T24 Display

User guide

# Catalog

1 Read me

★ Thank You for Purchasing our Smart ebike Driving System Equipped Bicycle, Read this manual before you take the first ride on your new bicycle and keep it for reference .

★ Contact dealer or the bicycle manufacturer if you can not understand this manual ,*Failure to follow this manual may be involved in risk or hazardous injury.*;

★ This manual is based on the general purpose. some of the content may not be applicable due to software updates or customization.

★ The communication between display and controller had been encrypted with different code, so we strongly recommend you that do not purchase display or controller from other suppliers and replace it by yourself.

★ Computer system may ask you to install drive software for this USB Dongle when connecting with your PC first time, you can download this drive software pack from our website, and install it properly. There have 2 models USB Dongle , USB-D1 is only for display and USB-C1 is only display.

★ The copy rights of all of these APP belong to us , you can not spread it without our permissions.

★ *For your sfety ,Make sure to not be distracted by the display while riding , focus exclusively on your riding environment.*

2 Technical Data(T24 Serials)

◆ Power: 15 - 60VDC /60 ma
◆ Screen: 2.4" Colorful TFT
◆ Button: Transparent silicon rubber
                       with LED Backlight
◆ Fix Position: Middle
◆ Communication: UART/TS232/CAN
◆ Material: ABS
◆ Ingress Protection: IP54
   (dust and splash water protected)
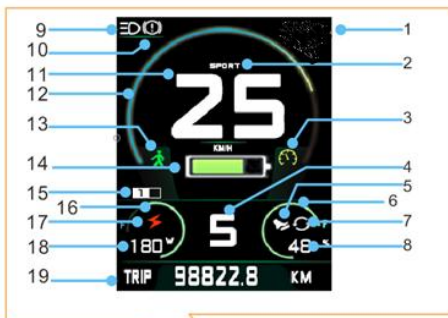◆ Customization :Valiable
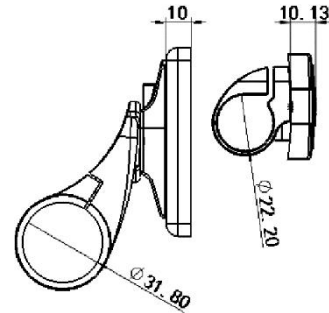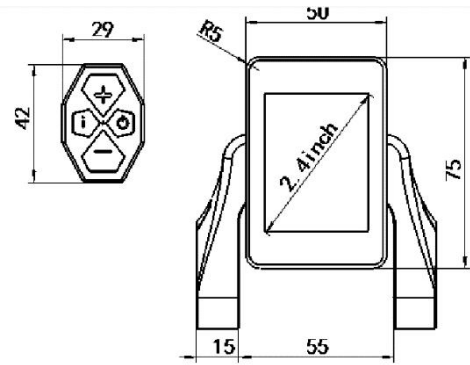
T24-V1

T24-V2

T24-H1

T24-H2

T24-H3

1	color of skin	13	Walk Assistance Indicator
2	Riding mode Indicator	14	Battery Indicator
3	Cruise indicator	15	Double battery system indicator
4	Assistance level indicator	16	Power indicator
5	PAS activated indicator	17	Power indicator
6	Drive indicator	18	Power value
7	Throttle activated indicator	19	Information indicator
8	Input Drive Value	20	UP button
9	Light indicator	21	INFO button
10	Brake indicator	22	DOWN button
11	Bike speed	23	POWER button
12	Bike speed ring	24	Light sensor

3 Operations

Caution:

Stop Bike if you want to make some operations on display , If you do not focus exclusively on your riding environment, you risk being involved in an accident.

Power on & off

--Long press ⬗ button with 3 seconds ;   user have to input password after power on if system was activated with password protecting function.

light on & off

--Long press 🔺 button with 3 seconds ,there has 3 options for light on or off , Manual ,Auto-Manual, Auto, LIGHT SENSOR will detect the environmental light intensity and turn the light on or off   automatically if select Auto-Manual, Auto options.

Switching Assistance level

--Short press 🔺 botton to increase assistance level or 🔻 button to decrease assistance level . the maxim assistance level can be set from 1 to 8 . usually more bigger level means more powerful and more speed;

--**Zero Level** ,The electric assistance switched off

-- Special level **A,C,R** Level should be   activated by menu options.

-**Auto Level** ,System will automatically adjust the power and motor speed according to the bike speed .

--**C Level** -Strong power at C level when use pedal sensor up-hill.

--**R Level** ,Motor will run backwards.

Walk assistance

--Walk assistance can make it easier for you to push the bike. The assisting speed can reach a maximum of 6km/h , **Using the walk assistance function is only recom-mended when pushing the bike and make sure bike's rim was touched with ground.**

Cruise

--Long press 🔻 button to activate Cruise function when bike speed is more than activated speed and electric assisting is on ,

--Pull brake or move the pedal or pull the throttle or press any key on display will cancel cruise

Caution: **There is risk of accident if you didn't concentrate on riding.**

Switching riding mode

--Three riding mode is ,ECO ,CITY ,SPORT, you can select desired mode ， Press Info button(**T24**)

--ECO：Effective assistance at maximum efficiency for maximum cruising range

--CITY：Uniform assistance with long cruising range

--SPORT: Powerful assistance for sporty off-road riding, as well as for urban traffic

Clear Trip

--Both long press ⬗ button and 🔻 button with 3 seconds , Trip meter will be cleared to zero.

TRIP , ODO ,MAX SPEED , AVG SPEED

--These information was shown at bottom of screen ,TRIP and MAX SPEED , AVG SPEED can be cleared by long pressing 🔄 button and 🔽 button   with 3 seconds;

Bike information

--Short press 🔄 button can switch the bike info show at bottom of screen , bike info include TRIP , TRIP TIME , ODO ,MAX SPEED , AVG SPEED ,TEST SCREEN , ABOUT.

ABOUT

-- Press 🔽 bottom when the ABOUT show on information indicator and short press 🔄 button can show different interface below.

--**Product information**

Show Version number, model of the product , service distance and Password.

--**Presentation mode**

Once enter this interface ,it can help you fully know how it works and different skins and different font color will repeatedly show on screen.

TEST

-- At this interface , you can check the status of all the components with details. which was connected with system .

--Pressing 🔼 bottom when the TEST show on information indicator,

-- short pressing 🔄 button can repeatedly switch such interface below.
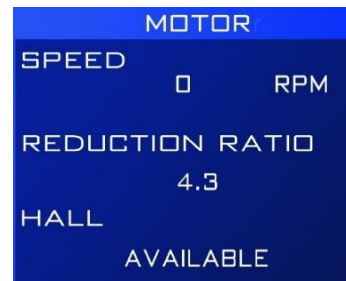
--**Realtime Voltage and current and power**

-- Motor information

Notice: you also can get correct motor reduction ratio when an unknow motor come to you.

-- Battery information

-Pedal sensor status and throttle status

-- Brake ,speed and shift sensor status

--Temperature sensor

Notice: not all of system was equipped with Temperature sensor ,and temp value is only for reference

--Select Skin

Three different color skins were preset in display, you can chose favorite one for yourself.
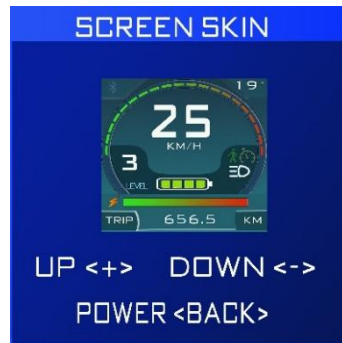
--Select Font Color

three different font solutions were preset in displat, you can chose favorite one for yourself.

As the skins and font color , you also can use our APP to make special color for you if three preset solutions are not enough for you.

4 Menu Settings

This is a full menu sets for T24 display , not all of the menu item will be visible for end user because some settings is only for some advance applications ,sometimes, maybe you can't modify set because you didn't get permissions from supplier , all menu items show with letters , it can help you to understand the meaning of each item easily, if you do not fully understand it , DON NOT CHANGE SETS ,**incorrect set may make system failure**.

➢ To enter the setting menu, press and hold the ▲ and the ⏻ bottom simultaneously within 3 seconds after the display starts to power on

--Password need be imputed if menu password protection option was activated.
--incorrect setting may cause bicycle can't work or make components failure.
--Maybe you can't modify settings because you don't have modify permissions;
--Some menu item may will be invisible.

a) Access settings menu

- Setting menu overview

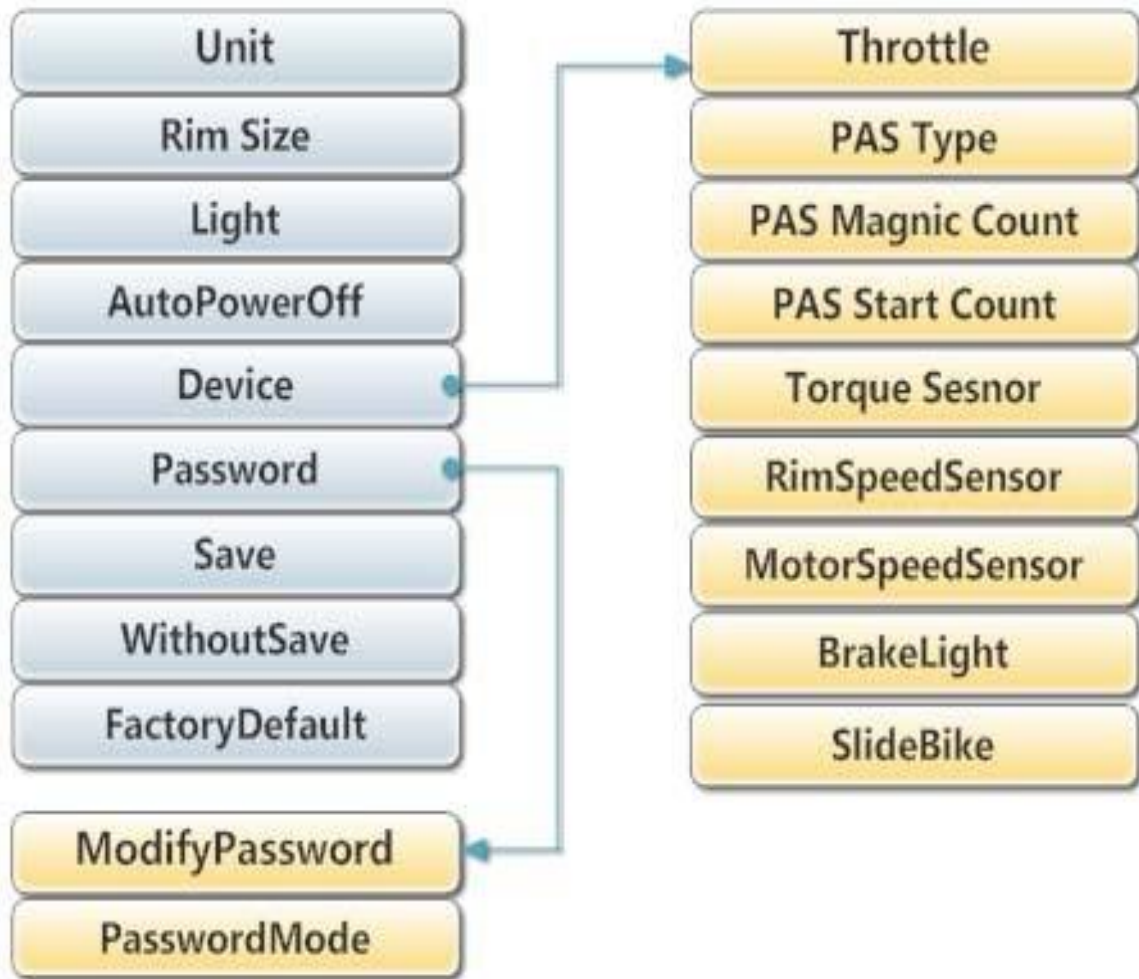| Menu Items	Instructions	Range of values
Unit	Speed mileage display unit	Metric, British
Rim Size	Wheel diameter	6inch-30Inch
Light	Headlight control	Manual - Manually control the headlight switch Auto - Automatic control (automatic control of light sensor) On - Always on when the vehicle is powered on
AutoPowerOff	Automatic shutdown time	3-15 minutes, when the vehicle is stationary beyond the set time, the automatic shutdown time
Device	Attachment Settings	See below
Password	Factory default user password: 1234	Change the user password, and password protection mode Non - No password protection function, PowerOn -boot password Menu - Password is required to access the Settings menu only (Note: Advanced password is not modifiable for users)
Save	Save Settings	Settings are not effective until the meter is turned back on after saving
WithoutSave	Discard this modification	
Factory Default	Restore factory default parameters	Modded type of meter, this menu is not visible
Throttle	Turn the knob on or off	Disable- Turns off, Enable - Turns on
PAS Type	PAS Type selection	Disable- To close, Low,High - no direction discriminant type PAS Auto - With directional discriminant type PAS
PAS MagnicCount	PAS magniccount	5-64
PAS Start Count	Number of PAS start magnets	1-12
TorqueSensor	Torque sensor function	Disable- Off, Enable- On
RimSpeedSensor	Wheel speed sensor magnetic steel number	0-12, with 0- indicating no equipment
MotorSpeedSensor	Motor built-in speed sensor magnetic steel number	0-36, with 0- indicating no equipment
BrakeLight	Brake taillight type and function	Disable - Off On/Off - three-wire brake taillights PWM - two-wire brake taillights
SlideBike	Scooter features	Disable- off, Enable - on

b) Access advanced settings menu

➢ To start the advanced settings, press and hold the ⚠ and ⚠ bottom simultaneously after entering the user setting menu. Enter the default advanced password (1234)

- Advanced menu setting overview
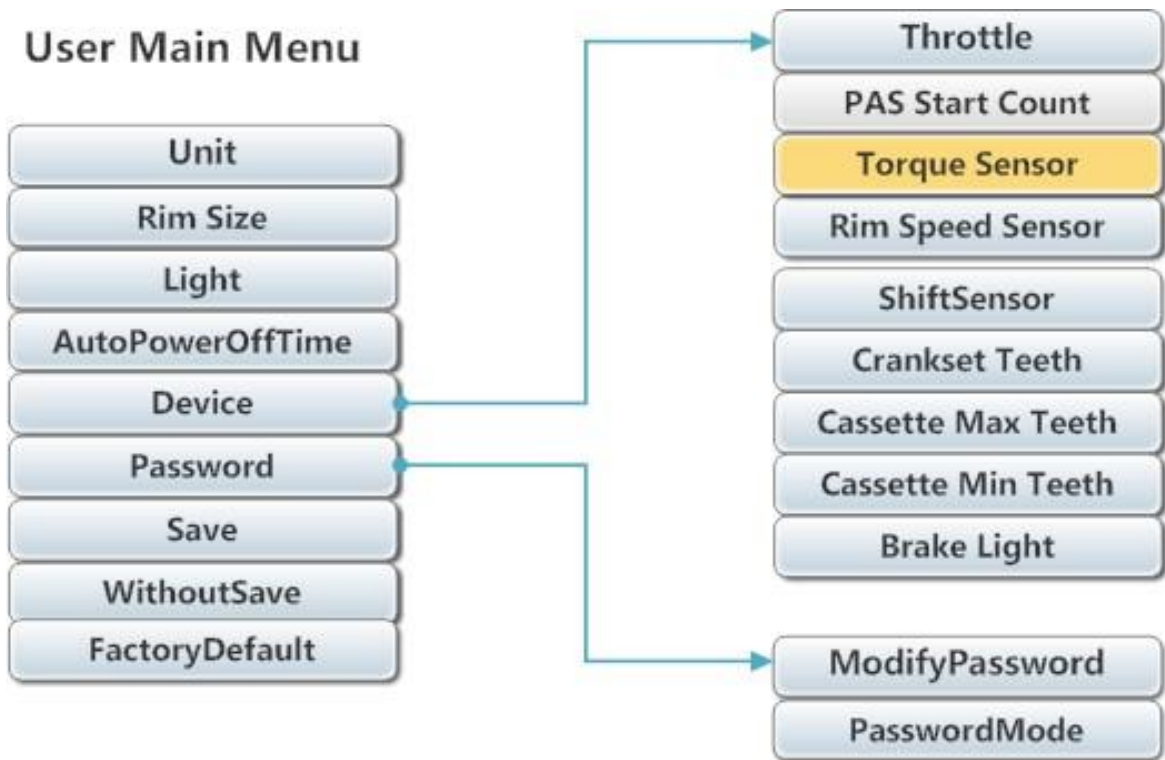
➢ **Application**

Menu Items	Instructions	Value range
Unit	Speed mileage display unit	Metric, British
Rim Size	Wheel diameter	6inch-30Inch
Light	Headlight control	Manual - Manual control Auto - Automatic control (hardware support required) On - Always on when the vehicle is powered on
AutoPowerOff	Automatic shutdown time	3 minutes -15 minutes, when the vehicle is stationary beyond the set time, automatic shutdown time
Device	Attachment setting	See below
Password	Factory default user password: 1234	Change the user password, and password protection mode Non - No password function, PowerOn - boot password Menu - Password is required to access the Settings menu only (Note: Advanced password is not modifiable for users)

Save	Save Settings	Settings are not effective until the meter is turned back on after saving
WithoutSave	Discard this modification	
Menu item	Instructions	Range of values
Throttle	Turn the knob on or off	Disable , Enbale
PAS Startup Count	Number of PAS startup magnets	1-6
RimSpeedSensor	Wheel speed sensor magnetic steel number	0-30, with 0- indicating no equipment
ShiftSensor	Shift sensor on or off	Disable , Enbale
Crankset Teeth	Crankset teeth	
Cassette Max Teeth	Maximum number of teeth for rear-shift	
Cassette Min Teeth	Minimum number of teeth for rear-shifting	
Brake Light	Rear brake light function on off	Disable , Enbale

➢ **Speed&Power** **(Gear speed and power limit definition)**

Specify the speed and current limits for each gear, with the current limit being a percentage of the maximum allowable working current

➢ **Battery**

The user can redefine the power meter of the battery in this interface by pressing and holding the ⬛ and ⬛ bottom at the same time. The OCV mode will be used for power measurement.

Note: To enter the definition of the electric meter, long press the ⬛ and ⬛ bottom. For more information, please refer to 《 section ② Definition of the battery electric meter 》

Menu	Description	Ranges
Type	Battery type	Customize -36V- 48V
StandardVoltge	nominal voltage	20V-60V
LowCutVoltage	Undervoltage value	15.0V − 55.0V

➢ **Controller**

Menu	Description	Ranges
MaxCurrentECO	The maximum current allowed in ECO mode	5a- 50a , The maximum current must not be greater than the rated current of the controller
MaxCurrentECITY	The maximum current allowed in CITY mode	5a- 50a ,The maximum current must not be greater than the rated current of the controller
MaxCurrentESPORT	The maximum current allowed in SPORT mode	5a- 50a , The maximum current must not be greater than the rated current of the controller

➢ Motor

To enter the FOC special parameter setting, press and hold the ⬆ and ⬇ keys simultaneously when the controller is in FOC mode. For more information, please refer to 《 section ① FOC vector control special setting 》

Menu	Description	Ranges
Gear	Motor gear	GearLess, Gear
PolePairs		
ReductionRatio		
AngleOffest	Hall installation angle error	-30° -30°
MotorConstant	Peak torque/square root of continuous power	After setting the motor parameters, the user can run the TEST Motor function to make the motor rotate. The value of the rotation speed can be obtained in this interface
StartMinVoltage%	Start initial loading voltage	0%-50%　（ % of battery voltage ）
StartMaxVoltage%	Start maximum loading voltage	0%-70%　（ % of battery voltage ）
StartSpeed(rpm)	Start initial speed	1-60rpm
StartMaxCount	The maximum frequency of commutations for the BLDC motor startup process	1-240
CommuteTable	motor commutation table	
Test Motor	Motor testing	The motor must be tested in a suspended state with the wheels off the ground. This is to ensure safety and to obtain accurate results. The real reduction ratio and motor constant can also be obtained by applying this function

➢ PAS

Menu	Description	Ranges
Type	PAS type	Disable　- disable PAS function Low　- Non-directional discrimination type 1 High - Non-directional discrimination type 2 Auto - With irection discrimination type PAS
MagnicCount	PAS magnets number	3-64
StartupCount	PAS starter magnets number	1-6
FilterCount	Smooth speed	1-3
KeepTime(ms)",		200ms-1000ms
MaxSpeed(rpm)	Maximum speed	60rpm – 200rpm
ControlMode	Speed control mode Under PedalSpeed mode， Bicycle speed = PAS speed x	MaxBikeSpeed – maximum gear speed limit LevelSpeed　- gear speed limit PedalSpeed1 -PAS rotate speed corresponds to

	maximum wheel speed / maximum PAS speed	bicycle speed, maximum speed limit PedalSpeed2 -PAS speed corresponds to bicycle speed, maximum speed limit

➢ Throttle

Menu	Description	Ranges
Activate	Turn the throttle on or off	Disable,Enable
StartupVol (mv)	The minimum voltage to start the throttle	800mv-2000mv
ControlMode	Speed control mode	0-12, Note: the throttle operation and speed limit are associated with the PAS working status. The speed limit is shown in the table below:

(throttle operation and speed limit mode table)

Mode	PAS not working	After PAS work
0	Null not working	6kmh
1	Null not working	Lelvel (gear speed)
2	Null not working	Ful (maximum gear speed)
3	6kmh	6kmh
4	6Kmh	Lelvel (gear speed)
5	6Kmh	Full (maximum gear speed)
6	Level gear speed	Level (gear speed)
7	Level gear speed	Full (maximum gear speed)
8	Full (Level gear speed)	Full (maximum gear speed)
9	6kmh	Full2 (maximum gear speed)
10	Level gear speed	Full2 (maximum gear speed)
11	Full (maximum gear speed)	Full(maximum gear speed)
12	Scooter	Scooter mode, no speed limit

➢ Torque Sensor

Menu	Description	Ranges
Activate	Torque sensor on or off	Disable,Enable
Mode	Operating mode	Sensitive – when Net torque output voltage > StartupNetVol, torques sensor is activated Safe – when Net torque output voltage>StartupNetVol，and start pedaling，the torque sensor is activated
ZeroVol(mv)	Zero point voltage	100mv- 2000mv
MaxVol(mv)	Output voltage	1000mv- 3300mv
StartupNetVol(mv)	Net starting voltage（note：	200mv- 2000mv

	starting voltage =current power supply - zero point voltage)	
KeepAngle(Deg)	The output keeps the pedal angle constant, and the output stability can be adjusted	0-180°
MinOutCurrent(a)	The minimum current bias The torque signal is proportional to the motor phase current	0-10a
Filter	Torque sensor smooth singnal	0-10
StengthValue	Assist strength = electric power/manpower	0-10

➢ **TemperatureSensor**

Menu	Description	Ranges
Activate(CTL)	Activate controller temperature sensor	Disable,Enable
OverTemp(CTL)	Current limiting mode in over-temperature state	Skip – unlimited power 30% Power -The motor is limited to 30% power after overheating 50% Power -The motor is limited to 70% power after overheating 70% Power -The motor is limited to 70% power after overheating
MinTemp(CTL)	Overheating start point	50°-80°
MaxTemp(CTL)	Maximum overtemperature end point	60°-100°
Activate(MOT)	Activate motor temperature sensor	Disable,Enable
OverTemp(MOT)	Current limit mode when overheated	Skip – unlimited power 30% Power -The motor is limited to 30% power after overheating 50% Power -The motor is limited to 70% power after overheating 70% Power -The motor is limited to 70% power after overheating
MinTemp(MOT)	Overheating start point	50°- 100°
MinTemp(MOT)	Maximum overtemperature end point	60°-120°

Notice: The motor temperature sensor is not included in the standard configuration. Please contact the seller for more information

> ### Restore Factory Settings

All data and settings on the display will be deleted and reset to the factory defaults.

Process: Main menu setting - Factory Default

① FOC vector control special setting

The display shows the controller's working mode. If the controller is in FOC mode, to enter the FOC parameter setting, long press the ▲ and ▼ bottom in the motor setting menu.

Menu	Description
Resistance(mohm)	Motor internal resistance，test by LCR，unit: milliohm
Inductance(uH)	Motor inductance，test by LCR，unit: : microhenry
SpeedKp	Speed PID Kp value（5-200）
SpeedKi	Speed PID Kp value（1-100）
Speed Filter	Speed feedback smoothing value（6-120）
CurrentKp	Curren loop PID Kp value（20-5000）
CurrentKi	Curren loop PID Kp value（1-500）
Auto CurrentPID	Determine the Kp and Ki values of the current loop PID automatically based on the motor's internal resistance and inductance
FluxWeakVoltage	The field-weakening speed-up function is activated in the battery voltage range（90% to 98%）
FluxWeakCurrent	Weakening field speed expansion maximum current (a) 0a-10a （0A means no field weakening function） Field weakening is a special function that not all FOC controllers have. **It can cause demagnetization of the motor**, so please consult the seller before using it

FOC Menu

Resistance(mohm)
Inductance(uH)
SpeedKp
SpeedKi
Speed Filter
CurrentKp
CurrentKi
Auto CurrentPID
FluxWeakVoltage
FluxWeakCurrent

② Definition of the battery electric meter

The system has a standard power definition table for 36V and 48V batteries. When using a non-standard battery (such as a 54V battery) or if the battery's discharge characteristics differ from the standard, the user can measure the battery's OCV (open circuit voltage) curve to set the voltage value

Battery Capacity

- Capacity=0%
- Capacity=20%
- Capacity=40%
- Capacity=60%
- Capacity=80%
- Capacity=100%

Menu	Description
Capacity=0%	Power =The open circuit voltage value at zero current
Capacity=20%	Power =The open circuit voltage of a battery at 20% state of charge
Capacity=40%	Power =The open circuit voltage of a battery at 40% state of charge
Capacity=60%	Power =The open circuit voltage of a battery at 60% state of charge
Capacity=80%	Power =The open circuit voltage of a battery at 80% state of charge
Capacity=100%	Power =The voltage of a fully charged battery

5 Error messages

Don't not use bike and try to shut the battery power off if errors were happened, DO NOT TRY TO REPAIR IT BY YOURSELF , send your bike to your service station , otherwise may result in serious injury.

WARNING Protocol Dismatch ⚠️	Communication encryption index number and controller inconsistency Solution: 1. Purchase a controller from the original system	WARNING Communication Interrupted ⚠️	The communication connection between the instrument and the control is interrupted Solution: Check the connection line between

	supplier 2. Purchase a controller with the same encrypted index number		the instrument and the controller to check whether the controller is damaged
WARNING Controller memory Fail ⚠️	Controller memory hardware failure or control memory save parameter verification failure Workaround: Replace the controller	**WARNING** Gallop Throttle Fail ⚠️	throttle failure Solution: Replace the throttle
WARNING Controller Mosfet Fail ⚠️	The controller MOS tube is damaged Solution: Replace the controller Important note: Once this fault occurs, please turn off the battery power immediately, otherwise it may cause battery damage, and even have the risk of fire	**WARNING** Motor Blocked ⚠️	Motor Blocked Solutions: 1. Reboot 2. Reset the phase parameters 3. Replace the motor
WARNING Speed Sensor Fail ⚠️	Speed sensor fail Solution: 1. Check that the speed sensor is installed correctly 2. Replace the sensor	**WARNING** Motor Hall Fail ⚠️	Motor Hall damage Solution: Replace the motor
WARNING Controller OverTemp ⚠️	Controller over-temperature Solution: stop riding or reduce the power of the ride	**WARNING** Motor OverTemp ⚠️	Motor over-temperature Solution: stop riding or reduce the power of the ride