Battery Monitor

Shunt Sampling

Model: KL-F Series

User Manual

Run

- Temperature Sensor — GND, VSNS

- Current Sensor — ISNS−, ISNS+, GND, VCC

- Output Control — GND, OUT, VEXT

VSNS
VEXT
GND

Battery Monitor
KL-Series

GND
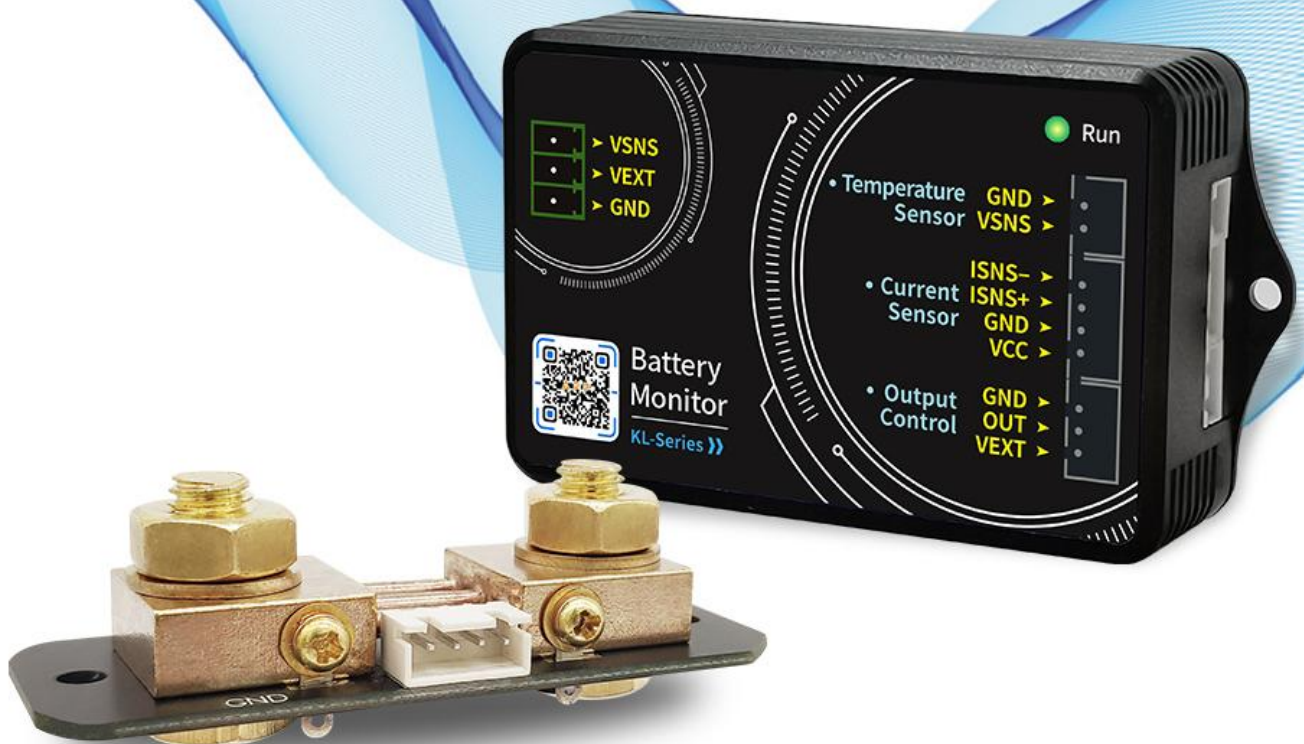
KL-F Series
Battery Monitor

Shunt sampling

User Manual

Rev1.0 May 2022

Guaranty and declaration

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This document replaces all previously published documentation.

Contact Us

If you have any problem or requirement when using our products or this manual, please contact JUNCTEK.

E-mail: **junce@junteks.com**

Website: **www.junteks.com**

Safety requirements

Safety regulations and safe use

General Safety Summary

Please review the following safety precautions carefully before putting the meter into operation so as to avoid any personal injury or damage to the meter and any product connected to it. To prevent potential hazards, please follow the instructions specified in this manual to use the meter properly.

Observe All Terminal Ratings

To avoid fire or shock hazard, observe all ratings and markers on the meter and check your manual for more information about ratings before connecting the meter.

Use Proper Over-voltage Protection

Ensure that no over-voltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the operator might be exposed to the danger of an electric shock.

Do Not Operate Without Covers

Do not operate the meter with covers or panels removed.

Do Not Insert Anything Into the Air Outlet

Do not insert anything into the air outlet to avoid damage to the meter.

Avoid Circuit or Wire Exposure

Do not touch exposed junctions and components when the unit is powered on.

Do Not Operate With Suspected Failures

If you suspect that any damage may occur to the meter, have it inspected by JUNCTEK authorized personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by JUNCTEK authorized personnel.

Provide Adequate Ventilation

Inadequate ventilation may cause an increase of temperature in the meter, which would cause damage to the meter. So please keep the meter well ventilated and inspect the air outlet and the fan regularly.

Do Not Operate in Wet Conditions

To avoid short circuit inside the meter or electric shock, never operate the meter in a humid environment.

Do Not Operate in an Explosive Atmosphere

To avoid personal injuries or damage to the meter, never operate the meter in an explosive atmosphere.

Keep Meter Surfaces Clean and Dry

To avoid dust or moisture from affecting the performance of the meter, keep the surfaces of the meter clean and dry.

Prevent Electrostatic Impact

Operate the meter in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

Handle with Caution

Please handle with care during transportation to avoid damage to keys, knobs, interfaces, and other parts on the panels.

Notices

1. Do not exceed the voltage and current range of the meter, otherwise the meter will be damaged.
2. The positive and negative poles cannot be reversed, and the reverse connection cannot be handled correctly.
3. The shell of the meter is fragile and easy to corrode. Please don't hit or close to chemicals to avoid corrosion.
4. Storage temperature: -25~50℃, and keep the meter in a dry environment.
5. Do not attempt to disassemble the meter, it will void the warranty. There are no user-serviceable parts inside the meter. Repairs can only be made through designated repair outlets or sent back to the factory.
6. Please do not move the meter violently to avoid causing irreparable damage to the internal circuit. If the meter does not work properly, please contact the supplier!

Contents

Inspection

When you get a new KL-F series coulometer, it is recommended that you inspect the meter according to the following steps.

Inspect the Packaging

If the packaging has been damaged, do not dispose the damaged packaging or cushioning materials until the shipment has been checked for completeness and has passed both electrical and mechanical tests. The consigner or carrier shall be liable for the damage to the meter resulting from shipment. We would not be responsible for free maintenance/rework or replacement of the meter.

Check the Contents

Please check the contents according to the packing lists. If the meter is damaged or incomplete, please contact your JUNCTEK sales representative.

|	
KL-F series of Measuring module	1pc
KL-F series of the Sampler	1pc
Temperature Sensor	1pc
4P connection cable	1pc
3P connection cable	1pc
Terminal	1pc
Quick guide	1pc

Inspect the Meter

In case of any mechanical damage, missing parts, or failure in passing the electrical and mechanical tests, contact your JUNCTEK sales representative.

Chapter 1 Overview

1. Brief Introduction

KL-F series DC voltage and current meter/battery coulomb meter is a new type of coulomb meter that can measure various parameters such as voltage, current, power, charge and discharge capacity, watt-hour, time, etc., and can also set parameters to achieve over-voltage protection , under-voltage protection, over-current protection, over-power protection, over-temperature protection and other protection functions. The meter can automatically identify the direction of the current, and can monitor the battery capacity in real time. During use, connect the sampler in series to the negative wire of the battery according to the wiring diagram, and then connect the sampler and measurement module through the data line, install the matching mobile phone APP, view the measured data through Bluetooth, control the meter and firmware upgrade through the mobile phone APP.

2. Dimension

The measurement module

The hole position

100A sampler

100A sampler hole position
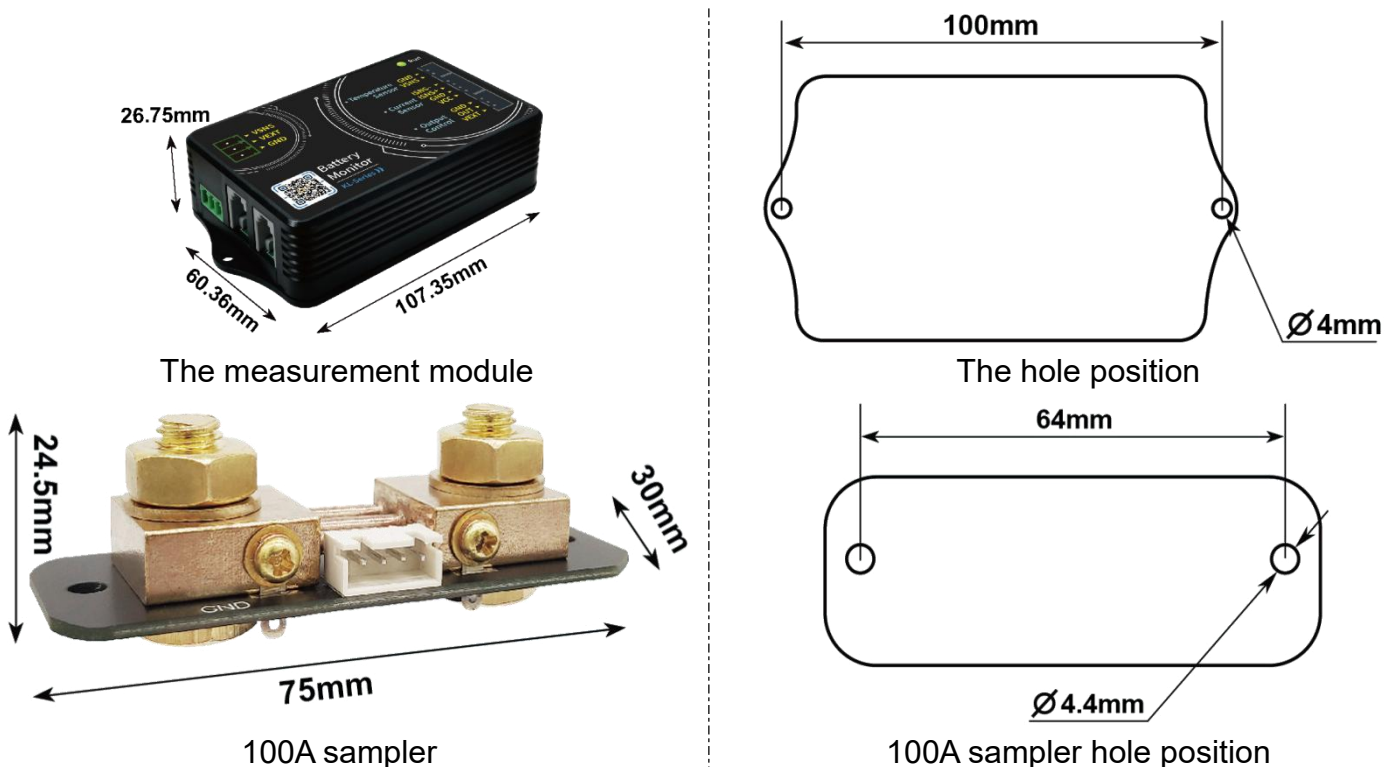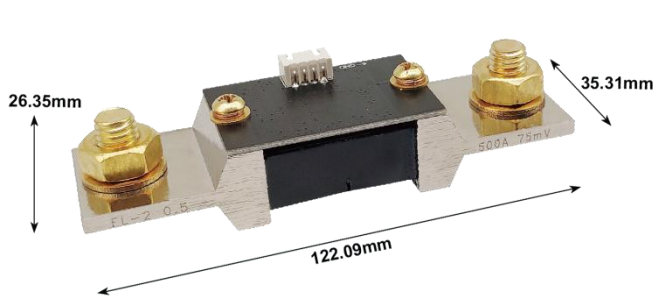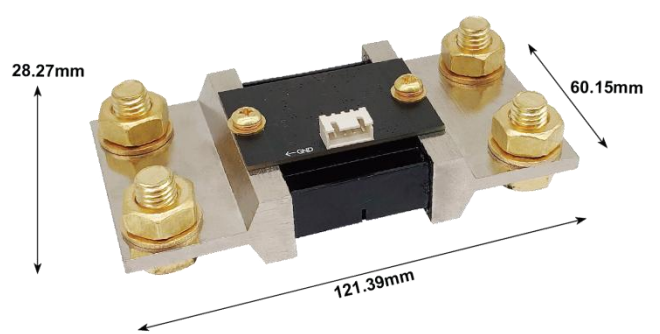
400A sampler

600A sampler

3. Technical parameter

Model	KL105F	KL110F	KL140F	KL160F	KL610F
Sampling method	Shunt	Shunt	Shunt	Shunt	Shunt
Voltage measurement range (External power supply)	0-120V	0-120V	0-120V	0-120V	0-600V
Voltage measurement range (Self-powered)	10-120V	10-120V	10-120V	10-120V	10-120V
Voltage resolution	0.01V	0.01V	0.01V	0.01V	0.01V
Current measurement range	0~50A	0~100A	0~400A	0~600A	0~100A
Current resolution	0.01A	0.01A	0.1A	0.1A	0.01A
Relay	Relay is not provided, need to be purchased separately				
Temperature measurement range	-20-120℃				
Capacity display range	0%~100%				
Power measurement range	0~72KW				
Power resolution	0.01W				
Amp-hour measurement range	0~9999.99AH				

Capacity resolution	0.001AH
Watt-hour measurement range	0~9999.99kWH
Watt hour resolution	0.01WH
Bluetooth communication distance	Max. 10 meters (without obstacles)
Voltage accuracy	±2%+3 digits
Current accuracy	±5%+10 digits
Sampling rate	1 time/sec
Measuring module power consumption	About 0.4W
OPP	0-99999.99W
NCP	0~50A/100A/400A/600A
OCP	0~50A/100A/400A/600A
OVP	0~120V/600V
LVP	0~120V/600V
OTP	0-120℃

Chapter 2 Meter Instruction
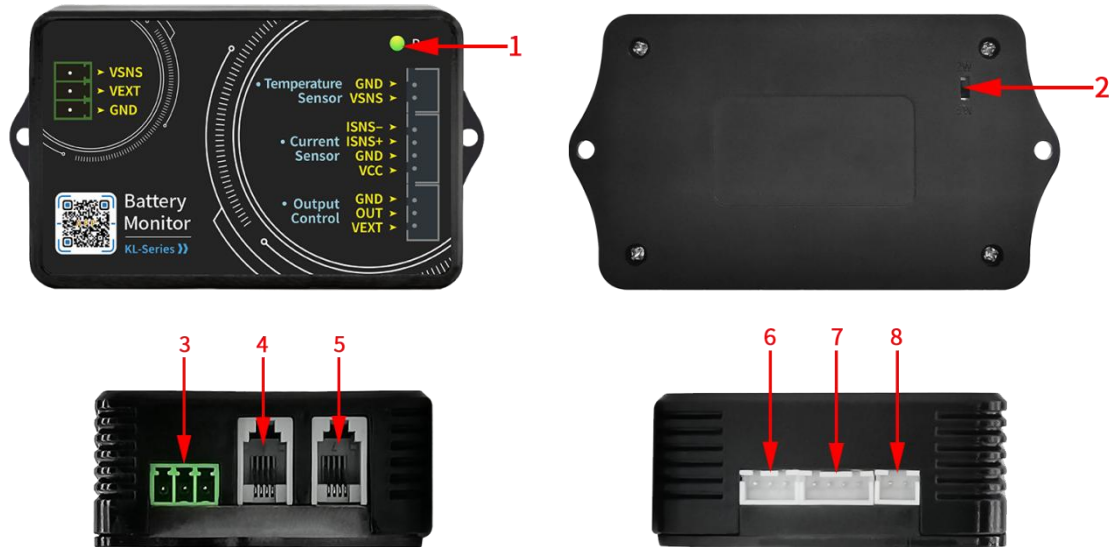
1. Measurement Module Introduction

Figure 3-1-1 Schematic diagram of KL-F series measurement module
Table 3-1-1 KL-F series measurement module instructions

No.	Instruction	No.	Instruction
1	Indicator light	5	Display reserved interface
2	2-wire, 3-wire power supply selector switch	6	Relay output control interface
3	Power supply interface	7	Sampler interface
4	485 communication connection interface	8	External temperature measurement interface

(1) Indicator light
    The indicator light can be used to check the output status.

(2) 2-wire, 3-wire power supply selector switch
    The toggle switch can be used to select external power supply or self-powered. The switch to 2W is suitable for self-powered; the switch to 3W is suitable for external power supply.

(3) Power supply interface
    There are three power supply interfaces, battery positive interface: Vsns, external power supply positive interface: VEXT, external power supply negative interface: GND.

(4) 485 communication connection interface

It is used to connect the supervisor computer interface, and also can connect to another measurement module through this interface to realize multi-meter communication. The internal order from left to right is: B, A, GND, NC.

(5) Display reserved interface (if you need display module, please purchase separately)

Connect with the display module. When the measurement module has power supply, the communication interface is live. The internal order from left to right is: B, A, GND, +5V.

(6) Relay output control interface

The relay output control interface can be used with relays. The internal sequence from left to right is: GND, OUT, VEXT.

(7) Sampler interface

Connect with sampler to detect current. The internal sequence from left to right is: VCC, GND, ISNS+, ISNS-.

(8) External temperature measurement interface

Connect with temperature sensor to measure external temperature. The internal sequence from left to right is: TSNS, GND.
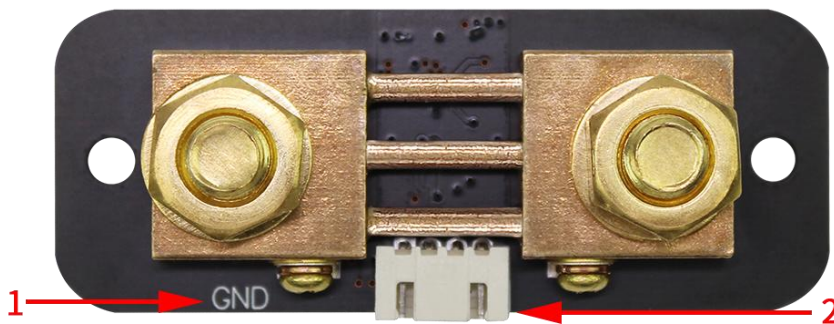
2. Sampler introduction

Figure 2-2-1 KL-F series sampler (100A sampler as an example)

Table 2-2-1 KL-F series sampler instructions (100A sampler as an example)

No.	Instruction	No.	Instruction
1	Battery negative terminal	2	Sampler interface

(1) Battery negative terminal

The negative terminal of the battery is connected to the screw with the GND or BATT- mark.

(2) Sampler interface

Connect with the sampler interface of the measurement module for current measurement.
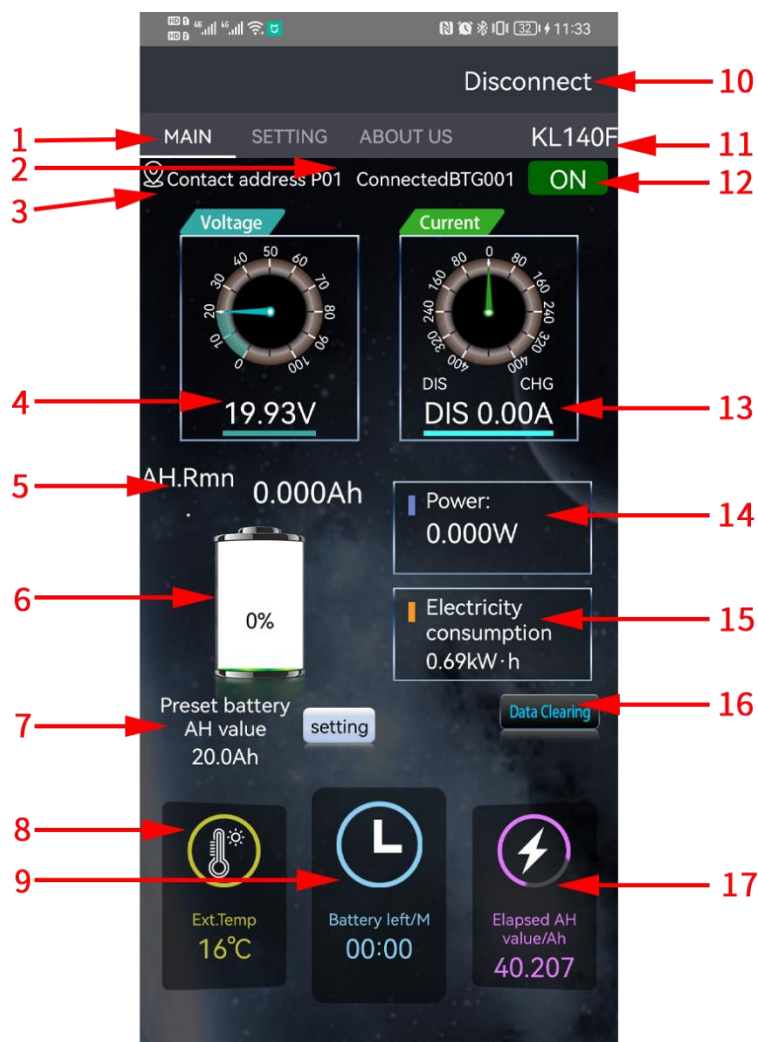
3. APP interface introduction

Figure 2-3-1 KL-F series APP interface

Table 2-3-1 KL-F series APP interface instructions

No.	Instruction	No.	Instruction
1	Interface title bar	10	Connect the Bluetooth switch
2	Device ID	11	Product model
3	Communication address	12	Control state
4	Measured voltage value	13	Measured current value
5	Battery remaining capacity	14	Power

6	Battery capacity percentage	15	Power consumption
7	Default battery capacity	16	Clear data
8	Ambient temperature	17	Cumulative capacity
9	Battery life		

(1) Interface title bar

Click the main interface, system settings, about us, you can enter the corresponding interface.

(2) Device number

After the device is successfully connected, the device number will pop out.

(3)   Communication address

The communication address range is P00-P99, P01 represents the current communication address is P01.

(4) Measured voltage value

Indicates the voltage value of the voltage measurement interface in the power supply interface.

(5) Remaining battery capacity

Indicates the remaining capacity of the battery through charging and discharging, remaining capacity = preset battery capacity-cumulative capacity.

(6) Battery capacity percentage

The remaining capacity of the battery is highlighted more intuitively with graphics, where the value of 100% represents that the remaining capacity of the battery accounts for 100% of the preset battery capacity.

(7)   Preset battery capacity

Indicates the preset capacity of the battery.

(8)   Ambient temperature

Display the current ambient temperature: 29°C, which means that the temperature of the environment where the external sensor is located is 29°C.

(9) Battery life

Calculate the battery life and charging time based on the charge and discharge current and capacity.

(10)   Connect the Bluetooth switch

The Bluetooth module in the measurement module can be disconnected and connected.

(11)　　Product model

The model of the product will be displayed after successful Bluetooth connection.

(12)　　Control state

Can control the output state.

(13)　　Measured current value

Represents the actual current value passing through the sampler. The current color is green when charging, and brown when discharging.

(14)　　Power

The measured current power value, the unit is W.

(15)　　Power consumption

Represents the actual accumulated electric energy during the running time, the unit is KW.h.

(16)　　Clear data

After clicking, you can clear the data of the time, power consumption, and accumulated capacity.

(17)　　Cumulative capacity

Indicates the accumulated capacity of charging and discharging during this period of operation.

Chapter 3 Basic Operation of the meter

1. Mobile control

(1) Instructions for using the Android App
Demonstration video of installation and operation of Android mobile APP:
http://68.168.132.244/KL-F_app_Android_EN.mp4
1) APP download
Google download link:
https://play.google.com/store/apps/details?id=com.juntek.celiangvat
Server download link:
http://68.168.132.244/app/KL/KL.apk
If you can't download it, you can ask for the software from the customer service staff.

2) Mobile App Software Installation
This software only supports Android5.0 and above systems. The location services will be applied during the installation process. Please agree and turn on location services. This manual corresponds to software version 1.4. Different versions may be slightly different. It is recommended to upgrade to the latest software for a better user experience. The installation steps are shown in the following figures 3-1-1 to 3-1-3.
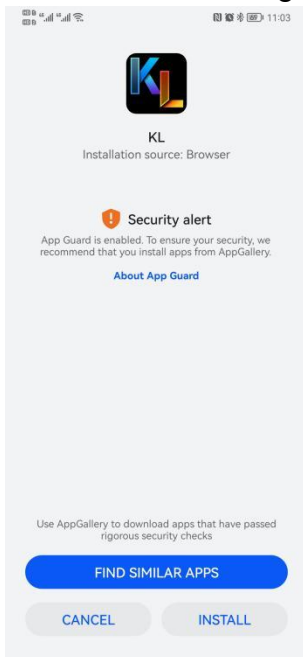
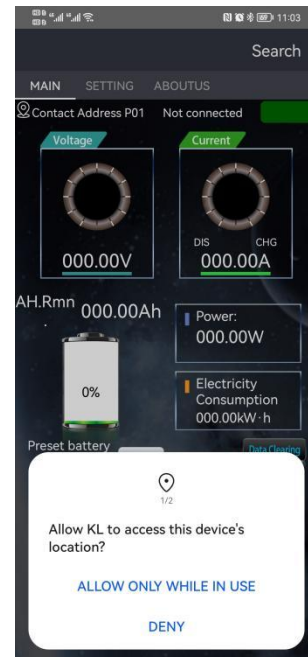Figure3-1-1 Installation step 1 | Figure 3-1-2 Installation step 2 | Figure 3-1-3 Installation Step 3
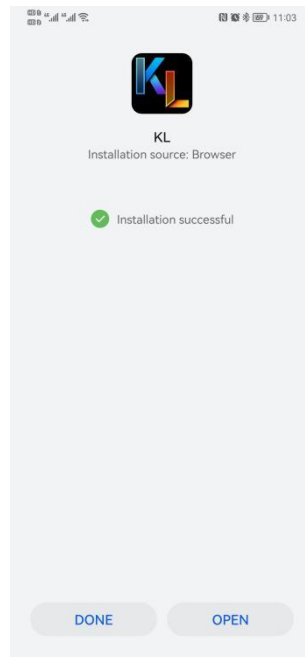
3) Software update
Click the App icon, after the App is started, the system will automatically check whether the App version is updated in the background, and the new version will pop up to remind you to update. The App downloaded by Google Play needs to detect the new version manually.

4) App interface display

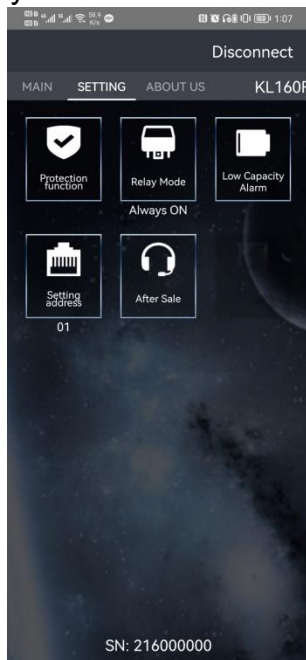Figure 3-1-4 Main interface

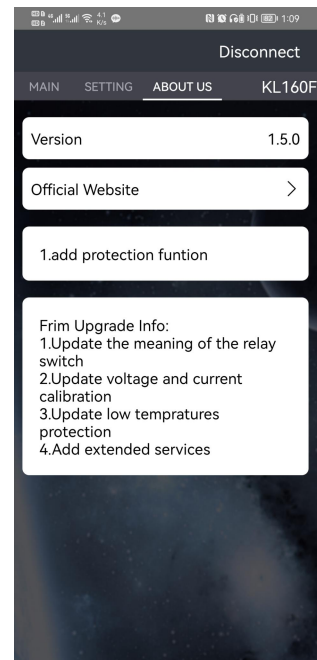Figure 3-1-5 System Settings

Figure 3-1-6 About us

5) App operating instructions

A. Online

Open the APP on the homepage and click the search in the upper right corner to search for the corresponding Bluetooth. After clicking the corresponding Bluetooth, "Connected" will pop up, and the search in the upper right becomes disconnected, and the machine model appears, indicating that the connection is complete. As shown in Figure 3-1-7, Figure 3-1-8, and Figure 3-1-9.
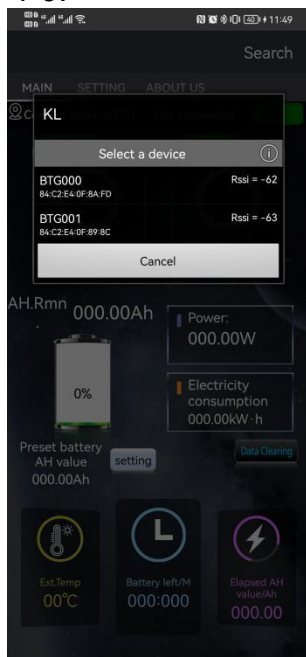
Figure 3-1-7 Online 01

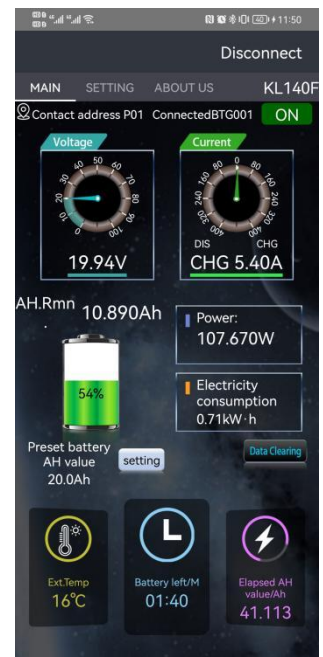
Figure 3-1-8 Online 02

Figure 3-1-9 Online 03

B. Main interface operation
Click the title of the main interface to enter the main interface of the APP.

a. Output state control switch
Click the "Output state control switch" to control the output state, and different states will be displayed under different protection states, as shown in Figure 3-1-10, the output state is off, and Figure 3-1-11 over voltage protection state.

b. Voltage fine adjustment
Click the voltage value, the "Input:Voltage calibration" pop-up box will pop up, enter the corresponding value for fine-tuning, the default voltage calibration is 100. As shown in Figure 3-1-12 below

c. Current fine adjustment
Click the value of the current, the "Input:Current calibration" pop-up box will pop out, enter the corresponding value for fine-tuning, the default current calibration is 100. As shown in Figure 3-1-13current calibration.

d. Voltage range
Click on the voltage dial to pop up the pop-up box "input voltage range", enter the corresponding value, you can adjust the scale range of the voltage dial, as shown in Figure 3-1-14 Voltage scale range.

e. Current scale maximum value
Click the current dial to pop out the pop-up box "Enter the maximum current value", enter the correct value, you can adjust the maximum scale value of the current dial, as shown in Figure 3-1-15 Current scale maximum value.

f. Clear data
Click the Clear data button, and the "Clear accumulated data" pop-up box will pop out. After clicking OK, reset the time, power consumption, and accumulated capacity, as shown in Figure 3-1-16.

g. Percentage of remaining capacity
Click the battery icon, the "Input:Percentage of remaining capacity" pop-up box will pop out, enter the corresponding value, click OK to complete the modification, as shown in Figure 3-1-17 remaining capacity percentage.
After using or replacing the battery for the first time, the capacity value displayed by the volt-ampere meter is not the actual value of the battery, and capacity setting is required.

h. Preset battery capacity
Click the setting button to the right of the preset battery capacity, the "Input:Preset battery AH. value" pop-up box will pop out, enter the corresponding value, click OK to complete the modification, as shown in Figure 3-1-18 to preset the battery capacity.
It is necessary to correctly set the effective capacity of the battery and the

current remaining power percentage before using it for the first time. If the effective capacity of the battery is unknown or the current remaining capacity is not known, it needs to be tested according to the following steps:

① Empty the battery pack or put it until you don't want to discharge it.

② Enter the preset battery capacity setting in the system settings, and set the capacity value as large as possible (for example, set the estimated 20Ah to 30Ah);

③ Set the remaining capacity percentage to 0%, and then charge the battery pack;

④ Check the remaining capacity value displayed after fully charged, and set this value to the preset battery capacity;

i. Fine adjustment of ambient temperature

Click on the ambient temperature, the "Input:Temperature calibration" pop-up box will pop out, enter the corresponding value for fine-tuning, the default temperature calibration is 100. The ambient temperature is shown in Figure 3-1-19 below.

j. Ambient temperature unit switching

Click the ambient temperature value to pop up the pop-up "Temperature Unit", select Celsius or Fahrenheit, the default is Celsius. Figure 3-1-20 Temperature unit as shown below.

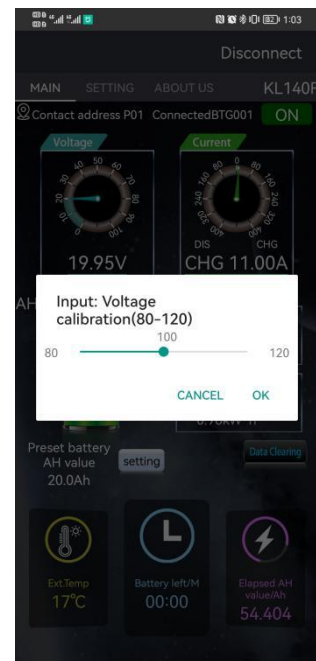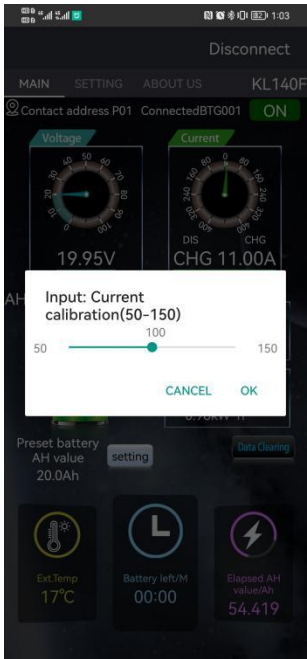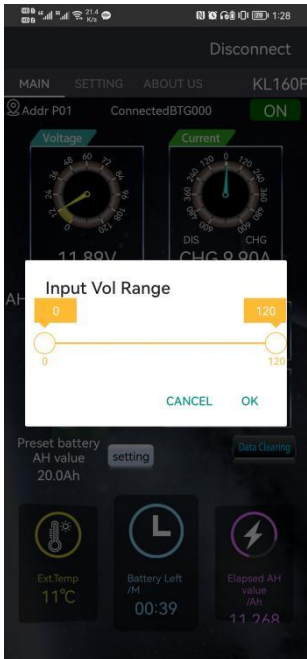| Figure 3-1-10 Output status is off	Figure 3-1-11 Over voltage protection status	Figure 3-1-12 Voltage calibration

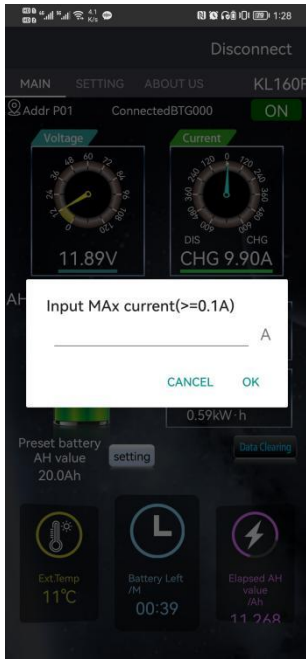Figure 3-1-13 Current calibration

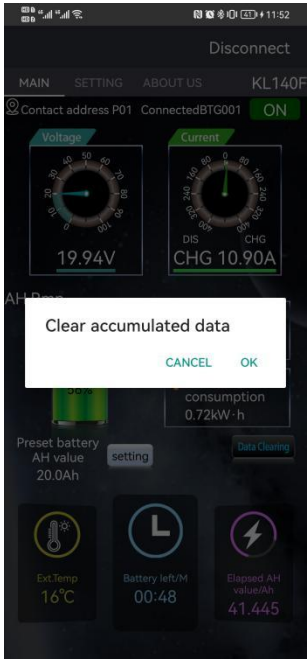Figure 3-1-14 Voltage range

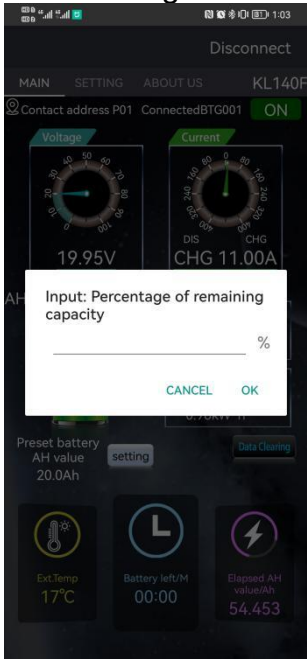
Figure 3-1-15Current maximum

Figure 3-1-16Clear data

Figure 3-1-17Percentage of remaining capacity

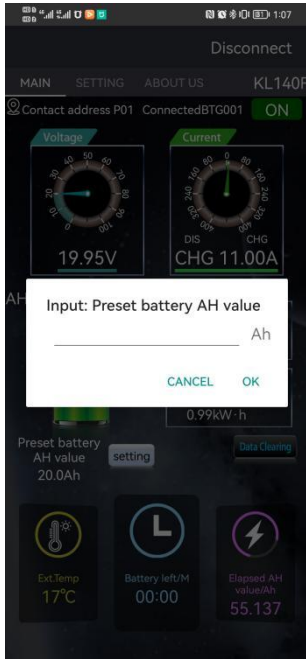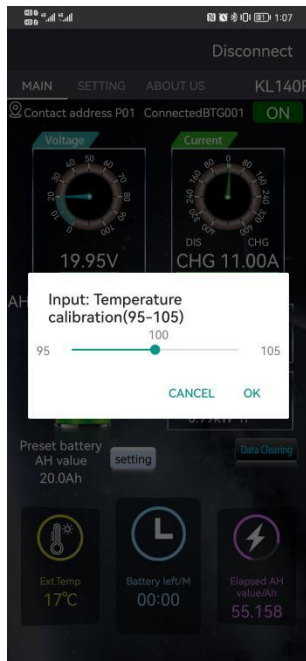Figure 3-1-18Default battery capacity

Figure 3-1-19Ambient temperature

Figure 3-1-20 temperature unit

C. System setting interface operation

Click on the system settings, the APP enters the system settingsss interface.

a. Protection function

Click the protection function button to enter the protection function interface. The protection function needs to be installed with a relay. If no relay is installed, please adjust the protection setting parameters to 0. The default 0 is to close the protection function. As shown in Figure 3-1-21 below.

① Over voltage protection

Click the OVP over-voltage protection button, the "Input:Over voltage protection" pop-up box will pop out, enter the corresponding value, and click OK to complete the modification, as shown in Figure 3-1-22 below.

When the value is 0.00V, the protection function will not be activated. If the value is greater than 0.00V, the protection will be activated. If the current voltage is greater than the set over voltage protection value, OVP will be displayed on the upper right of the APP main interface, which is in the protection state.

It is necessary to purchase a relay to realize the protection function, and the relay can be installed in the circuit to protect the circuit from being disconnected.

② Under voltage protection

Click the LVP low voltage protection button, the "Input:Under voltage protection" pop-up box will pop out, enter the corresponding value, click OK to complete the modification, as shown in Figure 3-1-23 below.

When the value is 0.00V, the protection function will not be activated. If the

value is greater than 0.00V, the protection will be activated. If the current voltage is less than the set low voltage protection value, the upper right of the APP main interface will display LVP, which is in the protection state.

It is necessary to purchase a relay to realize the protection function, and the relay can be installed in the circuit to protect the circuit from being disconnected.

③ Discharge overcurrent protection

Click the OCP Negative Overcurrent Protection button to pop out the "Input Discharge Overcurrent Protection" pop-up box, enter the corresponding value and click OK to complete the modification, as shown in Figure 3-1-24 below.

When the value is 0.00A, the protection function will not be activated. If the value is greater than 0.00A, the protection function will be activated. If the current discharge current is greater than the set discharge overcurrent protection value, OCP will be displayed on the upper right of the main interface of the APP, which is in the protection state.

The protection function needs to purchase additional relays, and only after installing the relays in the circuit can it play a protective role in disconnecting the circuit.

④ Over temperature protection

Click the OTP over temperature protection button, the "Input:External over temperature protection" pop-up box will pop out, enter the corresponding value, and click OK to complete the modification, as shown in Figure 3-1-25 below.

When the value is 0°C, the protection function will not be activated, if the value is greater than 0°C, the protection will be activated. If the current ambient temperature exceeds the set over-temperature protection value, the OTP will be displayed on the upper right of the main interface of the APP, which is in the protection state.

It is necessary to purchase a relay to realize the protection function, and the relay can be installed in the circuit to protect the circuit from being disconnected.

⑤ Over current protection

Click the OCP over current protection button, the "Input:Positive over current protection" pop-up box will pop out, enter the corresponding value, and click OK to complete the modification, as shown in Figure 3-1-26 below.

When the value is 0.00A, the protection function will not be activated. If the value is greater than 0.00A, the protection will be activated. If the current discharge current is greater than the set discharge over-current protection value,OCP will be displayed on the upper right of the APP main interface, which is in the protection state.

It is necessary to purchase a relay to realize the protection function, and the relay can be installed in the circuit to protect the circuit from being disconnected.

⑥ Over power protection

Click the NCP charging overcurrent protection button to pop out the "Input charging overcurrent protection" pop-up box, enter the corresponding value and click OK to complete the modification, as shown in Figure 3-1-27 below.

When the value is 0.00A, the protection function will not be activated. If the value is greater than 0.00A, the protection will be activated. If the current discharge current is greater than the set discharge overcurrent protection value, NCP will be displayed on the upper right of the main interface of the APP, which is in the protection state.

It is necessary to purchase a relay to realize the protection function, and the relay can be installed in the circuit to protect the circuit from being disconnected.

⑦ Low temperature protection

Click on the low temperature protection to pop up the "low temperature protection pop-up" pop-up box, you can choose to turn on or off the low temperature protection, click on the open pop-up box "input low temperature protection (-20-20) ℃", enter the corresponding value and click OK to complete the modification. The low temperature protection function is not activated by default. When we set the low temperature protection value to 0 °C, if the value is less than 0 °C, the protection will be activated, and the upper right of the APP main interface will display LTP, which is in the protection state. As shown in Figure 3-1-28 and Figure 3-1-29 below.

⑧ Protection recovery time

Click the protection recovery time button to pop out the "Enter protection recovery time" pop-up box, enter the corresponding value and click OK to complete the modification, as shown in Figure 3-1-30 below.

⑨ Delay protection time

Click the delay time button to pop out the "Input delay time" pop-up box, enter the corresponding value and click OK to complete the modification, as shown in Figure 3-1-31 below.

b. Relay mode

Click the relay type button, the "Relay model" pop-up box will pop out, select the relay type relative to the actual one, as shown in Figure 3-1-32 below.

When using this function, you need to select normally open or normally closed according to the type of relay connected during actual wiring.

c. Low volume reminder

Click the low-capacity reminder to pop up the pop-up box "Enter low-capacity reminder", enter the corresponding capacity percentage and click OK to complete the modification. When the KG-F mobile phone APP is connected to the instrument's Bluetooth, of course, when the battery capacity percentage is lower than the set value, it will be displayed in the A low-capacity reminder is displayed in the status bar of the mobile phone, as shown in Figure 3-1-33 below.

d. Set the address

Click the Set Address button to pop out the "Enter Set Address" pop-up box, enter the corresponding value and click Confirm to complete the modification of the communication address, as shown in Figure 3-1-34 below.

e. After-sales service

Click the after-sales service button to pop out the "Please enter the after-sales code" pop-up box, enter "8 6 1 0" and click OK to enter the after-sales service interface, as shown in Figure 3-1-35 and Figure 3-1-36 below.

① Firmware upgrade

In the after-sales service interface, click Firmware Upgrade to bring up the "Please enter the firmware code" pop-up box, enter the firmware code "0 0 0" and click OK, the instrument starts the firmware upgrade, and the indicator light of the measurement module flashes rapidly at this moment, indicating that the firmware upgrade is in progress. Please wait patiently during the upgrade process and do not perform other operations. After the upgrade is complete, the message "Upgrade Successful" will be displayed. The firmware upgrade sequence is as follows: Figure 3-1-37 Firmware upgrade 01, Figure 3-1-38 Firmware upgrade 02, Figure 3-1-39 Firmware upgrade 03. Note: After entering the firmware upgrade, please be sure to see that the firmware upgrade is successful before exiting.
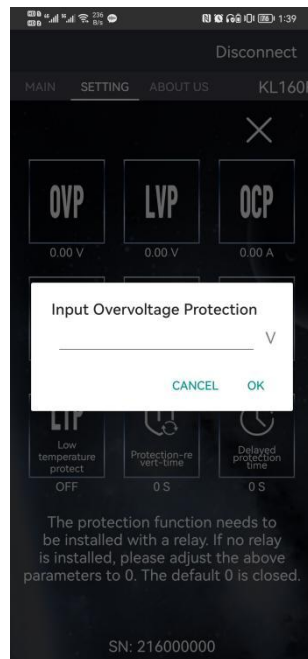
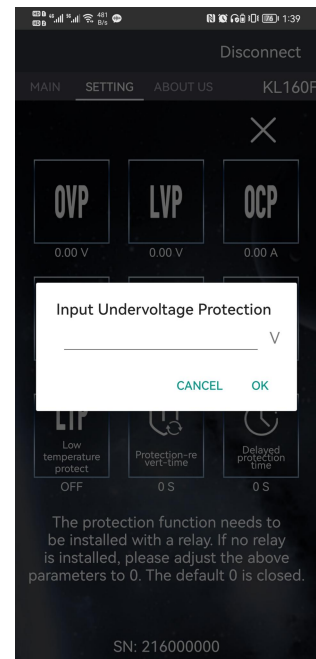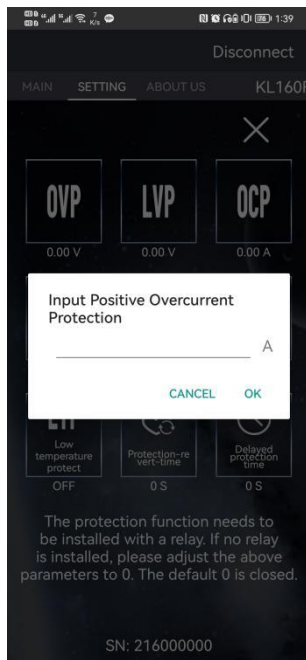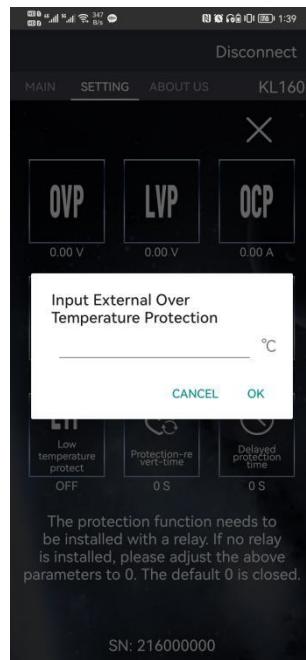| Figure 3-1-21 Protection function	Figure 3-1-22 Overvoltage protection	Figure 3-1-23 Undervoltage protection

Figure 3-1-24 Discharge overcurrent protection

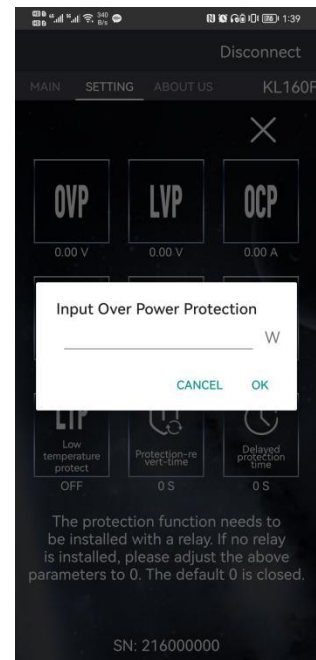Figure 3-1-25 Over temperature protection
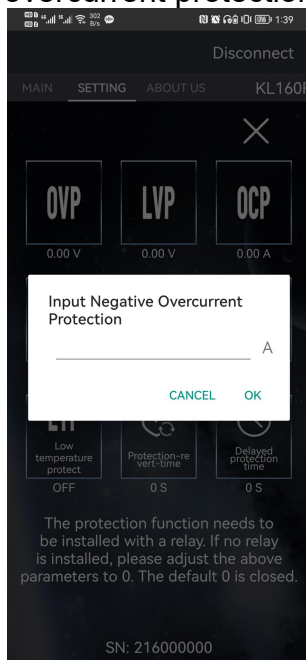

Figure 3-1-26 Overpower protection

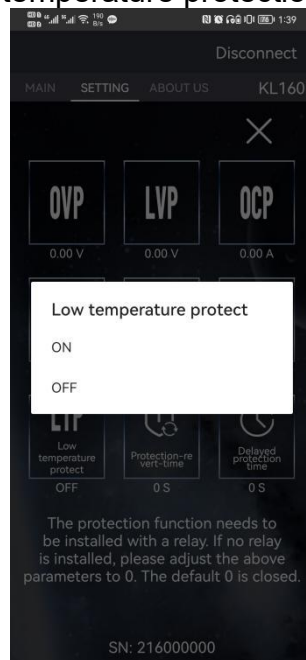Figure 3-1-27 Charging overcurrent protection
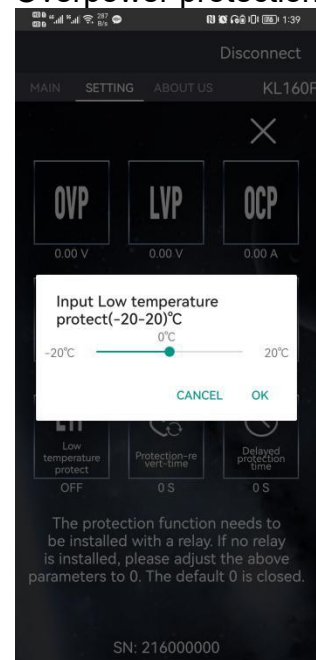

Figure 3-1-28 Low temperature protection 01

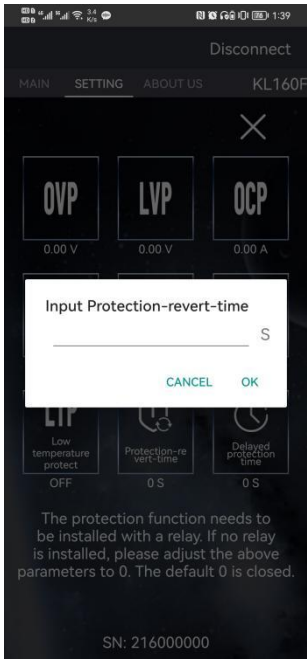Figure 3-1-29 Low temperature protection 02
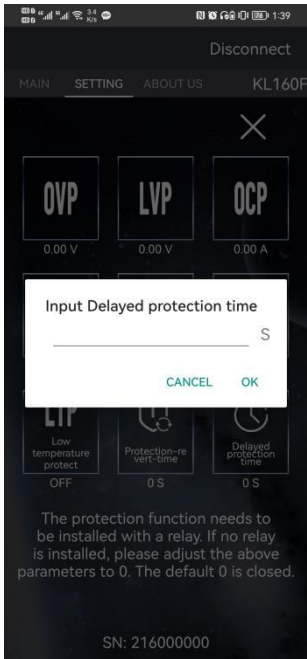
Figure 3-1-30 Protection recovery time
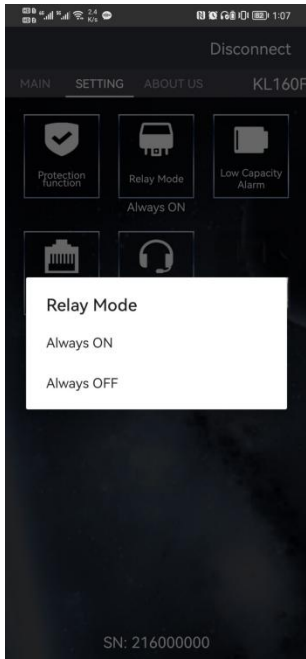

Figure 3-1-31 Delay protection time

Figure 3-1-32 Relay type
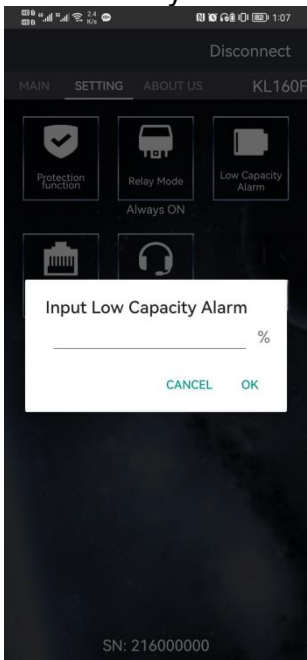
Figure 3-1-33 Low volume reminder
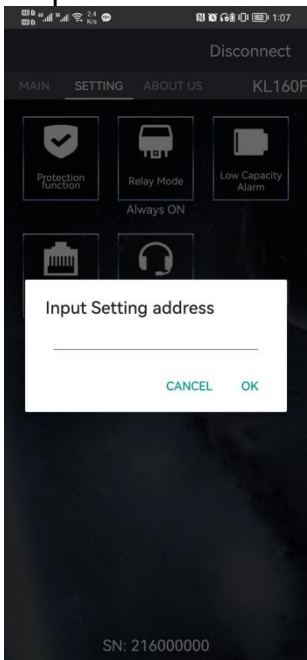
Figure 3-1-34 Setting address
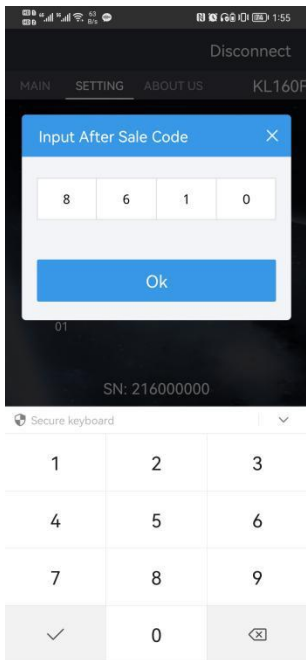
Figure 3-1-35 After-sale service 01
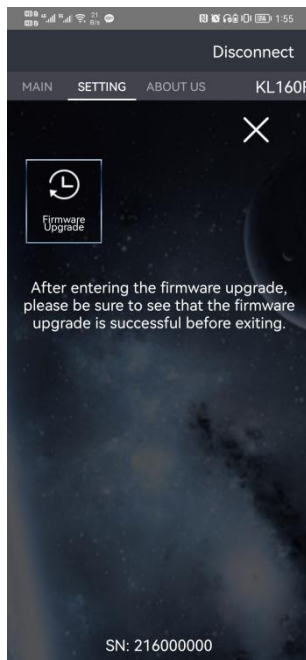
Figure 3-1-36 After-sale service 02
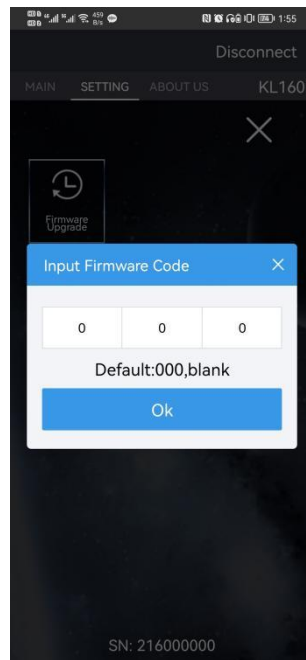
Figure 3-1-37 Firmware upgrade 01
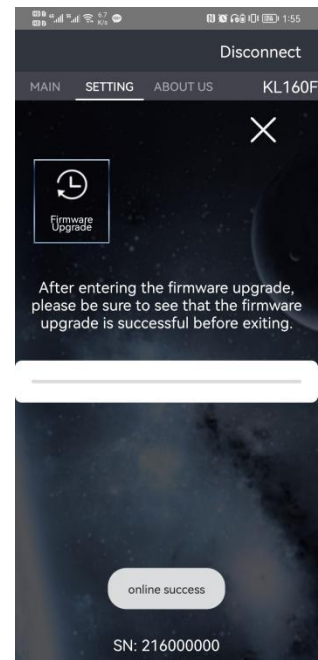
Figure 3-1-38 Firmware upgrade 02
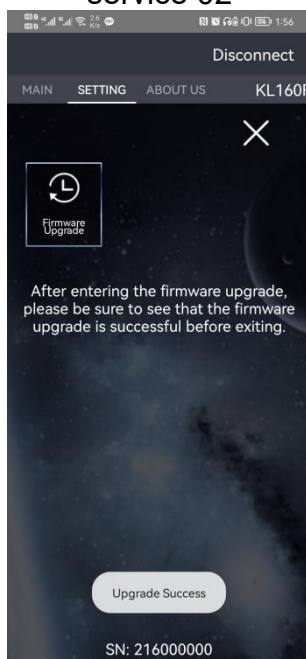
Figure 3-1-39 Firmware upgrade 03

D. About Us interface operation

Click on About Us, the APP enters the About Us interface.

a. Version

You can view the software version information, as shown in Figure 3-1-40 below.

b. Official website

After clicking the official website, you can jump to the official website of

our company, as shown in Figure 3-1-41 below.
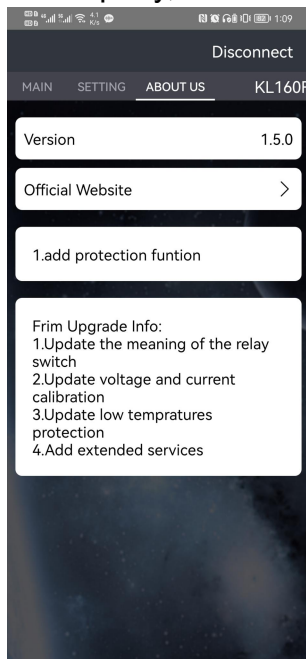
Figure 3-1-40 Version

Figure 3-1-41 Official website

(2) Instructions for using the IOS App

Demonstration video of the installation and operation of the IOS APP:
http://68.168.132.244/KL-F_app_IOS_EN.mp4

1) APP download

Search for "KL series" in the Apple Store to download.

2) Mobile App Software Installation

The software only supports systems above IOS 9.0. The first time the software connects to Bluetooth, it will access Bluetooth. Please agree to access. This manual corresponds to software version 1.1. Different versions may be slightly different. It is recommended to upgrade to the latest software for a better user experience.

3) Software update

You can get the latest software from the Apple Store. The current manual corresponds to the IOS software version 1.1.

4) App interface

Figure 3-1-42 Main interface
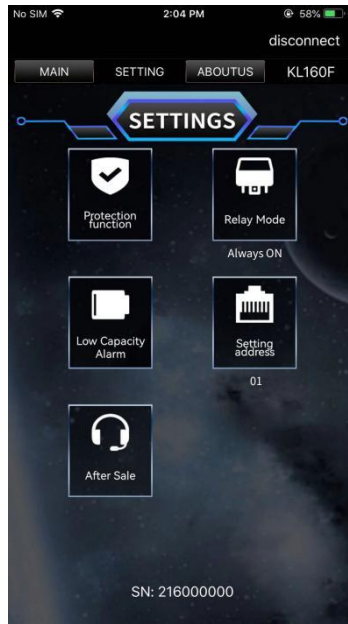
Figure 3-1-43 System Settings
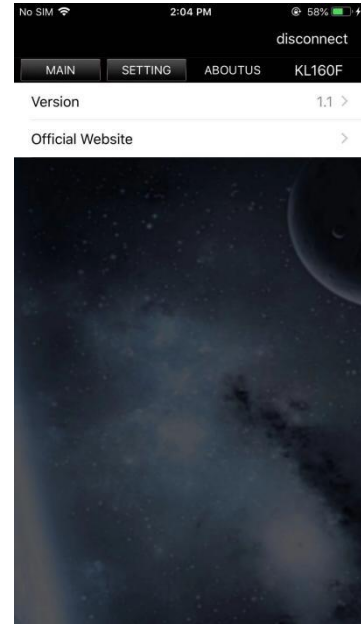
Figure 3-1-44 About us

5) App operating instructions

The operation of IOS is the same as that of Android.

2. Wiring methods

Wiring instructions video：http://68.168.132.244/KL-F_jxfs_EN.mp4

(1) Self-powered wiring method

If the voltage range of the battery under test is between 10-120V during normal operation, self-powered wiring can be used. First, turn the power selection interface switch to "2W". When wiring, connect the positive terminal of the battery to the power interface "VSNS". This line does not need to be particularly thick. 13-16AWG wire is fine. Pay attention to the positive and negative poles of the battery, do not connect the wrong or reverse connection.

The negative pole of the battery is connected to the screw with "BATT-" printed on the sampler, and the negative pole of the charger and the negative pole of the load are connected to another screw of the sampler. It is better to use a copper nose to connect it firmly. When charging, the current direction symbol of the APP color is red, and the remaining capacity value increases. When discharging, the color of the current direction symbol is sky blue, and the remaining capacity value decreases.

Figure 3-3-1 Self-powered wiring diagram

(2) External power supply wiring method

The measuring voltage range of the external power supply is 0-120V. First, set the power selection interface switch to "3W", connect the positive pole of the external power supply to the power interface "VEXT", and connect the negative pole of the external power supply to "GND". When wiring, connect the positive pole of the battery to the measurement interface "VSNS" in the power interface. Note that the positive and negative poles of the battery and the external power supply should not be connected incorrectly or reversed.

The negative pole of the battery is connected to the screw printed "BATT-" on the Shunt, and the negative pole of the charger and the negative pole of the load are connected to the other screw of the Shunt together. It is better to use copper nose to connect firmly. When charging, the current color on the mobile phone APP is green, and the remaining capacity value increases. When discharging, the current color is sky blue, and the remaining capacity value decreases.
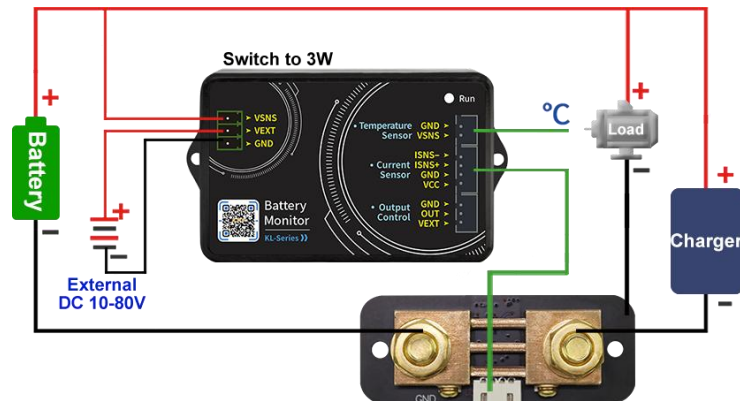
Figure 3-3-2 External power supply wiring diagram

(3) External power supply wiring method (Relay control)

The working power of the relay is provided by an external power supply. If the relay is connected, an external power supply with the same working voltage as the relay should be provided. Connect the control ports of the relay to the "OUT" and "VEXT" of the measurement module Output Control, connect the positive pole of the external power supply to the "VEXT" of the Output Control, and the negative pole of the external power supply to the "GND". Note that the positive and negative poles of the battery and the external power

supply should not be connected wrongly or reversed.

If you want to control the charging or discharging, you should connect the wiring according to the wiring diagram of external power supply relay in figure 3-2-3. When the relay is closed, the indicator light will be on, and when it is disconnected, it will be off as a prompt.

The negative pole of the battery is connected to the screw printed "BATT-" on the Shunt. The negative pole of the charger and the negative pole of the load are connected to the other screw of the sampler. It is better to use a copper nose to connect it firmly. When charging, the current color on the mobile phone APP is green, and the remaining capacity value increases. When discharging, the current color is sky blue, and the remaining capacity value decreases.
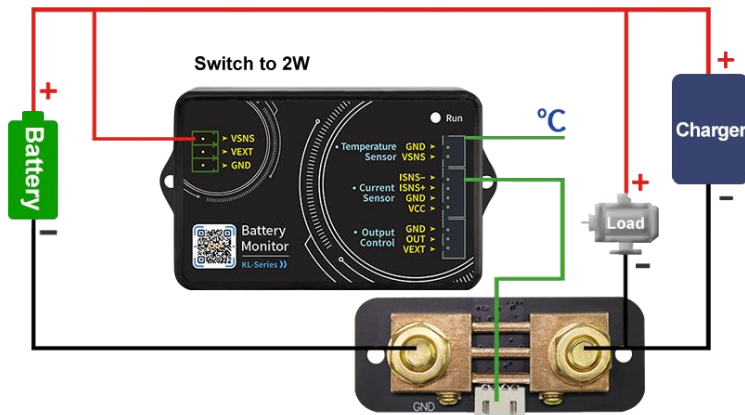
（The external power supply voltage is subject to the working voltage of the relay; for example, 12V or 24V.）
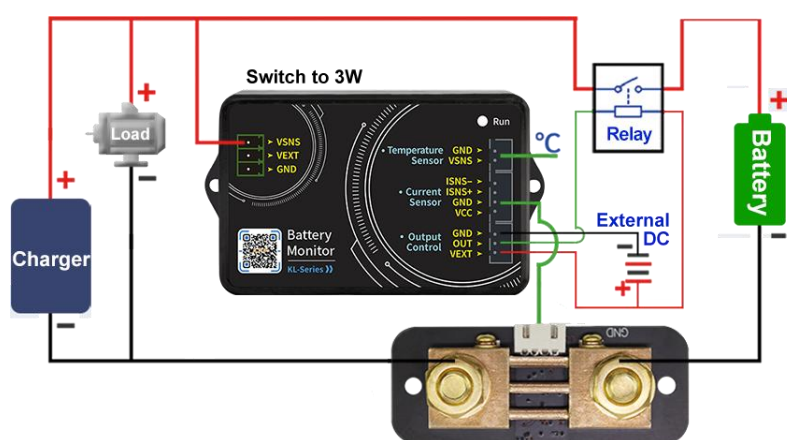
Figure 3-2-3 External power supply wiring diagram (Relay control)

3. Communication protocol control

We only provide communication protocol, customers can carry out secondary development according to communication protocol.

(1) Summary

The command line is used as the control command, and the communication rate is 115200. The PC sends out the command, the meter parses and executes it, and then returns the result to the PC. The different commands are described below.

The sending data format is as follows：

Start bit	Function code	Function No.	Connector	Address symbol	Spacer
:	W,R	00~99	=	1-99	,
Checksums	Spacer	Data field	Spacer	Terminator	
1-255	,	See instructions	,	<CR><LF>	

Explain:

1) Function code: "W" is the write instruction used to set various parameters, and "R" is the parameter used by the read instruction to return to the machine.
2) Function No.: different values represent different parameter settings.
3) Address symbol: address range is 1-99, 0 is broadcast address.
4) Checksum: the value of the sum is obtained by adding 1 to the remainder of 255 after the sum of all the numbers after the check sum. If the sum of the check is taken as 0, it means that it is not verified.
5) Data field: the data field is equivalent to the number of operations of the command. For example: W20=12162000, the instruction operands are 2000, which means that the over voltage protection is set to 20.00V.
6) Terminator: Each instruction ends with a carriage return + line feed, and <CR> represents the carriage return in the ASCII character table (hexadecimal representation is 0x0d). <LF> is the newline character in the ASCII character table (in hexadecimal notation is 0x0a). The above two methods indicate carriage return and line feed.

(2) W Command

Function code	Function	Command	Instruction
01	Set address	:W01=1,3,2,	Set the communication address to 2 (Use with caution, you must know the current communication address and the communication address to be set, and it is recommended to use a mobile phone to modify it.)
10	Turn on output	:W10=1,2,1, :W10=1,0,0,	Turn on the output state Turn off output state
20	Set over-voltage protection	:W20=1,216,2000,	The over-voltage protection value is set to 20.00V
21	Set under-voltage protection	:W21=1,216,2000,	The under-voltage protection value is set to 20.00V
22	Set over-current protection	:W22=1,216,2000,	The over-current protection value is set to 20A
23	Set negative over-current protection	:W23=1,216,2000,	The negative over-current protection value is set to -20A
24	Set over power	:W24=1,216,2000,	The over power protection value is set to 20W

	protection		
25	Set over temperature protection	:W25=1,151,150, :W25=1,211,210,	The over-temperature protection value is set to 50℃ The over-temperature protection value is set to 110℃
28	Set battery capacity	:W28=1,216,2000,	The battery capacity is set to 200.0Ah
29	Voltage calibration settings	:W29=1,121,120, :W29=1,81,80,	Set the voltage calibration to 20, and the voltage fine adjustment is increased. Set the voltage calibration to -20, and the voltage fine adjustment is reduced. (The value only represents the fine-tuning factor, the greater the absolute value of the value, the greater the amplitude of the fine-tuning)
30	Current calibration settings	:W30=1,121,120, :W30=1,81,80,	Set the current calibration to 20, and the current fine adjustment is increased. Set the current calibration to -20, and the current fine adjustment is reduced. (The value only represents the fine-tuning factor, the greater the absolute value of the value, the greater the amplitude of the fine-tuning)
31	Temperature calibration settings	:W31=1,104,103, :W31=1,99,98,	Set temperature calibration to 3°C, and the temperature increases by 3°C. Set temperature calibration to -2°C, and the temperature is reduced by 2°C.
33	Reserved settings (coming soon)	Reserved settings (coming soon)	Reserved settings (coming soon)
34	Set the relay type	:W34=1,2,1, :W34=1,0,0,	Set the relay type to normally closed Set the relay type to normally open
35	Resume factory setting	:W35=1,2,1,	Perform resume factory setting
36	Set current	:W36=1,4,3,	The current multiple is set to 3

	multiple		
60	Set the percentage of remaining battery capacity	:W60=1,51,50,	The remaining battery capacity percentage is 50%
61	Zero current	:W61=1,2,1,	Perform zero current
62	Clear accumulated data	:W62=1,2,1,	Perform clear accumulated data

(3) R Command

The R command is a read command, and its command format is basically the same as the write command format, and the description will not be repeated here. The data returned by the following machine is just an example.

Read	PC send	Receive	Read instruction
Read basic information	:R00=1,2,1,	:r00=1,47,1120,100,101,	1: Communication address; 47: Checksum; The first 1: Hall sensor (1-Hall sensor, 2-sampler) in 1120, the second 1: 100V, 20: 200A; 100: 1.00 version; 101: machine serial number;
Read all measured values	:R50=2,2,1,	:r50=2,215,2056,200,5408,4592,9437,14353,134,0,0,0,162,30682,	2: Communication address; 215: Checksum; 2056: Voltage, 20.56V; 200: Current ,2.00A; 5408: The remaining battery capacity is 5.408Ah; 4593: The cumulative capacity is 4.593Ah; 9437: The watt-hour is 0.09437kw.h; 14353: The running time is 14353s; 134: The ambient temperature is 34°C; 0: Delegate function to be determined; 0: The output status is ON; (0-ON, 1-OVP, 2-OCP, 3-LVP, 4-NCP, 5-OPP, 6-OTP, 255-OFF)

			0: Current direction, the current is forward current; (0-forward, 1-reverse) 162: Battery life is 162 minutes; 30682: The internal resistance of the battery is 306.82mΩ;
Read all set values	:R51=1,2,1,	:r51=1,211,3000, 100,2000, 2000,10000,151, 10,7,200, 120,90,101,0,0,2, 12,13,	1: Communication address; 211: Checksum; 3000: Over-voltage protection is 30.00V; 100: Under-voltage protection is 1.00V; 2000: The forward over-current protection is 20.00A; 2000: Negative over-current protection is -20.00A; 10000: Over power protection is 100.00W; 151: Over temperature protection is 51℃; 10: The protection recovery time is 10s; 7: The delay time is set to 7s; 200: The preset battery capacity is 20.0Ah; 120: 20 fine-tuning factors of the voltage calibration ; (100: fine-tuning 0) 90: -10 fine-tuning factors of the current calibration; (100: fine-tuning 0) 101: Temperature calibration increased by 1℃; (100: fine-tuning 0) 0: reserved setting (coming soon); 0: The relay type is normally open; (0-normally open relay, 1-normally closed relay) 2: The current multiple is 2; 12: The voltage curve scale is

			12V/div; 13: The current curve scale is 13A/div;

Chapter 4 Troubleshooting

The following lists the possible faults and troubleshooting methods of KL-F series products during use. When you encounter these faults, please follow the corresponding steps to deal with it. If you can't deal with it, please contact JUNCTEK, and please provide your equipment information at the same time.

If after power on, the mobile APP cannot connect to Bluetooth, and there is no display:
1) Check whether the power supply and measurement module are well connected;
2) After finishing the above inspection, restart the instrument;
3) If the product still cannot be used normally, please contact JUNCTEK.

Chapter 5 More Product Information

For more information about this product, please refer to the relevant manual (you can log in to the JUNCTEK official website (www.junteks.com) to download).
"KL-F Series Operation Demonstration Video" provides the actual operation video of this product.
"KL-F Series User Manual" provides the function introduction and operation method of this product, the possible failures in the use process and the treatment methods.

Chapter 6 Contact Us

If you have any questions or needs in the process of using this product or this manual, please contact JUNCTEK:
Email: junce@junteks.com
Website: www.junteks.com

Appendix 1:Interface text and abbreviations

Full names	Abbreviation
Disconnect	Disconnect
Search	Search
Main interface	MAIN
System settings	SETTING
About us	ABOUTUS
Voltage	Voltage
Current	Current
Voltage calibration	Voltage Cal.
Current calibration	Current Cal.
Maximum current	MAX Current
Remaining AH. value	AH.Rmn.
Discharge	DIS
Charge	CHG
Power	Power
Energy used	Electricity
Clear accumulated data	Clear data
Preset battery AH. value	AH.Preset:
Percentage of remaining capacity	AH.Remaining:
Set up	Setting
Ambient temperature	Ext.Temp
Battery left	BatLeft
Elapsed AH value	AH.Elp.
Over-voltage protection	OVP
Under-voltage protection	LVP
Over temperature protection	OTP
Forward over-current protection	OCP
Negative over-current protection	NCP
Relay Mode	Relay Mode
Current ratio	Current Ratio
Firmware upgrade	Firmware Upgrade
Set address	Address