

LCD135C Operation Manual



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1. Foreword

- Please read this manual carefully before using this display
- If you do not understand the specific function of the set parameters correctly, please do not try to modify the system parameters, because the wrong set parameters may cause damage to the system or components;
- Do not connect with electric vehicle controller not produced by our company, otherwise it may cause unforeseeable system damage;
- Instrument adopts encryption communication protocol, different systems use different encryption index number, encryption index number can be seen on the back label of the instrument or in the interface of the version information of the display; Only the controller with the same encryption index number can communicate with the instrument;
- This instrument can be optional Bluetooth function, as well as the matching special mobile APP, support mobile APP customization;
- The display and setting parameters of some customized instruments may be different from those described in this article, please consult the seller for details;

2. Product Description



Figure 1 Main interface

- This instrument is a TFT color graphics animation display control instrument with novel design and clear and intuitive interface, which is convenient for users to obtain vehicle status information during riding. The full-function test interface can display the working status data of all equipment, which is convenient for users to maintain and troubleshoot;

- The main part of the instrument is connected with the support by a fast bayonet, the main part of the instrument can be quickly removed, and the back of the instrument has two brakes and a throttle and keyboard interface, which is convenient for customers to install;



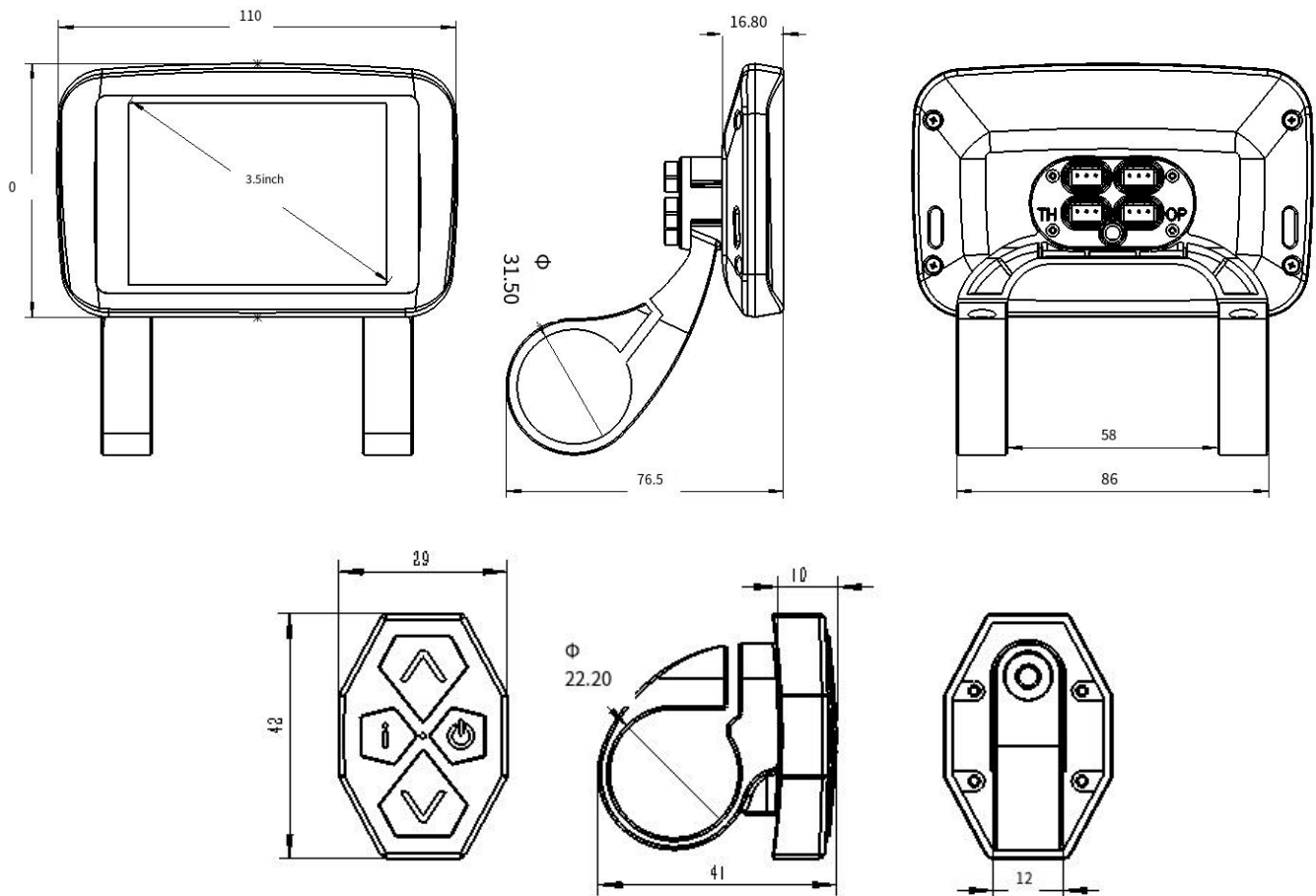
Figure 2 Test interface

- Rich configuration functions, can be personalized configuration and parameter settings for all components of the access system, can be configured the total number of gears, the power limit of each gear, the gear speed limit of the turntable, PAS, torque sensor; Motor parameters can also be configured, starting feeling, riding feeling, torque sensor parameters, foot parameters, etc.;
- The instrument is equipped with a four-key operator, and the operator is equipped with a backlight, which is convenient for the user to operate in a dark environment; The operator can carry out the following operations: switching on and off the machine, gear switching, riding mode selection, switching headlights, cruise and boost, functional testing, checking version information, interface switching, parameter setting, etc.
- Instrument adopts two-stage password protection and two-stage menu design, ordinary setting menu can be configured with conventional parameters, such as: wheel diameter, motor, battery, foot sensor, turn handle, torque sensor, etc.; Advanced menu, please refer to "LCD135C color screen instrument advanced Settings manual";
- The built-in photosensitive sensor of the instrument can automatically adjust the screen brightness according to the ambient brightness, can also automatically open and close the headlight according to the ambient light intensity;
- Instrument can be optional Bluetooth function, through the special mobile phone APP to lock or unlock the bike; The mobile APP has the functions of mileage record, speed display, cycling power curve saving, navigation, parameter setting, etc. Mobile APP support customization;

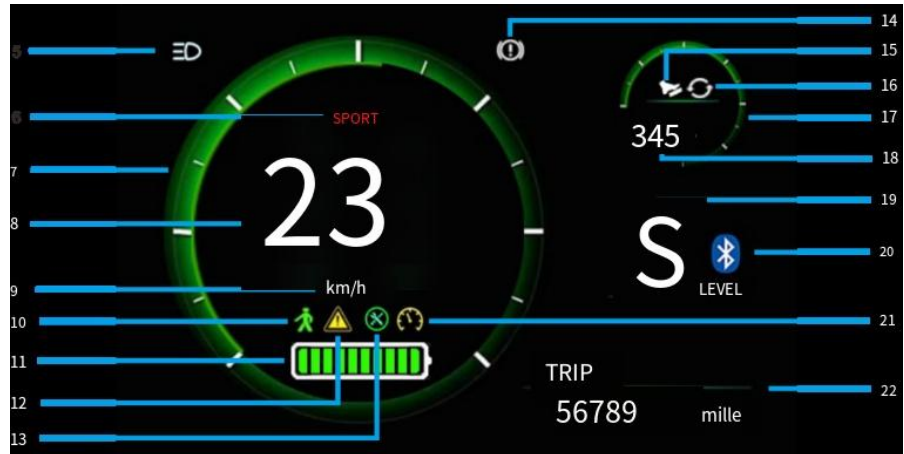
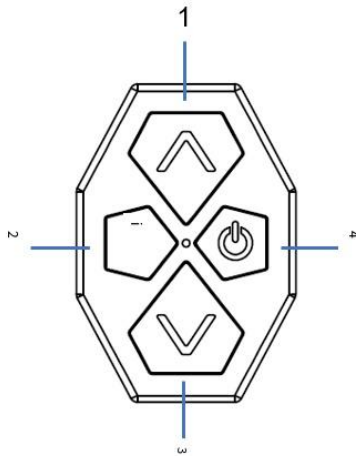
- Instrument with error status display function, each state is described in text, easy for users to understand and quickly solve the fault;

3. Technical parameters

- Display: 3.5-inch TFT color
- Operator: 4-button silicone button
- Detachable double stand: Brake x2 turn handle x1 Operator x1
- Operating voltage: 15-90VDC
- Waterproof rating: IP65
- Working temperature: -20-45°C



4. Work main interface and keyboard function



1	UP key	14	Brake signs
2	Info key	15	Pedal sign
3	DOWN key	16	Throttle sign
4	POWER key	17	Power display dynamic ring
5	Headlight sign	18	Output power
6 *	Riding pattern signs	19	Gear
7	Speed display dynamic ring	20 *	Bluetooth connection sign
8	Speed display	21	Cruise control sign
9	Unit of velocity	22	Information prompt box: TRIP: Single mileage ODO: total mileage TIME: Ride time MAX - AVG: maximum speed - average speed TEST: Test interface
10	6KM/H boost sign		
11	Battery level		
12	Trouble flag		

Note:

6*-- When the torque sensor is turned on, there are two modes M1 and M2: M1 indicates the torque mode, M2 step frequency mode;

When the torque sensor is turned off, there are three modes, ECO,CITY, SPORT;

20*-- Bluetooth module embedded instrument, when the mobile phone APP and instrument establish connection, Bluetooth icon will be displayed; (Optional function)

5. Test interface

The test interface can display the status information of each part of the system in real time, which is convenient for users to detect the operating status of each part of the system when there is a fault;



Display name	Instructions
Voltage	Battery voltage
Current	Controller bus bar current
Phase Current	Motor phase line current
Motor Speed	Motor speed
Constant	Back electromotive force constant of the motor
RR/TR	RR- Motor deceleration ratio (normal hub) TR- Front and rear rotation ratio (middle motor)
Throttle	Crank voltage
PAS	Treadle sensor RPM
Torque Sensor	Torque Sensor voltage
Speed & Shift	Speed - speed sensor status Shift- Shift sensor status
Temp ctl	Controller temperature
Temp Motor	Motor temperature
Hall Sensor	Detect the 3 HALL states of the motor

6. Controls

6.1 Power on and power off

- Long press the  key to turn the meter on; In the working state of the instrument, long press the  key to shut down;
- When the vehicle stops running for more than 5 minutes, the instrument will automatically shut down;

6.2 gear operation

- Short press the  keys and the  keys for gear switching, switching range: 0 - maximum gear (default maximum gear 5)
- At 0 gear, electric assist bikes do not provide electrical assist output

6.3 Switching of information display

Short press the  key can switch the information box; The information box is located at the bottom of the screen;

6.4 Ride mode switch

Short press the  key to switch riding mode;

6.5 Look over the fault information

When the warning sign on the main screen flashes, long press the  key and the you can read the warning status text information;

6.6 Look over the version information

Long press the  key can be used to read the model and version information of the instrument;

6.7 Exhibition demonstration mode

In the version information display interface, long press the  key to enter the exhibition demonstration mode;

6.8 Boost and cruise control functions

When the bicycle is in the stationary state, keep pressing the  key will enter the 6km/h boost mode. When stop pressing the key, the boost will stop;

6.9 Headlight control

Long press the  key to turn the headlights on or off;

6.10 TRIP Clear

Long press the  and  key to make TRIP zero.

6.11 Enter the test screen

- Short press the  key to switch the information display box until the  appears in the information display box.
- Short press the  key to enter the test interface;
- Short press the  key to exit the test on time.

7. Fault information

When the  keep flashing on the main interface of the instrument; Indicates that the system is faulty, long press the  key, then you can check the specific content of the fault;

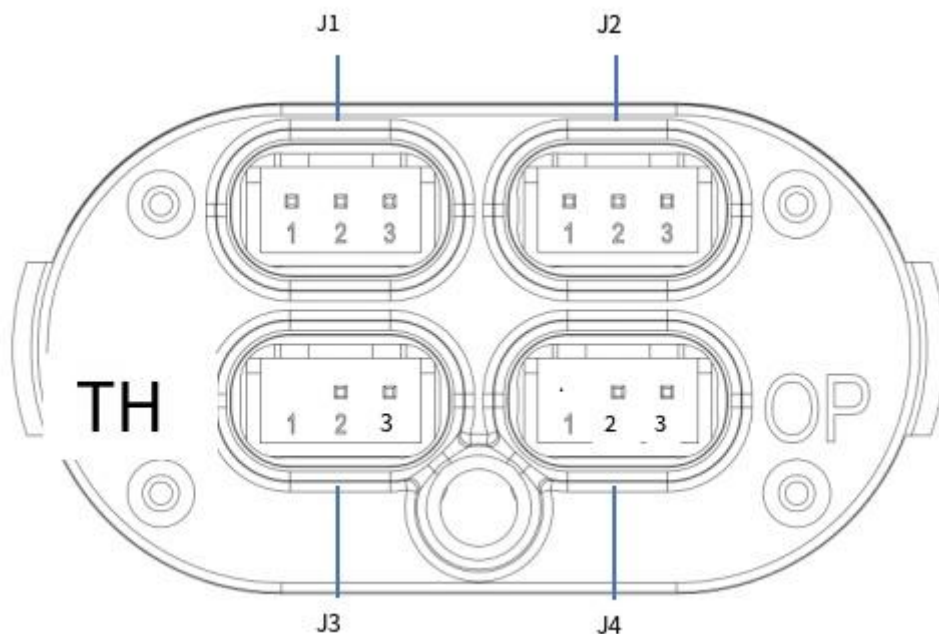
WARNING Protocol Mismatch 	Communication encryption index number and controller inconsistency Solution: 1. Purchase a controller from the original system supplier 2. Purchase a controller with the same encrypted index number	WARNING Communication Interrupted 	The communication connection between the instrument and the control is interrupted Solution: Check the connection line between 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 gridlock Solutions: 1. Reboot 2. Reset the phase parameters 3. Replace the motor
WARNING Speed Sensor Fail 	Speed sensor signal loss Workaround: 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 overtemperature Solution: stop riding or reduce the power of the ride	WARNING Motor OverTemp 	Motor overtemperature Solution: stop riding or reduce the power of the ride
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8. ODO mileage clear

- When the mileage is less than 100 kilometers, enter the parameter setting, long press  and , you can make the mileage zero.
- When the mileage is greater than 100 km, this function is invalid;

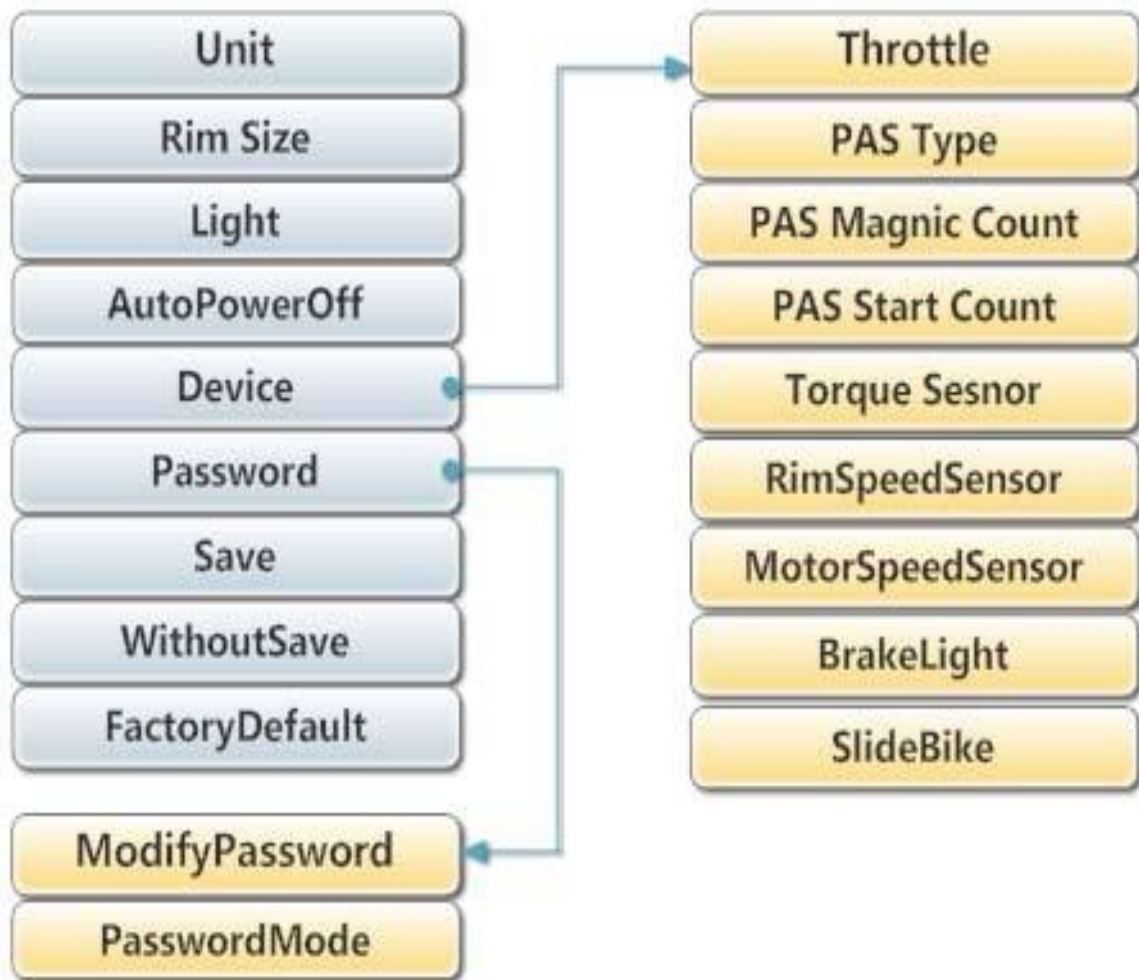
9. Meter wiring definition



Equipment	Number	Bit number	Definition	equipment	No	Bit number	Definition
Brakes	J1	1	5V	throttle	J3	1	5V
		2	GND			2	GND
		3	BRK			3	THR
Brakes	J2	1	5V	throttle	J4	1	operation
		2	GND			2	
		3	BRK			3	

10. Settings (Standard Edition)

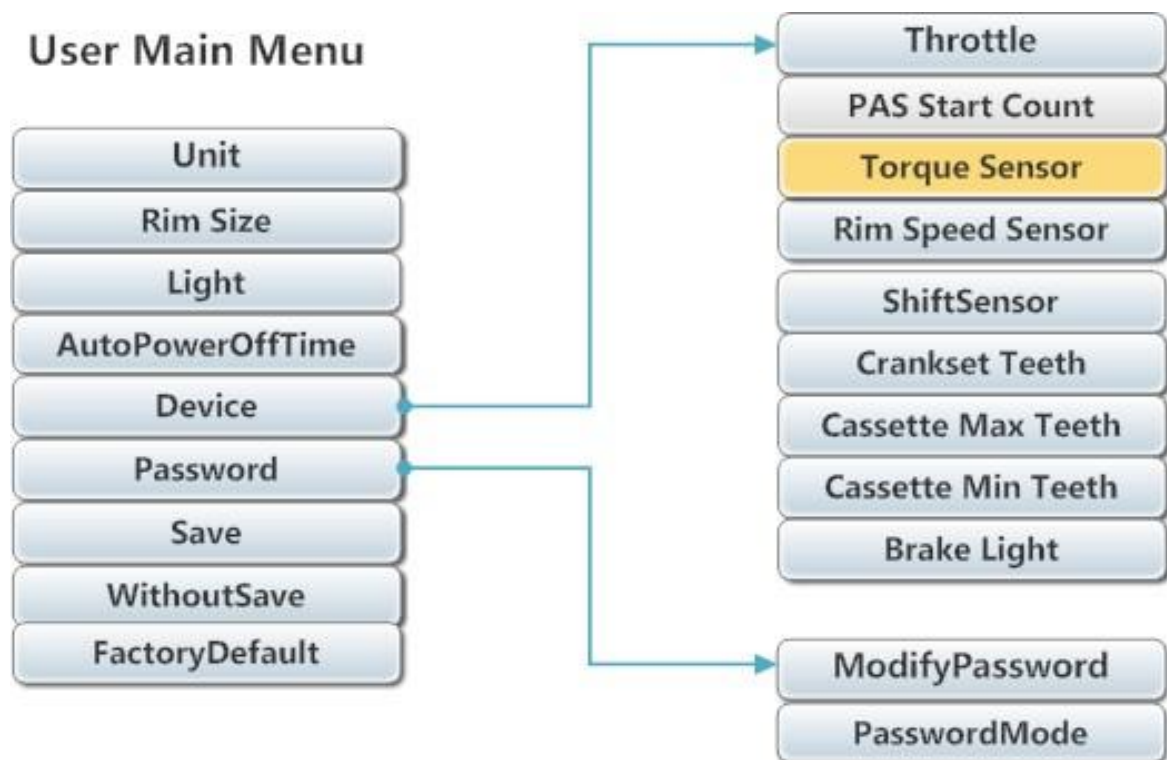
- Incorrect Settings may cause the system to fail to function properly. The Settings are password protected, the initial password: 1234, (users are advised to change the password before use)
- The TFT series color screen instrument has rich setting functions, which can be set according to actual needs and application scenarios (some functions require hardware support, specifically consult the seller)
- In the main interface state of the display, long press the Up key and the Power key at the same time, you can enter the setting mode.



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

11. Settings (Mid-drive motor version)

- Incorrect Settings may cause the system to not operate properly. The Settings are password protected, the initial password: 1234, (users are advised to change the password before use)
- The TFT series color screen instrument has rich setting functions, which can be set according to actual needs and application scenarios (some functions require hardware support, specifically consult the seller).
- In the main interface state of the display, long press the Up key and the Power key at the same time, you can enter the setting mode.

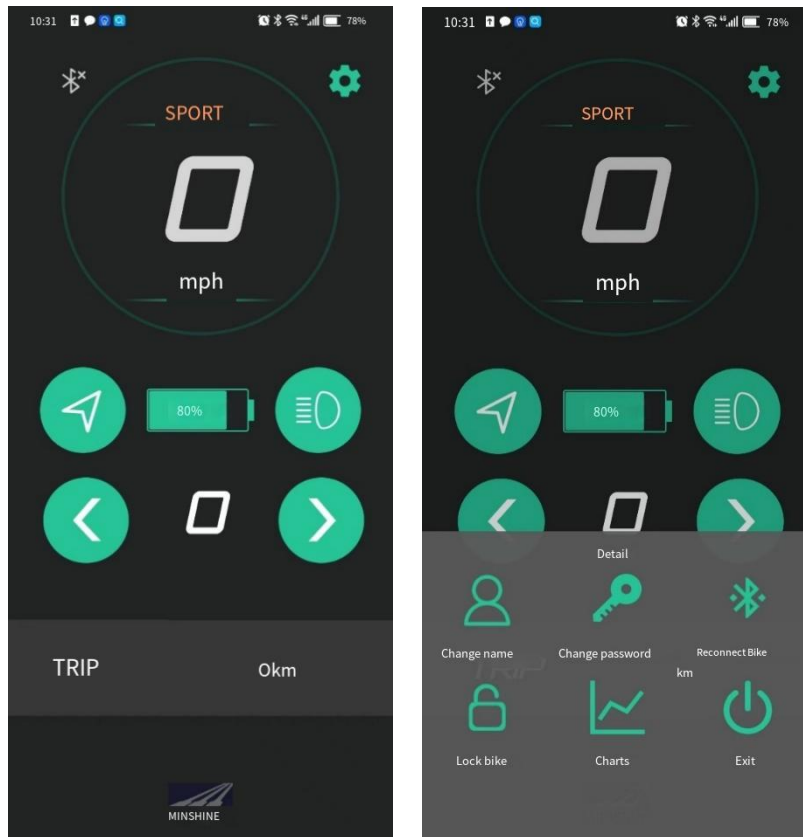


Menu Items	Instructions	Value range
Unit	Speed mileage display unit	Metric, British
Rim Size	Wheel diameter	6inch-30Inch
Light	Headlight control	Manual - Manual control Auto - Automatic control (hardware support required) On - Always on when the vehicle is powered on

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 , Enable
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 , Enable
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 , Enable

12. Bluetooth and mobile APP

- This function is optional, without the instrument with Bluetooth function, APP can not establish communication with the instrument
- With the Bluetooth function, you can lock and unlock through bluetooth
- Additional costs associated with the APP's Google, Apple Maps app and app store listings
- Support customer customization, please contact the seller for details;



13. Change records

Date	Changes	Signature
2023.12.27	Increased by 13; Change 10 and 11 Article 3 (see red font)	

1 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.

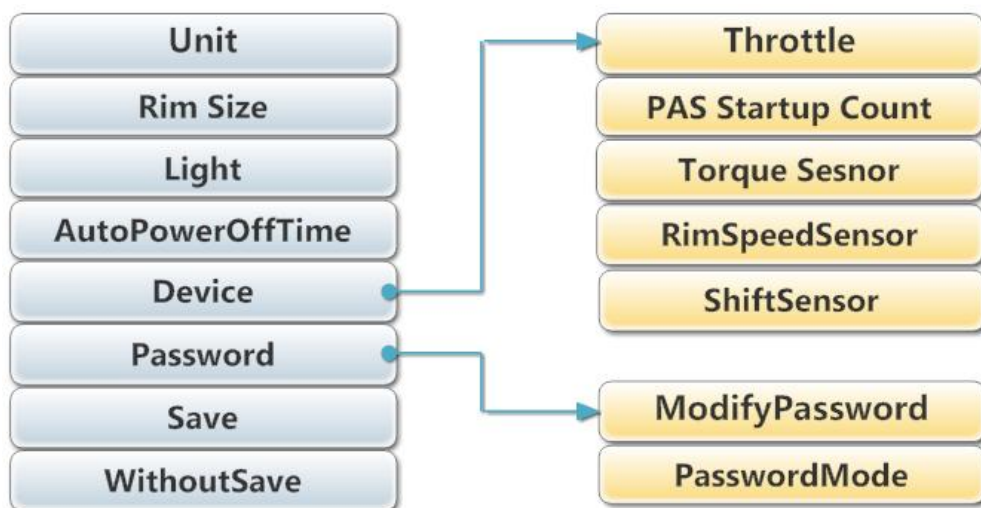
--incorrect setting may cause bicycle can't work or make components failure.

--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



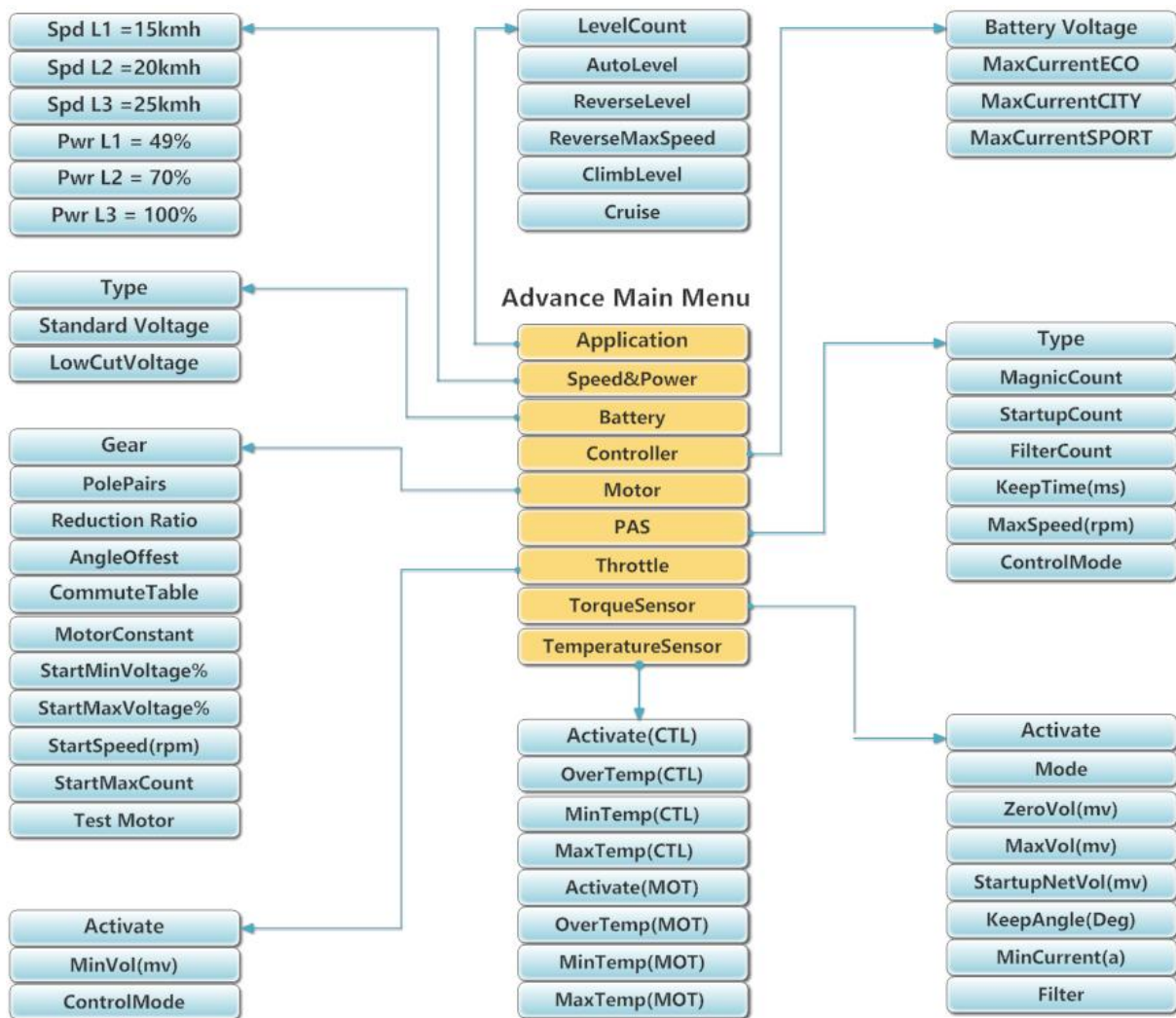
Menu	Description	Ranges
Unit	Unit of speed and distance	Metric, British
Rim Size	Wheel diameter	6inch-30Inch
Light	Front light control	Manual – Manual control Auto – Automatic control (hardware support required) On – the light remains on after the bicycle is powered on
AutoPowerOff	Automatic power-off time	The display will be automatically turn off after 3-15 minutes of inactivity
Device	Accessories setting	See below
Password	Factory default password: 1234	Set user passwords and password security Non – No password , Power On – password boot Menu - a password is only required to access the settings menu (Note: advanced password cannot be modified by users)
Save	Save settings	The settings will not be activated until the display is rebooted
WithoutSave	Discard this modification	

Device Menu	Description	Ranges
Throttle	Enable or disable the throttle	Disable , Enable
PAS Startup Count	PAS number of starter magnets	1-6
Torque Sensor	PAS number of starter magnets	Disable , Enable
RimSpeedSensor	Number of wheel speed sensor magnets	0-30, 0-表示没有装备
ShiftSensor	Gear sensor	Disable , Enable
Crankset Teeth	Crank teeth number	5-60
Thssette Max teeth	Maximum number of gears	5-60
Thssette Min teeth	Minimum number of gears	5-30

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	Description	Ranges
LevelCount	Supporting level	1-8
AutoLevel	Automatic function	Disable,Enable, 可根据自动调整档位
ReverseLevel	Reverse function	Disable,Enable
ReverseMaxSpeed	Maximum reverse gear speed	3kmh -10kmh
ClimbLevel	Climbing gear, this function is only supported by the Auto type PAS	Disable,Enable
Cruise	Cruise function	Disable,Enable

➤ **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
StandardVoltage	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 maximum wheel speed / maximum PAS speed	MaxBikeSpeed – maximum gear speed limit LevelSpeed - gear speed limit PedalSpeed1 -PAS rotate speed corresponds to 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: starting voltage =current power supply - zero point voltage)	200mv- 2000mv
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 signal	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. <u>It can cause demagnetization of the motor</u>, so please consult the seller before using it

FOC Menu



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



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