

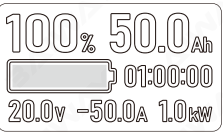
TF03H系列 电流型电池容量显示器  
库仑计

# 用户手册

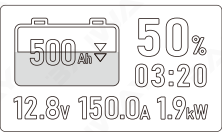


## TF03系列

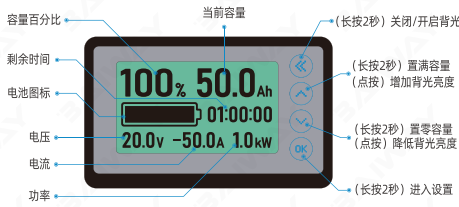
A款界面



B款界面



### 产品示意图



### 产品简介

本产品为高精度电流采集型电池电量表（也称库仑计）。能准确检测电池组的实时电压、电流、功率、真实容量、剩余使用时间等参数，随时了解电池的工作状态。  
可用于使用电池设备的房车、床车、电动车、应急电源、储能电源、测量设备、医疗设备、各种仪器仪表等产品。

### 适用电池规格

均可使用工作电压在8V~120V的锂电池、磷酸铁锂、铅酸、镍氢等各种电池组，注意本产品必须配合采样器。

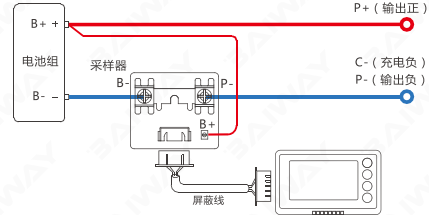
### 首次使用方法

- 接线并检查电流：  
按照[接线方法]图示完成连接后通电，屏幕应能显示，若无显示应断电检查连接是否正确。再对电池进行放电或充电并检查显示的电流值或功率值和实际值是否一致，若误差较大请再次检查接线是否正确。**(确保流过电池的所有电流都经过采样器！)**
- 电池实际有效容量的检测和设置：  
首次使用或更换电池需要正确设置电池的实际有效容量（CAP值），见[使用设置]。如电池的的有效容量值已知，根据[使用设置]完成有效容量设置，充满电满量，见[容量归位]。  
如电池的有效容量未知，需按以下操作步骤检测：  
A. 进入容量设置界面，将容量值尽量设大（例如预估20Ah的设成30Ah）；  
B. 将电池组放空，同时把表容量置零，再对电池组进行充电；  
C. 充满后将显示的容量值设置为电量表的CAP有效容量值。
- 容量归位（电池容量清零或满容量设置）  
A. 将电池放空(空)电后长按 键置零容量0%；  
B. 或将电池充满电后长按 键置满容量100%。

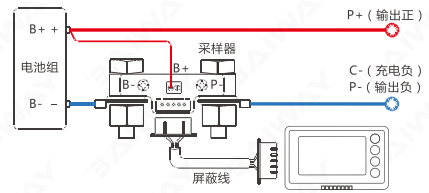
### 接线方法

- 配套的采样器必须串联到电池组的负极回路中。采样器上B-端连接电池组负极B-，P-端连接充放电的负极P-/C-。
- 取一根0.3-0.5mm²红色导线将电池正极和采样器B+连接，用于电量表供电。
- 用屏蔽线将采样器和电量表相连，确认无误后，通电即可。
- 接线原则：**确保流过电池的所有电流都经过采样器！**

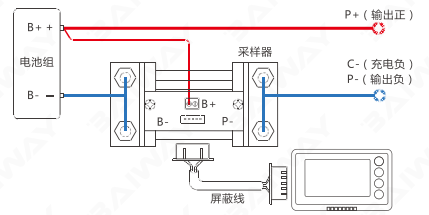
#### ★ 50A采样器接线方法：



#### ★ 100A/350A采样器接线方法：



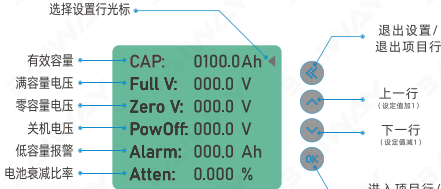
#### ★ 500A采样器接线方法：



注意：请严格按照图示接线，采样器必须串联在电池的负极回路中，严禁连接正极回路！屏蔽线不能自行延长。

### 使用设置

长按 键2秒进入设置界面：



**CAP** 有效容量：出厂时为初始容量，请根据电池组实际真实有效容量设置，否则容量百分比显示会不正确；  
**Full V** 满容量电压：高于此电压时容量自动置为100%（置满）；  
**Zero V** 零容量电压：低于此电压时容量自动置为0%（清零）；  
**PowOff** 关机电压：低于此电压时背光与液晶关闭，无显示；  
**Alarm** 低容量报警：低于此容量时百分比和电池符号闪烁(仅限B款)，蜂鸣器每10s报警一次  
**Atten** 电池衰减比率：电池累计每循环一次CAP容量后，按照此比率对CAP值进行自动变更。

注意事项：  
在未了解电池组电压特性(充满电压和放空电压)情况下，请勿设置FULL V和ZERO V。FULL V和ZERO V出厂默认为0V，即无效。

### 使用说明

- 进行充电和放电时，库仑计必须处于工作状态，否则不能准确计算电池容量。本产品为低功耗设计，背光不亮（待机）时功耗很低，供电B+尽量不接在电源开关后，即始终保持通电状态。
- 连接负载，当放电电流 > 背光开启电流时，背光开启（若背光闪烁，说明采样器的B-和P-接反），指示电池在放电，并显示放电电流和剩余放电时间。若负载电流波动较大，时间也会波动，属正常现象。
- 断开负载，连接充电器，当充电电流 > 背光开启电流时，背光闪烁（若背光常亮，说明采样器的B-和P-接反），指示电池在充电，并显示充电电流和剩余充电时间。
- 充电或放电电流值 < 背光关闭电流时，将进入低功耗状态，背光关闭。
- 如使用一段时间后百分比和容量值出现偏差，可进行归位（见[首次使用方法] → [容量归位]）。如果仍出现偏差，电池容量可能衰减，需要重新进行电池容量校正（见[首次使用方法] → [电池有效容量的检测和设置]）。
- 本产品具有断电容量记忆功能。
- 在电流变化剧烈的场合可能产生一定的误差，影响容量值。

### 低功耗 休眠/关机

当电池电流 < 开启电流，电量表将进入低功耗休眠状态，背光关闭，电量表不工作（不采集容量）但仍显示电池参数，如设置了关机电压，且电池电压 < 关机电压，则进入关机状态。

以下状态可以唤醒休眠或退出关机：

- 当电池电流 > 开启电流或按下任意键，电量表自动唤醒工作且背光亮起；
- 当电池电压 > 关机电压或按下任意键，或者电池电流 > 开启电流都将退出关机状态；

### 开启/关闭 和调整背光亮度的

- 长按 退出键 关闭背光（工作时背光不会亮起）；
- 再长按 退出键 打开背光（充电时闪烁，放电时常亮）；
- 点按 或 键降低或增加背光亮度的。

### 通讯功能

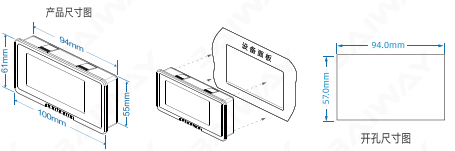
本产品可定制TTL电平串口通讯功能，将电量表参数上传上位机。电量表工作时每秒发送一次，内部采用安全可靠的光耦隔离方式。  
详细说明见《TF03库仑计TTL串口通讯协议》。

### 输出控制功能

本产品可定制输出控制功能。可外接扩展继电器、大功率报警器等，低电压或低容量时输出导通。采用光耦隔离方式。  
详细说明见《TF03库仑计输出功能说明》。

### 安装方式

要在安装的设备面板上开一个矩形孔，将显示器从正面安装并将电量表嵌于设备面板上，如下图：



(注:设备面板非产品配件，不包含在产品中)

### 技术参数

参数	最小值	常规值	最大值	单位
工作电压	8.0	50.0	120.0	v
工作功耗		8.0	12.0	mA
静态功耗		1.0	2.0	mA
关机功耗		50		μA
电压采集精度		±1.0		%
电流采集精度		±1.0		%
容量采集精度		±1.0		%
背光开启电流(50A规格)		50		mA
背光开启电流(>50A规格)		100		mA
容量检测范围	0.1	100	9999.0	Ah
50A采样器电流	0.0	50.0	75.0	A
100A采样器电流	0.0	100.0	150.0	A
350A采样器电流	0.0	350.0	500.0	A
500A采样器电流	0.0	500.0	750.0	A
使用环境温度范围	-10	20	60	℃
重量 (50A/100A/350A/500A)		210/270/420/700		g
TF03K尺寸		100x61x17		mm

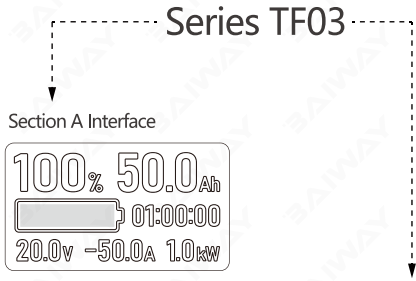
注意：本产品需配合采样器使用，不同规格采样器与电量表禁止混用。  
采样器为发热部件，尽量安装在空气流通处，严禁包裹覆盖！按照最大电流长期使用，务必保持通风和散热。

### 注意事项及质保

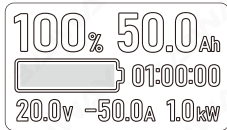
本产品不能在阳光下长期暴晒，不能长时间暴露在低于-10℃和高于50℃的极端条件下，否则将缩短显示器液晶屏的使用寿命。  
本产品自原始购买之日起享有1年保修期，保修期内出现非人为质量问题，均可免费维修。  
本产品可能会技术改进或更新，如果您购买的产品与本手册中所描述的产品外观、技术参数等有出入，请以实物或网站介绍为准。

TF03H Series Current Battery Capacity Display  
Coulomb counter

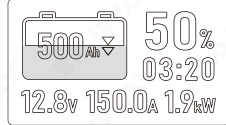
# USER MANUAL



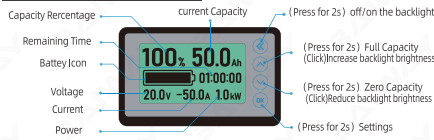
Section A Interface



Section B Interface



## Schematic Diagram



## Product Introduction

This product is a high-precision battery power meter (also called Coulometer) based on current acquisition type. It can accurately detect the voltage, current, power, real capacity and remaining time of the battery pack etc. The working status of the battery is obtained accurately at any time.

This product is suitable for Touring car, wheeled litter, electric vehicles, emergency power supplies, energy storage power supplies, measuring equipment, medical equipment, various instruments and so on.

## Applicable Battery Specifications

This product is suitable for lithium batteries, lithium iron phosphate, lead acid, nickel hydrogen and other battery packs with working voltages from 8V to 120V. Note that this product must be used with the sampler.

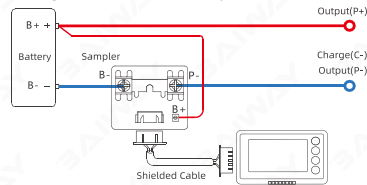
## First use method

- Wiring and checking the current:  
After completing the connection according to the [wiring method], power on and the screen should be able to display. If there is no display, power off and check if the connection is correct. Then disVcharge or charge the battery and check whether the displayed current value or power value is consistent with the actual value. If the error is large, please check again whether the wiring is correct (Make sure that all current flowing through the battery passes through the sampler.)
- Detection and Setting of Battery actual Effective Capacity:  
The actual effective capacity (CAP value) of the battery should be set correctly when the battery is used for the first time or replaced, see [Usage Settings].  
If the effective capacity value of the battery is known, complete the effective capacity setting according to the [use settings], and set it to full when the battery is fully charged, see [Capacity homing].  
If the effective capacity of the battery is unknown, you need to follow the steps below:  
A. Enter the capacity setting interface and set the capacity value as large as possible. (For example, it is set to 30Ah if the estimated value is 20Ah.)  
B. Empty the battery pack and at the same time clear the capacity value to 0%, and then charge the battery pack;  
C. After full charge, set the displayed capacity value to the CAP effective capacity value of the electricity meter.
- Capacity Homing (The battery capacity is cleared or full capacity setting.):  
A. Press and hold the button (down arrow) after the battery is discharged (empty) and the capacity value is cleared to 0%;  
B. Or Press and hold the button (up arrow) after the battery is full charged and the capacity value is set to 100%.

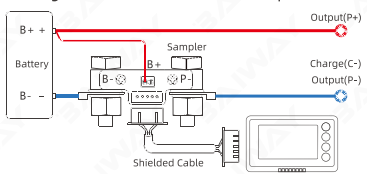
## Wiring method

- The sampler supplied with this product must be connected in series to the negative circuit of the battery pack. The B- of the sampler is connected to the negative B- of the battery pack, and the P- is connected to the negative P-/C- of the charge and discharge.
- Take a red wire(20-22AWG) and connect the positive battery to the sampler B+ for power supply to the electric meter.
- Use a shielded cable to connect the sampler to the meter. After confirming that it is correct, power on.
- Wiring principle: Make sure that all current flowing through the battery passes through the sampler.

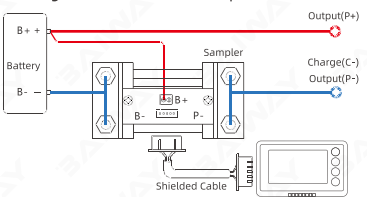
### ★ Wiring method of 50A sampler:



### ★ Wiring method of 100A/350A sampler:



### ★ Wiring method of 500A sampler:



Note: Please wire strictly as shown. The sampler must be connected in series with the negative circuit of the battery. It is strictly forbidden to connect the positive circuit. Shielded wires cannot be extended by yourselves.

## Usage Settings

- Press and hold the button (OK) for 2 seconds to enter the settings.
- Line cursor setting: CAP: 0100.0Ah, Full V: 000.0 V, Zero V: 000.0 V, PowOff: 000.0 V, Alarm: 000.0 Ah, Atten: 0.000 %
- Exit settings/Exit the project line/Previous row (setting value +1)/Next row (setting value -1)/Enter the project line/Select plus or minus/
- CAP** Effective capacity of battery: It is the initial capacity at the factory. Please set according to the actual effective capacity of the battery pack, otherwise the capacity percentage display will be incorrect;
- FULL V** Full capacity voltage: The capacity value is automatically set to 100% after the voltage is exceeded (Fill up);
- ZERO V** Zero capacity voltage: The capacity value is automatically set to 0% if below this voltage. The voltage value will flash, and the buzzer will alarm once per 10s if the discharge continues (Zero clearing);
- PowOff** Shutdown voltage: Backlight and LCD off and no display if below this capacity; the buzzer will sound per 10s if below this capacity.
- Alarm** Low capacity alarm: The percentage and battery symbol will flash, and the buzzer will sound per 10s if below this capacity.
- Atten** Battery attenuation ratio: After the battery Capacity cumulatively once per cycle, the capacity value is automatically changed according to this ratio.
- Precautions: Do not set Full V and Zero V without understanding the voltage characteristics of the battery pack (full voltage and vent voltage). The factory default of Full V and Zero V is 0V, which is invalid.
- ### Instructions for use
- The coulombmeter must be in working condition when charging or discharging, otherwise the battery capacity cannot be accurately calculated. It's designed for low power consumption. When the backlight is not bright (standby), the power consumption is very low. Don't connect the power supply B+ behind the power switch, (always keep the power on).
  - When connect the load. The backlight turns on (the sampler's B- and P- are reversed if the backlight flashes) indicating that the battery is discharging when the discharge current > the backlight turn-on current. And display the discharge current and the remaining discharge time. If the load current fluctuates greatly, the time will also fluctuate, which is a normal phenomenon.
  - Disconnect the load and connect the charger. When the charging current > the backlight turn-on current, the backlight flashes (if the backlight is always on, it means that the B- and P- of the sampler are connected reversely), indicating that the battery is charging. And display the charging current and the remaining charging time.
  - It will enter low power consumption and the backlight will be turned off when the charge or discharge current < the backlight turn-off current.
  - If the percentage and capacity values deviate after a period of use, it can be reset (see [first use method] → [capacity reset]). If the deviation still occurs, the battery capacity may decay, and the battery capacity needs to be corrected again (see [first use method] → [detection and setting of battery effective capacity]).
  - This product has a power-off capacity memory function.
  - A certain error may occur in the case where the current changes drastically, which affects the capacity value.

## Low power dormancy / shutdown

When the battery current is less than the turn-on current, the battery enters a low power sleep state, the backlight turns off, and the electric meter does not work but the battery parameters are still displayed; If the shutdown voltage is set and the battery voltage < the shutdown voltage, it will enter the shutdown state.

The following states can wake-up or exit shutdown:

- When the battery current > turn-on current or pressing anykey, the electricity meter will wake up automatically and the backlight will light up
- When battery voltage > shutdown voltage, battery current > turn-on current or pressing anykey, it will exit shutdown status.

## Turn on/off backlight adjust backlight brightness

- Press and hold the (left arrow) button to turn off the backlight (The backlight will not light up during work).
- Press and hold the (left arrow) button again to turn on the backlight (The backlight will flash during charge, and the backlight will light up during discharge).
- Click (down arrow) or (up arrow) button to increase or reduce backlight brightness.

## Communication Function

This product can be customized with serial communication function based-on TTL level, and upload the meter parameters to PC. The meter parameters are sent once every second, and the internal opto-coupler isolation method adopted is safe and reliable.

For details, see "TF03 Coulometer TTL Serial Communication Protocol".

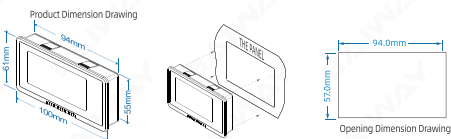
## Output Control Function

This product can be customized with output control function. It can be connected with an extended relay, a high-power alarm, etc., and the output is turned on at low voltage or low capacity. Opto-coupler isolation is adopted.

For details, see "TF03 Coulometer Output Function Description".

## Installation Method

Open a hole in the panel to be installed, install the monitor from the front and clamp the meter to the panel as shown below.



(Note: The panel is not a product accessory and is not included in the product.)

## Technical Parameters

Parameter	Min.	Regular	Max.	Unit
Working voltage	8.0	50.0	120.0	v
Working Consumption		8.0	12.0	mA
Static Consumption		1.0	2.0	mA
Power off Consumption		50		μA
Accuracy of Voltage Collecting		±1.0		%
Accuracy of Current Collecting		±1.0		%
Accuracy of Capacity Collecting		±1.0		%
Backlight on current(>50A specifications)		50		mA
Backlight on current(>50A specifications)		100		mA
capacity detection range	0.1	100	9999.0	Ah
50A Sampler Current	0	50.0	75.0	A
100A Sampler Current	0	100.0	150.0	A
350A Sampler Current	0	350.0	500.0	A
500A Sampler Current	0	500.0	750.0	A
Temperature Range in Application Environment	-10	20	60	°C
Weight (50A/100A/350A/500A)		210/270/420/700		g
TF03K Size		100×61×17		mm

Note: This product needs to be used with the sampler (the internal parameters of the meter are different), and the sampler of different specifications and the meter are forbidden to be mixed.

The sampler is a heat-generating component, and it should be installed in the air circulation as much as possible. Always keep ventilation and heat dissipation when using the maximum current for long periods of time.

## Precautions and warranty

This product cannot be exposed to sunlight for a long time, and cannot be exposed to extreme conditions below -10 °C and above 50 °C for a long time, otherwise it will shorten the life of the LCD.

The warranty period is within one year from the date of purchase. It can be repaired free of charge when non-human quality problems occur.

This product may be technically improved or updated. If the product you purchased differs from the appearance and technical parameters described in the Product User's Guide, please refer to the actual product or website.