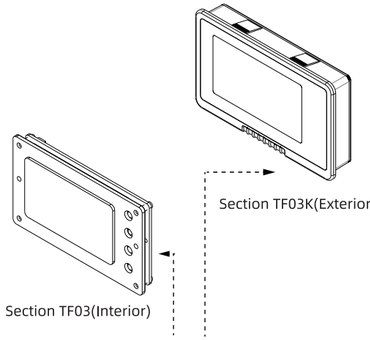
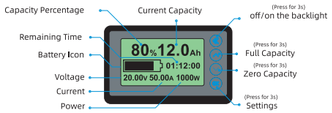
TF03 Series Current Battery Capacity Display
Coulomb counter

USER MANUAL

POWER SCIENCE



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. The working status of the battery is obtained accurately at any time.

●This product is suitable for 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.

Steps for Usage

1.Wiring and checking the current:
Power on after the connection as shown in the figure. The battery voltage, current and capacity percentage should be displayed on the screen. If there is no display, the power should be turned off to check if the connection is correct. Then discharge or charge the battery and check if the current value and the actual value are consistent. If the error is large, check the wiring again. (Make sure that all current flowing through the battery passes through the sampler.)

2. Detection and Setting of Battery Effective Capacity:
The battery's effective capacity (CAP) needs to be set correctly before first use, see "Usage Settings".
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 clear the capacity of electric meter to zero, and then charge the battery pack;
C. The display's capacity is set to the CAP of the electric meter when fully charged.

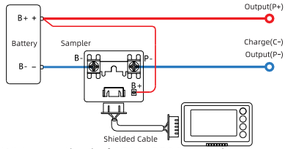
3. Capacity Homing (The battery capacity is cleared or full capacity setting.):
The capacity displayed on the electric meter is not the actual value of the battery after the first use or replacement of the battery. And zero or full capacity operation is required:

A. Press and hold the button "﹀" after the battery is discharged (empty) and the capacity value is cleared to 0%;
B. Or Press and hold the button "﹀" after the battery is full charged and the capacity value is set to 100%.
Then it will work as expected and you don't need to do this later.

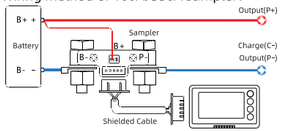
Wiring method

1.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.
2.Take a red wire and connect the positive battery to the sampler B+ for power supply to the electric meter.
3.Use a shielded cable to connect the sampler to the meter. Power on and will work normally after confirming that it is correct.
4.Wiring principle: Make sure that all current flowing through the battery passes through the sampler.

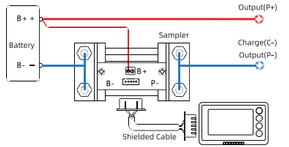
★ Wiring method of 50A sampler:



★Wiring method of 100A/350A sampler:

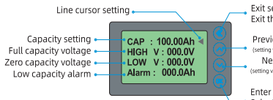


★ Wiring method of 500A sampler:



Usage Settings

Press and hold the button"OK" for 3 seconds to enter the settings.



CAP Effective capacity of battery: The default is 100Ah.Please set according to the actual effective capacity of the battery pack, otherwise the capacity percentage display will be incorrect;

HIGH V Full capacity voltage: The capacity value is automatically set to 100% after the voltage is exceeded;

LOW 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;

Alarm Low capacity alarm: The percentage and battery symbol will flash, and the buzzer will sound per 10s if below this capacity.

Precautions:
The default of HIGH V and LOW V is 0V. It is invalid.
Do not set HIGH V and LOW V without knowing the voltage characteristics of battery pack (full voltage and vent voltage).

Turn on/off backlight

1.Press and hold the "﹀" button to turn off the backlight
(The backlight will not light up during work).
2.Press and hold the "﹀" button again to turn on the backlight
(The backlight will flash during charge, and the backlight will light up during discharge).

Sleep Function in Low Power

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;
Wake up in sleep state:
1.When the battery current is greater than the turn-on current, the meter automatically wakes up, the meter works and begins to collect current and the backlight illuminates.
2.Press any key to wake up in the sleep state, and the backlight will light up.

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".

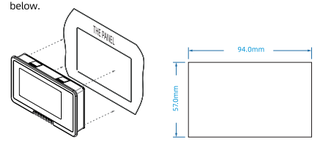
Output Control Function

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 Notes

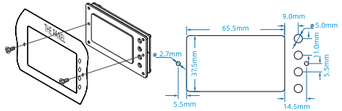
This product is divided into two types according to the installation method. The external model: TF03K, internal model: TF03.

1. External Model TF03K:
Open a 94*57mm rectangular 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.)
The panel

2. Internal Model TF03:
Open a hole in the panel as shown in figure. Install the meter from the inside to the outside. The 3mm self-tapping screws are fixed to the panel from the front as shown below.



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

Technical Parameters

Parameters	Minimum	Regular	Maximum	Unit
Operating voltage	8.0	50.0	120.0	V
Working consumption		10.0	15.0	mA
Sleep power		1.0	2.0	mA
Voltage acquisition accuracy		±1.0		%
Current acquisition accuracy		±1.0		%
Capacity acquisition accuracy		±1.0		%
Backlight turn-on current (>50A)		50		mA
Backlight turn-on current (>50A)		100		mA
Preset capacity value	0.1	100	9999.0	Ah
50A Sampler current	0.0	50.0	75.0	A
100A Sampler current	0.0	100.0	150.0	A
350A Sampler current	0.0	350.0	500.0	A
500A Sampler current	0.0	500.0	750.0	A
Ambient temperature	-10	20	50	℃
Weight (50A/100A/350A/500A)		210/270/420/700		g
TF03 (external model) Size		94×55×20		mm
TF03K (internal model) 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.

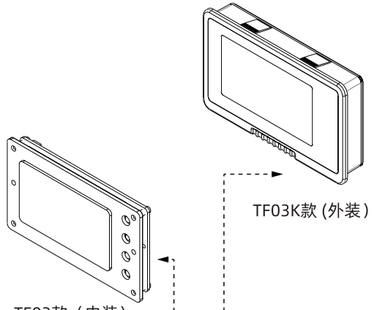
● The warranty period is within one year from the date of purchase. It can be repaired free of charge when non-human quality problems occur.

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.

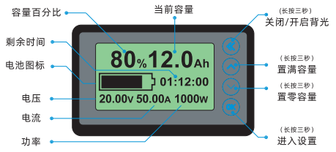
TF03系列 电流型电池容量显示器
库仑计

用户手册

POWER SCIENCE



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)。能准确实时的检测电池组的电压、电流、功率、真实容量、剩余使用时间等，随时准确了解电池的工作状态。

●适用于使用电池设备的电动车、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

●适合于工作电压在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使用。

使用步骤

1.接线并检查电流：

按照图示完成连接后通电,屏幕应显示电池电压,电流和容量百分比等信息。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电流值和实际电流值是否一致，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！）

2.电池有效容量的检测和设置：

首次使用前需要正确设置电池的有效容量（CAP值），见“使用设置”。

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，并将电量表的容量清零，再对电池组进行充电；

C. 充满后将显示器的容量值设置到电量表的CAP容量值。

3.容量归位（电池容量清零或满容量设置）：

首次使用或更换电池后电量表显示的容量值并非电池的实际值，需进行零容量或满容量操作：

A.将电池放完(空)后长按 下键 “ ”，容量值清零为0%；

B.或将电池充满电后长按 上键 “ ”，容量值置满为100%。

即可正常使用，以后无需再进行此操作。

接线方法

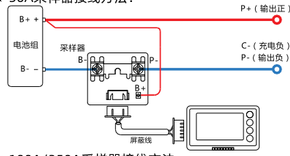
1.本产品配套的采样器必须串联到电池组的负极回路中。采样器上B-端连接电池组负极B-，P-端连接充放电的负极P-/C-。

2.取一根红色导线将电池正极和采样器B+连接，用于电量表的供电。

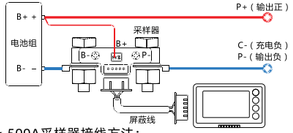
3.用屏蔽线将采样器和表相连，确认无误后，通电即可正常工作

4.接线原则：确保流过电池的所有电流都经过采样器！

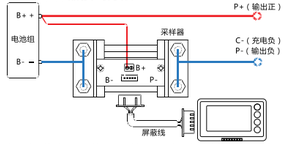
★ 50A采样器接线方法：



★ 100A/350A采样器接线方法：



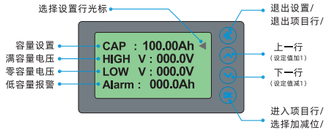
★ 500A采样器接线方法：



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 “ ” 3秒进入设置：



CAP 电池有效容量：出厂时默认为100Ah，请根据电池组实际的有效容量进行设置，否则容量百分比显示会不正确；

HIGH V 满容量电压：高于此电压后容量值自动置为100%；

LOW V 零容量电压：低于此电压后容量值自动置为0%，若继续放电则电压值闪烁，蜂鸣器每10s报警一次；

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

注意事项：

HIGH V和LOW V出厂默认为0V，即无效。

在不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HIGH V和LOW V。

开启/关闭 背光

1. 长按 退出键 “ ” 关闭背光（工作时背光不会亮起）；
2. 再长按 退出键 “ ” 打开背光（充电时闪烁，放电时常亮）；

低功耗休眠功能

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；

休眠状态下的唤醒：

1.当电池电流>开启电流，电量表自动唤醒，电量表工作并开始采集电流且背光亮起；

2.休眠状态按下任意键唤醒，且背光亮起；

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。

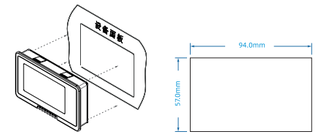
详细说明见《TF03库仑计输出功能说明》。

安装说明

本产品根据安装方式分两种，外装型号：TF03K，内装型号：TF03。

1. 外装TF03K：

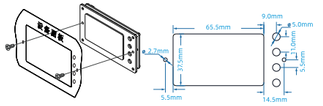
在要安装的设备面板上开一个94*57mm矩形孔，将显示器从正面安装并将电量表卡于设备面板上，如下图：



（注:设备面板非产品配件，不包含在产品中）

2. 内装TF03：

按照图示在设备面板开孔，将电量表从内部向外安装，从正面用3mm自攻螺丝与设备面板固定，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		10.0	15.0	mA
休眠功耗		1.0	2.0	mA
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)		50		mA
背光开启电流(>50A)		100		mA
预设容量值	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	-10	20	50	℃
重量（50A/100A/350A/500A）	210/270/420/700			g
TF03（外装）尺寸	94×55×20			mm
TF03K（内装）尺寸	100×61×17			mm

注意：本产品需配合采样器使用（表内部参数不同），不同规格采样器与表禁止混用。

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时，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。

● 本产品质保期自购买日起一年内，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《产品使用说明书》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。