motor area
5. Push housing up the nylon tube through Side Arm further on into the top tube so that you can guide it out the head tube cable entry (removing TCU can help feed cable through port); loop in motor area: be careful when straightening the loop not to kink housing
6. Fine-tune housing length (if required)
7. Reinstall cable guides in Side Arm, tighten to 1 Nm
8. Reassemble shock (10 Nm upper eyelet / 23 Nm lower)
9. Connect shift cable, adjust shifting



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

Prep:

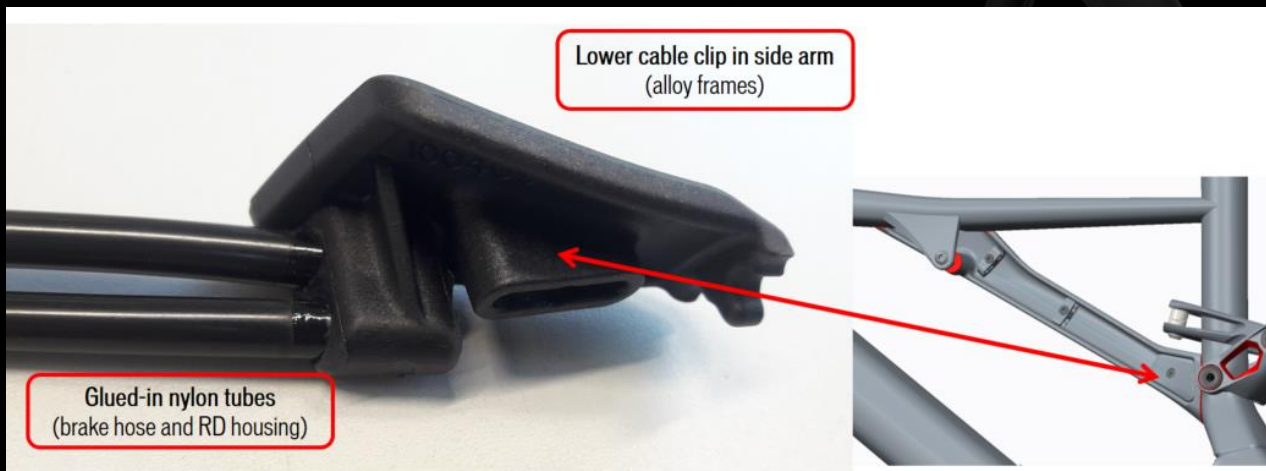
Fix bike in repair stand, clamping it at outer seatpost



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Remove shock without letting rear end drop
- Fix rear end to frame with toe strap: protect frame/rear end contact area



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Unbolt cable routing clips in Side Arm
- Turn two upper ones by 90°
- Loosen lower one



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Remove shift cable and housing
- You can pull out housing easily from headtube



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Cut housing to correct length
- Insert it through chainstay opening at dropout so that it exits motor area



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ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Push housing up the nylon tube through Side Arm further on into the top tube so that you can guide it out the head tube cable entry
- Removing TCU can help feed cable through port)
- Loop in motor area: be careful when straightening the loop not to kink housing
- Fine-tune housing length (if required)



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Reinstall cable guides in Side Arm, tighten to 1 Nm



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

- Reassemble shock
- 10 Nm upper eyelet
- 23 Nm lower eyelet



LEVO TECH & SERVICE

ALLOY FRAMES: SHIFT HOUSING REMOVAL & INSTALLATION

Connect shift cable, adjust shifting



MY19 TURBO LEVO FSR

Brake Hose Removal & Installation

LEVO TECH & SERVICE

REAR BRAKE

- REAR BRAKE
- REAR DERAILLEUR
- DROPPER POST ROUTING
- TCU - MOTOR
- TCU - REMOTE
- SPEED SENSOR
- MOTOR – BATTERY CONNECTOR



LEVO TECH & SERVICE

REAR BRAKE HOSE REMOVAL & INSTALLATION

Prep: Fix bike in repair stand; remove rear wheel; alloy frames: remove shock/fix rear end to seat tube and remove Side Arm cable guides; unscrew rear brake cable guide at seatstay; remove brake (hose) according to brake manufacturer manual (pull out from chainstay)

1. Prepare brake to insert hose through chainstay at caliper so that it comes out at front of chainstay - make sure brake fluid does not spill onto parts or into frame
2. Push up hose through nylon tube in motor area
3. Guide hose through up Side Arm and out of cable port entry in head tube (removing TCU can help feed the hose)
4. Reassemble brake
5. Reassemble parts: rear brake cable guide at seatstay (0.8 Nm); Side Arm cable guides (1 Nm); shock (10 Nm upper eyelet / 20 Nm lower); rear wheel 15 Nm
6. Bleed and adjust brake

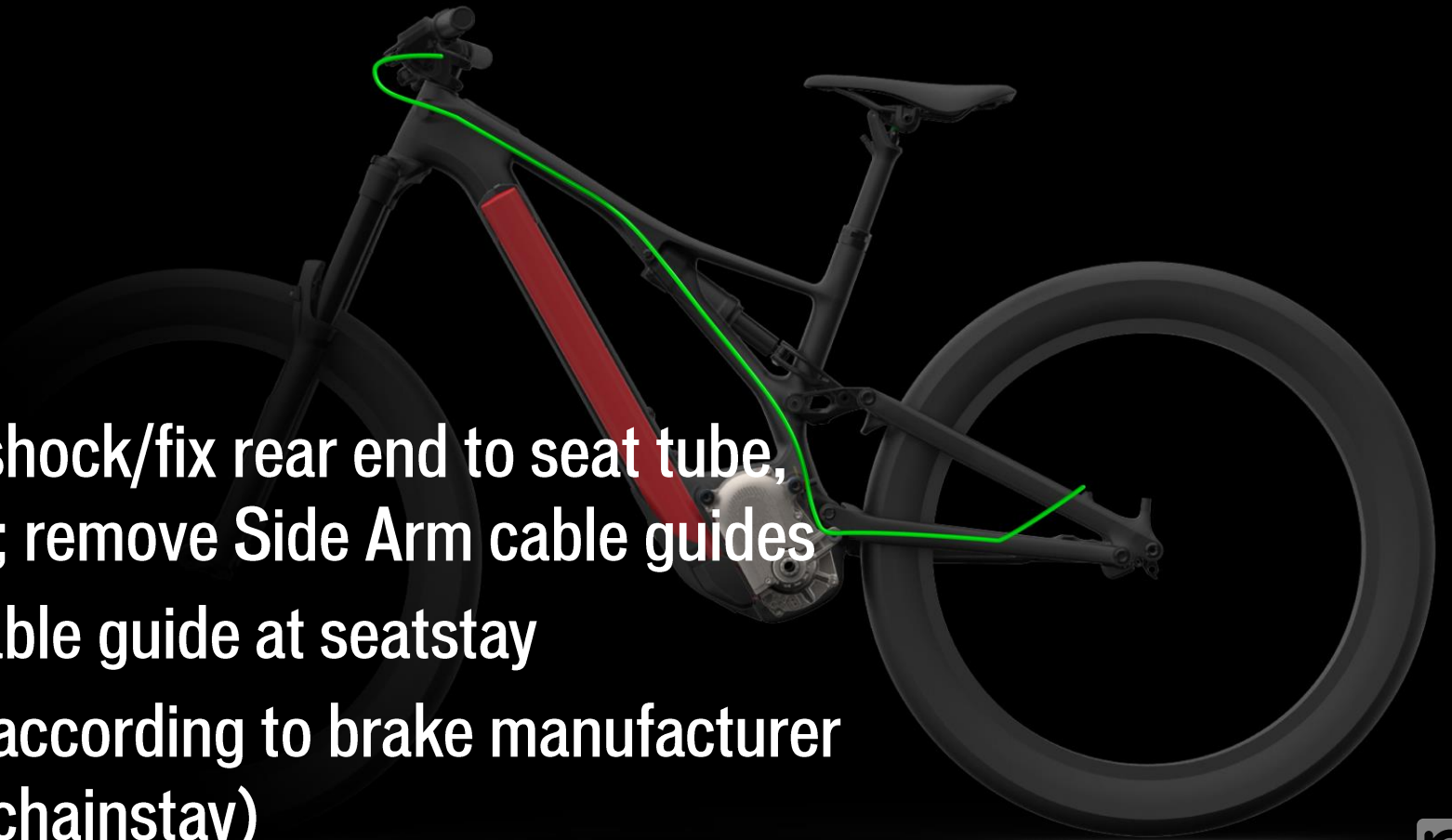


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REAR BRAKE HOSE REMOVAL & INSTALLATION

Prep:

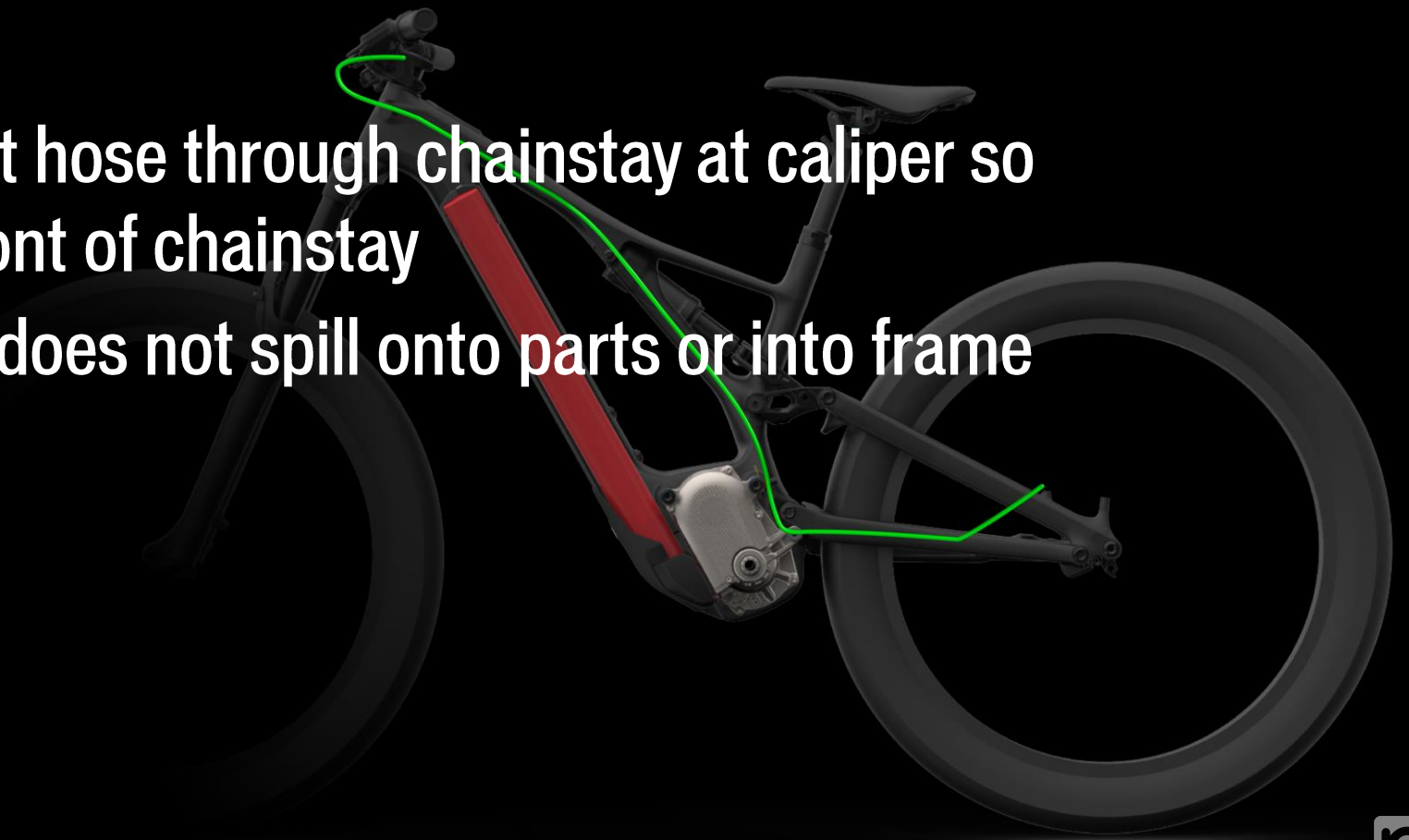
- Fix bike in repair stand
- Remove rear wheel
- Alloy frames: remove shock/fix rear end to seat tube, protecting all surfaces; remove Side Arm cable guides
- Unscrew rear brake cable guide at seatstay
- Remove brake (hose) according to brake manufacturer manual (pull out from chainstay)



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REAR BRAKE HOSE REMOVAL & INSTALLATION

- Prepare brake to insert hose through chainstay at caliper so that it comes out at front of chainstay
- Make sure brake fluid does not spill onto parts or into frame

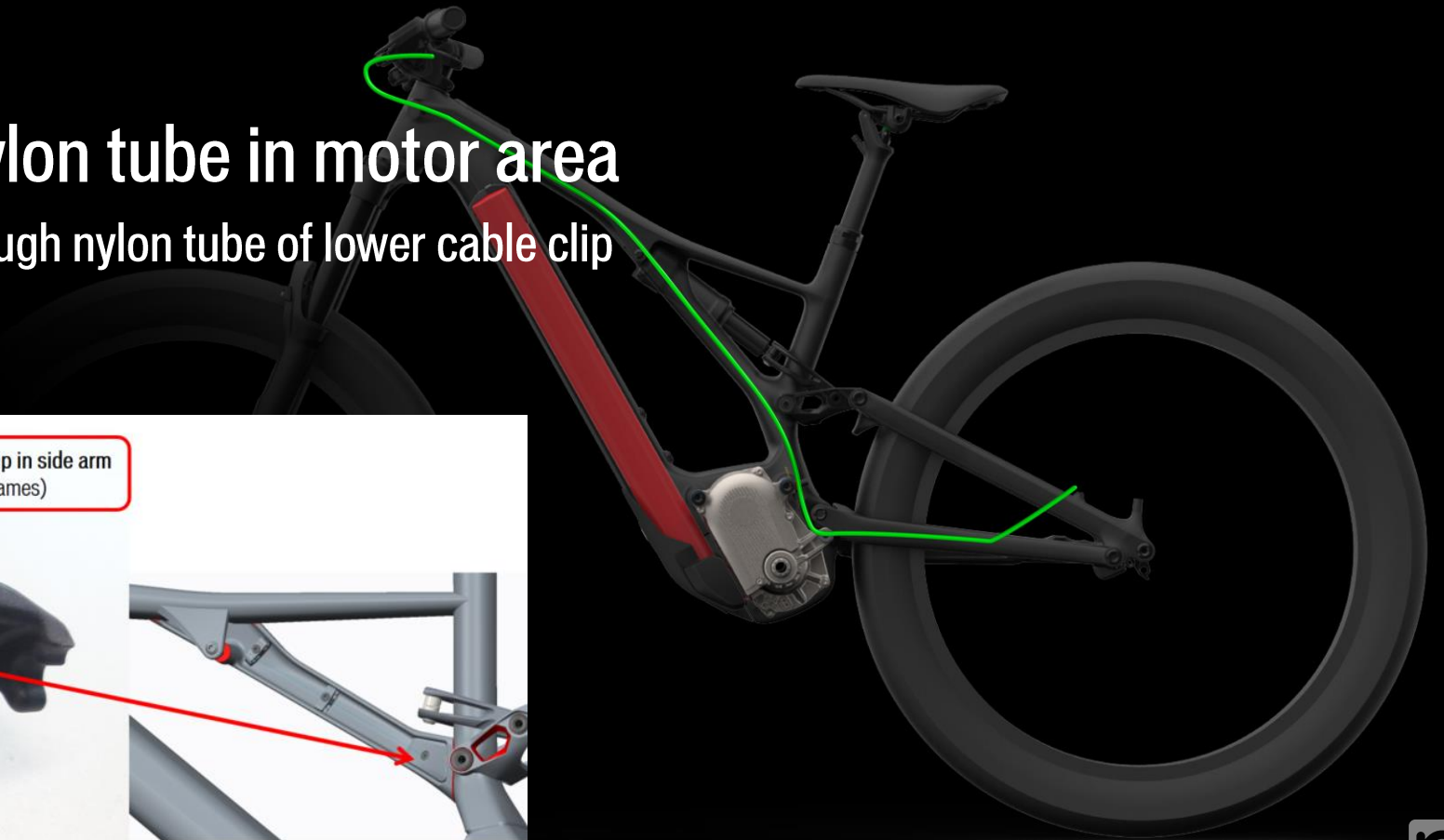
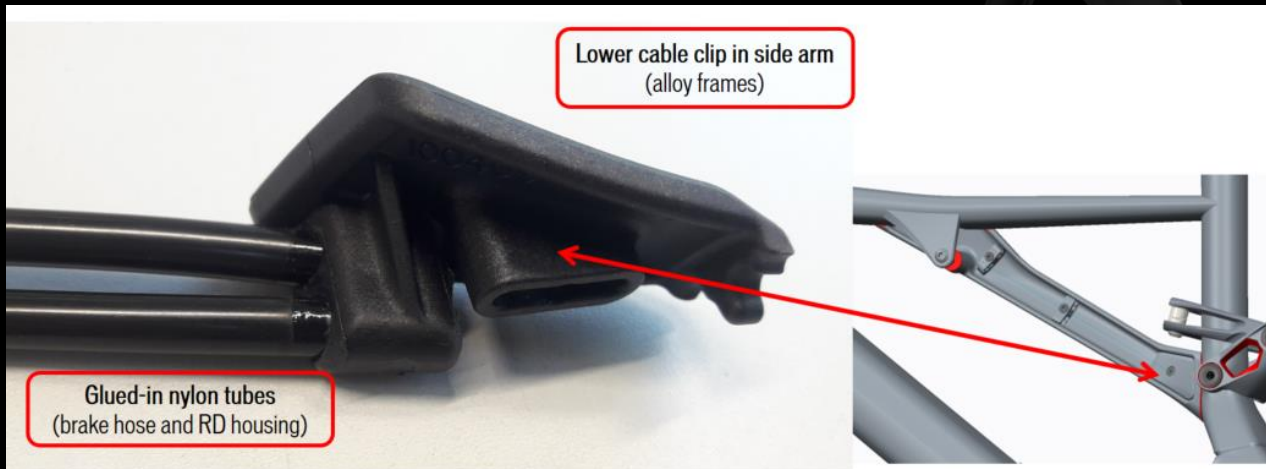


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REAR BRAKE HOSE REMOVAL & INSTALLATION

Push up hose through nylon tube in motor area

Note for alloy frames: hose runs through nylon tube of lower cable clip



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REAR BRAKE HOSE REMOVAL & INSTALLATION

- Guide hose through up Side Arm and out of cable port entry in head tube
- Removing TCU can help feed the hose



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REAR BRAKE HOSE REMOVAL & INSTALLATION

Reassemble brake



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REAR BRAKE HOSE REMOVAL & INSTALLATION

Reassemble parts:

- Rear brake cable guide at seatstay (0.8 Nm)
- Side Arm cable guides (1 Nm)
- Shock (10 Nm upper eyelet / 20 Nm lower)
- Rear wheel (15 Nm)



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REAR BRAKE HOSE REMOVAL & INSTALLATION

Bleed and adjust brake



TURBO LEVO COMPONENTS

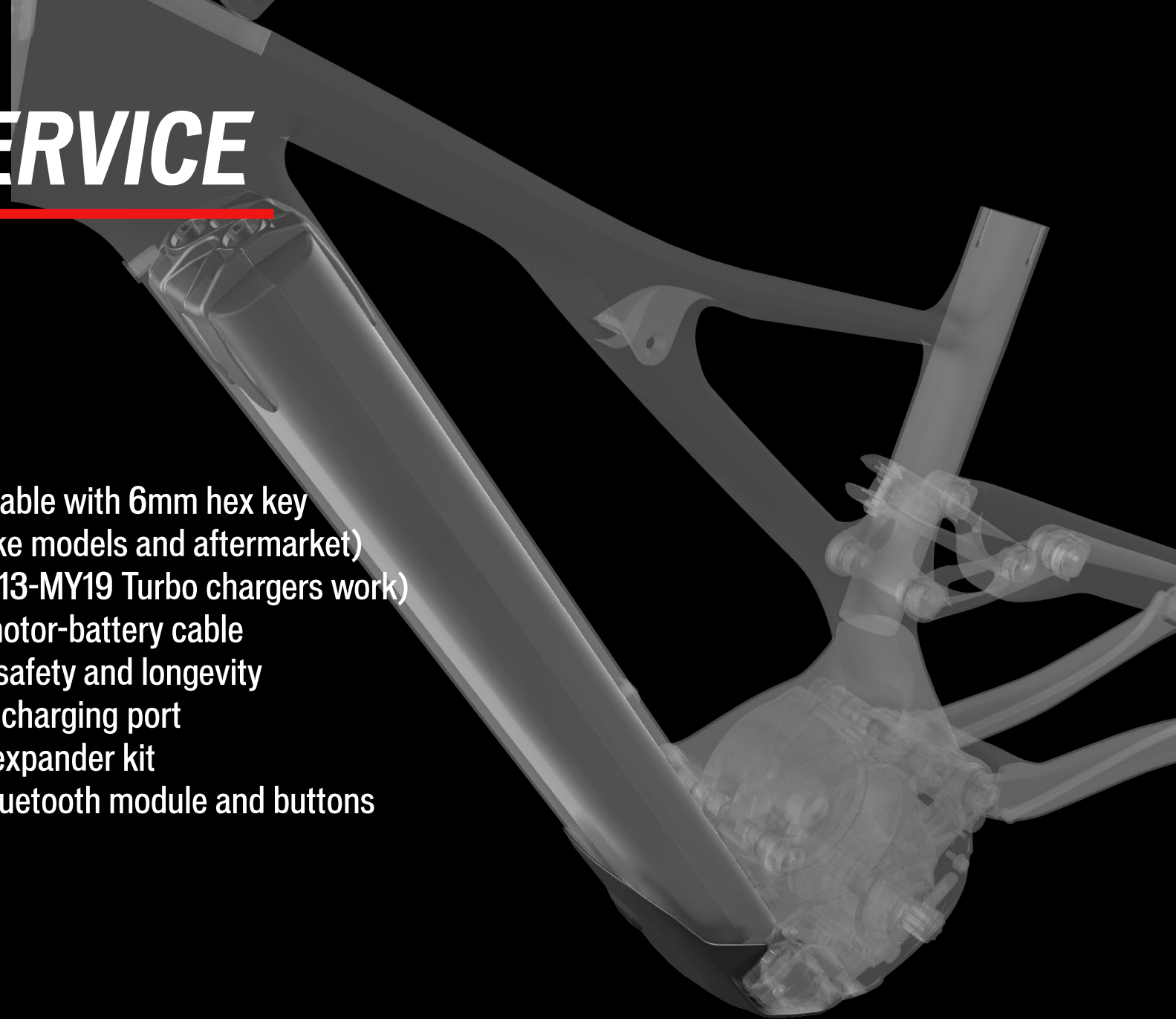
The Battery

LEVO TECH & SERVICE

BATTERIES

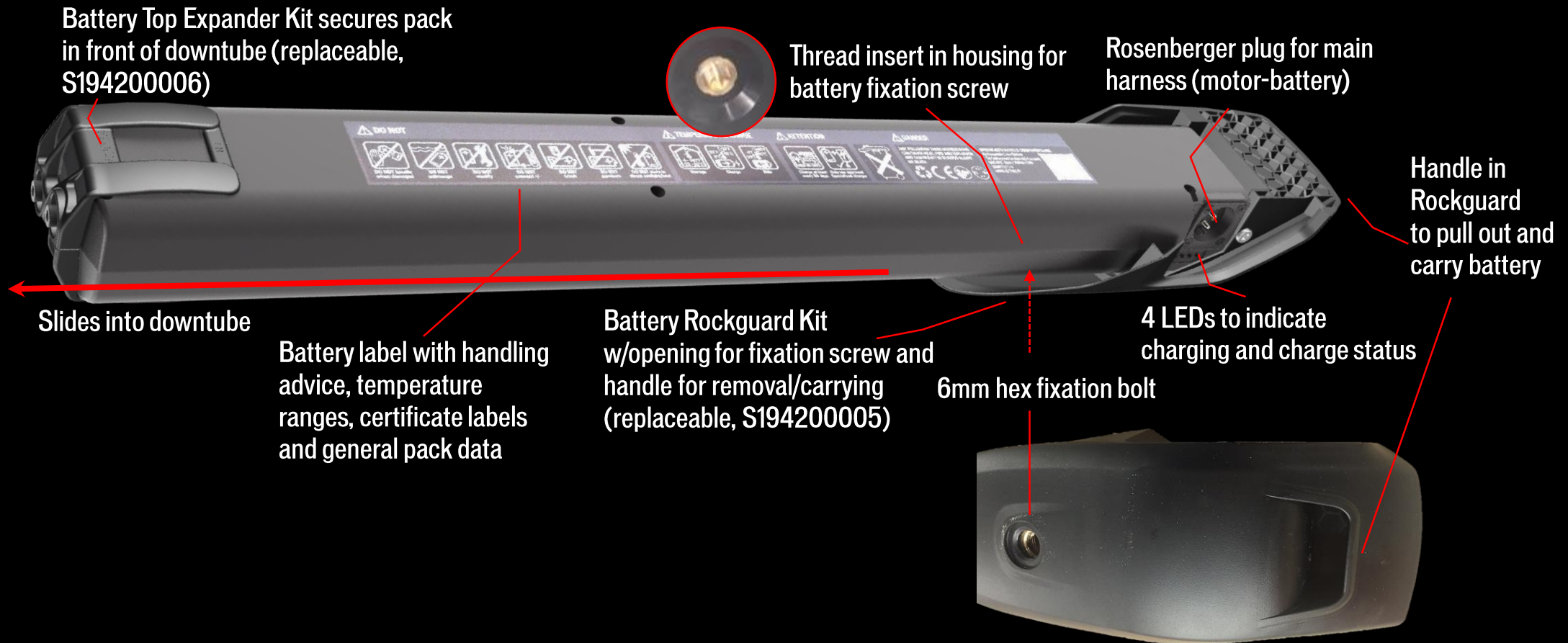
Key Functions & Properties

- Fully integrated into downtube, removable with 6mm hex key
- 700 Wh and 500 Wh version (with bike models and aftermarket)
- Internal and external charging (all MY13-MY19 Turbo chargers work)
- 36V power supply to motor through motor-battery cable
- Controlled by BMS for a maximum of safety and longevity
- Indicates charging through 4 LEDs at charging port
- Features replaceable rock guard and expander kit
- Versus Levo Gen1: does not include Bluetooth module and buttons (intelligence moved to TCU)



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BATTERIES - CONSTRUCTION AND REPLACEABLE PARTS



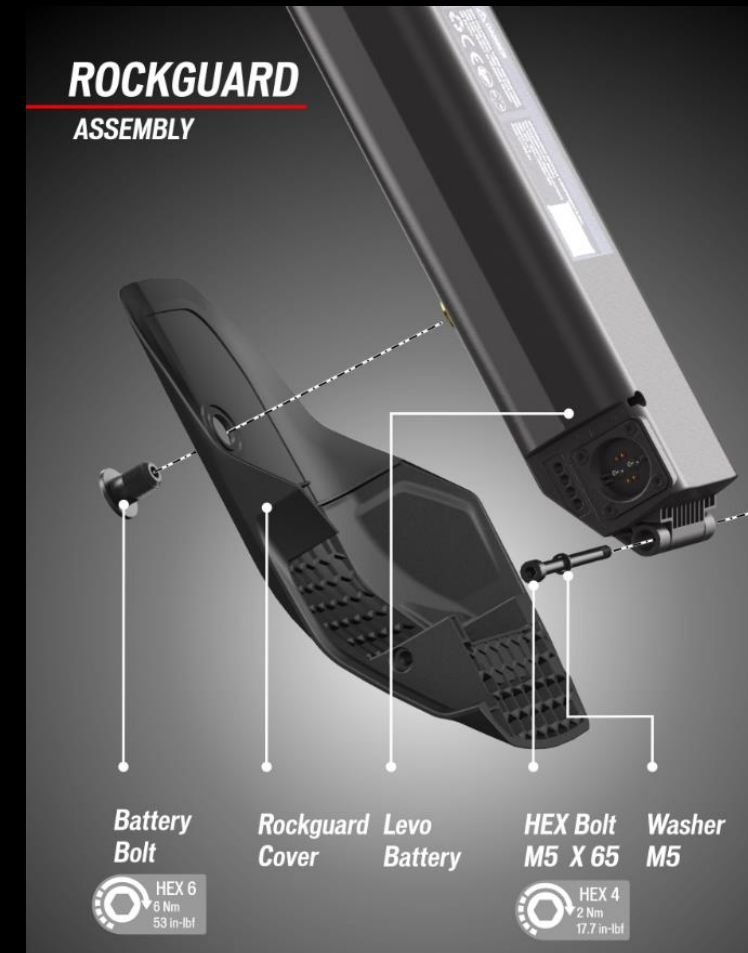
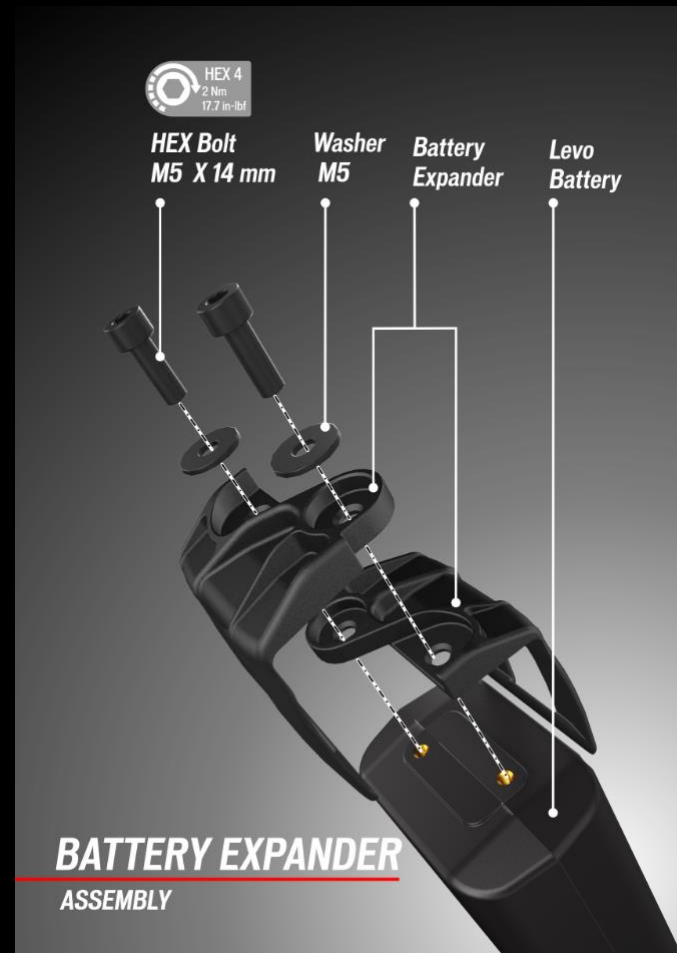
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BATTERIES - ROCKGUARD AND EXPANDER KIT REPLACEMENT

- Parts are easy and quick to replace
- Have all battery parts in stock all the time
- Stick to torque settings
 - Rockguard bolt M5x65: 2 Nm
 - Expander Kit bolts M5x14: 2 Nm



Especially overtightening the rockguard bolt causes the housing to crack



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BATTERY – THREE REMOVAL METHODS

Based on the situation, there are three methods for battery removal and installation:

1. **Bike in repair stand**
 - Preferred method whenever a suitable repair stand is at hand
2. **Bike upside-down**
3. **Bike placed on its side**
 - Two methods when no repair stand is at hand

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BATTERY – REMOVAL METHOD ‘REPAIR STAND’

When to use

- Whenever there is a suitable repair stand at hand

Removal procedure

- Power bike off
- Clamp bike in repair stand (clamp at seatpost and avoid clamping at moving part of dropper post)
- Rotate cockpit down so that rear end faces up (this prevents the battery from sliding out uncontrolled)
- Disconnect main harness
- Remove battery fixation screw in downtube (6 mm hex)
- Pull battery out, using rock guard handle to pull in line with downtube



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BATTERY – REMOVAL METHOD ‘BIKE UPSIDE-DOWN’

When to use

- Whenever there is no suitable repair stand at hand
- Possible method for riders when they are at the trail head

To be considered

- This method requires user to be comfortable turning the bike upside down - bike weight is between 20 and 22.5 kg
- The bike will rest on the cockpit and the saddle
 - Depending on cockpit setup components like the Trail Remote may or may not contact the ground
 - Make sure you remove all cockpit accessories (TCD, GPS device etc.)
 - Choose even and stable ground, preferably a meadow or tarmac
 - Cushion the contact points with something soft (tip for retailers: hand out some foam tubes that come with the bike)

Removal procedure

- Almost the same as general steps - be careful to slide in battery in controlled manner



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BATTERY – REMOVAL METHOD ‘BIKE ON SIDE’

When to use

- Whenever there is no suitable repair stand at hand
- Possible method for riders when they are at the trail head

To be considered

- Choose even and stable ground, preferably a meadow or tarmac
- The battery cannot slide out completely without slightly lifting the rear end

Removal/installation procedure

- Almost the same as general steps
- Special: lift rear end up slightly for battery insertion



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BATTERY – GENERAL REMOVAL STEPS

- 1. Power bike off**
- 2. Position bike according to preferred removal method**
 - Turn bike upside down (cushion contact points of saddle and cockpit to protect components from cosmetic scratches)
 - Place bike on its side for ease of handling
 - Hang bike in work stand, cockpit pointing down
- 3. Disconnect main harness**
- 4. Remove battery fixing screw in downtube (6 mm hex)**
- 5. Pull battery out, using rock guard handle to pull in line with downtube**

LEVO TECH & SERVICE

BATTERY - GENERAL INSTALLATION STEPS

- 1. Position bike according to preferred installation method**
 - Turn bike upside down (cushion contact points of saddle and cockpit to protect components from cosmetic scratches)
 - Place bike on its side for ease of handling
 - Hang bike in work stand
- 2. Make sure battery bracket and rock guard are installed properly**
- 3. Make sure battery is clean; clean inside of downtube with soft brush**
- 4. Slide in battery in a controlled manner till hole in rock guard and frame align properly with thread in battery**
- 5. Thread in lightly greased battery fixing screw and tighten it to 6 Nm**
- 6. Reattach main harness**

MY19 TURBO LEVO FSR

The Charger

LEVO TECH & SERVICE

CHARGER

Key Functions & Properties

- Identical with chargers of first generation Levo
- 42V / 4 A
- Length: 175mm
- Width: 80mm
- Height: 40mm
- Weight incl. cabling: approx. 890g
- Charge times
 - 500 Wh: about 3.5 hours (0-100%)
 - 700 Wh: about 5 hours (0-100%)



The TCU is not on during charging, but the 4 LEDs in the battery indicate the charging and the charge level

MY19 TURBO LEVO FSR

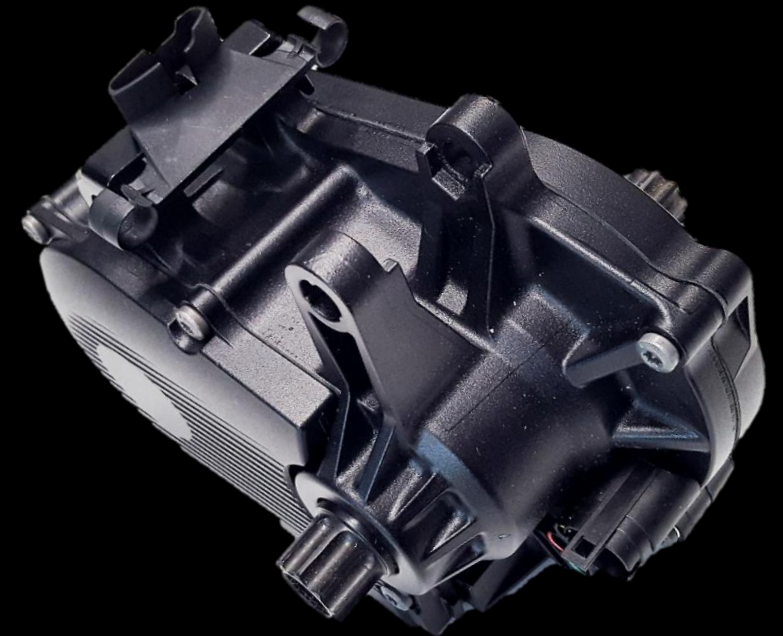
The Motor

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SPECIALIZED 2.1 MOTOR

Key Properties

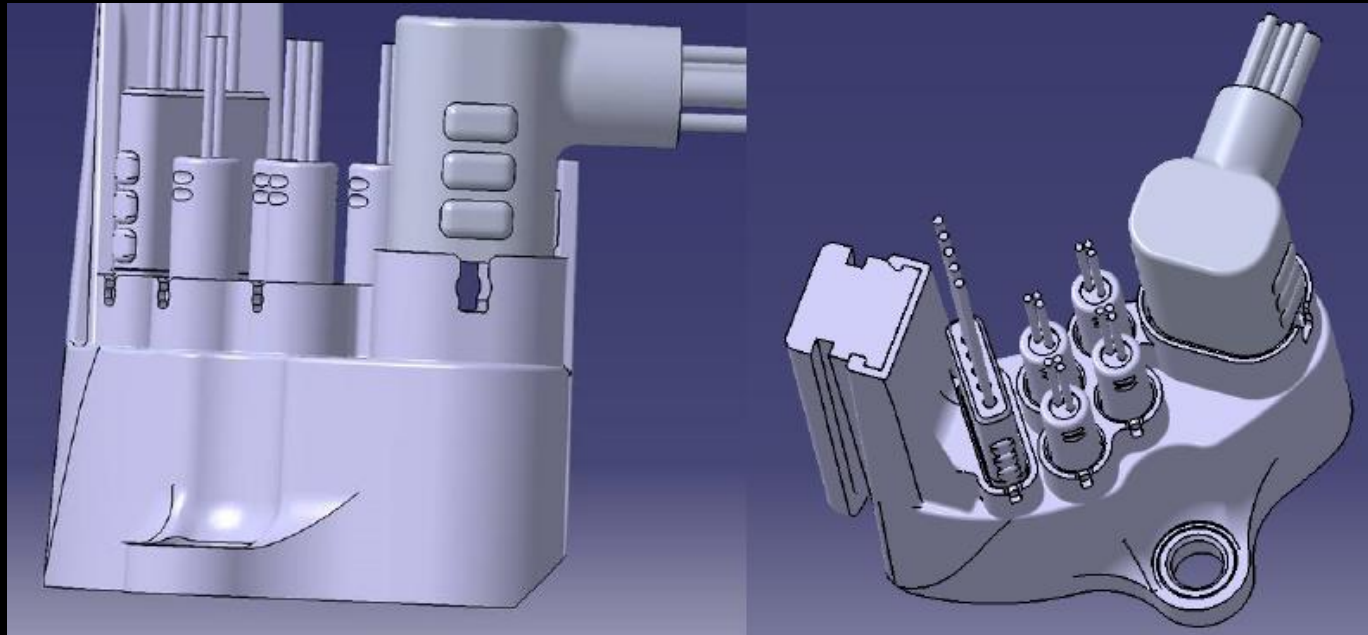
- 11% lighter due to magnesium housing: 3.0 kg instead of 3.4 kg: minus 400g
- 15% smaller (new dimensions: 197,5 x 150 x 136,5mm)
- Slightly more powerful in some cadences vs. 1.3 motor
- Direct mounting into bottom bracket area from below (no additional brackets)
- New socket design
- Light port output: 12V/24W, 2A max. (previous 1.3 motor was 6V/2A max.)
- Motor cover: only 1 cover needed, attached to motor, less prone to creaking
- IP56 ingress protection rating and double sealed bearings on both sides of unit (still, do not pressure wash)



LEVO TECH & SERVICE

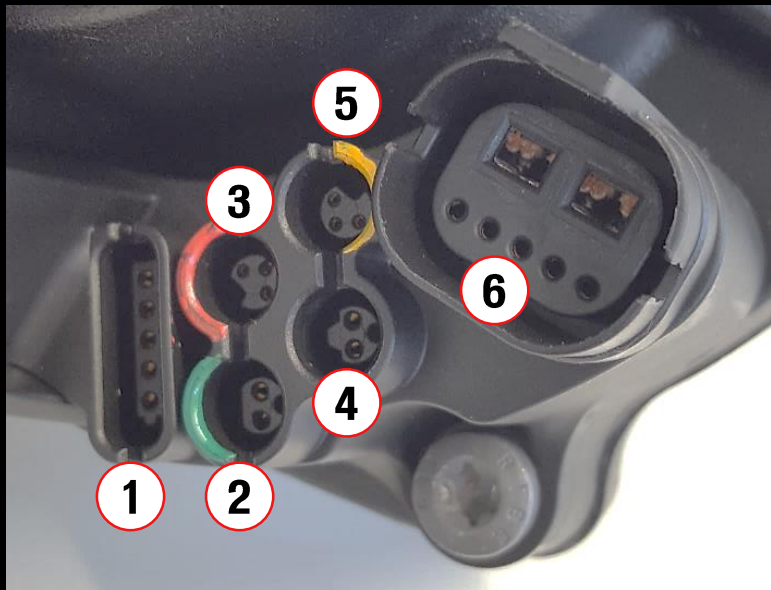
2.1 MOTOR - NEW SOCKET DESIGN

- 90° battery plug for easier cable routing with reinforced fixation hook on socket and plug
- New 3 PIN e-Bike connector (brake sensor, gear sensor)
- New sealings with different colors for easier assembly



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2.1 MOTOR - PORTS AND BLIND PLUGS



Used ports

- 1 - TCU (Turbo Connect Unit)
- 4 - Speed Sensor
- 6 - Battery

Unused ports (covered with blind plugs)

- 2 - Front Light
- 3 - Rear light/brake light
- 5 - E-Bike



Important: All unused ports need to be closed with blind plugs! Picture shows standard setup with blind plugs covering ports 2, 3 and 5

MY19 TURBO LEVO FSR

Motor Removal & Installation

LEVO TECH & SERVICE

MOTOR REMOVAL & INSTALLATION - GENERAL NOTES

What this manual covers:

- The following instructions cover the removal and installation of the Brose 2.1 motor drive unit on all MY 2019 Specialized Levo bicycles

Expected Service Time (EST):

- EST is the time that the entire service should take, assuming the mechanic has all proper tools, a clean and organized work area, no distractions and no unforeseen problems
- Proficient: 20-30 minutes
- First time: 45-60 minutes

LEVO TECH & SERVICE

MOTOR REMOVAL/INSTALLATION - TOOLS AND SUPPLIES

- Park Tool BBT-18 and 36mm spanner (or Shimano TL UN-98)
- Chain whip
- Universal 2-jaw puller with swiveling jaws (e.g. Kukko 41-1)
- Brose spline cover (S175300006)
- Flatbed and needle nose pliers
- M8x40 bolt, washer and matching tool
- 3/5/6/8 mm allen keys (8mm requires long lever)
- Torque wrenches for 0.8-40 Nm
- Torque bits: 3/5/6/8 mm hex and T10 bits
- Mallet
- Zip tie, ideally reusable
- Open foam tube (keep when unboxing Specialized bike)
- Piece of cloth
- Grease
- Medium-strength screw lock



TURBO LEVO

MOTOR - REMOVAL

PREPARATORY STEPS

Put bike in repair stand, clamp at outer seatpost (if required, cover seatpost with foam tube to prevent scratches)

Power bike off, unplug harness from battery

Remove battery fixation screw in underside of downtube, then pull battery out of downtube, using the handle in the rock guard; set battery aside

Remove rear wheel

TOOL

repair stand

by hand

6mm allen

6mm allen



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Optional and recommended: Remove chain guide (chain whip engages better when removing spider lock ring)

Remove chain from chainring

Take off crank arms (self-extracting)

TOOL

5mm allen

by hand

long 8mm allen
- L shape



LEVO TECH & SERVICE

MOTOR - REMOVAL



OPERATION

Remove spider
lock ring

TOOLS

Park Tool BB T18 or Shimano TL-UN
98 + matching wrench, chain whip



LEVO TECH & SERVICE

MOTOR - REMOVAL



OPERATION

Remove spider w/chainring
(ensure that puller arms are
securely contacting spider on
recessed areas between spider
arms)

TOOLS

2 arm puller + puller
spindle tool (if
needed), Brose
spline cover
(S175300006)



Not using the spline cover can damage motor bearings!



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Remove non-drive-side motor cover

TOOL

3mm allen



LEVO TECH & SERVICE

MOTOR - REMOVAL

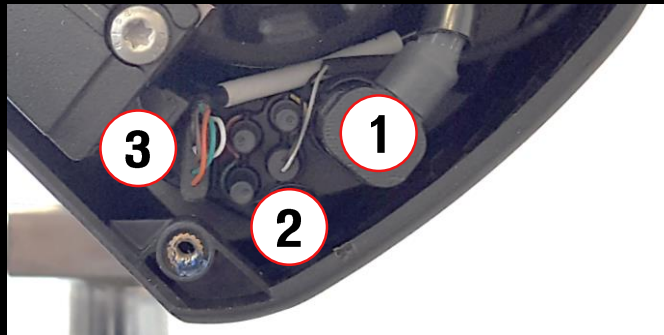
OPERATION

Disconnect all motor cables without pulling at the cables

1. Motor-Battery cable
2. Speed Sensor
3. Turbo Connect Unit

TOOL

Flatbed or
needle nose
pliers



Be careful not to damage cables or connectors



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Reason for shock removal: lower motor mount bolts become accessible by moving up chainstays

Remove upper shock mounting bolt and, holding the shock, carefully let the rear end down to its lowest position, making sure no damage is done to the frame, neither by shock nor shock link

TOOL

5mm allen



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Protect the downtube at shock contact point and the seat tube where the shock link touches

Fix rear end to seat tube in highest position

TOOL

Piece of foam and cloth

Zip tie or toe strap



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Remove main pivot axle

Note: This step is recommended, but may not be needed on all bikes. Removing the main pivot axle allows easier access to the rear motor mount bolts and should be considered individually for the bike in service. It also depends on housing lengths and adjustability

TOOL

6mm allen



Be mindful of the two FSR bearing washers



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Loosen, but do not remove, the 4 main motor mounting bolts (2 upper screws on each side)

TOOL

6mm allen



Loosen on drive and non-drive side, do not remove yet



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Remove both motor mounting bolts
below chain stay bearings/main pivot

TOOL

6mm allen



Removing the main axle pivot makes removing these screws easier. Gently pull away the shift cable to access/remove screw



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Remove the 4 main motor bolts,
remove the upper right on last - the
motor is free now, hold it securely!

TOOL

6mm allen



Hold motor securely when removing the main bolts



LEVO TECH & SERVICE

MOTOR - REMOVAL

OPERATION

Pull the motor unit out till you can unclip brake hose and derailleur housing from slotted loops in Shadow Loop (circled).

Holding it firmly, take the motor unit out

TOOL

by hand

by hand



LEVO TECH & SERVICE

MOTOR COVER & MOUNTS - REMOVAL

OPTIONAL OPERATION

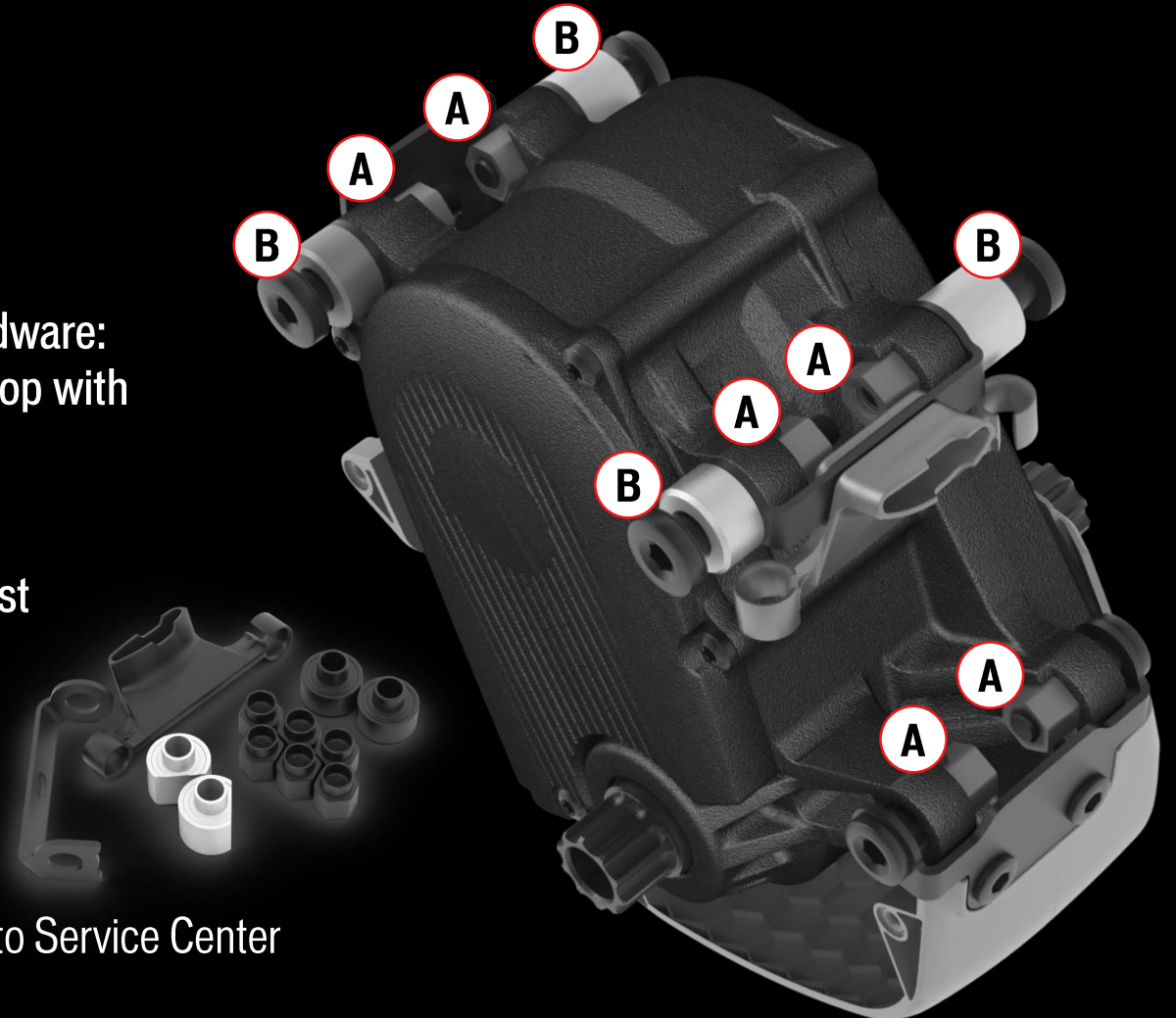
If motor needs to be shipped to a Service Center, remove all hardware: mounting inserts, cover and bracket, Command Post Shadow Loop with bracket and the three blind plugs.

6 x small insert (A) with threads for motor bolts

4x large insert (B) - hold motor cover bracket and Command Post Shadow Loop bracket



Do not forget to remove all hardware if motor is shipped to Service Center



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MOTOR MOUNTS - REMOVAL

OPERATION

Remove the 6 small inserts by threading in bolt and tapping them out carefully

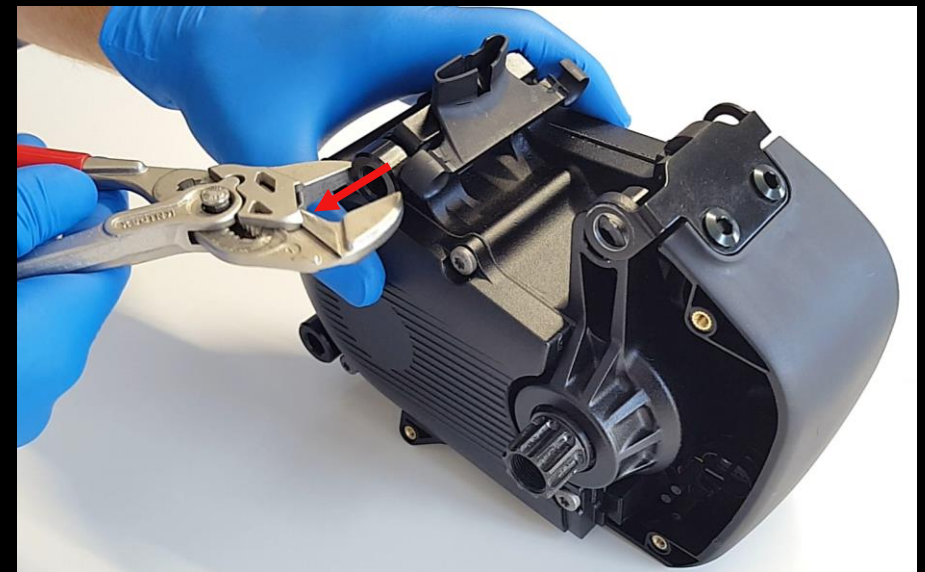
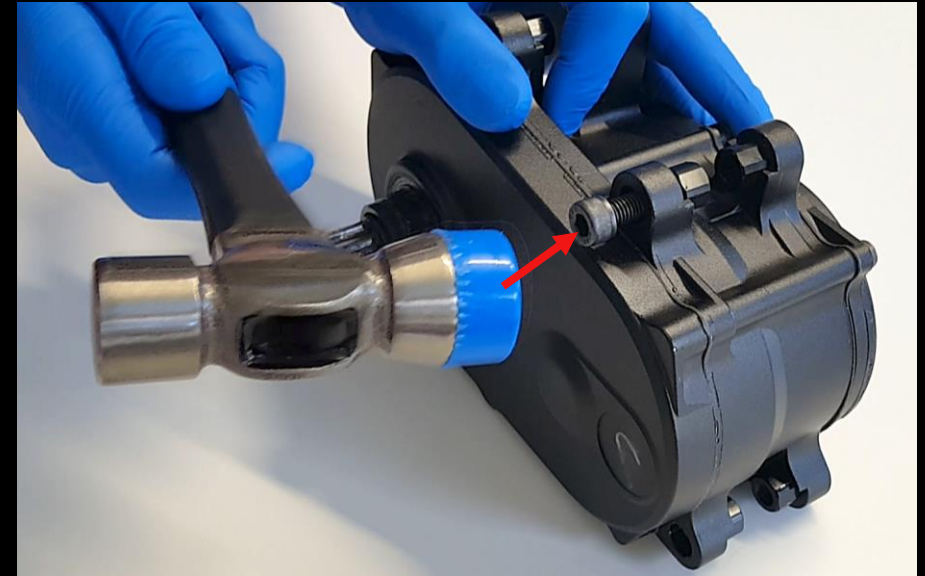
Remove the four large motor mount inserts: use smooth flatbed pliers

Removing the inserts also allows taking off the cover and the bracket holding the CP Shadow Loop

TOOL

M8x40 bolt +
mallet

flatbed pliers (no
markings) and
piece of rubber
(optional)



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MOTOR MOUNTS - REMOVAL

OPERATION

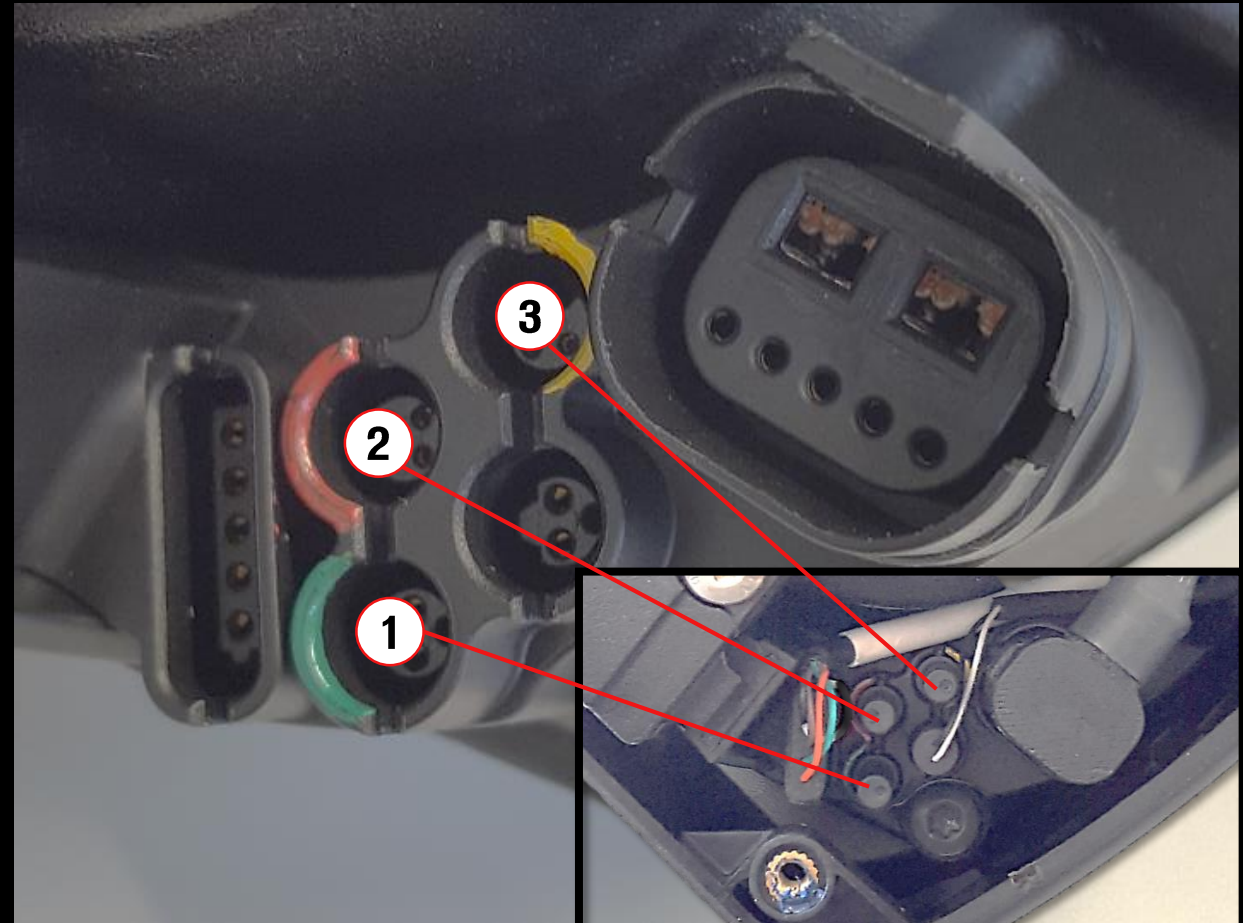
If motor needs to be shipped to a Service Center, also remove all motor blind plugs from unused ports - reinstall later in new motor

TOOL

by hand or
with pliers



Do not forget to remove all 3 blind plugs
Reinstall them in new motor
Missing blind plugs will cause failures at some point



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MOTOR MOUNTS - INSTALLATION

OPERATION

Installation of the six small motor mount inserts: clean and lightly grease surfaces, use M8 bolt to press inserts in

Installation of the four large motor mount inserts: clean and lightly grease surfaces, then press in with M8 bolt

TOOL

M8x40 bolt
and matching
tool



MY19 TURBO LEVO FSR

Motor Installation

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MOTOR - INSTALLATION

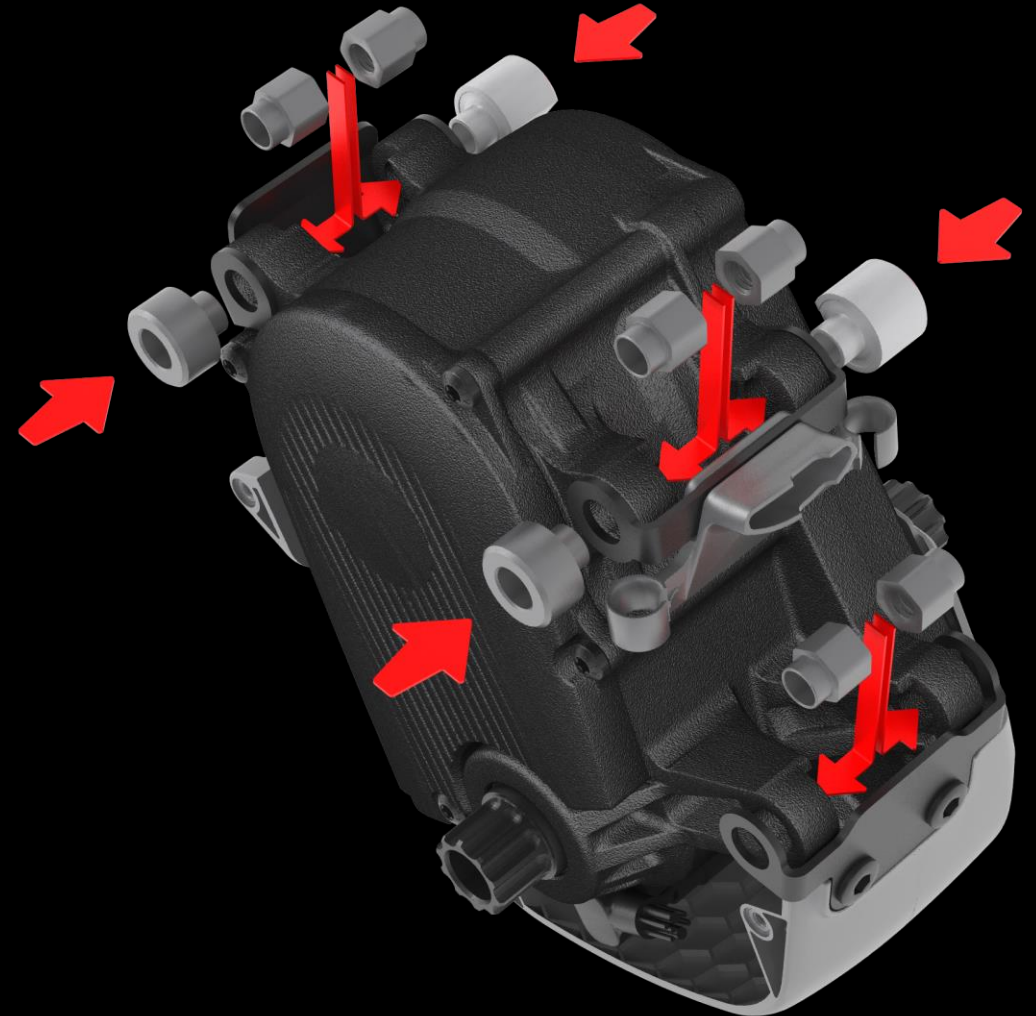
PREPARATORY OPERATIONS - 1

Before installation, make sure:

- The motor mount bolts are installed with the brackets holding the motor cover and the Shadow Loop (= dropper post cable guide)
- The 3 needed round blind plugs are installed with correct orientation on the colored ports
- Connecters are clean and dry
- All contact surfaces between frame and motor are clean and lightly greased



Do not forget to install all 3 blind plugs
Missing blind plugs will cause failures at some point



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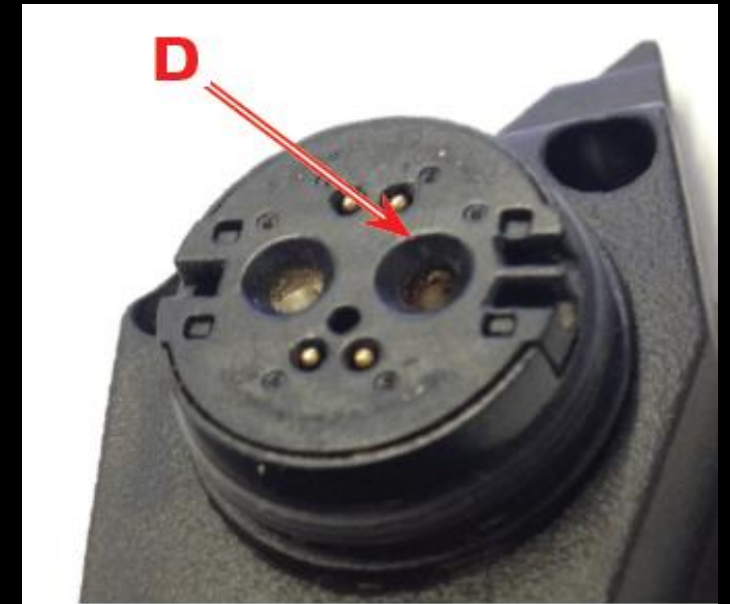
MOTOR - INSTALLATION

PREPARATORY OPERATIONS - 2

Basic cable inspection before assembly: Inspect motor-battery-cable contacts (D); if there is any evidence of arcing (burnt female connector), it must be replaced - you may need to remind the rider to power off the system before connecting/reconnecting at battery. Also visually inspect all other connectors and cables for damage (bent or broken pins, corrosion, contamination)



Inspect all cables and connectors before installation
Damaged cables/connectors and contamination is the primary source for bike issues



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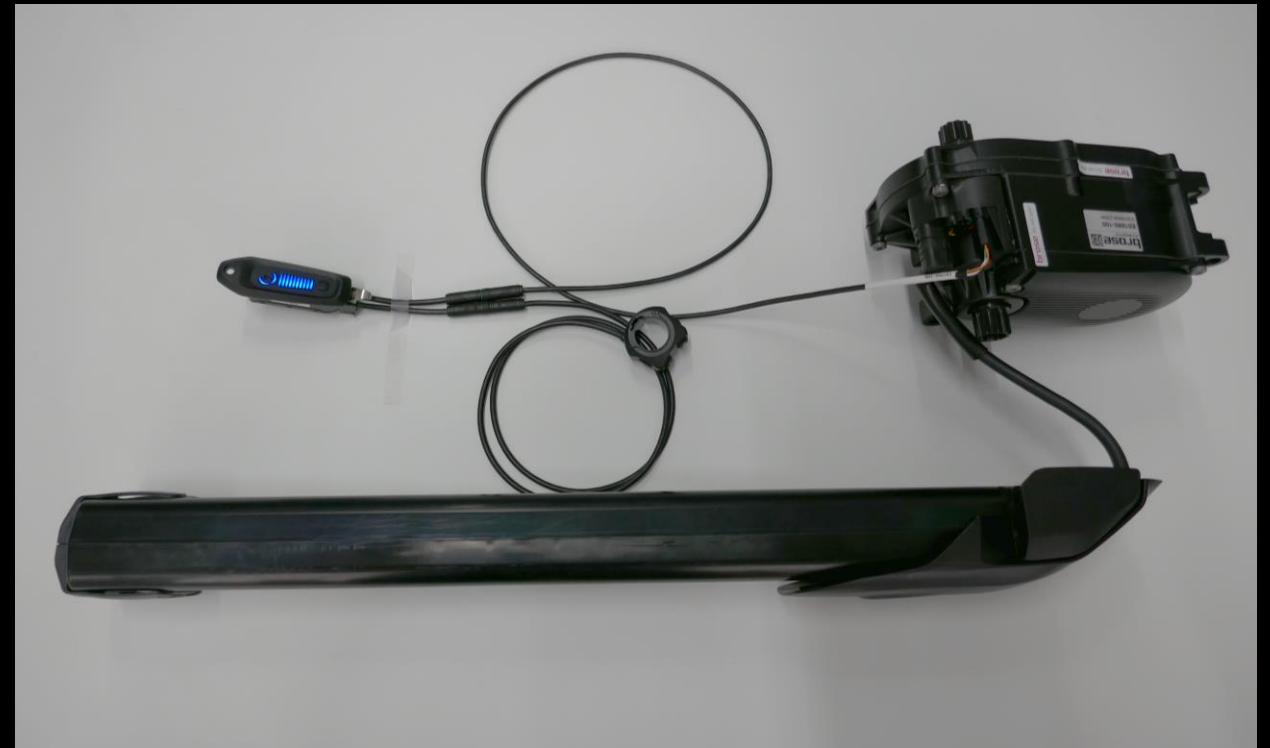
MOTOR - INSTALLATION

PREPARATORY OPERATIONS - 3

Basic motor and cable test before assembly: should you put in a new motor unit, test it by cabling externally: connect motor to battery with main harness, plug in the Turbo Connect Unit in the HMI port, connect the remote to the TCU, power on the system and keep the walk assist button pressed to see if the motor gets activated.



A so called Desktop Setup is very useful for checking parts externally - have all parts at hand all the time



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MOTOR - INSTALLATION

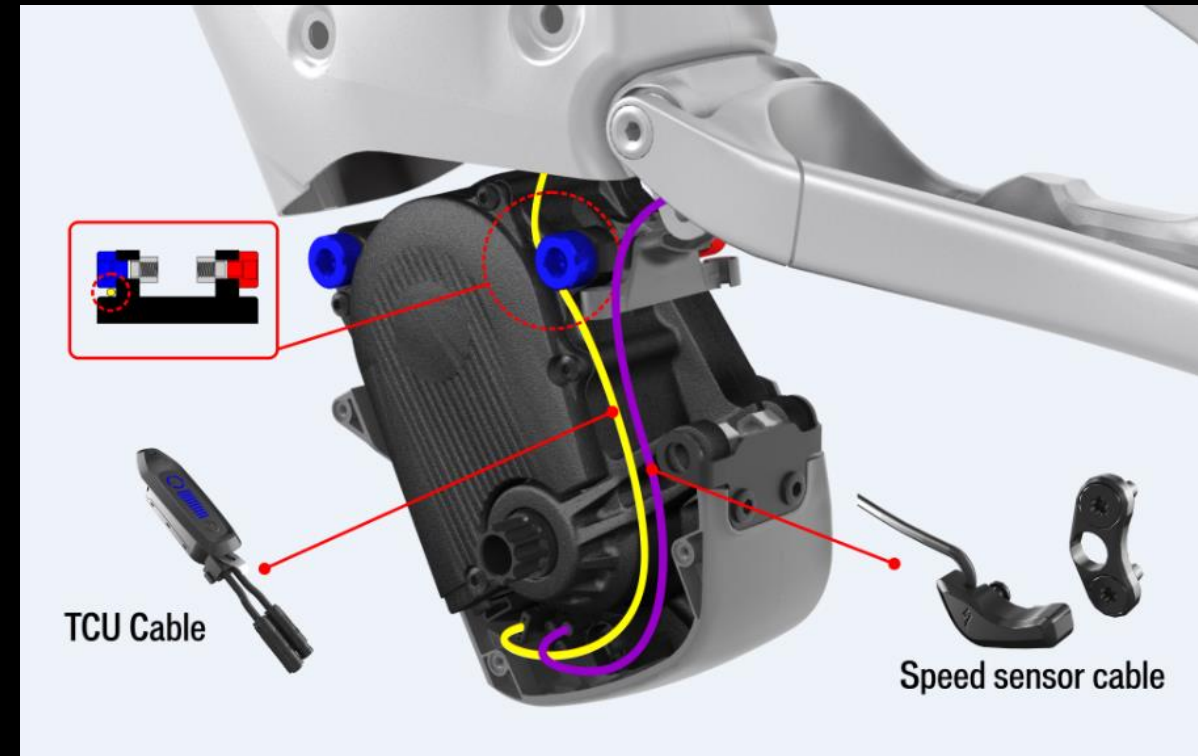
OPERATION

Put motor unit in frame, making sure:

- The dropper post housing runs under the Shadow Loop bracket
- The TCU and Speed Sensor cable are routed as shown
- No cable is squashed between motor unit and frame

TOOL

by hand



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MOTOR - INSTALLATION

OPERATION

First, fix motor with the two top motor mount screws, only tighten lightly

TOOL

by hand +
6mm allen



Apply a small amount of medium-strength screw lock to all motor mount screws



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MOTOR - INSTALLATION

OPERATION

Next, insert the two front motor mount screws, only tighten lightly

TOOL

by hand +
6mm allen



Apply a small amount of medium-strength screw lock to all motor mount screws



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MOTOR - INSTALLATION

OPERATION

Lastly, insert the two rear motor mount screws, only tighten lightly

Tip: Slightly bending/pulling out the shift housing and the brake hose makes putting the screws back in easier

TOOL

by hand +
6mm allen



Apply a small amount of medium-strength screw lock to all motor mount screws



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MOTOR - INSTALLATION

OPERATION

Tighten all motor mount bolts to 18 Nm
in a cross pattern

TOOL

6mm allen key
in torque
wrench



Always use a torque wrench



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MOTOR - INSTALLATION

OPERATION

Reassemble the main pivot axle and tighten to 13 Nm

Grease axle, pivot washers and bearings

TOOL

6mm allen key
in torque
wrench



Do not forget to reinstall both pivot washers



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MOTOR - INSTALLATION

OPERATION

Reattach all motor cables and blind plugs in this order:

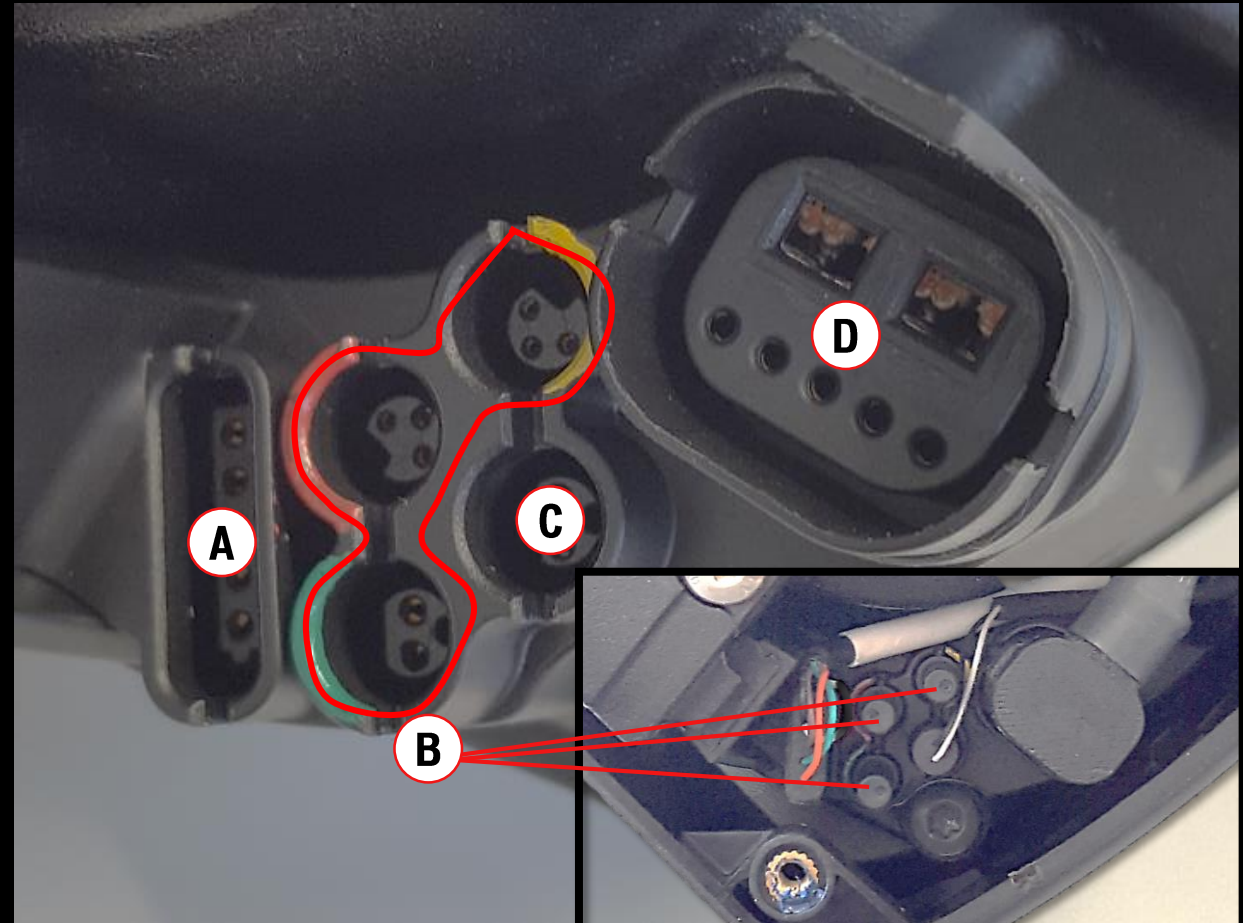
- A) TCU connector
- B) Blind plugs (cover colored ports)
- C) Speed Sensor
- D) Motor-Battery-Cable

TOOL

by hand /
needle nose
pliers



Do not forget to reinstall all 3 blind plugs



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MOTOR - INSTALLATION

OPERATION

Reattach motor cover, torque screws to 1 Nm

- Make sure the zip tie head around the battery-motor cable sits inside the cover
- Make sure cover sits evenly and does not squash Speed Sensor cable

TOOL

by hand /
3mm allen in
torque wrench



Do not overtighten cover screws, 1 Nm max. torque



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MOTOR - INSTALLATION

OPERATION

Cut zip tie at seat tube, carefully lower rear end

Reattach shock, torquing lightly greased upper shock bolt to 10 Nm

TOOL

side cutter

5mm allen key
in torque
wrench



Be careful not to damage
paint when lowering rear end



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MOTOR - INSTALLATION

OPERATION

Put some grease behind outer spindle seal on drive side

Note: This can only be done with new motor units since the seal gets pushed back once spider is installed

TOOL

grease gun



Only applies to new motor units



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MOTOR - INSTALLATION

OPERATION

Install spider/chainring

Clean and grease inner faces of spider (A+B)

Slide spider onto motor spindle motor

Grease threads and inner face of spider lock ring, then thread on to spider driver with splined BB tool

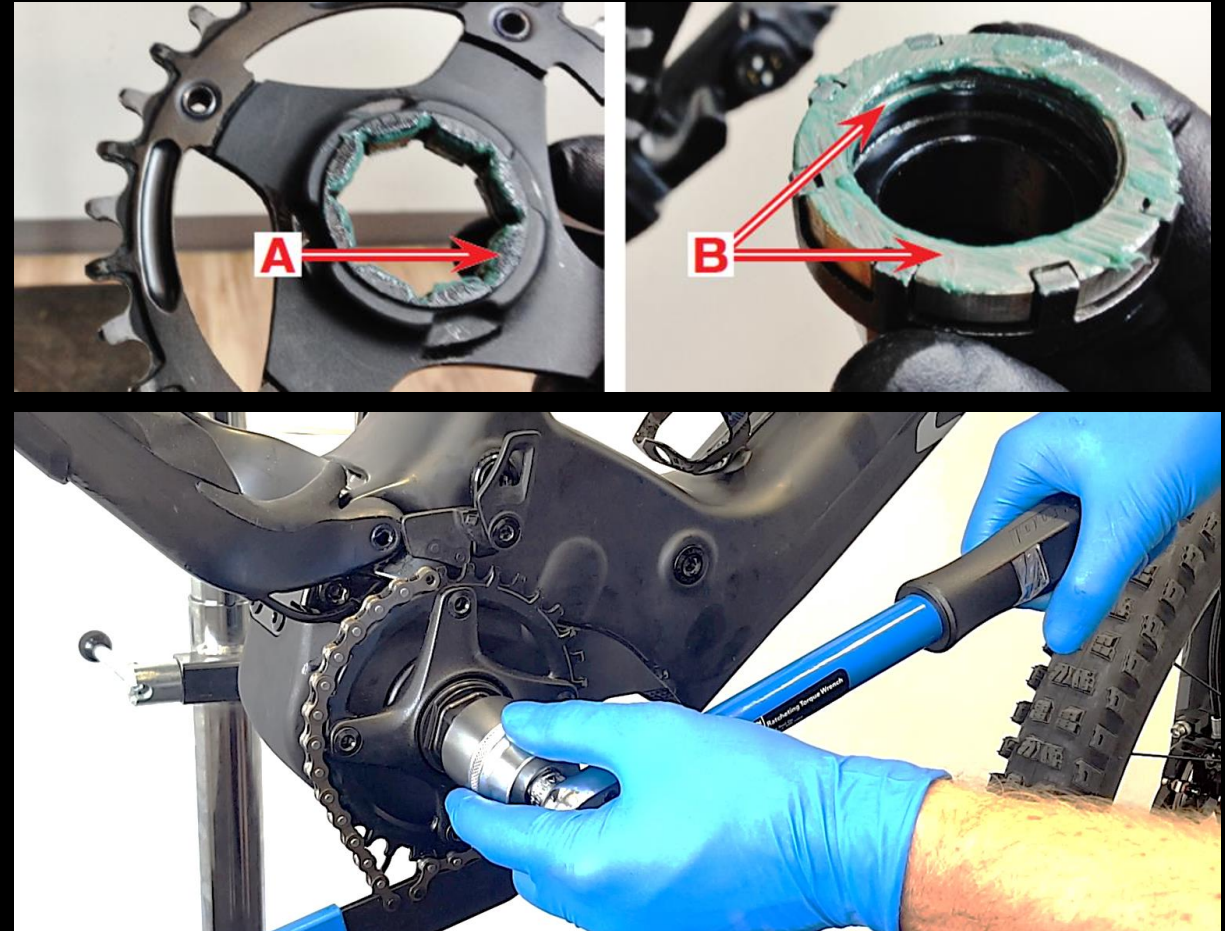
Put chain on spider

Use chain whip to hold spider and attach lock ring tool

Holding chain whip firmly, tighten lock ring to 40 Nm

TOOL

BBT 18 or TL UN-96 + wrench, chain whip



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MOTOR - INSTALLATION

OPERATION

Install rear wheel

Clean and lightly grease axle

Install axle, tighten it to 15 Nm

Release derailleur cage, shift to smallest cog

TOOL

6mm allen key
in torque
wrench



Use torque wrench for correct axle torque



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MOTOR - INSTALLATION

OPERATION

Installing cranks

Clean and lightly grease spindle

Reinstall crank arms in correct position: 180° offset and arm marked 'L' on non-drive-side, 'R' on drive side

Tighten crank arms to 40 Nm

TOOL

8mm allen in
torque wrench



Pay attention to L/R crank arm orientation



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MOTOR - INSTALLATION

OPERATION

Reinstall chain

Reinstall chain guide

TOOL

5mm allen



Do not forget to reinstall chain guide washers
Without correct washer placement, there is no functionality



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MOTOR - INSTALLATION

OPERATION

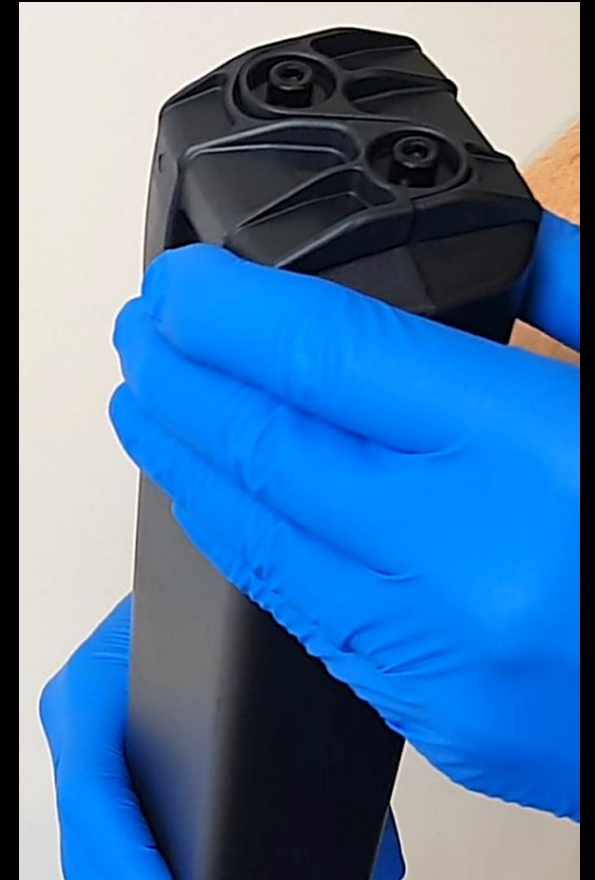
Before battery installation:

Make sure battery is clean outside and downtube is clean inside

Make sure rock guard and battery expander plug are installed correctly



Replace broken or worn battery parts



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MOTOR - INSTALLATION

OPERATION

Battery installation:

Rotate front of bike down before battery installation

Slide in battery till rock guard sits flush with frame and battery thread insert is aligned with hole in rock guard



Avoid letting the battery fall into the downtube



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MOTOR - INSTALLATION

OPERATION

Clean and lightly grease
battery fixation bolt

Thread in and tighten bolt to 6 Nm



Use a torque wrench

TOOL

6mm allen in
torque wrench



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MOTOR - INSTALLATION

OPERATION

Reattach battery plug

TOOL

by hand



Make sure the connectors are clean/dry



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MOTOR - INSTALLATION

OPERATION

Run functional test and check for firmware updates through Turbo Studio

- Turn bike on
- Switch all modes on remote and TCU
- Test walk assist
- Check motor assist
- Check for firmware updates
- Check shifting and brakes
- Test-ride bike
- Wipe down bike before handover



Do not forget to check for firmware updates



MY19 TURBO LEVO FSR

Firmware Updates

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FIRMWARE UPDATES

Easy & Quick

Download Turbo Studio from Service Website and install it on PC

- Turbo Studio is only compatible with Windows Computers
- Important: Use a Micro USB cable that is suitable for data transmission
- Connect TCU/bike to PC, run updates

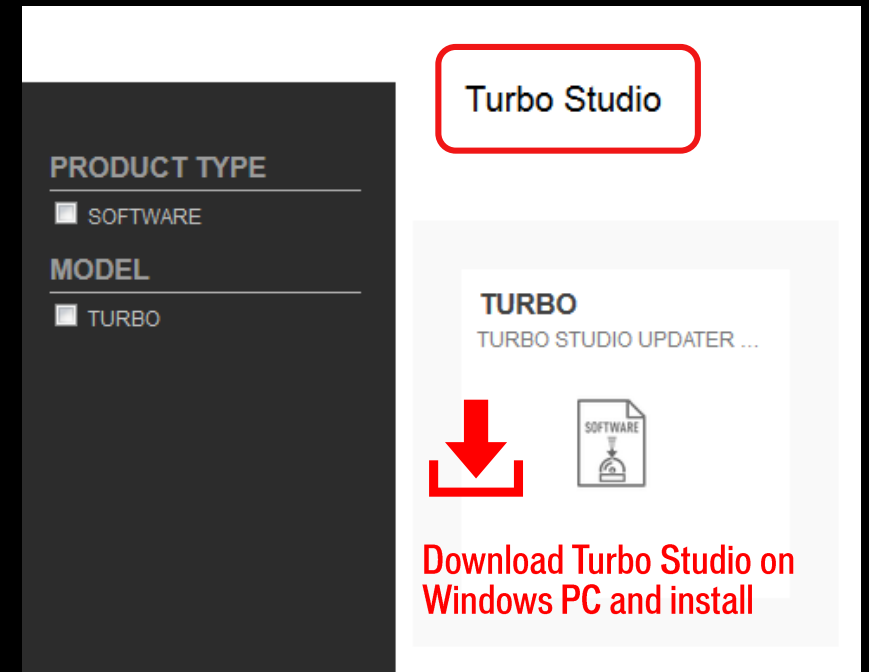
Run Turbo Studio:

1. After building bike
2. Before bike handover to customer
3. Whenever rider brings bike to service



The battery must be at least 20 % charged to run updates

Visit <http://service.specialized.com/> and log on with retailer account



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FIRMWARE UPDATES - STEPS

To update

1. Power bike off
2. Remove TCU (Torx 10)
3. Remove rubber cover, connect Micro USB cable
4. Connect USB cable to PC
5. Power on TCU
6. Start Turbo Studio
7. Check for updates, run them

After updating

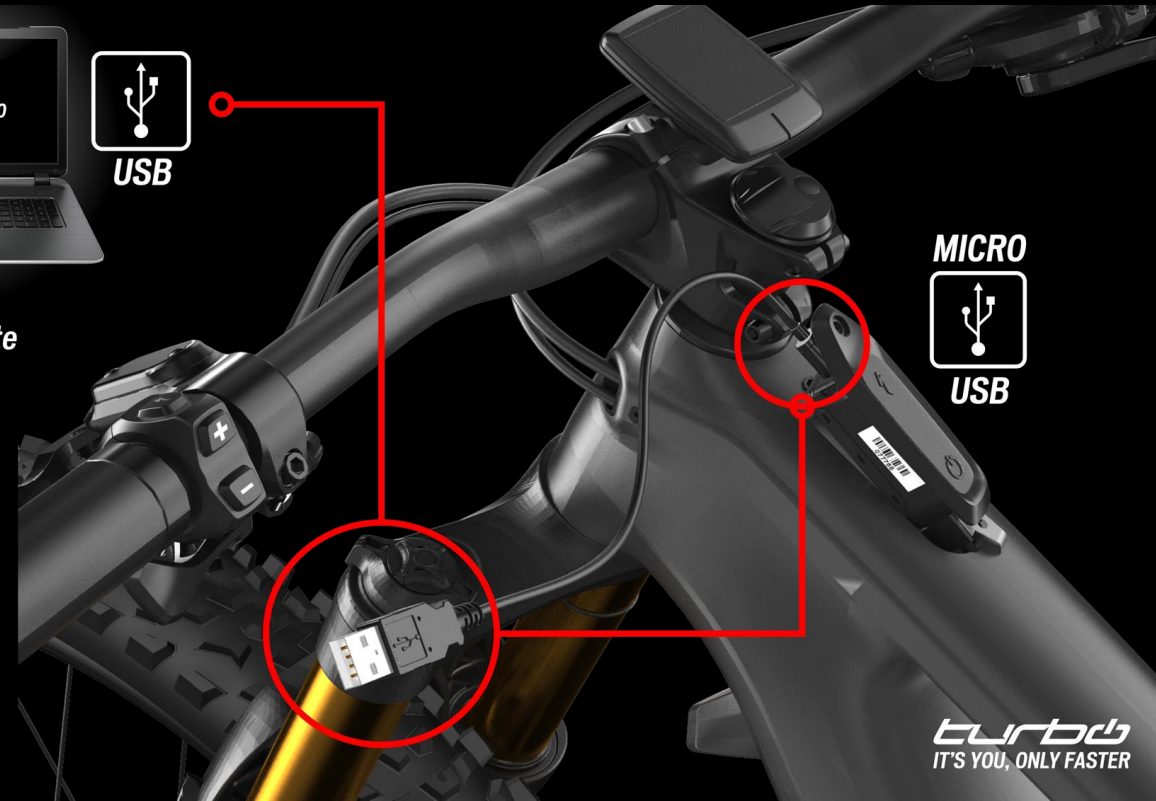
1. Remove USB cables
2. Reseal TCU USB port
3. Reinstall TCU, tighten to 0.8 Nm
4. Test functions, test ride



Not sealing the USB port can cause issues if water ingresses



Turbo Studio
Firmware Update
Software



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FIRMWARE UPDATES - TURBO STUDIO

Login

1. Username
 - Your B2B Username (without @ symbol)
2. Account number
 - Your B2B account number (without @symbol)
3. Password
 - Your B2B password

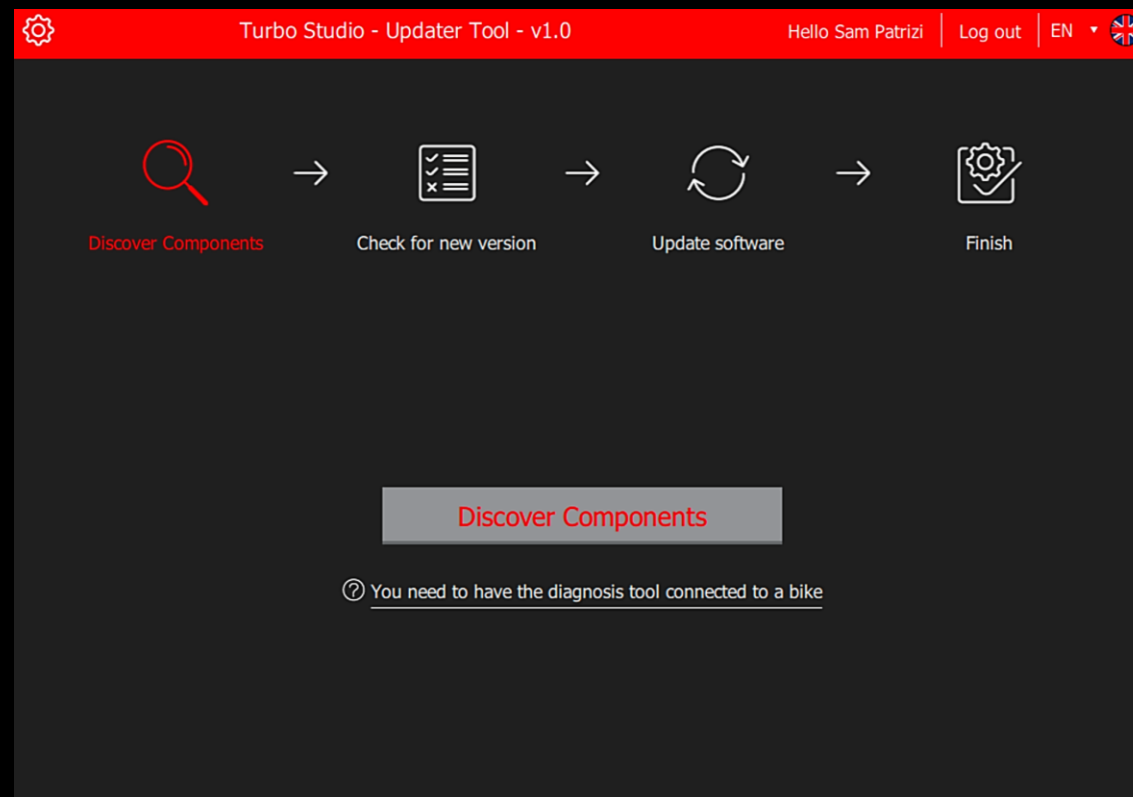
The screenshot displays the 'Turbo Studio - Updater Tool - v1.0' interface. At the top, a red header bar contains the title and a language dropdown set to 'EN' with a flag icon. Below the header, a workflow diagram shows four steps: 'Discover Components' (magnifying glass icon), 'Check for new version' (list with checkmarks icon), 'Update software' (refresh icon), and 'Finish' (gear with checkmark icon), connected by right-pointing arrows. The 'Check for new version' step is currently active. Below the workflow, there are three input fields labeled 'Username', 'Account number', and 'Password'. A red 'Login' button is positioned below these fields. At the bottom, a note states: 'Please use your Specialized B2B dealer account.'

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FIRMWARE UPDATES - TURBO STUDIO

Discover Components

To check for available updates, click on 'Discover Components'









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FIRMWARE UPDATES - TURBO STUDIO

Update Firmware




- In this screen you see if updates are available
- 'Current Firmware' shows installed firmware
- 'Latest version available' shows latest firmware
- Click on 'Update Firmware' to start update process

 Turbo Studio - Updater Tool - v1.0 Hello Sam Patrizi | Log out | EN 

 →  →  → 
Discover Components Check for new version Update software Finish



Components

Type	Current Firmware	Latest version available
Battery	0.3.1 	N/A
Motor	RSL_6.0.1 	RSL_6.0.1
Hmi	17.B.0 	18.B.0

Firmware description: Levo 2 18.B 6.0.1

Update Firmware

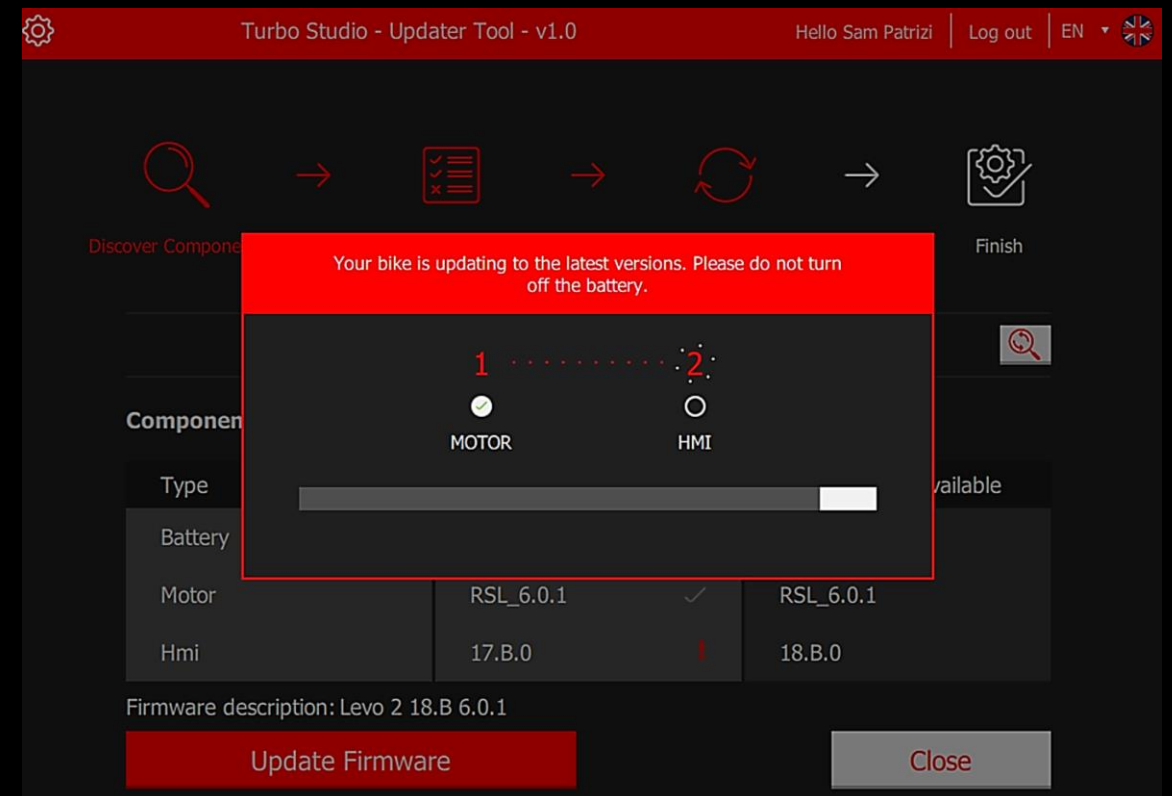
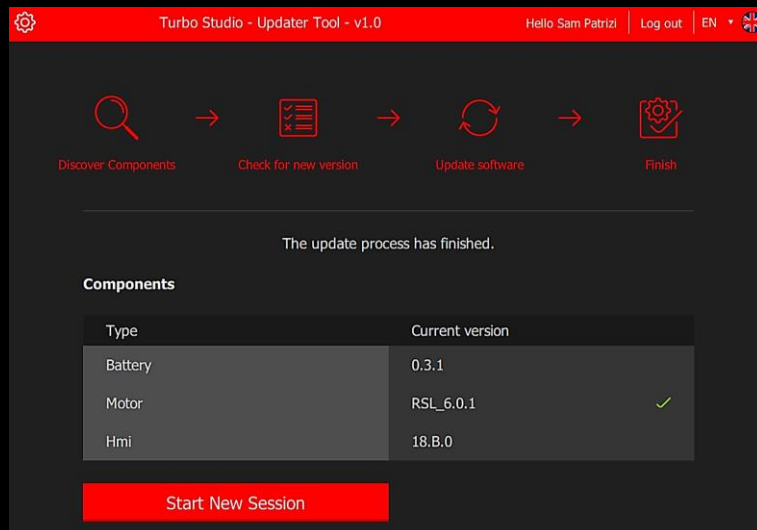
Close

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FIRMWARE UPDATES - TURBO STUDIO

Update Firmware

- Updating takes a couple of minutes
- Confirmation shows update success

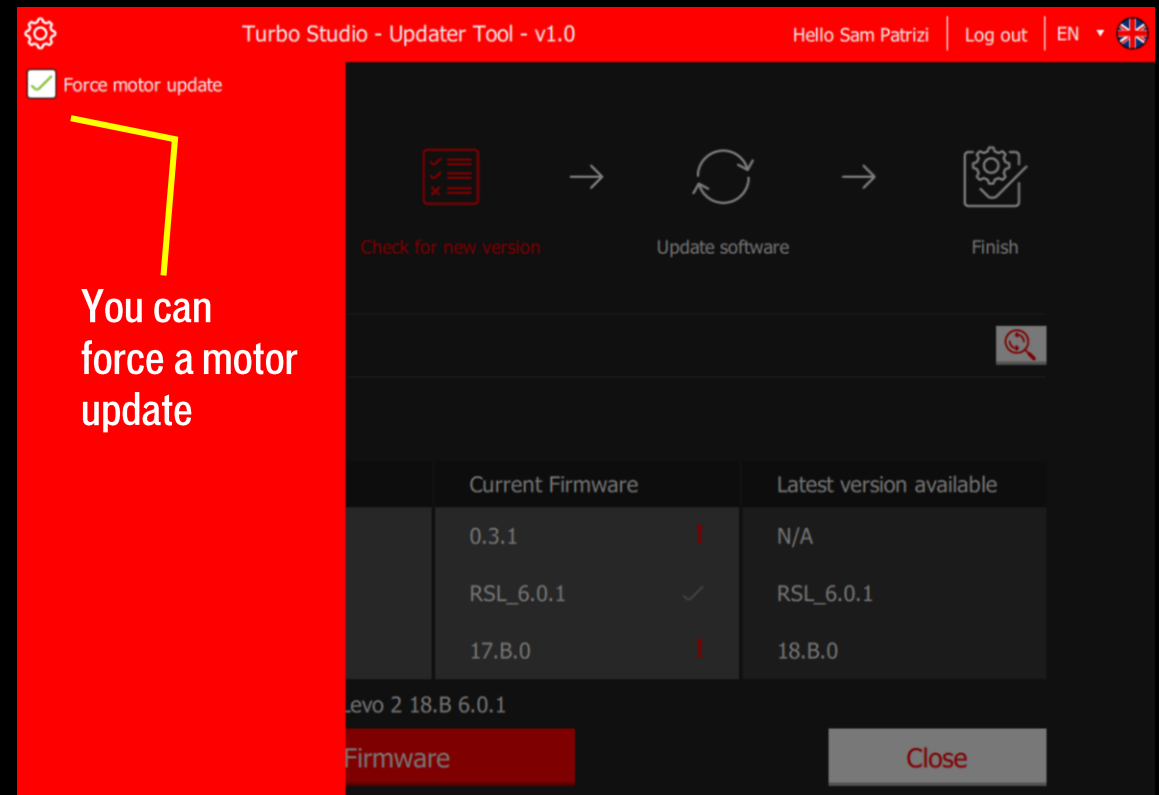


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FIRMWARE UPDATES - TURBO STUDIO

Force motor update

If you want to run a motor update even though the latest version is already installed, click on the cog symbol in the upper left corner and tick box 'Force motor update'. Then click on 'Update Firmware'.



MY19 TURBO LEVO FSR

Diagnosis & Troubleshooting

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DIAGNOSIS & TROUBLESHOOTING

General tips to avoid issues

- Always power off bike before connecting/re-connecting cables
- Connector plug at battery should be dry/clean
- Do not pressure wash - follow our guideline
- Leave battery in bike and connected when cleaning
- If washing bike w/o battery, cover battery connector
- Blind plugs need to be installed on all 3 unused motor ports
- Keep firmware up to date (Turbo Studio)
- First perform TCU factory reset if bikes behaves odd/differently



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DIAGNOSIS & TROUBLESHOOTING

Resources





- TCU / TCD: Error messages
- Mission Control App: User actions
- Turbo Studio: Service recommendations (in future)
- Guidelines: Systematic diagnosis process
- The Rider: Get all relevant information to understand issue
- Service Centers: Reach out to get service parts and further assistance

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DIAGNOSIS & TROUBLESHOOTING

Error messages - general

- TCU shows 4 basic error codes through LED combinations (decoded in manual)
- TCD shows error messages as text (e.g. battery not found)
- MC App gives out user actions for errors
- Turbo Studio will allow retailer deeper understanding of error

LED DISPLAY	MEANING	SOLUTION
	BATTERY ERROR	Try rebooting or checking Mission Control App for more info. Contact your Authorized Specialized Retailer
	BATTERY NOT FOUND	Make sure everything is connected, then reboot system
	MOTOR ERROR	Try rebooting or checking Mission Control App for more info. Contact your Authorized Specialized Retailer
	MOTOR NOT FOUND	Make sure everything is connected, then reboot system

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DIAGNOSIS & TROUBLESHOOTING – 7 STEP QUICK DIAGNOSTIC GUIDE

The following 7 steps help you to solve issues in an efficient manner, if:

THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

- Please make sure you have all needed spare parts in stock all the time
- Besides, you should have Mission Control App and Turbo Studio set up

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DIAGNOSIS & TROUBLESHOOTING - 7 STEP QUICK DIAGNOSTIC GUIDE

ISSUE: THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

STEP 1: TURN THE BIKE OFF AND ON

Does the issue persist?



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DIAGNOSIS & TROUBLESHOOTING – 7 STEP QUICK DIAGNOSTIC GUIDE

ISSUE: THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

STEP 2: DO QUICK HARDWARE DIAGNOSIS

- a. Is the battery sufficiently charged?
 - When bike is turned on, TCU must show at least one solid blue bar
- b. Is the Speed Sensor system functional?
 - Is the magnet installed on rear wheel?
 - Is the sensor in the left rear dropout installed properly?
 - Is the Speed Sensor system free of dirt?







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DIAGNOSIS & TROUBLESHOOTING – 7 STEP QUICK DIAGNOSTIC GUIDE

ISSUE: THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

STEP 3: DOES TURBO CONNECT UNIT SHOW ERRORS?

- a. Perform TCU factory reset to see if error reappears (see chapter 'TCU' or Levo manual)
 - Before that note settings in MC App so that you can restore for rider
- b. If battery or motor are not connected, TCU shows 'not found'
 - Note: message 'Battery not found' indicates a problem in the CAN communication
- c. If battery or motor have internal issue, TCU shows 'error'
 - This message does not necessarily mean motor or battery need to be replaced
 - Perform TCU factory reset
 - Turn to Steps 5a and 5b before considering motor swap
 - Try different battery when battery shows 'error'

LED DISPLAY	MEANING
	BATTERY ERROR
	BATTERY NOT FOUND
	MOTOR ERROR
	MOTOR NOT FOUND

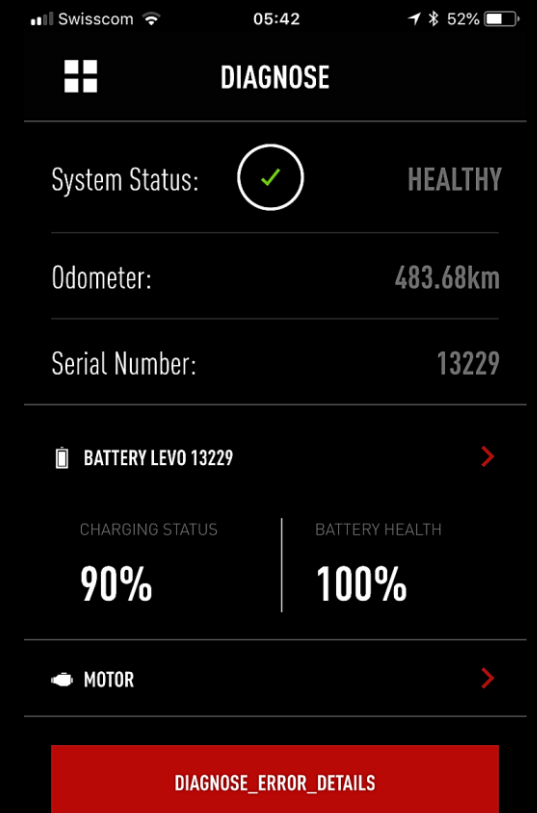
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DIAGNOSIS & TROUBLESHOOTING – 7 STEP QUICK DIAGNOSTIC GUIDE

ISSUE: THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

STEP 4: CONNECT BIKE TO MISSION CONTROL APP

- General note: if a TCU factory reset has been performed, there is no need to reset default values in the App (unless wheel circumference needs resetting)
- Check for error messages and follow them
- Restore default settings in 'Tune' on the Mission Control App (TCU factory reset preferred)
- Make sure all components are up to date (if not sure, connect to Turbo Studio)
- Ensure motor/battery data is visible in 'Diagnose'
 - If no data is shown, perform steps 5a and 5b



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DIAGNOSIS & TROUBLESHOOTING – 7 STEP QUICK DIAGNOSTIC GUIDE

ISSUE: THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

STEP 5: CHECK AND REPLACE CABLES STEP BY STEP

- a. Try new Motor-Battery cable
 - Could be faulty without visible damage and despite MC App showing firmware
 - Does battery connector show marks of burns? Pins bent/broken? Clean and dry?
- b. Try new TCU-Motor cable
 - Pins bent/broken? Clean and dry?
- c. Try new Speed Sensor cable
 - Could be faulty without visible damage
 - Pins bent/broken? Clean and dry?



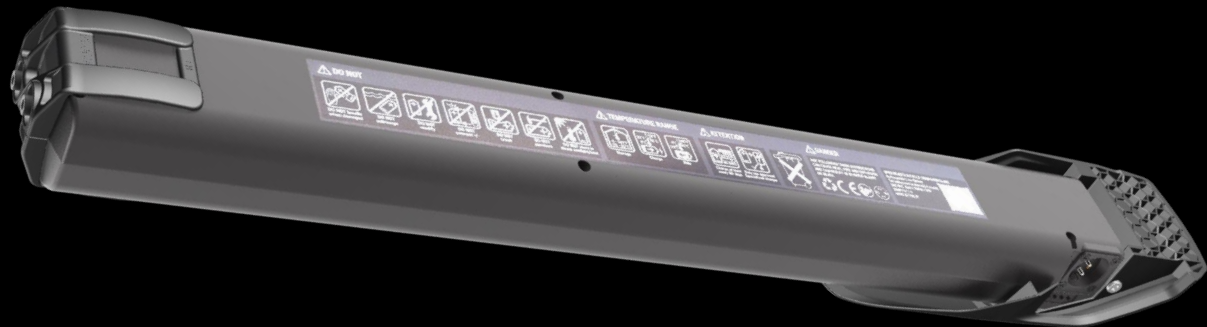
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DIAGNOSIS & TROUBLESHOOTING – 7 STEP QUICK DIAGNOSTIC GUIDE

ISSUE: THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

STEP 6: TRY A DIFFERENT UPDATED BATTERY

Note that this step may be worth taking earlier, but especially if bike causes issues at a certain state of charge, the battery may need to be ridden for quiet some time to reproduce issue



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DIAGNOSIS & TROUBLESHOOTING - 7 STEP QUICK DIAGNOSTIC GUIDE

ISSUE: THE BIKE TURNS ON, BUT PROVIDES IRREGULAR OR NO SUPPORT

STEP 7: TRY A DIFFERENT UPDATED MOTOR

Note that motor issues are very rare - therefore a motor swap should be the last step and there needs to be clear evidence for a replacement



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DIAGNOSIS & TROUBLESHOOTING – 3 SCENARIOS

In the following, three troubleshooting guidelines help resolve issues for these scenarios:

- SCENARIO 1: Levo does not turn on, TCU stays dark
- SCENARIO 2: Levo switches modes randomly, modes are stuck or disabled
- SCENARIO 3: Short or interrupted motor support

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POSSIBLE SCENARIO 1: LEVO DOES NOT TURN ON, TCU STAYS DARK

- Step 1: Disconnect battery connector, check connectors for damage and contamination, reconnect if okay
Jump to Step 4 if battery cable has marks of damage (burnt connectors etc.)
- Step 2: Try known working battery by connecting it externally - does TCU power on now?
- Step 3: Remove left crank and motor cover: disconnect/check TCU and battery connectors at motor together with all pins (bent? broken? contaminated?) - reconnect if okay, replace if bad
- Step 4: Try new motor-battery-cable
- Step 5: Try new TCU, incl. cable, by wiring external (if that is solution, test if TCU itself or TCU cable is faulty)
- Step 6: Try new motor (a motor issue is unlikely in this scenario, but cannot be ruled out completely)

Note: Remote and Speed Sensor can be ruled out - they are switches only and would not prevent the bike from starting even when faulty

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POSSIBLE SCENARIO 2: LEVO SWITCHES MODES RANDOMLY, MODES ARE STUCK OR DISABLED

- Step 1: Switch bike off and on again
- Step 2: Run visual inspection of Remote itself and Remote cable at cockpit (sticky button, damage etc.)
- Step 3: Perform TCU factory reset (before that note settings in MC App so that you can restore for rider)
- Step 4: Unscrew TCU unit and take it out of top tube
- Step 5: Check Remote connection at TCU (plugged in properly, connector/cable okay?)
- Step 6: Disconnect Remote and run functional test w/o Remote (can modes be switched normal via TCU?)
If modes behave normal w/o connected Remote, the TCU is okay
- Step 7: Try new Remote
- Step 8: Try new TCU

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POSSIBLE SCENARIO 3: SHORT OR INTERRUPTED MOTOR SUPPORT

- Step 1: Switch bike off and on again**
- Step 2: Check Speed Sensor System externally (magnet installed on wheel? Sensor in dropout? Clean?)**
- Step 3: Perform TCU factory reset (before that note settings in MC App so that you can restore for rider)**
- Step 4: Check Speed Sensor plug at motor (remove left crank and motor cover)**
- Step 5: Check accessible cable for damage (squeezed somewhere etc.) - replace if damaged**
- Step 6: Check motor-battery-cable - replace if pins are bent/broken, battery connector shows marks of arcing etc.**
- Step 7: Replace Speed Sensor cable**

MY19 TURBO LEVO FSR

Maintenance tips

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ELECTRONIC MAINTENANCE AND HANDLING TIPS

- Always power off bike before connecting/re-connecting cables - there is a CAUTION sticker on main plug: 'Keep dry / clean'
- Do not pressure wash - cleaning with water okay, but no high pressure - leave battery installed and connected
- Make sure the firmware is up-to-date at all times
- Stick to tips in manual, e.g. battery removal procedure
- When transporting bike w/o battery, cover battery plug with plastic bag and fix cable to bike



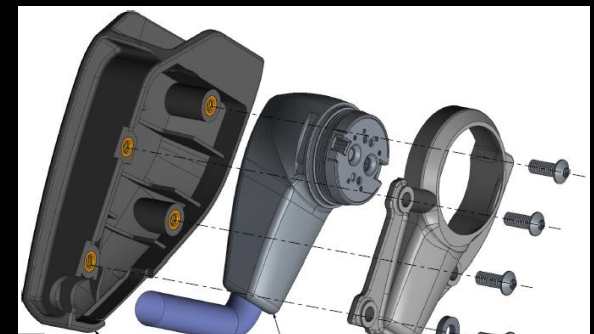
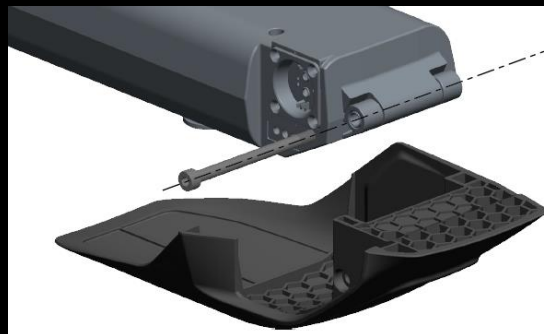
MY19 TURBO LEVO FSR

Service Parts

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SERVICE PARTS

- All parts are filed on the Service Website and can be ordered via B2B
- Service Parts Kit is the best choice at retail
- Make sure to stock all needed service parts all the time - individual items multiple times, depending on volume sold
- Only good service part inventory ensures expected service quality and speed



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SERVICE PARTS KIT

- SKU S199900014 (MSC KIT LEVO GEN2 BASE SERVICE KIT)
- Indispensable for quick service turn-around
- Contains main parts needed to service a MY19 Levo FSR - stock up based on need
- Used parts should be reordered immediately

MY19 LEVO BASE SERVICE KIT		
DESCRIPTION	SKU	QTY
ELE MY19 LEVO FSR SPEED SENSOR CABLE	S196800004	1
SUB MY19 LEVO FSR SPEEDSENSOR-MAGNET KIT	S194200016	2
ELE MY19 LEVO FSR BATTERY-MOTOR CABLE, 220MM	S196800003	1
ELE MY19 LEVO FSR, CABLE FOR MOTOR TT-DISPLAY,BROSE MOTOR HMI	S194200010	1
SUB MY19 LEVO FSR TOP TUBE DISPLAY KIT	S194200017	1
SUB MY19 LEVO FSR BATTERY TOP EXPANDER KIT	S194200006	1
ELE MY19 LEVO FSR REMOTE WIRED TO TOP TUBE DISPAY, SBC-R02	S194200007	1
Shipped separately:		
LEVO GEN2 BATTERY, 500WH, SINGLE PACK	98919-5611	1
ELE MY19 LEVO FSR TURBO 2.1, CUSTOM RX TRAIL TUNED MOTOR	S196800005	Optional

MY19 TURBO LEVO FSR

Service Check-In: Recommended Procedure

LEVO TECH & SERVICE

SERVICE CHECK-IN-STEPS

Specialized recommends that technicians follow the steps as shown on the next page when a Levo is checked in for service.

This process will:

- Reveal the potential bike service need more effectively
- Allow more accurate quotations on service fee
- Result in less need for follow-up with customer
- Allow the technician to recommend early parts replacement
- Stimulate workshop profitability, parts sales and customer satisfaction

This is how it can be done:

- Technician asks customer what service he has in mind, if any issues have occurred, how much riding has been done and what lies ahead (example: technician learns about long bike trip = recommends early brake pad replacement and sells spares for trip)
- Technician explains that he is now going to check the bike following the M-method
- Technicians performs M-check in front of customer, systematically scrutinizing areas 1-5 (M-shape)
 - Technician should explain what he is doing and what he finds/recommends
 - Technician should have tools like chain wear indicator ready
 - Technician can also remove left crank and motor cover to look at motor sockets
- Technician recommends service and seeks customer agreement

SERVICE CHECK-IN

E-Bike Specific Steps

1

- Check tire & inflate to correct psi
- Check wheels are straight & tight
- Check front brake
- Check suspension

2

- Stem & handle bars tight
- Brake / gear levers tight
- Check bar tape / grips
- Check headset tension
- Stem & handle bar aligned
- Check battery for play
- Check power & modes
- Check cable routing & condition
- Check mode switching
- Check walk-assist

3

- Pedals inspected
- Check drive train & crank arm bolts
- Check front gears
- Check motor power cable/socket

4

- Check seat post & clamp
- Saddle tight

5

- Check tire & inflate to correct psi
- Check wheels are straight & tight
- Check rear brake
- Check rear gears
- Check rear suspension
- Check speed sensor & magnet



A wide-angle photograph of a person riding a bicycle up a steep, grassy hill. The hill is covered in dense, green grass, and a narrow dirt path leads up the slope. The rider is positioned in the upper left quadrant of the frame, appearing small against the vast landscape. The sky is a clear, pale blue. The overall scene conveys a sense of achievement and outdoor recreation.

THANK YOU
