

ThunderStruck Motors VCU v3.2.13 Feature List – April 2025

The following is a list of feature descriptions and configuration examples for the Dilithium/Thunderstruck Motors VCU firmware version 3.2.13. Starting with this version, torque limits are corrected for Newton Meter units across all inverter platforms. Contact Thunderstruck motors if an upgrade is desired.

For additional VCU support documents, see the VCU tab *Manuals & Downloads* on the Thunderstruck-ev.com website.

The v3.2.13 VCU release includes the following features:

- Canbus control of UQM, UQM Coda, and Nissan Leaf (2010-2025) motor inverters
- Simple command line user interface for Windows and Mac
- Zero torque output if throttle depressed during start
- Neutral wait option requires entering Neutral before activating throttle input (nwait)
- Dual channel throttle option
- Throttle mapping for torque slope control
- Software feathered throttle with seamless regenerative braking
- Throttle zero torque position (deadspot) - percent of travel where throttle transitions to regen
- Throttle off/max voltage settings for single or dual channel throttle
- Forward/Neutral/Reverse feature with in-motion protection against direction change
- 5 Volt output for powering throttle sensor (pot or hall)
- Outputs for precharge and main contactors
- Output for relay control of reverse light circuit
- Output for relay control of Brake light circuit during regenerative braking
- Configurable torque threshold for brake light activation (blonregen)
- Maximum output torque (maxtorque) – allows torque limiting
- Braking regeneration settings: throttle (idleregen) and brake pedal (brakeregen)
- Configurable acceleration rate of change limit (jerklim), applied to torque requests
- Torque taper settings limit torque and current at high rpm (maxrpm torque, torquekneerpm)
- Maximum pack voltage setting limits regenerative braking for charged packs (regenvmax)
- Minimum pre-charge voltage setting tested prior to closing main contactor (prechgminv)
- Software settable canbus termination resistor (120 Ohm)
- Canbus and status tracing for debugging
- Measure feature for testing throttle, FNR and brake inputs

Nissan Leaf Configuration Example using v3.2.13:

vcu> show config

THROTTLE

thtype : dhall ** use thtype "hall" for single channel and potentiometer
thw1off : 0.10v ** set to channel 1 min throttle voltage
thw1max : 4.90v ** set to channel 1 max throttle voltage
thw2off : 0.38v ** set to channel 2 min throttle voltage
thw2max : 2.29v ** set to channel 2 max throttle voltage

MAP

range1 : 0.. 75% throttle => 0.. 56% torque
range2 : 75..100% throttle => 56.. 99% torque
r1top : 75 ** throttle percent at top of range1
r1scale : 0.75 ** throttle scale for range1
r2top : 100 ** throttle percent at top of range2
r2scale : 1.75 ** throttle scale for range2
deadspot : 30% ** this is the throttle position starting throttle regen

BRAKE

brtype : switch ** set to "hall" for variable brake input. FNR is disabled in this case
brakeregen: 120.0Nm ** maximum brake regen torque, reduce to 10 for bench testing
blonregen : 50.0Nm ** regen torque value to activate brake light circuit relay

MOTOR/INVERTER

inverter : leaf ** set to inverter type
maxtorque : 280.0Nm ** max torque, 80kw max shown, reduce to 25 for bench testing
maxrpm : 10000 ** initial setting shown, set to max motor/drivetrain RPM
jerklim : 500Nm/S ** Larger number gives faster throttle response
idleregen : 120.0Nm ** max throttle regen torque, reduce to 10 for bench testing
maxrpm torque : 2.0Nm ** torque at top end of torque knee ramp
torquekneerpm: 5000 ** start of ramp to maxrpm torque - set to 0 for max torque
prechgminv: 310.0V ** set to minimum startup pack voltage
regenvmax : 410.0V ** set to maximum pack voltage during regen to protect pack

OPTIONS

FNR : enabled (Forward/Neutral/Reverse switch)
NWAIT : enabled (wait for Neutral before starting)
canterm : enabled (CAN termination resistor)

vcu>