

# EZ-Tune App Details

A summary of the tunable controller parameters

## Controller Settings

1. Max Phase Current (A)
2. Max Rotor Speed (RPM)
3. Max Bus Current (A)
4. Peak Current Duration (s)
5. Control Mode:
  - a. Torque
  - b. Speed
  - c. Power
  - d. Position
6. PWM Mode
  - a. CPWM
  - b. DPWM
7. Acceleration
8. Deceleration
9. PI Constants
  - a. Phase Current
    - i.  $K_p$
    - ii.  $K_i$
  - b. Rotor Speed
    - i.  $K_p$
    - ii.  $K_i$
  - c. Bus Current
    - i.  $K_p$
    - ii.  $K_i$
  - d. Flux Weakening
    - i.  $K_p$
    - ii.  $K_i$

## Battery Settings

1. Over voltage shutdown voltage (V)
2. Under voltage limit threshold (V)
3. Under voltage shutdown threshold (V)

# Motor Settings

## Motor Electrical Parameters

1. Motor Type
  - a. BLDCM (Square-Wave)
  - b. PMSM (Sine-Wave)
  - c. ACIM
2. Nominal Rotor Speed (RPM)
3. Pole Pairs
4. BEMF Constant
5. Lq Constant
6. Ld Constant

## Main SPF Sensor

7. Main SPF Sensor Type
  - a. None
  - b. Hall
  - c. Encoder
  - d. EncoderPWM
  - e. Sensorless
  - f. 5
  - g. 6
  - h. 7
  - i. 8
  - j. 9
8. **Main SPF Sensor phase shift (degrees)**
9. Main SPF Sensor pulses per revolution (PPR)
10. Main SPF Sensor revert A B Signal : Disable/Enable
11. Main SPF sensor input capture filter: 0 to 15

## Aux SPF Sensor

12. Aux SPF Sensor:
  - a. Aux SPF sensor type:
    - i. None
    - ii. Hall
    - iii. Encoder
    - iv. EncoderPWM
    - v. Sensorless
    - vi. 5
    - vii. 6

- viii. 7
  - ix. 8
  - x. 9
  - b. Aux SPF Sensor phase shift (degrees)
  - c. Aux SPF Sensor pulses per revolution (PPR)
  - d. Aux SPF Sensor revert A B Signal : Disable/Enable
  - e. Aux SPF sensor input capture filter: 0 to 15
13. SPF Sensor invert PWM signal: Disable/Enable

## Temperature Sensor

14. Motor temperature sensor type:
- a. None
  - b. KTY84-130/150
  - c. PT100
  - d. 230K/B4537
  - e. 4
  - f. 5
  - g. 6
  - h. 7
  - i. 8
  - j. 9
15. Motor over temperature limit threshold (degree Celsius)
16. Motor over temperature shutdown threshold (degree Celsius)

## Throttle

1. Throttle type:
- a. General
  - b. Joystick-Y
  - c. Joystick-XY
2. Throttle Mode:
- a. Linear
  - b. Comfort
  - c. Sport
  - d. 3
  - e. 4
  - f. 5
  - g. 6
  - h. 7
  - i. 8
  - j. 9
3. Throttle not reset check enable: Disable/Enable

## Main Throttle

4. Main throttle min fault threshold (mV)
5. Main throttle min reference threshold (mV) - 1000
6. Main throttle max reference threshold (mV) - 4000
7. Main throttle max fault threshold (mV) - 5000
8. Aux throttle min fault threshold (mV)
9. Aux throttle max fault threshold (mV) - 5000
10. Aux throttle min reference threshold (mV) - 4000
11. Aux throttle max reference threshold (mV) - 4500

## Gear

1. Direction positive or negative: Positive/Negative
2. Neutral Gear enable: disable/enable
3. Gear mode:
  - a. BD
  - b. DD
  - c. JJ
  - d. 3
  - e. 4
  - f. 5
  - g. 6
  - h. 7
  - i. 8
  - j. 9
4. Default Gear:
  - a. Low gear
  - b. Middle gear
  - c. High gear
  - d. 4
  - e. 5
  - f. 6
  - g. 7
  - h. 8
  - i. 9
5. Parking gear mode:
  - a. Disable
  - b. Invalid
  - c. Valid
  - d. Brake Unlock
  - e. Emergency stop high level
  - f. Emergency stop low level
  - g. 6

- h. 7
- i. 8
- j. 9

## Sport Gear Ratios

- 6. Sport Gear Phase Current ratio (%)
- 7. Sport Gear rotor speed ratio (%)
- 8. Sport Gear bus current ratio (%)

## High Gear Ratios

- 9. High Gear Phase Current ratio (%)
- 10. High Gear rotor speed ratio (%)
- 11. High Gear bus current ratio (%)

## Middle Gear Ratios

- 12. Middle Gear Phase Current ratio (%)
- 13. Middle Gear rotor speed ratio (%)
- 14. Middle Gear bus current ratio (%)

## Low Gear Ratios

- 15. Low Gear Phase Current ratio (%)
- 16. Low Gear rotor speed ratio (%)
- 17. Low Gear bus current ratio (%)

## Reverse Gear Ratios

- 18. Reverse Gear Phase Current ratio (%)
- 19. Reverse Gear rotor speed ratio (%)
- 20. Reverse Gear bus current ratio (%)

## Flux Weakening

- 1. Flux weakening current (A)
- 2. Flux weakening reference ratio (%)

## EBS

- 1. EBS reference current (A)

2. EBS max voltage (V)
3. EBS min rotor speed (RPM)
4. EBS auto mode enable

## Hold

1. Hold current (A)
2. ARB Enable: enable/disable

## Self-Learning

1. Self-learning reference D - 50 | 200
2. Self-learning reference Q - 2500 | 4000

## Meter

1. Meter Type:
  - a. SIF
  - b. Hall
2. Rotor speed pulses per revolution (PPR)
3. Tire diameter (cm)
4. Transmitting ratio (%)
5. Speed unit: km/h or mph
6. Speed factor (%)

## Communication

1. TCS Mode: 0 to 9
2. Bluetooth login password
3. RS485 communication protocol
4. CAN communication protocol
5. Part number

## Line Contactor

1. Contactor mode:
  - a. LCON
  - b. RCON
  - c. Controller over temperature
  - d. Motor over temperature
  - e. Controller or motor over temperature

- f. 5
  - g. 6
  - h. 7
  - i. 8
  - j. 9
2. Contactor coil voltage (V)
  3. Controller over temperature threshold contactor on (degree celsius)
  4. Motor over temperature threshold contactor on (degree celsius)

## Buzzer

1. Buzzer enable : enable/disable

## Factory Settings (non-configurable)

1. Serial Number
2. Nominal Voltage (V) : 144
3. Nominal phase current (A) : 400
4. Current factor : 90
5. Phase current U factor : 17294
6. Phase current V factor : 17157
7. Bus current factor : 17400
8. Bus voltage factor : 3166
9. Phase current U(A) : 0
10. Phase current V(A) : 0
11. Bus current (A) : 0
12. Bus voltage (A) : 0