RIDER GUIDE · SV168

How the wheel works

How the SV168 controller, battery, motor, and charger are built, and what matters in daily use and service. Compiled from the developer Alexander Smirnov (@Alexovik).

VOLTAGE	CAPACITY	POWER STAGE	WEIGHT
168 V	2400 Wh	48 FET, 400 A	83.8 lb

If this is your first EUC

A euc balances itself. Sensors read the tilt of the shell, and the motor corrects dozens of times a second so the wheel stays upright. The rider sets speed and direction by leaning forward, back, and to the sides. The electronics handle all the balancing and power. Below are the terms you will meet on this page.

Controller and firmware	The wheel's "brain": a board with a processor that reads the tilt sensors and decides how much current to send the motor. Firmware is the program inside it, written and updated by the developer.
BMS	The battery's guard: it watches every cell, balances their charge, and keeps the pack from being overloaded.
Pedal lift (tiltback)	The wheel raises the pedal noses when it is time to slow down — low charge or near the power limit. It is a warning, and you need to heed it.
Free spin	The wheel is lifted into the air and spins with no load. Keep in mind: it does not shut off this way and keeps spinning the motor up.
FOC and the "sliders"	A way of driving the motor for smooth, strong torque. The app sliders fine-tune it (see "Kralya" in the Controller section).
FETs and PWM	FETs are the power transistors that push current into the motor. PWM shows how hard they are being driven; near the power limit the wheel starts to beep.

Controller

Power board: 48 FET, 400 A. Transistors are hyg100n20 — the same ones most 151–168 V controllers use. The MCU is an STM32F4.

The motor runs on field-oriented control (FOC). The app exposes current-loop coefficients (the q-axis and a few related ones); these used to be hard-coded and are gradually being surfaced.

The wheel pairs with a phone over Bluetooth, and in the app a regular rider needs only two sliders. The first is "Kralya" (an in-house, tongue-in-cheek name for the parameter): it sets how sharply or softly the wheel responds to acceleration — how hard the pedals push back on your foot as you add throttle; a beginner is calmer starting soft. The second is horizon correction: it tilts the pedals a degree or two forward or back so you stand level and don't have to curl your feet.

The rest are marked as engineering settings: leave them alone unless you understand them, since a wrong value can burn the controller.

The controller does not set the currents alone — it limits them. At zero speed the amps are deliberately capped. The PWM frequency is chosen on purpose: switching losses grow with frequency, so it is kept moderate. Up to 99 mph everything works normally on the stock motor.

Cooling

The controller is cooled passively, with no fans. A large pin-fin radiator with plenty of surface area sits on a solid aluminum base and spreads the heat from the power board across the aluminum. Copper would give a little more, but it is harder to interface thermally and prone to oxidation, so aluminum was chosen, with margin to spare. Because of this the wheel holds its temperature even under a heavy rider on the track, where many models pull into a pit stop from overheating.

Battery and BMS

EVE Energy 40PL cells, chosen after in-house testing for stability under high load. 168 V, 2400 Wh.

Cells are joined by copper welding, which cuts pack resistance 10x versus soldering. Soldering is more reliable when done perfectly, but slower and harder, so production uses welding.

The BMS is an in-house design, and each one is tested at assembly. You cannot push hundreds of amps without control, so a BMS is mandatory for this wheel.

On balancing: keep the charge a touch above the lower bound so every balancer works and the cells top up. Undercharging is harmful. Checking pack health is simple — open the lid and measure each brick; more than 0.5 V spread is a reason to investigate. The balancer boards hold ±0.02 V.

The 50PL cells were tried, but their discharge current is capped at 50 A versus 70 A for the 40PL, so the 40PL stayed as the base.

Charging

The SV168 does not come with a charger. The brand decided not to bundle a charger with its 168 V wheels because many riders already have one for this voltage, so you buy it separately. Wheels from 210 V up do ship with a charger.

Riders use lab chargers such as the "Gulya 4875" or "Skat ZX4875F1". A charger like this delivers up to 25 A and needs a quality outlet and a 25 A breaker (a 16 A one will likely trip). The wheel uses an XT90 connector, rated for 45 A.

The cells will take up to 25 A, but the developer recommends no more than 20 A. The charger itself can be set to a 3500 W power limit.

> **Careful when charging**
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> Do not charge overnight or unattended. Check the charger's no-load voltage with a multimeter. If voltage exceeds 170 V, the wheel lifts the pedals — an overvoltage safeguard, and the cells come to no harm.

Motor

Based on the Leaperkim R12–R14. The choice was deliberate after studying every motor on the market: light for its power, with the best rim. Motor, shocks, and mounts are stock Leaperkim factory parts. Acceleration power is 20–30 kW.

Three variants by purpose: r12 for racing, r14 for street and racing, and a rewound r14 for highway and speed. The 24-turn rewind behaves more evenly on jumps.

A fast motor dips the pedals on landing, so jump at no more than 70 % charge; otherwise you can burn the power FETs on touchdown.

Chassis and weight

An in-house carbon-fiber monocoque, with production Alexander mastered himself. The shell doubles as the battery compartment. Weight is 83.8 lb after the carbon process was lightened.

Carbon conducts heat far worse than aluminum, and the battery has thick heat-shrink on top, so the pack cools slowly. Keep that in mind after hard riding in the heat.

The body has protection at impact zones, underside and shock guards, two carry handles, and stock mounts for a GoPro or Insta360.

Quality and service

Every wheel is tested, and every part is inspected by hand before it ships to the customer.

An SV is easier to service than most wheels on the market: fewer parts, a precise fit between them, and a simple, deliberate design. Aluminum and carbon composite set a different level of body geometry and repairability.

The fasteners are quality stainless steel, so taking the wheel apart never turns into a fight with seized bolts, even after a winter or a rough off-road season.

How it behaves

Power equals torque times speed, and torque comes from phase current. Battery current rises as you accelerate. The cutoff is by maximum phase current.

The key control trait: this wheel does not sag forward like most. It builds power and throws everything backward — the rider, or itself if a spun-up empty wheel catches traction. Keep that in mind at the limit.

Service and safety

Before opening the wheel, discharge it fully: battery voltage sits on the screws between the lower and upper boards. The first power-on after assembly is done from the charger or a lab power supply.

Charge-based pedal lift triggers at a calculated 3.0 V per cell. Modes and safeguards are covered in the separate riding-modes guide.

→ Riding modes guide

SOURCE

Compiled from the official @sv_euc channel and the @fc_sv fan club, mostly from answers by the developer @Alexovik. This is a rider reference, not a factory manual. Confirm disputed details with the developer.