TURBO LEVO GEN3

SPECIALIZED UNIVERSITY

FEATURES, BENEFITS & GUIDELINES WORKBOOK

SPECIALIZED Bicycle Components University

DEAR SPECIALIZED RETAILER AND SPECIALIZED EMPLOYEE,

A forty-year obsession with creating the best riding mountain bikes possible takes a bionic leap forward with the new Levo. It sets the standard for full power ride quality with stable, natural trail manners born from an integrated full carbon chassis development approach; fusing together 150mm of rear suspension, progressive geometry, sophisticated motor assist and the advanced MasterMind Turbo Control Unit to bring you a ride like no other. Harness this technology and amplify your experience. More speed. More distance. More freedom. More trails ridden, more pure stoke generated, more unforgettable experiences... experienced. This is where the impossible becomes possible and you are riding better, stronger, farther, and faster than ever before. The new Levo; merging unprecedented power and range with natural, confident handling for an unbelievable ride. At the end of the day, that's what matters most.
The ride. Your ride. Believe it.

This Workbook supports you as product experts by summarizing all the features & benefits you may need for your Rider conversations. It is complementary to the service & repair resources on the Service Website.

HERE ARE OUR ASKS FOR USING THIS WORKBOOK:

- Keep it and its value within your business - this document is meant to be a source of knowledge exclusively for Turbo Retailers and Specialized staff
- Read it at least once in its entirety so that you know the breadth
- Use the clickable table of contents to find your desired topic
- Use the zoom function to enlargen small text or tables
- Use the search function (Ctrl+f) to scan the document for key words
- Use it to host product presentations to your teams and colleagues

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

- The Specialized Turbo Team

Disclaimer: The content of this Workbook was compiled according to best knowledge and with greatest care. Yet, all data is subject to change. Regular corrections and additions will make sure the content stays up-to-date.

TURBO LEVO
GEN3

KEY IMPROVEMENTS

FEATURES
Refined kinematics (based on learnings made with latest Enduro and Stumpjumper Evo bikes)

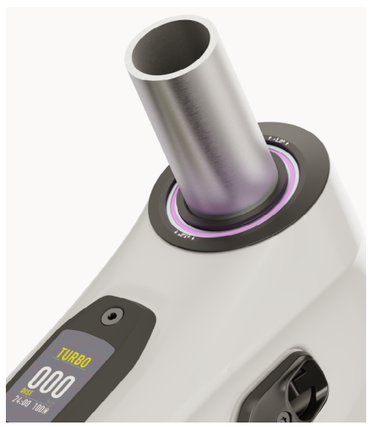
See details further down under "Suspension & Kinematics"

- More playfulness and precise handling
  - 'Mullet' setup: 29" front wheel and 27.5 rear wheel allows for shorter chainstay (441 mm in default setting - previously was 455mm)

  - New 2-piece shock link, beefed up for best stiffness; allows for shorter chainstay and leaves more clearance between link and seat tube

- More progressive geometry
  - Steeper seat tube angles, longer reaches, slacker head tube angle

- Possibility to tune geometry based on terrain and preference
  - Head tube angle is adjustable by using one neutral cup (installed by default) and one optional +/- 1 degree cup (supplied in small parts box); Flip Chip setting also affects head tube angle
  - Default head tube angle is around 64.5° (out-of-the box setting)
  - The adjustment range for he ad angle is between 63° and 65.5°
- Flip Chips at the Horst pivot link adjust the chainstay length, bottom bracket height and also head tube angle
  - High setting(default): 441 mm chainstay, standard head tube angle and bottom bracket height
  - Low setting (optional): 446 mm chainstay length, 0.5° slacker head tube angle and 7mm lower bottom bracket heigh



- New rear shock specification
  - Compatibility with reservoir shocks without compromising standover and water bottle clearance
  - More consistent shock performance on longer and /or demanding descents

RIDER BENEFITS
Maximum of control and capability in demanding terrain

- Mullet setup adds playfulness and agility.

- Progressive geometry makes the bike more capable.

- Geometry adjustability gives riders freedom to tune the character from 'aggressive & planted to 'quick & nimble' - and to anything in between.
  - High bottom bracket (default setting) = shorter wheelbase, steeper head tube angle = stable, yet agile
  - Low bottom bracket (optional setting) = 5 mm longer wheelbase, 0.5° slacker head tube angle = most stable character and best climbing performance in challenging terrain

- Headset cups can be used to dial the head tube angle to achieve the intended character.

- New shock spec and reservoir compatibility for better performance in more extreme conditions.

IMPROVED FIT FOR RIDERS

S sizing accomodates larger range of rider sizes.

- Riders choose size based on ride style and frame length, not based on seat tube length

- Greater range of riders can fit onto one size

- S1 and S6 covered (compares to XS and XXL)

More Riders fit on new Levo and all Riders have more freedom to pick the character they prefer.

KEY LEVO GEN 3 FEATURES

MasterMind TCU with new functionality

More reliable and robust motor-battery-cable

Use of Nyogel 760G (additional waterproofing for connectors)

All models feature the new motor-batterycable; it is fully sealed (see details further down) and we added a three-level sealing system for the motor-battery-connector.

The drop-symbols indicate the water barriers created by the sealing system.

More reliability for Riders and less risk of inducing issues through washing and use in extremely wet and dirty conditions. We took Rider feedback and field issues very seriously and came up with a more robust design.

1. MasterMind TCU with new functionality
   - Color TFT display with Gorilla glass to make it robust and scratch-resistant
   - Controlled through handlebar remote (change screens, enter setup menu)
   - Customizable screen layout through Mission Control allows to add/remove, structure and name up to 16 screens; select from multiple screen layouts and more than 30 metrics
   - Max. number of customizable screens: 16
   - Lots of new settings and metrics can be displayed, such as:
     - *Infinite Tune settings (e.g. 45/100)
     - *Micro Tune settings (e.g. 60/60 - Support/Peak can be changed in increments of 10 via remote)
   - Battery state of charge as % number
   - Rider power
   - Motor power
   - Current altitude & elevation gain (built-in pressure sensor)
     - measured through a built-in pressure sensor
     - air pressure changes require calibration before ride for accurate data
   - 2 calibration options:
     1. through remote/MasterMind TCU setup menu (entering the setup menu requires a simultaneous long double press of +/- on the remote; explained in Levo manual)
     2. Through Mission Control at later point (not a launch feature)
   - Range estimator
   - Battery watt hour consumption (live)
   - ANT+ and BLE heart rate belt pairing
   - Time of day
   - Ride Time

The scope of functions will broaden further over time

New MasterMind TCU allows a super clean cockpit since more features are integrated - everything a TCD displays plus much more.

Micro Tune allows Riders to simultaneously adjust Support/Peak in increments of 10% through the handlebar remote. This feature enables Riders to fine-tune the motor output on-the-fly. One useful scenario would be mixed rides or group rides during which you want to adjust your speed to other riders, especially when climbing.

IMPROVED TURBO TECHNOLOGY

MasterMind TCU with new functionality

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All models feature the new motor-batterycable; it is fully sealed (see details further down) and we added a three-level sealing system for the motor-battery-connector.

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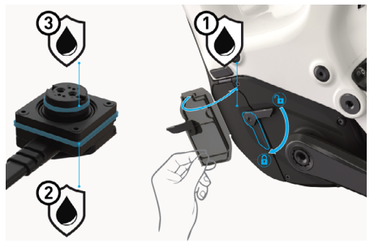
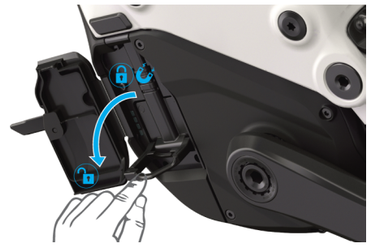




The use of Nyogel 760G adds additional waterproofing for connectors.

What are the benefits of Nyogel 760G?

Nyogelt 760G is a special connector grease to:
Extend the life of connectors
Prevent corrosion
Seal & protect from environment
Prevent fretting wear
Insulate from short circuits
Reduce mating force

Has Specialized tested compatibility with connector/plug materials?
Yes, compatibility is validated through testing. This also covers compatibility with sealing o-rings.

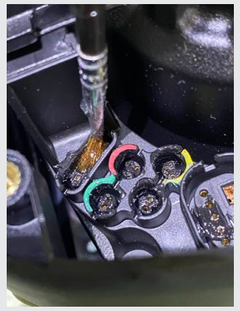
Where is Nyogel 760G applied during bike assembly?
It is applied to these motor sockets/ports: power socket, TCU/HMI port, speed sensor and light ports (see images).

Do other products need to be applied together with Nyogel 760G?
No, Nyogel 760G is the only connector grease that should be used.
Nyogel replaces all other greasing.

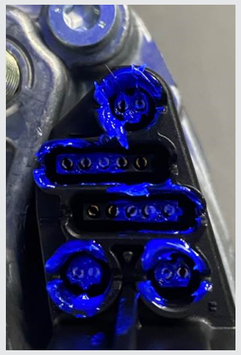
Will Nyogel 760G be applied to other Turbo bikes and connectors as well?
Yes, the plan is to use Nyogel 760G with all Turbo E-MTBs (at production). At point of drafting this section, this is in planning stage.

Will Specialized provide Retailers with Nyogel 760G and instructions how and when to use it?
We aim to bring to market a `Motor Area Service Kit` that includes Nyogel 760G, together with instructions on application during service procedures at Retail (more to follow).
Retailers can purchase their own Nyogel 760G in small tubes or large tubs depending on service volume. It can be used to treat all semipermanent connectors on Specialized Turbo bikes.
Retailers can also use a UV torch to ensure Nyogel 760G got applied correctly to all motor sockets.

How often should Nyogel 760G be renewed?
Older Turbo bikes prior to Levo Gen 3 should assumed not to have Nyogel applied and therefore should have this compound applied at the next service.
For all Turbo bikes this compound should be checked during an annual service – preferably pre-winter in wet climates. Checking with a UV torch will enable a Retailer to see whether

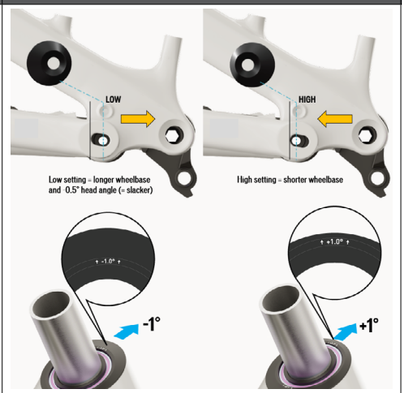


Application of Nyogel 760G during bike assembly



UV light is used to check correct application (Nygel then looks blue) Nyogel is present in the right quantities

KEY LEVO GEN 3 FEATURES

CATEGORY	UPDATES	IMAGE REFERENCE	LEVO GEN 2 COMPATIBILITY NOTE
FRAMES	• All-new carbon frames (all full carbon) • All-new alloy frame S-Sizing (S1-S6) • Adjustable head tube angle • More progressive geometry • Short rearend (27.5" wheel) • Flip Chip in chainstay to adjust bottom bracket height, chainstay length and also head tube angle (high setting is default		Frameparts are not interchangeable.
CABLE ROUTING & FRAME HARDWARE	• New dropper housing guide in downtube, attached to bottle cage; housing slides freely • Nylon tubes for shift housing and brake hose run from front to rear so that housing/hose can be easily pushed through on one go • Seatpost stopper in seat tube • New frame protectors • New chainstay protector • New chainguide (fixation pin to prevent rotation with motor bolt) • New cable entry ports • SRAM UDH (Universal Derailleur Hanger)	 	*All hardware not interchangeable between Levo Gen3 and Levo Gen2 (e.g. chainstay protector, frame protectors, derailleur hanger). Those parts are specific.*

CATEGORY	UPDATES	IMAGE REFERENCE	LEVO GEN 2 COMPATIBILITY NOTE
SUSPENSION & KINEMATICS	• Refined kinematics (see details further down under "Suspension & Kinematics") • New 2-piece shock link • Flip Chip now in chainstay at Horst link • Expert up: reservoir shocks		Shock links are not crosscompatible.
WHEELS	• `Mullet` setup: 29 front and 27.5 rear • Rear end not compatible with 29" wheel 27x2.6" is the max. rear tire size		n.a.

TURBO TECHNOLOGY

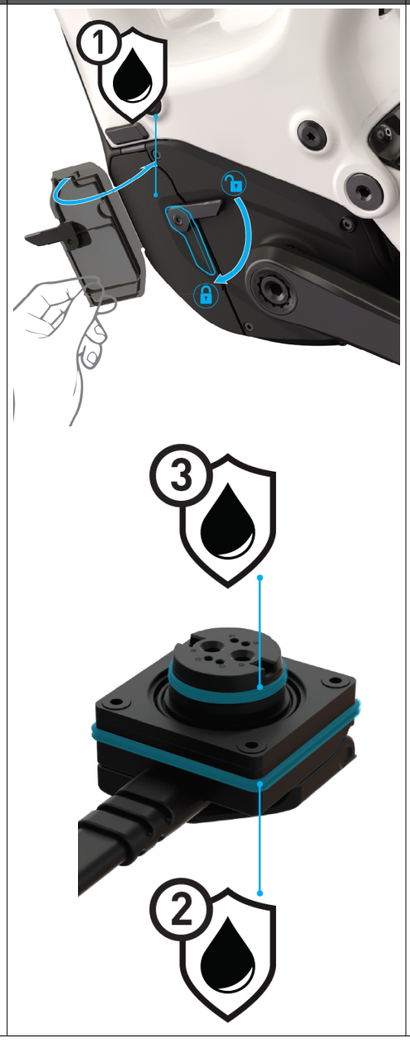
CATEGORY	UPDATES	LEVO GEN 2 COMPATIBILITY NOTE
TURBO TECHNOLOGY GENERAL 	•Same main ingredients as before and same working principle • Specific new features for better rider experience • Display naming and categorization • Mastermind	The following parts can be transferred between with the needed hardware and post-installation: • Motor (specific hardware needed) • Batteries (specific hardware needed) • TCU unit to bikes originally equipped with vice versa) • Handlebar remote (top/bottom buttons labelled same function) • Speed sensor cable and wheel magnet The following parts cannot be transferred Gen3: • MasterMind TCU to bikes with TCU (setting not possible; no MC connection) • Motor-battery cable • Motor hardware, except bolts • Battery Hardware (e.g. do not try to install hardware for Gen3 in a Gen2 Levo and vice versa)

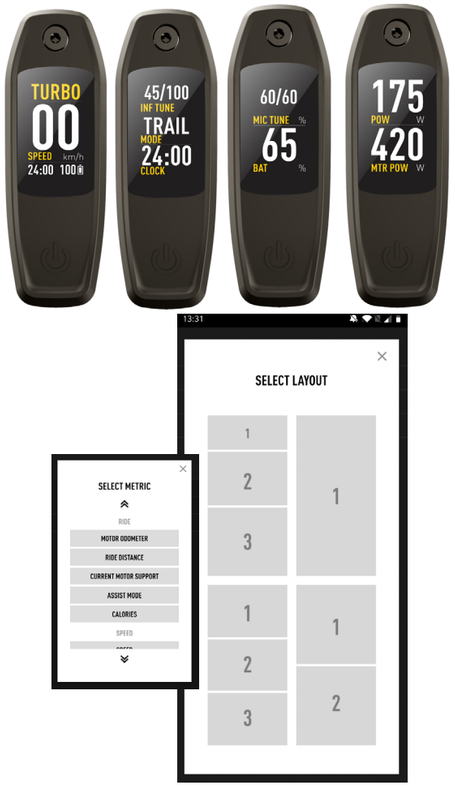
TURBO TECHNOLOGY

CATEGORY	UPDATES	IMAGE REFERENCE	LEVO GEN 2 COMPATIBILITY NOTE
MOTOR	• Specialized 2.2 Note on naming: The 2.1 was renamed as the 2.2 motor to align with the launch of the all-new Turbo Levo and to reflect the hardware & firmware improvements we`ve made to motor reliability/rideability over the past two years.		Motor unit as such is identical for both generations, specific. Levo Gen3 hardware: • Steel TX 25/30 motor bolts (more durable • 3 sizes of the motor mount bracket, specific allows optimally orientating the motor in each are easier to access; more service friendly • S1/S2 (engraved on bracket) • S3/S4 (engraved on bracket) • S5/S6 (engraved on bracket) • Thru axle at forward motor mounts • New motor inserts/spacers: pressed in by plastic to better distribute loads and dampen vibrations

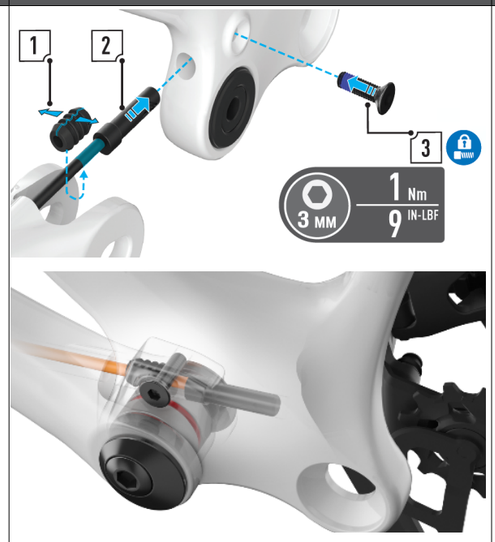
CATEGORY	UPDATES	IMAGE REFERENCE	LEVO GEN 2 COMPATIBILITY NOTE
BATTERY HARDWARE	• Identical core packs (700 wh and 500 Wh) • New battery hardware (expander, rock guard + door) • New fixation screw with knurled brim (helps to thread in screw by hand before tightening) • Motor covers feature extended coverage at edges to have less contamination in motor area		*All hardware not interchangeable between Levo Gen3 and Levo Gen2 (e.g. chainstay protector, frame protectors, derailleur hanger). Those parts are specific.*

TURBO TECHNOLOGY

CATEGORY	UPDATES	IMAGE REFERENCE	LEVO GEN 2 COMPATIBILITY NOTE
MOTOR BATTERY CABLE	The new motor-battery cable is fully sealed and we added a three-level sealing system for the motor battery connector. • New cable, fully closed/jacketed construction, with better sealed Rosenberger plug (closed area around pins) • Flat cable, routed over motor and fixed with stressrelief clip to frame • Handle at motorconnect or for easy and safe installation/removal • High waterproofing level thanks to 3 protection levels: <u>Level 1</u> Door with labyrinth sealing to keep out most water and debris (no IP defined, would be at IP40 level) <u>Level 2</u> Two square seals around the housing for the battery connector itself to protect internals (IPx7) <u>Level 3</u> Round seals at the round 'Rosenberger' plug itself (no IP defined)		*Motor-battery-cables are not cross-compatible*

CATEGORY	UPDATES	IMAGE REFERENCE	LEVO GEN 2 COMPATIBILITY NOTE
DISPLAY	New MasterMind TCU • Color TFT display • More features • Customizable screens		*MasterMind TCU is not an aftermarket item and compatible with TCU bikes.* *Add note for service (hardware detection only allows identical display; TCU2 can be replaced by TCU1*
REMOTE (MASTERMIND TCU MODELS)	• Same function ality as known from Levo Gen2 or from remote s used on TCU models • New labeling for top and bottom button (now F1 / F2 = function buttons)		*The handlebar remote used with MasterMind TCU two function buttons labelled `F1`and 'F2'.*

TURBO TECHNOLOGY

CATEGORY	UPDATES	IMAGE REFERENCE	LEVO GEN 2 COMPATIBILITY NOTE
SPEED SENSOR SYSTEM	• Cable and rotor magnet remained unchanged • Now bracket-less design: sensor is directly integrated into the drop-out • The sensor has a tiny bit of movement, which is acceptable. The screw merely holds it in place, it does not compress or engage the sensor • Labelled parts 1 Rubber grommet to prevent ingress of dirt 2 Speed sensor cable with receiving magnet 3 Fixation screw to secure receiving magnet in drop-out		
CHARGER	Unchanged 4A charger		*All Turbo chargers with Rosenberger plug work batteries. Key Model Specifications (MY2022)*

KEY MODEL SPECIFICATIONS (MY2022)

- This overview shows the specifications for the first Levo Gen3 MY22 models
- Specs are subject to change
- For latest specs, refer to the sell sheets for your market

	S-WORKS FRAME SET[1]	S-WORKS	PRO CARBON	EXPERT CARBON	COMP CARBON
SIZE	S2 - S6	S2 - S6	S2 - S6	S1 - S6	S1 - S6
FRAME	FACT 11m (Full Carbon)				
MOTOR	Specialized 2.2 Full Power motor with custom Rx Trail Tune firmware 90 nm peak torque 565 watts peak power (mechanical)				
BATTERY	700WH (SPECIALIZED M3-700, integrated battery, SBCB22)				
USER INTERFACE	MasterMind TCU (customizable TFT screen) + handlebar Trail Remote				
FORK (all 160 mm travel and 44 mm offset)	n. a.	FOX FLOAT 38 Factory 29, Grip2 damper, HSC, LSC, HSR, LSR, 160mm travel, Kashima	FOX FLOAT 38 Factory 29, Grip2 damper, HSC, LSC, HSR, LSR, Kashima	FOX FLOAT 38 Performance Elite 29, Grip2 damper, HSC, LSC, HSR, LSR	FOX FLOAT 36 RHYTHM 29, GRIP damper, 2-position sweep adjust
SHOCK (all 55x210 mm, 150 mm travel,custom Rx Trail Tune) *See details under `Suspension & Kinematics`*	FOX FLOAT X2 Factory, LSC, LSR, 2-position lever, Kashima		FOX FLOAT X2 Factory, LSC, LSR, 2-position lever, Kashima	Size S1: FOX FLOAT DPS Performance Elite Sizes S2-S6: FOX FLOAT X2 Performance, LSC, LSR, 2-position lever	Size S1: FOX FLOAT DPS Performance Sizes S2-S6: FOX FLOAT X Performance, LSR, 2-position lever
DRIVETRAIN (all 1x12)	n. a.	SHFTR: SRAM Eagle AXS, Rocker Paddle RD: SRAM XX1 Eagle AXS CASS: SRAM XG-1299 Eagle, 10-52	SHFTR: SRAM X01 Eagle, single-shift RD: SRAM X01 Eagle CASS: SRAM XG-1295 Eagle, 10-52	SHFTR: SRAM X01 Eagle, single-shift RD: SRAM X01 Eagle CASS: SRAM XG- 1275 Eagle, 10- 52	SHFTR: SRAM GX Eagle, multi-shift RD: SRAM GX Eagle CASS: SRAM XG- 1275 Eagle, 10-52
BRAKES	n. a.	Magura MT7 with custom Loic brake lever; 4-piston calipers, Sport brake pads 203 mm rotors front and rear (all sizes)	SRAM Code RSC, 4-piston calipers, sintered brake pads S2/S3: 200 front rotor S4-S6: 220 front rotor 200 mm rear rotors (all sizes)	SRAM Code RS, 4-piston calipers, sint ered brake pads S1-S3: 200 mm front rotor S4-S6: 220 mm front rotor 200 mm rear rotors (all sizes)	SRAM Code RS, 4-piston calipers, sint ered brake pads S1-S3: 200 mm front rotor S4-S6: 220 mm front rotor 200 mm rear rotors (all sizes)
WHEELS (all tubelessready)	n. a.	Roval Traverse SL (system wheel, hookless carbon rims, 30 mm inner width)	Roval Traverse Carbon (system wheel, hookless carbon rims, 30 mm inner width)	Roval Traverse (system wheel, hookless Roval alloy rims, 30 mm inner width)	Front/Rear Hub: Specialized, sealed cartridge bearings Rims: Roval Traverse 29, hookless alloy, 30mm inner width Spokes: DT Swiss Industry
TIRES (all tubelessready)	n. a.	Butcher Grid Trail T9, 29x2.6, (front) Eliminator Grid Trail T7, 27.5 x2.6 (rear)			
SEATPOST (all dropper posts w/ varying length /travel per frame size)	n. a.	RockShox Reverb AXS	Fox Transfer, Kashima	X-Fusion Manic	

[1] The S-Works frameset ships with the usual frame hardware and all specific Turbo components to build the bike: Praxis Carbon Crank w/ 32t chainring, all other Turbo hardware and all Turbo system components

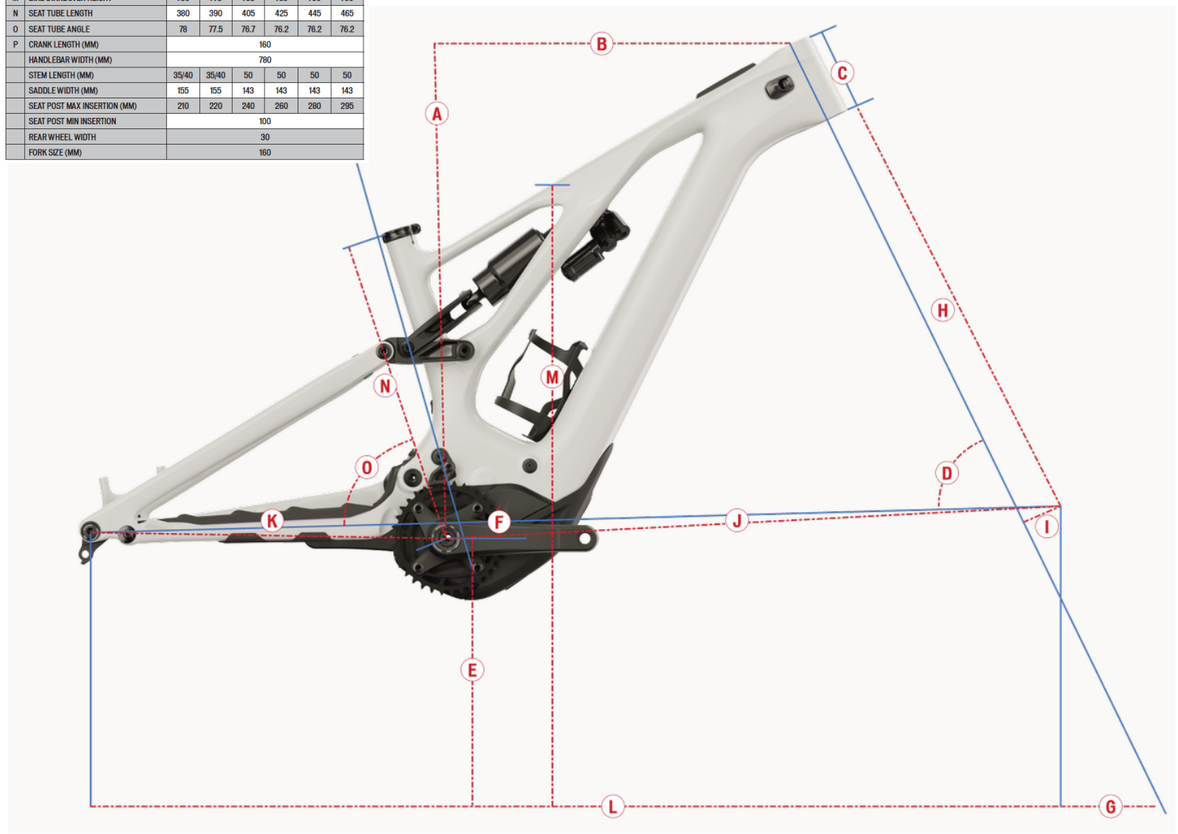
BIKE GEOMETRY & SIZING

S-Sizing is a unique approach to frame design that allows riders to choose their bike based on desired handling characteristics rather than standover height.

Note: Levo Gen3 size S1 will be marketed later in 2021.

This geometry chart refers to the default geo adjustment:
High Flip Chip setting and neutral headset cup.

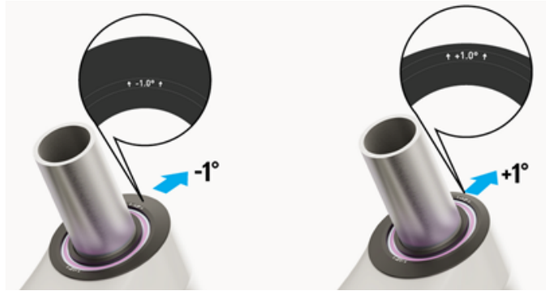
	FRAME SIZE	S1	S2	S3	S4	S5	S6
A	STACK	605	618	626	635	644	653
B	REACH	412	432	452	477	502	532
C	HEAD TUBE LENGTH	105	105	115	125	135	145
D	HEAD TUBE ANGLE	64.5	64.7	64.7	64.7	64.7	64.7
E	BB HEIGHT	352	350	350	350	350	350
F	BB DROP	25	27	27	27	27	27
G	TRAIL	131	129	129	129	129	129
H	FORK LENGTH (FULL)	557	567	567	567	567	567
I	FORK RAKE/OFFSET	44					
J	FRONT CENTER	737	759	784	813	842	877
K	CHAINSTAY LENGTH (SHORT SETTING)	441					
L	WHEELBASE	1179	1200	1224	1254	1283	1381
M	BIKE STANDOVER HEIGHT	750	775	785	785	790	790
N	SEAT TUBE LENGTH	380	390	405	425	445	465
O	SEAT TUBE ANGLE	78	77.5	76.7	76.2	76.2	76.2
P	CRANK LENGTH (MM)	160					
	HANDLEBAR WIDTH (MM)	780					
	STEM LENGTH (MM)	35/40	35/40	50	50	50	50
	SADDLE WIDTH (MM)	155	155	143	143	143	143
	SEAT POST MAX INSERTION (MM)	210	220	240	260	280	295
	SEAT POST MIN INSERTION	100					
	REAR WHEEL WIDTH	30					
	FORK SIZE (MM)	160					

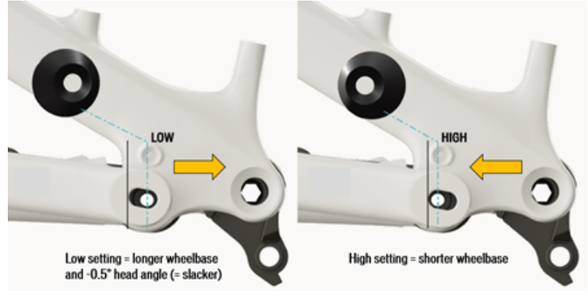


HEAD ANGLE & BOTTOM BRACKET MATRIX

This table reflects head angle values and bottom bracket heights, as a result of different Flip Chip/head set cup(s) configurations.
Note that these are rounded values which vary slightly with frame size.

	HS CUP		
FLIP CHIP @ HORST LINK /DROPOUT	Neutral	(+) 1°	(-) 1°
HIGH/SHORT	**Head angle**: approx. 64.5° (default) **BB height**: approx. 350 mm (default)	**Head angle:** approx. 65.5° **BB height:** approx. 352 mm	**Head angle:** approx. 63.5° **BB height:** approx. 348 mm
LOW/LONG (- 0.5° HEAD ANGLE)	**Head angle**: approx. 64° (default) **BB height**: approx. 343 mm (default)	**Head angle:** approx. 65° **BB height:** approx. 346 mm	**Head angle:** approx. 63° **BB height:** approx. 342 mm



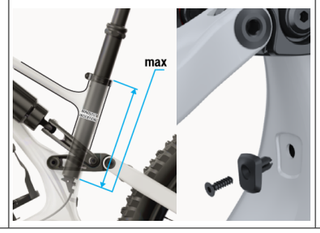


BIKE WEIGHTS (MY2022)

- All weights w/o pedals, tubeless and default batteries.
  Deviations for same size model can occur based on colorway and tire tolerances.
- Compared to Levo Gen2, the bikes got a bit heavier since Gen3 uses a more capable and more robust parts spec (Fox 38 forks, resevoir shocks and more robust hardware for increased reliability).
- Setting up bikes tubeless will save around 300 g (deduct 245 g for the 27.5" tube and 255 g for the 29" tube, add about 100g for the sealant and tubeless valve per tire).

MODEL	APPROX. WEIGHTS (SIZE S4, TUBES, W/O PEDALS)	APPROX. WEIGHTS TUBELESS
LEVO S-WORKS CARBON	22.1 kg	21.8 kg
LEVO PRO CARBON	22.1 kg	21.8 kg
LEVO SL COMP CARBON	n/a	n/a
LEVO SL COMP (ALLOY)	n/a	n/a

FRAME - CONSTRUCTION & MEASUREMENTS

FRAME MATERIALS	FRAME CABLE ROUTING	WHEEL SPACING	BRAKE MOUNTS	MAX. ROTOR SIZE	SEAT TUBE/SEAT POST	SEATPOST MAX. INSERTION DEPTH
FACT CARBON FRAMES • All carbon frames are FACT 11m with full carbon front and rear triangles ALUMINUM FRAME • The aluminum frame is made of M5 Premium aluminum	Routing: nylon tubes for shift housing and brake hose run from front to rear so that housing/hose can be easily pushed through on one go	• Spacing: 148mm 12mm thru axle • Thru axle length: 172mm Thru axle thread pitch 1.0	Post Mount 180 (180 mm rotors can be mounted w/o adaptor, larger ones require one	Min. 180mm Max. 220mm	Seat collar diameter: 38.6 mm Seat post: 34.9 mm The seat tube is designed to allow for as long seat posts as possible (carbon and alloy frames). There is a stopper in the seat tube to protect the lower seatpost assembly when the post is pushed in. It ensures the assembly does not touch the motor. 	Applies to all frames S1: 210mm S2: 220mm S3: 240mm S4: 260mm S5: 280mm S6: 295mm

KEY FORK DATA & OPTIONS

FORK TRAVEL COMPATIBILITY	FORK TYPE COMPATIBILITY	STEERER TUBE	RAKE /OFFSET	AXLE TYPE	MIN /MAX. ROTOR SIZE
• Default and max.: 150 mm (S1) • Default and max.: 160 mm (S2-S6)	Only single crown forks with the max. travel should be used. 'Use of different styled forks or forks with longer travel may result in catastrophic failure of the frame which may result in serious personal injury or death.' (bike manual)	1 1/8" to 1.5"	44 mm	15x110 mm thru	Min. 180mm (direct mount) Max. 220mm (adaptors)

HARDWARE

FRAME CABLE PORTS

Cable ports are modular

(can be swap left/right and there are open and closed versions)

Non-drive-side at head tube

FRAME PROTECTORS

There are multiple new, improved frame protectors to prevent cosmetic damage ad dirt accumulation.

- Frame protection between chainstays at main pivot: mud flap keeps dirt out of motor; it complies with the rear end movement
- Seat stay bridge clips on and inner surfaces are protected with clear + mylar tape
- Updated chainstay protector with modified wave design to further dampen chain noise
- Various clear protective foils to prevent cosmetic damage (downtube, inside of seat stays, etc.)

HEADSET

Bearing set (S182500005)

- Upper bearing: 1 1/8" (42 mm x 30.5 x 8 mm, 45 x 45°)
- Lower bearing: 1.5" (52 mm x 40 x 7 mm, 45 x 45°)

Headset cups (S212500015)

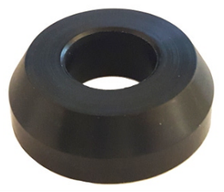
The bicycle ships with the "zero" offset cup (installed) and a +/- 1-degree headset cup (image) ships in the small parts box.

KEY COMPONENT DATA & COMPATIBILITY

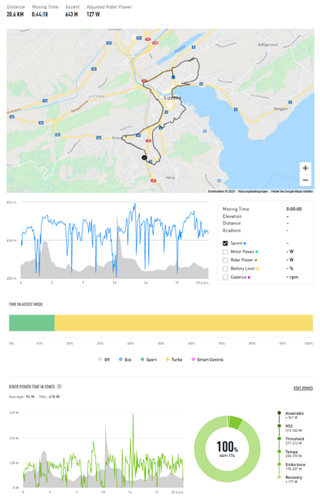
HANDLEBAR DIMENSIONS	STEM LENGTHS	CRANK LENGTH	SADDLE WIDTHS	DROPPER POST TRAVEL (CARBON)	DROPPER POST TRAVEL (ALLOY)	MAXIMUM DROPPER POST INSERTION LENGTHS
•780mm wide (all models and sizes) • 35mm clamp diameter • 6° upsweep (about 30mm rise) • 8° back-sweep	All stem/bar combos use 35 mm clamp diameter S-Works Carbon • S1-S3: 35 mm • S4-S6: 50 mm Pro Carbon • S1-S3: 35 mm • S4-S6: 50 mm Expert Carbon • S1/S2: 40mm • S3-S6: 50 mm Comp Carbon • S1/S2: 40mm • S3-S6: 50 mm	160mm (all models and sizes) The cranks are deliberately shorter to avoid crank arm strokes in technical uphills and in trail sections you have to pedal in. This ensures riders have consistent motor support to tackle technically challenging segments.	S1/S2: 155mm S3-S6: 143mm	S-Works Carbon • S1: n.a. • S2: 125mm • S3/S4: 150 mm •S5/S6: 170 mm Pro Carbon • S1: n.a. • S2: 125mm • S3/S4: 150mm • S5/S6: 170mm Expert Carbon • S1: 100mm • S2: 125mm • S3: 150mm • S4/S5: 170mm • S6: 190mm Comp Carbon S1: 100mm S2: 125mm S3: 150mm S4/S5: 170mm S6: 190mm	S1: 100mm S2: 125mm S3/S4: 150mm S5/S6: 170mm	*S1: 210mm* *S2: 220mm* *S3: 240mm* *S4: 260mm* *S5: 280mm* *S6: 295mm* *Note: Minimum insertion for all frames sizes is 100 mm.*

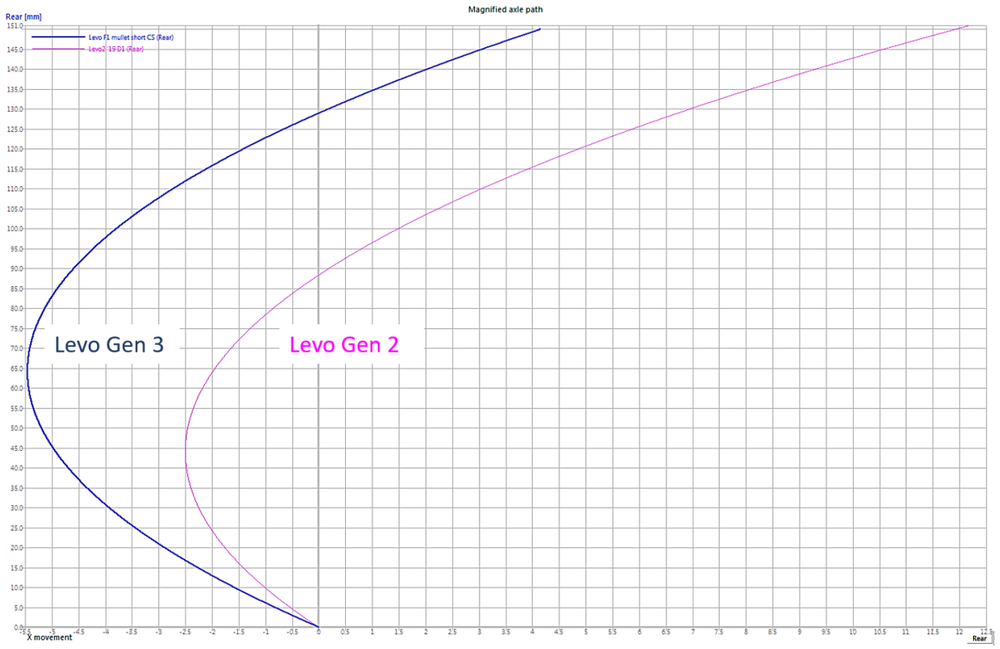
CHAINRING DIMENSIONS	WHEEL/TIRE COMPATIBILITY	MIN/MAX. ROTOR SIZE	TUBELESS COMPATIBILITY	WATER BOTTLE COMPATIBILITY	OPTIONS FOR WIRED LIGHTS
• 104 BCD • 34t is default • 32-34t works with chain guide • 36t works w/o chain guide	Rear • 27.5 rear wheel only • Max. 2.6" tire Front • 29x2.6 recommended • Not all forks are designed to accept a larger tire. Always check with the fork manufacturer	Front and rear Min. 180mm (direct mount) Max. 220mm (adaptors)	All bikes come tubeless ready (tubeless valves included, tubeless rim strips mounted, tires compatible)	With reservoir shocks: S2/S3/S4: 22 oz bottle S5/S6: 26 oz bottle With inline shock: All sizes accept a 26 oz bottle For max. bottle clearance, the cage mount area in the downtube is recessed and the shock is moved forward as much as possible with the help of the bridge-less 2-piece shock link.	The motor offers light ports for wired front and rear lights (rear light cable cannot be routed though) Key facts: • Output:12V/24W, 2A max. • Green port: front light • Red port: rear light • Specialized does not offer lights through its distribution channels • Various (front) lights work with the output the motor ports provide, examples: Supernova M99 Mini Pro-25, Lupine SL X E-Bike, Light&MotionSeca1800 E-Bike (order connecting cable separately) • Lights will be powered when bike is on, unless a switch is integrated into light wiring or head lamp itself

SUSPENSION & KINEMATICS

GENERAL	MAX. TRAVEL	KINEMATICS VS. LEVO GEN2	RX TUNE (SHOCKS)	SHOCK OPTIONS / COMPATIBILITY	RECOMMENDED SAG BASELINE SETTINGS
Suspension and kinematics are dialed specifically for the Levo experience. This means that Riders get a very capable bike to master challenging trails with plenty of confidence and fun. Main ingredients: • Kinematics • Choice of suspension components • Rx Shock Tune	Rear Default and max. 150mm Front Default andmax. 150mm (S1) Default and max. 160mm (S2-S6)	Levo 3 rewards Riders with refined kinematics to grant a maximum of control and capability in demanding terrain. These are the main changes versus Levo Gen • More reward axle path: helps the bike soak up bigger square edge hits better and provides the rider more control. • Lower leverage rate: helps keep shock pressures lower overall and gives the shock a bit more bottom out resistance. • Higher anti- squat: bike has more support under pedaling and will wallow a bit less in the travel while pedaling uphill. Overall, the Levo 3 kinematics are based on Stumpjumper Evo with the added higher anti-squat support.	Rx stands for `Recommended Experience` which means that the shock is custom-tuned for the specific bike and experience to achieve optimal performance. Generally speaking, Rx shock tunes in MY22 Levo are similar to Stumpjumper Evo. **For MY22 Levo, the FOX FLOAT (FACTORY) X2 shocks see the biggest change:** • They come with a 0.2 cubic inch volume reducer in the positive chamber and a `Jounce` bumper to control bottoming out • This allows using a more linear spring rate (less progressive) for smooth performance without additional risk of bottoming out **Is there a Rx tune difference between X2 FACTORY (SWorks and Pro) and the other X2 shocks?** • No, the internal tune remains the same on all models with X2 shocks specified on MY22 Levo • Only two differences between the X2 performance levels: - Coating Kashima coating for Factory and Performance Elite - Black anodizing on Performance series Adjustment possibilities • Factory and Performance Elite: High and low speed adjustments • Performance series: only low speed compression and rebound adjust **FOX FLOAT DPS Performance:** • Used on all size S1 models • The Float DPS is tuned as close as possible to all other shocks on the other sizes, both for spring and damper • Only difference: rebound tune is a bit lighter since it is only be used on S1. This allowed us to focus on a more narrow band of rider weights A `Jounce` bumper (example image) is a rubber stop to control bottoming out of the shock. Float X and X2 shocks feature a `Jounce` bumper, lower models have a small O-ring bumper. 	•Shock length/stroke: 210 x 55 mm • Using compatible aftermarket-shocks is technically possible, but you get the best performance with the original Rx tuned shock. • From manual on shock compatibility/ options: 'Specialized frames are generally designed and tested to work with the suspension components provided as original equipment. When changing out shocks, be aware certain models of shocks may not be compatible with the frame due to the position of the shock reservoir, size, and/ or other compatibility factors, even if they fit.'	Shock: approx. 13.75 mm sag (see manual for details) Fork: see manual of fork manufacturer 

CONNECTIVITY AND CUSTOMIZATION

MISSION CONTROL	RIDER HUB FOR POST-RIDE ANALYTICS	DISPLAY OPTIONS & EXTENSIONS	TURBO STUDIO
Key MasterMind TCU features: • Customizable screens - Add screens customize screen layout (1-3 segments) - Name screens Shared TCU and MasterMind TCU features: • Stealth mode • TCU: no LEDs visible unless TCU button or remote button is pressed (triggers short illumination) • MasterMind TCU: one single screen, battery state of charge in% number and mode names (Turbo, Trail, Eco, Off) displayed in grey font colour <u>Motor settings</u> Acceleration Response and Shuttle Mode in addition to standard Tune settings. • Default Acceleration Response: 40% • Default • Shuttle Mode: 0% (Shuttle off)	The Specialized Rider Hub is the perfect tool to see your postride metrics. Simply log on with your Specialized account (same login as Mission Control/single sign-in) to evaluate the rides recorded through Mission Control. They are visible automatically after ride recording. 	• TCD (for bikes with TCU; can pair to MasterMind TCU as well, but not really needed) • ANT+ connectivity in TCU displays to connect to motor sensors for rider power, speed and cadence 	• MasterMind TCU connects via a USB-C data cable • TCU connects via Micro USB data cable left: USB-C // right: Micro USB 



Graph shows the more rearward axle path for Levo Gen 3

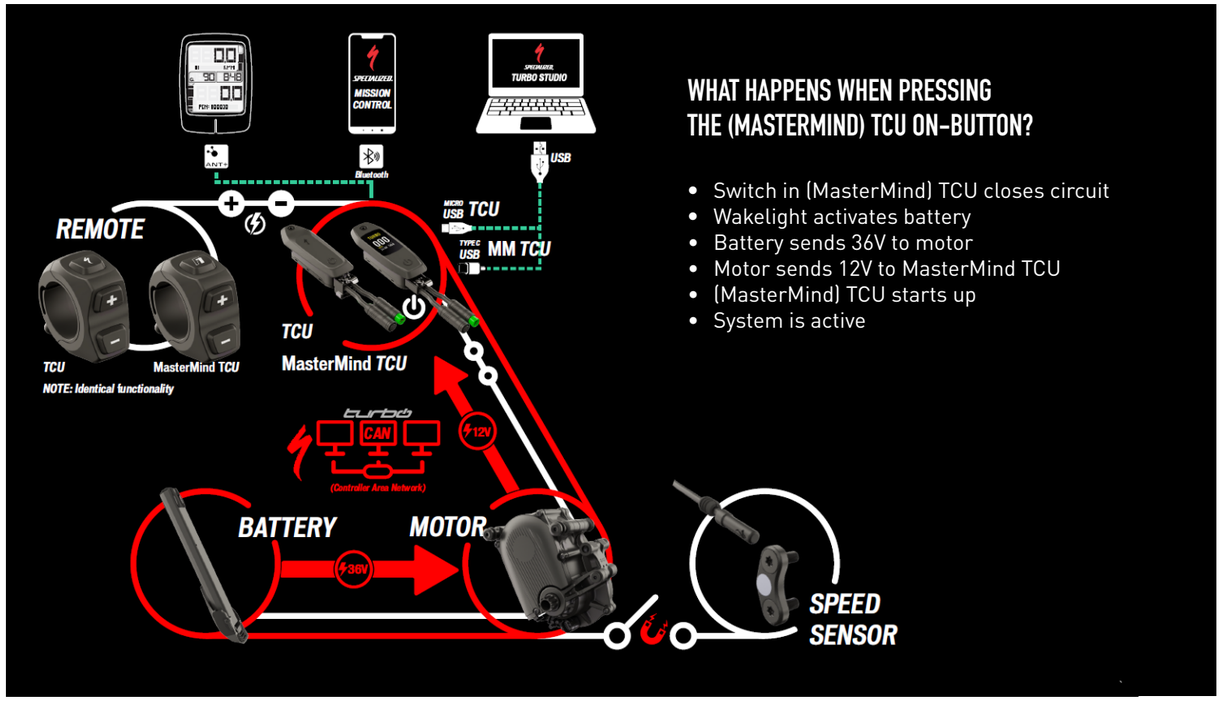
TURBO "FULL POWER" SYSTEM

Reference 250w system/Full Power Workbook (page is in development)

The goal is to be perceived not only as bike brand but also as a brand designing its own E-Bike System. Specialized does not use off-the-shelf components but customizes all e-parts to achieve a high level of integration, unparalleled ride qualities and stylish aesthetics. This means Specialized is an E-Bike-System brand as well as a bike brand.

The Specialized E-Bike System comprises the following custom Turbo elements: motor, battery & charger, speed sensor, user interfaces, remote and Mission Control App. When talking about the motor, for instance, it should be highlighted that Specialized develops their own firmware to give the motor the natural ride feel we all appreciate when riding a Levo.

E-BIKE SYSTEM COMPONENTS



Theory of Operation

SPEED SENSOR SYSTEM

TCU AND MASTERMIND TCU

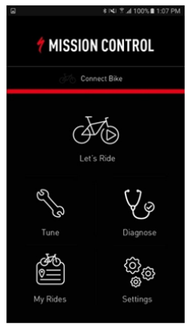
TRAIL REMOTE

SPECIALIZED FULL POWER MOTOR WITH CUSTOM TRAIL TUNE

BATTERY

MOTOR-BATTERY-CABLE

BATTERY CHARGER



CONNECTIVITY (OPTIONAL): MISSION CONTROL APP & TCD (TURBO CONNECT DISPLAY)

MASTERMIND TCU VS. TCU

KEY DIFFERENTIATORS

	TCU	MASTERMIND TCU
NAMING & REFERENCE		
	Marketing name: TCU Internal name: TCU1	Marketing name: MasterMind TCU Internal name: TCU2
KEY FEATURES	• LED panel, static display, 10 bar state-of-charge, mode settings • Master for bike-control, on/off, etc. • Mode cycling via display button and wired remote • ANT+/Bluetooth (Mission Control, etc.) • Micro USB cable connection (Turbo Studio) • Back-up battery: CR 1620, replaceable • Event/Error log	• Color TFT-screen, customizable • Master for bike-control, on/off, etc. • Mode cycling only via wired remote • ANT+/Bluetooth (Mission Control, etc.) • USB-C cable connection (Turbo Studio) • Pressure sensor for barometric measurement • Back-up battery: fully integrated (kept charged via system) • Event/Error log
INTERNAL BACK UP BATTERY	Important difference to MasterMind TCU: The bike powers on with a longer button-press even if the internal coin cell is empty or missing. Details: • Replaceable CR 1620 back-up battery • If battery is low/empty, TCU shows an error pattern • Empty battery does not cause functional issues (bike can still be started with a longer button-press, internal log is not lost, etc.) • Effect of empty coin cell: only time /clock will be lost, but will be re-set automatically when connecting to MC App after replacing	Important difference to TCU: The back-up battery needs to be sufficiently charged for the bike to power on. Details: • Back-up battery is fully integrated and not replaceable (it is designed to last as long or longer than the expected bike life time) • When connecting the bike directly to Turbo Studio, the MasterMind TCU will receive power via the USB-A to USB-C connection and the bike will power on by itself • If the bike does not power-on during unboxing, connect the display to Turbo Studio or to a USB port to start the bike and to charge the internal battery • Internal battery is always charged when the bike is turned on • Fully charging the internal MasterMind TCU battery will take up to 1.5 hours (either through riding the bike or through connecting the display via a USB-C cable to a power source) • A fully charged internal battery will allow the bike to be powered on during 1 year without charging it or powering the bike on; different storage temperatures and conditions will affect this time span; moderate storage temperatures preserve the state of charge better

	TCU	MASTERMIND TCU
SERVICE PART	S216800009 (ELE TURBO CONNECT UNIT DISPLAY (A1.2) WITH GITEKI MARK) (Display is not an aftermarket item)	S216800020 (ELE TURBO CONNECT UNIT 2) (Display is not an aftermarket item)
SERVICE NOTE	• For service reasons, a MasterMind TCU can be replaced by a TCU, but not vice versa • Always run Turbo Studio Component Change and available updates to ensure intended functionality	
CONNECTION TO TURBO STUDIO	USB-A to Micro USB Note: A TCU/bike needs to be turned on manually when connected to Turbo Studio	USB-A to USB-C Note: A MasterMind TCU/bike will turn on automatically when connected to Turbo Studio
UPDATING DURING UNBOXING	Must be updated through Turbo Studio during unboxing for latest firmware and intended functionality/features.	Must be updated through Turbo Studio during unboxing for latest firmware, intended functionality/features, correct speed limit and Mission Control connectivity.
TUNE MENU	Fully applicable in Mission Control and in Turbo Studio	• In Turbo Studio, only core Tune values can be customized (Support, Peak Power, etc.) • Screen customization exclusively manageable through Mission Control
SCREEN CUSOMISATION	Not available (apart from Stealth Mode)	• Exclusive via Mission Control • Can be done through any Mission Control account Note: Any custom screen settings are (re-) applied through the latest Mission Control connection. Example: User A customizes the screen, then User B connects with his Mission Control account. Result: screen settings of User B over-write settings of User A because the custom settings are tied to the respective Mission Control account.
DIAGNOSTICS	• 100 event logs held locally and sent via Advanced Diagnostics in Mission Control Note: diagnostics are not uploaded automatically	• 100 event logs held locally and uploaded automatically via Mission Control or via Advanced Diagnostics Note: despite the auto-upload function, it is advisable to upload diagnostics through Mission Control before looking at the Event Log
COMPONENT CHANGE	Should be completed through Turbo Studio to install latest firmware and to ensure intended functionality/features	Must be completed through Turbo Studio, otherwise bike will not connect to Mission Control and only latest firmware ensures intended functionality/features

MASTERMIND TCU

DEFINITION FOR CONSUMPTION & POWER VALUES

METRIC	MISSION CONTROL DATA FIELD	MASTERMIND TCU DATA FIELD	EXPLANATION (SEE ALSO HELP TEXTS WITHIN MISSION CONTROL)
CONSUMPTION	DIAGNOSE BATTERY LEVEL CONSUMPTION SLOPE		Consumption • Unit: Wh (watt hours) per kilometer/ mile • Explanation: Shows the battery consumption in watt hours per kilometer/mile. The higher the number, the larger the consumption.

METRIC	MISSION CONTROL DATA FIELD	MASTERMIND TCU DATA FIELD	EXPLANATION (SEE ALSO HELP TEXTS WITHIN MISSION CONTROL)
ALL POWER VALUES	POWER RIDER POWER MOTOR POWER TOTAL POWER AVERAGE TOTAL POWER POWER RATIO		*NOTE ON POWER CALCULATION: There will be firmware improvements soon to distinguish between rider power and the two different types of motor power, electrical and mechanical motor power. This also means that respective MasterMind TCU screens and MC fields will carry the matching unit identifiers, e.g. 'ele' for 'electric power'. Currently, motor power is 'electric power', both for TCU and MasterMind TCU metrics.* Rider Power • Unit: w (watts) • Explanation: Rider powered is mesured through a power sensor in the motor. Motor Power • Unit: w (watts) • Explanation: Displays the electrical output (watts) of the bike. The max. electrical output is higher than the max. mechanical output, since efficiency can never reach 100%. The reference to the mechanical output (watts) of a motor is used in sources outside of Mission Control, e.g. 565 watts for a Specialized full power motor. Total Power • Unit: w (watts) • Explanation: This is the combined power of motor power and rider power. Average Total Power • Unit: w (watts) • Explanation: This is the average for motor power and rider together, calculated over ride time. Power Ratio • Unitless • Explanation: this is the same as `Average Support` Level" in Mission Control and represents the idea of x times you. • Calculation: (electric) motor power / rider power = power ratio

EXPLANATION FOR `AVERAGE SUPPORT LEVEL` IN MISSION CONTROL HELP GUIDE

Mission Control calculates the Average Support Level for recorded rides. For instance, the value 183% means that rider input was amplified by the factor of 1.83 over the ride and in average. The underlying formula is:

Bike [Wh] / Rider [Wh], e.g. 550Wh / 300Wh = 1.83 = 183%

Put into words, the average support level is the ratio of (electrical) motor performance to rider power. The higher the number, the more support the rider gets from the motor and vice versa. The value primarily depends on a higher or lower Support and Peak Power level.

Example: If you have an Average Support Level of 100%, you put the same energy into your ride as your battery. If it is at 200%, the system (battery) doubled your input. If it is at 50%, the battery added half of your input.

Why do we use watt hours as the unit?

Watt hours (Wh) is a unit for energy – 'Wh' works well for this purpose because it's calculated by rider power over time for rider input and electrical power delivered over the same time. We could use also Kilojoule, Joule or any other energy unit, but watt hours is most suitable in terms of understandability in this context.

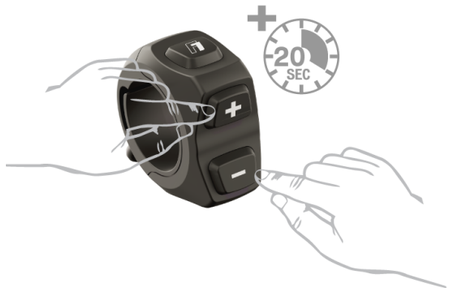
MASTERMIND TCU

DEFINITIONS FOR RESETTING THE DISPLAY

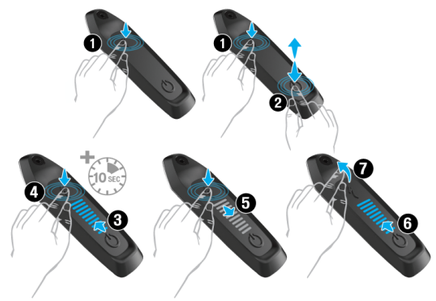
This table references details for the (MasterMind) TCU reset functionality

For MasterMind TCU, there are two types of reset
- `Standard Reset` (not explained in bike manuals)
- `Factory Reset` (when and how to carry is explained in bike manuals)

For TCU, there is one type of reset
- `Factory Reset` (when and how to carry out is explained in bike manuals)

DISPLAY TYPE	RESET TYPE	METHOD	REASON TO RESET	DATA THAT WILL BE RESET/CLEARED
MASTERMIND TCU	Standard Reset	*• Dual press and hold the (+) (-) and buttons on remote for 20 seconds. During this process the MasterMind TCU will reboot once* *• Not covered in Levo manual* 	First troubleshooting step in case there is odd bike or display behaviour, such as failing to connect to MC whereas it previously worked and everything else is good Restore default Tune settings, incl. Acc. Response and Shuttle for Levo Gen3 (e.g. test events or Retailer test bike) Default Tune settings Eco: 35/35 Trail: 35/100 Turbo: 100/100 Shuttle: 0% (=off) Acceleration Response: 40%	As `Factory Reset` with these 2 differences: •Bike will not need to be repaired to Mission Control Clock defaults to 01: 00 (good indicator that a Standard Reset was performed) • Clock will be be set again once connected to Mission Controlor Turbo Studio Factory Reset
MASTERMIND TCU	Factory Reset	*• Dual press and hold the (+) (-) and buttons on remote for 45 seconds During this process the MasterMind will reboot twice* *• Covered in Levo manual* 	• When a new or used bicycle is sold For deeper troubleshooting - two examples: • Bike does not switch off • Mission Control connectivity is sues, especially if standard reset has not help; Factory Reset clears/resets BLE pairing	• Acceleration Response & Shuttle (if applicable) • All zeroable data such as ride data, distance, ride time, elevation gain etc. • Dark Mode (off as default) • Button beeper (on as default) • Clock defaults to 08:00 (good indicator that a factory reset was performed) • Clock will be reset again once connected to Mission Control or Turbo Studio Display menu configuration Will go back to customized settings, if applicable, once re-connected to Mission • Control Display brightness (default 100%) • Pairing with any ANT+ or BL devices

For TCU, there is one type of reset
- `Factory Reset` (when and how to carry out is explained in bike manuals)

DISPLAY TYPE	RESET TYPE	METHOD	REASON TO RESET	DATA THAT WILL BE RESET/CLEARED
TCU	Factory Reset	*• Make sure the 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* *• Covered in Levo manual* 	As MasterMind TCU Factory Reset	• Support & Peak Power • Acceleration Response & Shuttle (if applicable) • All zeroable data such as ride data, distance, ride time, etc. • Dark Mode (off as default) • Button beeper (on as default) • Pairing with any ANT+ or BLE devices, such as heart rate belt, TCD, or Mission Control

BASIC THEORY OF OPERATION

Basic component interaction

The schematic shows you how the electronic components interact and what role they fulfil. Knowing these basics helps you understand the working principle and to solve issues more effectively.

Example: If the bike does not turn on, it makes sense to check first if the battery connector is attached properly. Reason: Without a functioning battery connection the wakeline from TCU to battery is without effecting the battery does not wake up and the TCU won't receive the 12V it needs to start the bike.

KEY TAKE-AWAYS

- Three components are part of the CAN bike system communication (components 'talk' to each other)
    1. TCU (can be seen as master of the bike, also allowing external communication)
    2. Motor
    3. Battery
- Remote and Speed Sensor act as switches - they are not part of the bike communication as such
- Learn what happens when TCU is switched on

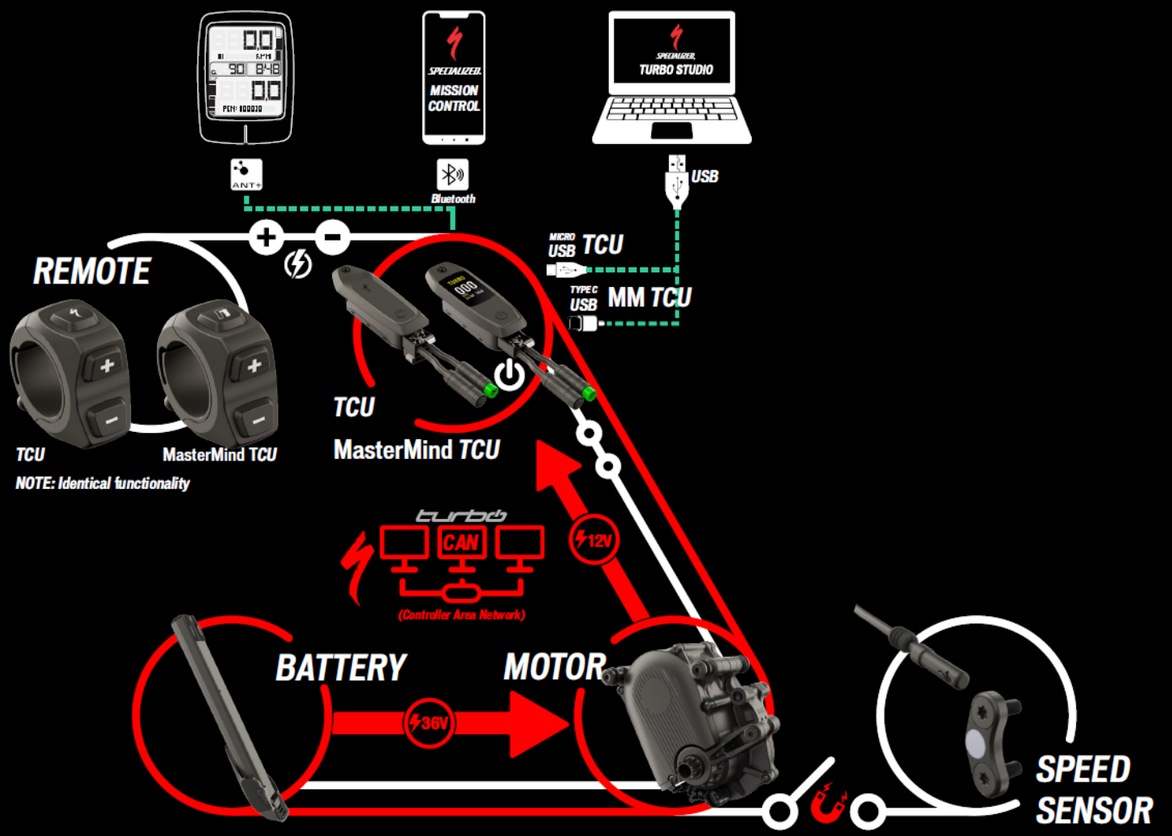
CONDITIONS FOR MOTOR SUPPORT

With all components being connected and functional, these are the conditions for the motor to support the rider:

1. Battery: Needs to be sufficiently charged
2. Mission Control App: Peak Power/Support must be high enough to feel support in selected riding mode
3. TCU: Must be turned on and set to a support mode
4. Bike Speed: Motor must get signal from Speed Sensor and bike speed must be > 0 / < 25 kph (or relevant market speed limit)
5. Rider: Must apply torque to pedals

WHAT HAPPENS WHEN PRESSING THE (MASTERMIND) TCU ON-BUTTON?

- Switch in (MasterMind) TCU closes circuit
- Wakelight activates battery
- Battery sends 36V to motor
- Motor sends 12V to MasterMind TCU
- (MasterMind) TCU starts up
- System is active



FIRMWARE UPDATES

Running firmware updates ensures the bike performs as intended at all times

Firmware updates at Retail should be run:

- After building a bike
- Before bike-handover to rider
- Whenever a rider brings a bike into the store
- Whenever replacing a Turbo system component (motor, display, battery) or replacing the frame
  - Run 'Component Change' in Turbo Studio
  - Battery replacement does not require a Component Change, but updating the battery firmware is needed Levo Gen3 TCU vs MasterMind TCU bikes

Turbo Levo Gen3 bikes with a MasterMind TCU ship with a motor speed assist restricted to 15 kph.

- Update notification on MasterMind TCU screen (turtle symbol + text)
- Firmware updates must be carried out to apply correct market speed limit and the latest set of features
- Mission Control connection is only possible after running updates

Turbo Levo Gen3 bikes with a TCU do not have a speed limit restriction, but need to be updated as well.

- Update card under TCU
- Firmware updates must be carried out to apply the latest set of features

Over-the-air vs. wired updates (bikes already in the field).

For Levo Gen2 and Gen3, Riders can run TCU and motor updates through Mission Control (possibly after bike release). If Riders cannot update a component, but see a later version in Mission Control, they get a notification to turn to the Retailer to update these components. Batteries, for instance, are generally not updatable through Mission Control, but only through Turbo Studio.

Important for unboxing at Retail:
The very first updates need to be run through Turbo Studio.

Go to the SBCU YouTube channel to watch how-to videos around Mission Control over-the-air updates: https://www.youtube.com/user/SBCU1/videos

MasterMind TCU and TCU out-of-the-box update notifications.

RANGE AND RIDE TIME

SIMPLIFIED RANGE TABLE
The table states the most common spectrums for elevation gain (M), distance (KM) and ride time (H) for each default mode.

BATTERY WH	ECO (35/35)*	TRAIL (35/100)*	TURBO (100/100)*
700 WH	2000 - 2500 M 50 – 70 KM 3.5 – 5.5 H	1500 – 2000 M 30 – 50 KM 2.0 – 3.0 H	1000 – 1500 M 25 – 45 KM 1.5 – 2.5 H
500 WH	1500 - 1850 M 35 – 50 KM 2.5 – 4.0 H	1000 – 1500 M 20 – 35 KM 1.5 – 2.0 H	750 – 1100 M 15 – 30 KM 1.0 – 1.75 H

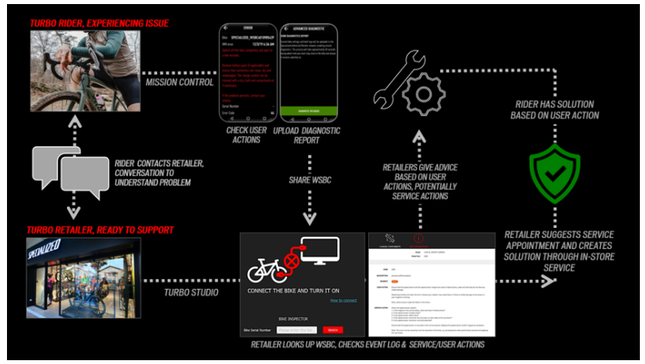
Range and ride time of e-bikes depend on multiple variables, based on differing conditions for rider, bike and environment. Consequently, there can never be a hard and fast range rule. To offer some orientation and to better manage expectations, we used three tracked Levo rides to get a simplified range matrix. Range between Levo Gen2 and Gen3 will be very similar since the battery capacity stayed unchanged. These were the underlying parameters for the tracked rides:

- Same rider with same bike and identical settings (80 kg rider and 24 kg bike)
- 25 kph motor assist speed limit
- Use of default motor settings for all three ride modes (Eco, Trail, Turbo)
- Same mode used through entire ride
- Use of maximum battery capacity: 700 Wh battery, fully charged
- Batteries were drained from 100% to 1% (motor shut-off)
- Normalized rider input around 150 watts
- Average cadence around 70 rpm
- Motor Supp ower in %, default values, customizable in Mission Control app
- Based on 15 mph / 25 kph max. motor assist speed
  - Deduct 10-20% range for 20 mph / 32 kph speed setting, depending on terrain and use of motor support

DIAGNOSTICS & TROUBLESHOOTING BASICS

These fundamentals cover the core procedure troubleshooting functional issues with Turbo bikes, that is, issues that are related to the electronic components.

1. Understand the issue
   A. Differentiate issue vs.system behaviour
   B. Master Rider Conversation & Reporting
2. Run Digital Diagnostics whenever possible
   A. TCU/TCD-w bikes
   B. Use Turbo Studio Event Log / Service Actions
3. Use Resources
   A. Troubleshooting Guide (step-by-step guide will be integrated into Turbo Studio, likely by mid2021)
   B. TCU Error Codes
   C. Service Website



'Digital Diagnostics' refers to the use of digital tools to identify an issue and find a solution. Turbo bikes with a TCD-w or TCU have the capability of being diagnosed remotely with the rider using Mission Control and in store by the retailer using Turbo Studio.

This flow summarizes how Riders and Retailers should partner to create solutions as quickly as possible.

SERVICE & REPAIR (RETAILER)

RESOURCE OVERVIEW

These are a some important technical resources for Retailers to use. Please visit the Service Website for these and additional resources.

- Unboxing video
- Motor replacement animation
- Schematics (small parts, cabling, suspension, etc.)
- Levo bike manual
- Many more (Service Website)

BATTERY EXPANDER AND SLEEVES

PURPOSE OF EXPANDER AND SLEEVE

The below shown expander and sleeve(s) need to be installed correctly on batteries to ensure a proper fit of the battery inside the frame.

DEFAULT CONFIGURATION

All MY22 Levo bikes should ship with batteries that have the expander and one sleeve pre-installed.
Per default, all batteries in MY22 Levo carbon frames should have one sleeve installed, as illustrated further down. The sleeve is installed on the battery side with the fixation inserts and faces the ground when the battery is installed.

REQUIRED ACTION

Please ensure the default configuration is installed as a minimum and follow the guidelines here to grant correct battery fitment in the frame.

INSERTION OF BATTERY WITH ONE SLEEVE INSTALLED

With one sleeve installed, the battery should create noticeable resistance around the expander area when seated in the uppermost position in the down tube (see blue circle). This is intended and ensures a snug fit in the frame.

WHEN TO INSTALL A SECOND SLEEVE

Please install one additional sleeve on the other side of the expander under these circumstances:

1. If the battery slides into the uppermost position (see blue circle) without any resistance.
   This additional sleeve can be found in the small parts box that ships with the bike.
2. If a Rider reports the battery to create noise on the trail – this would manifest as a dull noise under bigger impacts and can feel like a loose headset.

Generally, frame sizes S4, S5 and S6 are more likely to require an additional sleeve. Sizes S1, S2 and S3 should be set up per default with one sleeve, but always ensure the battery creates noticeable resistance in its uppermost position.

SERVICE PART REFERENCE

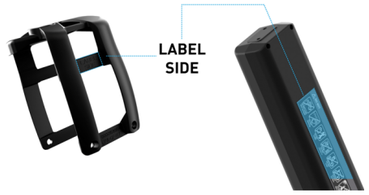
This is the service part if you need to order an expander kit for MY22 Levo bikes:

- S214200032 (SUB MY22 LEVO BATTERY EXPANDER KIT)

This kit contains the expander itself and two additional sleeves.
The kit is required if you need to equip a different battery to make it compatible with a MY22 Levo frame.
Please ensure you also install the required rock guard and door kit.

1. S216800026 (ELE MY22 LEVO ROCK GUARD DOOR KIT)
2. S214200033 (SUB MY22 LEVO BATTERY ROCK GUARD KIT)

Circled in blue:
uppermost position of the battery expander kit inside the frame / downtube



Expander orientation on battery:
Ensure the side of the expander that says "Label Side" is facing in the same direction as the battery safety and handling symbols

Expander and parts schematic:
1 = Battery expander
2 = Expander sleeve (one per default, facing battery fixation inserts / ground)
3 = Expander fixation screws w/ washers (4 mm hex, use screw-lock, tighten to 4 Nm)

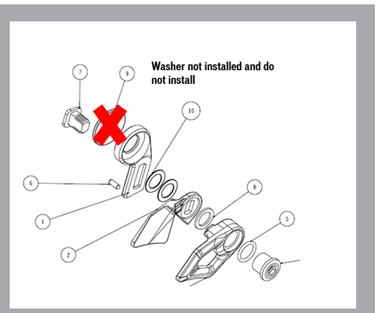
SMALL PARTS BOX

This list covers some additional contents of the small parts boxes that ship with the bikes.

All models are supplied with:

- Charger
- Tubeless valves
- Component accessories (e.g. disc brake pad spacer)
- Set of manuals (Levo and components

MODEL	CATEGORY	PART DESCRIPTION	NOTES
LEVO SWORKS CARBON	FRAME HARDWARE	1x Internal cable routing insert, 2 wires/2 cables	For non-drive-side brake cable and Levo remote
	FRAME HARDWARE	+/- 1° headset cup to adjust steerer tube angle	Optional for geo adjust
	DRIVETRAIN	AXS batteries	Not installed in components
	CHAINGUIDE	Chain guide washer/ spacer	Do not install washer (9 in image)
	WHEELS/ RIMS	60 tubeless plugs for Traverse SL rims, delrin material, with rubber O-ring.	n.a.
	HEADSET	1x 10 mm spacer 1x 20 mm spacer	n.a.
	FENDERS	FOX 36/38 fender mud guard	Not installed on fork
ALL OTHER MODELS	FRAME HARDWARE	+/- 1° headset cup to adjust steerer tube angle	Optional for geo adjust
	CHAINGUIDE	Chain guide washer/ spacer	Do not install washer (9 in image
	HEADSET	1x 10 mm spacer 1x 20 mm spacer	n.a.



SERVICE PARTS

Please visit service.specialized.com to find more service parts and to look up related details/imagery.

ALLOCATION	GENERAL DESCRIPTION	OFFICIAL PART DESCRIPTION	SKU
Frame Parts	Chainstay (carbon, 1 piece)	CHS MY22 LEVO CARBON, GLS BLK	S2115 00003
	Chainstay (alloy, 1 piece)	CHS MY22 LEVO ALLOY, STN BLK	S2115 00002
	Seatstay (carbon, 1 piece)	STS MY22 LEVO CARBON, GLS BLK	S2150 00003
	Seatstay (alloy, 1 piece)	STS MY22 LEVO ALLOY, STN BLK	S2150 00002
	Headset cups	HDS MY22 LEVO HEADSET CUPS	S2125 00015
	Seatpost/Seattube insertion limiter	MSC MY22 LEVO SEATPOST LIMITER KIT	S2199 00041
	Flip Chip Kit (chainstays)	BLT MY22 HORST PIVOT GEO ADJUST KIT	S2105 00006
	Chain guide	CHG MY22 LEVO CHAIN GUIDE KIT	S2112 00004
Frame Protectors	Seatstay bridge protector	MSC MY22 LEVO SEATSTAY BRIDGE PROTECTOR, PLASTIC	S2199 00036
	Mud flap at motor/ chainstays MSC MY22	MSC MY22 LEVO MUD FLAP KIT	S2199 00035

ALLOCATION	GENERAL DESCRIPTION	OFFICIAL PART DESCRIPTION	SKU
Motor	Specialized 2.2 motor	CUSTOM RX TRAIL TUNED MOTOR	S1968 00005
	Motor mount bolts	BLT MY22 LEVO MOTOR MOUNTING BOLT KIT	S2105 00010
	Motor cover	MSC MY22 LEVO MOTOR COVER KIT	S2199 00034
	Rock guard with door	ELE MY22 LEVO ROCK GUARD DOOR KIT	S2168 00026
Motor (cont.)	Motor mount carrier/ bracket (S1-S2)	MSC MY22 LEVO MOTOR CARRIER, S1-S2	S2199 00031
	Motor mount carrier/ bracket (S3-S4)	MSC MY22 LEVO MOTOR CARRIER, S3-S4	S2199 00032
	Motor mount carrier/ bracket (S5-S6)	MSC MY22 LEVO MOTOR CARRIER, S5-S6	S2199 00033
Battery	700 Wh battery (w/o hardware)	Specialized M3-700 Battery w/Rockguard (Service-AM) Single pack Notes: • used as service and aftermarket SKU • includes all hardware for Levo Gen3 frames: rock guard, charge port door, expander kit, all fixation hardware	98921-5614
	Bracket that sits on top of battery	SUB MY22 LEVO BATTERY EXPANDER KIT	S2142 00032
	Rock guard	SUB MY22 LEVO BATTERY ROCK GUARD KIT	S2142 00033
TCU	Turbo Connect Unit 2 (customizable TFT screen)	ELE TURBO CONNECT UNIT 2	S2168 00020
	Turbo Connect Unit 1 (10 LED charge indicator)	ELE TURBO CONNECT UNIT DISPLAY (A1.2)	S2168 00009
REMOTE	Wired handlebar remote with F1/F2 buttons	ELE TRAIL REMOTE 2	S2168 00019
WIRING	Main harness / motor-battery cable	ELE MY22 LEVO MAIN WIRING HARNESS	S2168 00018
INTERNAL CABLE ROUTING	All parts that fix the motor-battery cable to the inside of down tube 	CBG MY22 LEVO HARNESS ICR KIT	S2165 00006

ALLOCATION	GENERAL DESCRIPTION	OFFICIAL PART DESCRIPTION	SKU
		CBG MY22 LEVO MP ICR KIT	S2165 00004
	Set of all head tube cable entry guides, including 2 screws. 	CBG MY22 LEVO ICR PORT KIT	S2165 00007
		CBG MY22 LEVO DT ICR KIT	S2165 00005
Suspension Hardware	Carbon crank, left/non-drive-side CRK MY22	LEVO G2 CRANKARM, CARBON, 160MM, NDS, WITH CRANK BOLT	S2116 00021
	Carbon crank, right/ drive-side CRK MY22	LEVO G2 CRANKARM, CARBON, 160MM, DS, WITH CRANK BOLT	S2116 00020
	Alloy crank, left/non-drive-side	CRK MY22 LEVO G2 CRANKARM, ALLOY, 160MM, NDS, WITH CRANK BOLT	S2116 00019
	Alloy crank, right/drive-side CRK MY22	LEVO G2 CRANKARM, ALLOY, 160MM, DS, WITH CRANK BOLT	S2116 00018

SPOKE LENGTHS

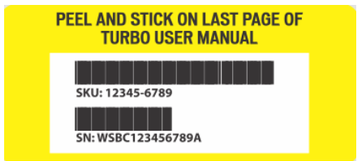
MODEL	WHEELS (148/110MM, 12/15MM THRU AXLES)	SPOKE LENGTHS FRONT (29) (IN MM)		SPOKE LENGTHS REAR (650B) (IN MM)	
LEVO S-WORKS CARBON	default spec	282	282	264	264
LEVO PRO CARBON	default spec	282	279	261	262
LEVO EXPERT CARBON	default spec	283	283	266	266
LEVO COMP CARBON	default spec	282	280	261	263
LEVO COMP ALLOY	default spec	282	280	261	263
LEVO ALLOY	default spec	282	280	261	263

BOLT TORQUES

These values are taken from the Levo manual. Find additional information there and/or on the Service Website.

LOCATION	TOO L	TORQUE	
		(NM)	(IN-LBF)
SEAT COLLAR	4 mm HEX	6.2	55
STEM @ STEERER TUBE (TRAIL STEM)	5 mm HEX	8	71
STEM @ HANDLEBAR (TRAIL STEM)	5 mm HEX	6	53
SPIDER LOCK-RING	Shimano BB-UN 98 / Park Tool BBT-18	50	443
CRANK BOLTS	8 mm HEX	40	354
SEAT COLLAR	4 mm HEX	6.2	55
CHAINRING BOLTS	5 mm HEX	10	89
WATER BOTTLE CAGE BOLT	3 mm HEX	2.8	25
12 mm REAR AXLE	6 mm HEX	15	133

LOCATION	TOO L	TORQUE	
		(NM)	(IN-LBF)
DERAILLEUR HANGER	8 mm HEX	25	221
HEAD TUBE ICR GUIDE SCREW	T10 TORX	0.8	7
TCU DISPLAY 1 & 2	T10 TORX	0.8	7
MOTOR MOUNT BOLTS REAR	T30 TORX	18	160
MOTOR MOUNT BOLTS CENTER	T30 TORX	18	160
MOTOR MOUNT BOLT FRONT DS	T25 TORX	9	80
MOTOR MOUNT BOLT FRONT NDS	T30 TORX	9	80
SPEED SENSOR BOLT	3 mm HEX	1	9
MOTOR COVER BOLTS	2.5 mm HEX	2	18
REMOVABLE MOTOR COVER BOLTS	3 mm HEX	1	9
SPEED SENSOR MAGNET (6 BOLT VERSION)	T25 TORX	6.2	55
REMOTE	2 mm HEX	0.8	7
BATTERY BOLT	6 mm HEX	6.2	177
BATTERY ROCK GUARD THRU-BOLT	4 mm HEX	3	26
BATTERY EXPANDER BOLT	4 mm HEX	4	35
BATTERY ROCK GUARD BOLTS	2.5 mm HEX	0.8	7
REAR BRAKE GUIDE	2.5 mm HEX	0.8	7
	2.5 mm HEX	4	35
CHAINSTAY BRIDGE COVER BOLTS	2.5 mm HEX	4	35
MOTOR HOUSING CABLE GUIDE BOLTS	2.5 mm HEX	4	35
CHAIN GUIDE	5 mm HEX	4.5	40



PEEL ME STICKER

Important for technicians and bike builders

The yellow Peel Me Sticker needs to be taken off the frame BY THE RETAILER/TECHNICIAN and put onto the last page of the Levo manual. There is a dedicated field on that page and a call to action on the sticker itself.

- There are legal reasons to do this. The WSBC number and the declarations in the manual need to be clearly associated with the bike sold
- The sticker for Turbo bike with a MasterMind TCU does not state a BLE pairing code since the pairing code shows on the display itself
- There is a note in the manual: In order to connect the bicycle and this user manual together, the serial number decal located on the drive side of the down tube of the bicycle must be placed over the facsimile of the decal on the back page of this user manual

IMPORTANT
As a Retailer, make sure you always hand out the matching Levo manual to the customer. Ideally, put the Manual (with Peel Me sticker applied) in a transparent plastic bag and write the last 5 digits of the WSBC number on the bag, using a permanent marker. Doing this, you will find it easy to find the right Levo manual after you sold the bike, since the frame is labelled with the WSBC number through a second sticker.

MAINTENANCE & HANDLING TIPS (RIDER)

Bike Manual

Plese read, use and follow the Levo User Manual.

The Levo manual is very informative and well-illustrated. It addresses these topics and more:
- Component overview
- Intended usage
- Assembly and setup notes, also suspension and geo adjustments
- Operating the Levo (riding, modes, display, remote, charging etc.)
- Battery handling and charging
- Compatibility notes (wheels, tires, shocks, etc.)
- Torque values
- Declaration of Conformity

Call for action (Retailer)

- Show and recommend it to their riders
- Stick the Peel Me Sticker into the Manual and show it to rider during bike handover, pointing out BLE pairing code for Mission Control App (TCU models only)

BATTERY REMOVAL & INSTALLATION

The Levo manual describes battery removal and insertion in detail. This here is a short version.

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

1. Bike in repair stand
- Preferred method whenever a suitable repair stand is at hand
- Battery has enough room to slide out - make sure to hold battery securely with your hands at all times

2 Bike placed on its side
- Alternatively, if a repair stand is not available, the bicycle can be carefully placed on its side or turned upside down
- If placed on its side, the bicycle should be on even ground and leaned towards the non-drive side
- To easily remove the battery, the rear end needs to be lifted up a bit so that the battery has enough room to slide out

3. Bike upside-down
- Due to its increased weight, turning the bicycle upside down may require more effort than with a regular bicycle. Be careful not to damage any cockpit components when turning the bicycle over and place it on soft ground or protective material

CLEANING TIPS

Please support Riders with cleaning tips. This helps avoid issues. The Levo manual holds important information, too.

Check-steps before cleaning
- Always turn the bicycle off and remove the charger from the charge port and wall socket before cleaning the bicycle.
- Leave the battery in the frame and leave the motor-batterycable connected when washing/cleaning
- Ensure the charge port cover/door is closed

Washing/cleaning rules
- Never use a high-pressure cleaner or high-pressure hose when cleaning your Levo
- Best practice is to use a bucket of water with a wet cloth or a sponge to
- Regularly clean the magnet on the rear wheel with a cloth. Brake dust with metal parts can collect and cause issues
- For instructions on how to clean third party components, refer to the respective manufacturer's instructions

After washing/before bike use
- Allow more sensitive areas to dry out: open the charge port door and disconnect the battery connector
- Make sure the charge port is free from water and/or dirt
- Blow out the contamination with low air pressure or use a soft brush to remove dry contamination
- Clean and relube the drive train system, using a lint-free rag and high-quality chain oil. Ideally, you do this before/after each ride.
- For instructions on how to maintain third party components, refer to the respective manufacturer's instructions

TRANSPORTATION TIPS

By car
- Only use car racks suitable for ebikes and follow the manufacturer's manual
- Remove battery from frame and transport it inside car
- Cover battery plug with plastic bag and fix cable to bike
- Do not drive at high speeds, especially when wet
- Do not place bike parts close to the exhaust pipes, especially rims/wheels - the heat from the exhaust(s) can damage parts

By airplane
- On passenger airplanes all batteries with a capacity greater than 100 Wh are usually not allowed (160 Wh SL Range Extender batteries are sometims accepted in hand luggage - check with airline)

Battery Connector
When transporting the bike w/o battery, cover the battery connector with a plastic bag and fix cable to bike

WEIGHT LIMITS

MODEL	STRUCTURAL WEIGHT LIMIT*	NOTE
LEVO S-WORKS CARBON	109 kg / 240 lbs	Roval system wheels with carbon rims and/ or carbon handlebar are the components that limit to 109 kg.
LEVO PRO CARBON	109 kg / 240 lbs	
LEVO EXPERT CARBON	125 kg / 275 lbs	n.a.
LEVO COMP CARBON	125 kg / 275 lbs	n.a.
LEVO COMP (ALLOY)	136 kg / 300 lbs	n.a.
LEVO (ALLOY)	136 kg / 300 lbs	n.a.

*The maximum total weight (rider and cargo) the bike is designed and tested to support structurally; this number does not include the bike weight itself.

RIDING WITH KIDS (USE OF TRAILER)

Use of trailer
The Levo manual includes a passage called 'Riding With Kids', defining all you need to know around the use of a trailer or other means to ride with kids.
- Please refer to this passage and inform your customers along those lines
- Note that the document 'Specialized Bicycle Owner's Manual Addendum: Riding With Kids' can be found on www.specialized.com as well; it can be downloaded as PDF on every bike page in the 'Manual Downloads' drop down (see screenshot)

SPECIALIZED BICYCLE OWNER'S MANUAL ADDENDUM
RIDING WITH KIDS

This is an addendum to the Specialized Bicycle Owner's Manual.

RIDING WITH KIDS

There are many different setups that allow you to ride with kids. Please look at the Riding Safely section in the Owner's Manual regarding general information and instructions on child carriers or trailers.

WARNING! Specialized bicycles are only designed and tested for use by one person at a time. Carrying a child on your Specialized bicycle is at your own risk. If you choose to install an accessory on your Specialized bicycle such as a trailer, carrier, or trailer cycle, make sure it is compatible and refer to the manufacturer's instructions and your Authorized Specialized Retailer. You should make sure your bicycle is still safe to ride with the accessory installed. Be sure to not exceed the structural weight limit of the bicycle if you use a trailer, trailer cycle or child carrier. Also make sure not to exceed the maximum cargo weight if you use a child carrier.

If you regularly ride with kids on your bicycle, your Authorized Specialized Retailer should conduct a periodic safety inspection.

WARNING! Riding with kids on your bicycle will affect the handling by altering the center of gravity, weight and balance. It may also negatively impact your cornering ability, increase your stopping distance and reduce your ability to slow down and maneuver, especially at higher speeds or down a steep grade. All of this can result in a loss of control, potentially causing serious injury and/or death. You should also become familiar with and practice riding with the accessory in a controlled environment away from traffic.

Before riding with kids on your bicycle, please inform yourself of all applicable legal requirements and regulations in your country and state. There may be restrictions on riding your bicycle with certain or any accessory(ies). This is especially true for electric and pedal-assist bicycles.

WARNING! Do not attach a child carrier, trailer or similar accessory to a composite or carbon fiber part or component, either directly or indirectly. For example, do not attach a trailer to a rear axle when the rear triangle is made of composite or carbon fiber. Likewise, do not attach a trailer cycle bicycle to a composite or carbon seatpost or a child carrier to a composite or carbon fork. Either may potentially apply unusual forces on your bicycle frame or component which could result in damage and cause a complete failure, with the risk of serious injury or death. If you have previously attached an accessory to a composite or carbon fiber part or component, do not ride until you have had your Authorized Specialized Retailer conduct a careful safety inspection.

SPECIALIZED Bicycle Components University