

VESC Fault Code Cheat Sheet

Print it, tape it to your bench. Read the code → find the cause → apply the fix.

First: Read the Fault Code (3 steps)

- 1 Connect via **USB / BLE / CAN** in VESC Tool.
- 2 Go to **Terminal**, type `faults`, press Send — or use **VESC DEV Tool → Diagnostics**.
- 3 No computer? **Count the LED flashes** — the blink pattern maps to the code below.

Fault Code Reference

CODE	FAULT	WHAT IT ACTUALLY MEANS
1	OVER_VOLTAGE	Pack voltage above the controller's silicon rating. Regen overshoot is the usual trigger.
2	UNDER_VOLTAGE	Pack sagged below the cutoff. Check connectors and sag under load, not just resting voltage.
3	DRV	Gate-driver IC failure (DRV8302 on many 4.x / some 6.x boards).
4	ABS_OVER_CURRENT	Instantaneous phase current exceeded the limit. Often a wiring or detection problem, not a dead board.
5	OVER_TEMP_FET	MOSFETs overheating — cooling, mounting or current limits.
6	OVER_TEMP_MOTOR	Motor too hot — reduce load or add motor cooling.
7	GATE_DRIVER_OVER_VOLTAGE	Gate-driver supply rail too high. Check the rail and supply caps.
8	GATE_DRIVER_UNDER_VOLTAGE	Gate-driver supply rail too low. Look for cold joints on the driver stage.
9	MCU_UNDER_VOLTAGE	MCU logic supply too low. Check the logic regulator & its cap — not the same as Code 2 (battery low).
10	BOOTING_FROM_WATCHDOG_RESET	Woke from a watchdog reset, not a clean power-on. Noise / marginal supply / firmware.
14	FLASH_CORRUPTION	Firmware or config corrupted — reflash via bootloader mode.

Codes 1–10 and 14 are the ones you will actually meet in the field. The firmware also defines higher codes (encoder variants 11–13, UNBALANCED_CURRENTS 18, resolver and flash-corruption variants) — see the online troubleshooting guide for the exhaustive list.

Top 5 Faults & Fastest Fixes

1 FAULT_CODE_DRV (Code 3)

Cause: Rapid start/stop bench cycles, regen with the battery disconnected, high switching frequency + FOC stress on the DRV8302.

- **Software:** switching frequency 20–25 kHz, lower motor current max, ramp time 2 s+
- **Hardware:** replace DRV8302 (~\$5–6 part) — needs hot-air reflow
- **Prevent:** current-limited bench supply; never brake with the pack disconnected

2 Motor Detection Fails (often Code 4)

- Drop detection current: set motor current max to 10–20 A before running detection
- Use **Experiments → Duty Sweep**; if it works, enter R / L / flux linkage manually
- Re-check phase & hall wiring order, then try a different motor to isolate

3 VESC Tool Won't Connect

- Needs **≥8 V on the input** to power logic — USB alone usually isn't enough
- Install STM32 VCP drivers (Windows) / check permissions (Linux, macOS)
- Try a data-capable cable; hold the button for **bootloader mode** and reflash

4 Over-Temperature (Code 5 / 6)

- Add heatsink / fan / airflow; verify thermal coupling to a heat-spreading surface
- Lower motor & battery current maximums
- Code 6 = motor overheating: reduce load or cool the motor

5 Inconsistent Throttle / Stuttering

- Run sensor detection (Motor Settings → Sensors → Detect)
- Raise observer gain slightly for sensorless FOC (stay below 1.0)
- Check phase connectors; drop switching frequency to 20 kHz at high ERPM

⚠ Bench safety

- Always use a **current-limited supply** (1 A) for first power-up
- Use an anti-spark connector or pre-charge resistor
- **Never** regen with the battery disconnected
- Recheck polarity with a meter before mating packs

Prevention checklist

- ☐ Current-limited supply for bench tests
- ☐ Switching frequency ≤ 25 kHz
- ☐ Thermal paste to heatsink
- ☐ Battery current max 20% below rating
- ☐ Read release notes before updating
- ☐ Secure all phase & sensor plugs

DRV-less = no Code 3

Code 3 only exists on boards using an integrated gate-driver IC. ChatRobotic TRONIC & SEVEN series use a **DRV-less** discrete gate-drive design — there is no DRV8302 on the board to fail.

Quick sizing check

- **250R** — 125 V (27S), 300 A peak · e-bike / scooter
- **X12 PRO** — 120 V (26S) 662 A or 150 V (32S) 380 A · eskate / EUC
- **SEVEN 18** — 993 A (26S) / 792 A (32S) · Onewheel
- **SEVEN 30** — 1655 A (26S) / 950 A (32S) · e-moto