

# Multifunction Battery Meter

## Overview

This document describes the specification of the PZEM-013/015 DC multifunction battery tester, this meter is mainly used to test all kinds of battery's voltage、discharge current、discharge power、discharge impedance、internal resistance、capacity、SOC、energy、running time, and display the measurement data through LCD screen.

PZEM-013: Measuring Range 10A (Built-in Shunt)

PZEM-015: Measuring Range 300A (use external shunt, can matched with 50A, 100A, 200A, 300A four kinds of shunt).

## 1. Function description

### 1.1 Voltage

Measuring range: 0-200V. (when the test voltage is  $<8V$ , please use the independent power supply mode)

Display format:  $<10V$  display as: 9.99V

$<100V$  display as: 99.9V

$\geq 100V$  display as: 199V

Minimum resolution:0.01V

The starting test voltage: 0.05V

Measurement accuracy:1%

### 1.2 Current

Measuring range: 0-10A. (Type: PZEM-013)

0-300A(Type: PZEM-015) can set 50A, 100A, 200A,300A four range depend on the external shunt, the factory default is 100A.

Display format:  $<1A$  display as: 999mA

$<10A$  display as: 9.99A

$<100A$  display as: 99.9A

$\geq 100A$  display as: 199A

Minimum resolution: 1mA

The starting test current: 10mA(Type: PZEM-013)

20mA(Type: PZEM-015)

Measurement accuracy:1%

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### 1.3 Power

Measuring range: 0-2000W (Type: PZEM-013)

0-60000W(Type: PZEM-015).

Display format: <10W display as: 9.99W

<100W display as: 99.9W

<1000W display as: 999W

<10000W display as: 9.99kW

≥10000W display as: 19.9kw

Minimum resolution: 0.01W

The starting test power: 0.1W (Type: PZEM-013)

0.2W (Type: PZEM-015)

Measurement accuracy:1%

### 1.4 Impedance

**Impedance=Voltage/ Current**

Measuring range: 0-1000Ω

Display format: <100Ω display as: 99.9Ω

≥100Ω display as: 999Ω

When over the test range or the current is zero, it display “---”

Minimum resolution: 0.1Ω

Measurement accuracy:1%

### 1.5 Internal Resistance

**Internal resistance= (Full voltage – Bring load voltage) / Bring load current, when the bring load voltage is larger than the maximum voltage, the internal resistance is zero.**

Measuring range: 0-999mΩ

Display format: 999mΩ, when over the test range or the current is zero, it display “---”.

Minimum resolution: 1mΩ

Measurement accuracy:1%

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Note: Before you test the internal resistance, you should preset the full voltage depend on the battery type, after it is fully charged you can use it to test; if you do not fully charge it, you can set the battery without load voltage is the full voltage, then test; the internal resistance is not a fixed value, the more the battery discharged, the bigger the resistance.

## 1.6 Capacity

Measuring range: 0-1000AH

Display format: <1AH display as: 999mAH

<10AH display as: 9.99AH

<100AH display as: 99.9AH

<1000AH display as: 999AH

Minimum resolution: 1mAH

Measurement accuracy:1%

Note: Battery capacity testing is a cumulative process of discharge current versus time, it need some time, the time is depend on the discharge current; before you test the capacity, you should preset the full voltage and the cut-off voltage depend on the battery type, after it is fully charged you can use it to the discharge test; When the dump energy display blank, it means the discharge is over, this capacity display value is the battery's capacity.

## 1.7 SOC

SOC is display via the battery symbol, totally 10 grids, every grid present 10% energy.

SOC is calculated via the current battery voltage value, before test you should preset the full voltage and the cut-off voltage depend on the battery type; every grid voltage = (the highest voltage – the lowest voltage) / 10.

## 1.8 Energy

Measuring range: 0~9999kWh

Display format: <1kWh display as: 999Wh

<10kWh display as: 9.99kWh

<100kWh display as: 99.99kWh

<1000kWh display as: 999.99kWh

≥1000kWh display as: 9999kWh

Over the test range will become zero.

Minimum resolution: 1Wh

Measurement accuracy:1%

Note: 1Wh=0.001kWh=0.001 Kilowatt

## 1.9 Running time

Measuring range: 0 ~ 999 hour (without load the time will not accumulate)

Display format: 0:00:00 ~ 999:59:59

Over the test range will become zero.

## 2. Operating Instructions

### 2.1 Setting the full and cur-off voltage

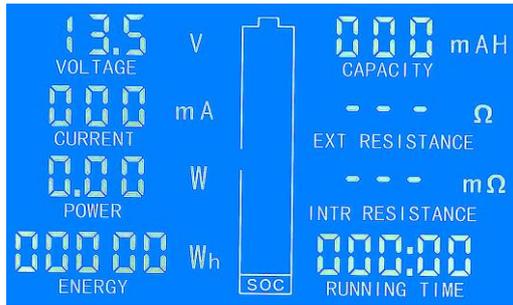


Figure 1: the normal display interface

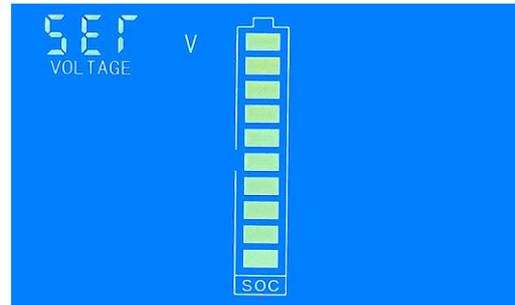


Figure 2: the voltage setting interface

#### Set the full voltage:

Step 1: In the normal display interface (like fig. 1), long press the button until the LCD screen displays the interface like fig. 2, then release the button.

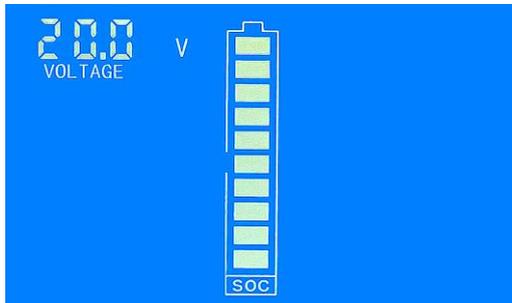


Figure 3: full voltage setting interface (low bit)

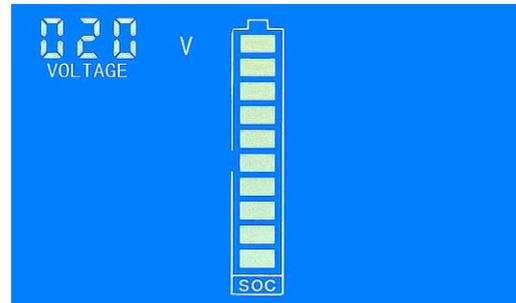


Figure 4: full voltage setting interface (high bit)

Step 2: SET character blink present it is the setting status of full / cut-off voltage, long press the button until the LCD screen displays the interface like fig. 3, then release the button.

Step 3: At this time, the battery symbol displays full grids energy means the full voltage setting status, factory default the full voltage is 020.0V, the numerical code circulation flashing from the low bit to the high bit shows that the current setting digit, short press to set the digit; please pay attention that, as the full voltage setting value has 4 digits, but the numerical code has only 3 digits, so the setting is divided into two parts: low bit (fig. 3) + high bit (fig. 4). For example, the default full voltage is 020.0V, then the display state is 20.0V to 020V low and high cyclic switching display. If you need to set the full voltage is 199.0V, then please set the low bit to 99.0V, when the cycle reaches the high bit, it will display 099V, and only the highest zero bit flickers to prompt it can be set. Setting the high bit to 199V represents the full voltage is 199.0V.

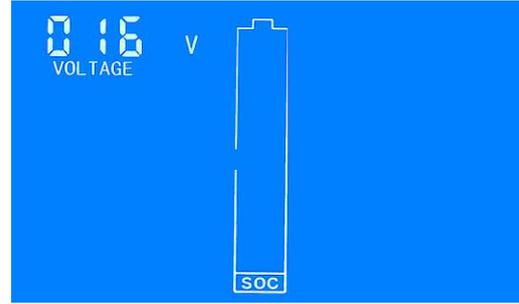
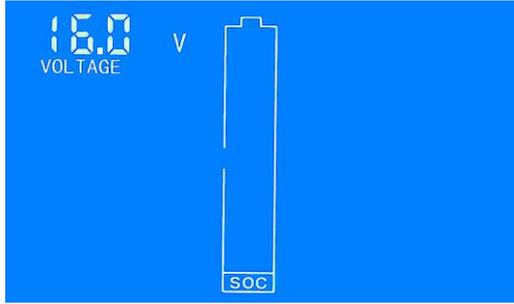


Figure 5: cut-off voltage setting interface(low bit)      Figure 6: cut-off voltage setting interface(high bit)

**Set the Cut-off voltage:**

Step 1: After you set the full voltage, loner press the button until LCD shows the interface of Fig. 5, then release the button;

Step 2: At this time, the battery symbol shows the zero-grid to indicate the cut-off voltage setting state, the default cut-off voltage is 016.0V, the setting method is the same as above; the cut-off voltage is 0.8 times of the full voltage by default, after setting the full voltage, the cut-off voltage is automatically generated in the relationship of 0.8 times; otherwise, you can reset it;

After all the above settings are completed, long press the button until the settings are saved and exit the setting status, restore the normal display interface.

**2.2 Current range setting (Only for PZEM-015)**

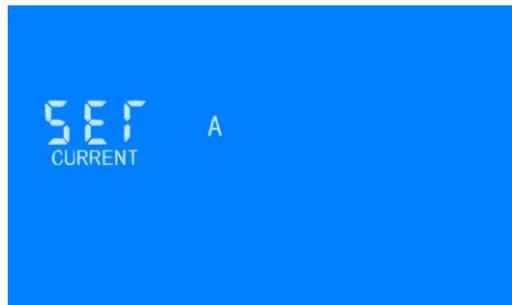


Figure 7 Current range setting interface

Step 1: In the normal display interface, long press the button until the LCD shows the interface of Figure 2, then release the button, short press the button again switch to the interface to Figure 7, it indicates that this state is the current range setting state.



Figure 8 Current range choosing interface

Step 2: Longer press the button until the LCD shows the interface of Figure 8, then release the button, short press the button again to switch the current range. This meter provides four current ranges, factory default is 100A, choose the corresponding range according to the shunt.

Step 3: After the current range setting is completed, long press the button until the settings are saved and exit the setting status, restore the normal display interface.

**2.3 Clear the Energy**



Figure 9 clear the energy interface

Step 1: In the normal display interface, long press the button until the LCD shows the interface of Figure 2, then release the button, short press the button again switch to the interface to Figure 9, it indicates that this state is the clearing energy setting state.

Step 2: Longer press the button until the data has been cleared and exit the setting status, restore the normal display interface.

#### 2.4 Clear the capacity



Figure 10 clear the capacity interface

Step 1: In the normal display interface, long press the button until the LCD shows the interface of Figure 2, then release the button, short press the button again switch to the interface to Figure 10, it indicates that this state is the clearing capacity setting state.

Step 2: Longer press the button until the data has been cleared and exit the setting status, restore the normal display interface.

#### 2.5 Clear the running time



Figure 11 clear the running tim interface

Step 1: In the normal display interface, long press the button until the LCD shows the interface of Figure 2, then release the button, short press the button again switch to the interface to Figure 11, it indicates that this state is the clearing running time setting state.

Step 2: Longer press the button until the data has been cleared and exit the setting status, restore the normal display interface.

## 2.6 Working mode

This meter has two modes: normal display mode and dormant mode. In normal display mode, short press the button to enter the dormant mode, in order to reduce the whole machine power consumption, the backlight and LCD display will be turned off in dormant mode. In dormant mode, short press the button will switch to the normal display mode.

Note: The meter will stop all measurement functions in dormant mode, so please do not switch to dormant mode if normal measurement is performed.

## 3. Wiring Diagram

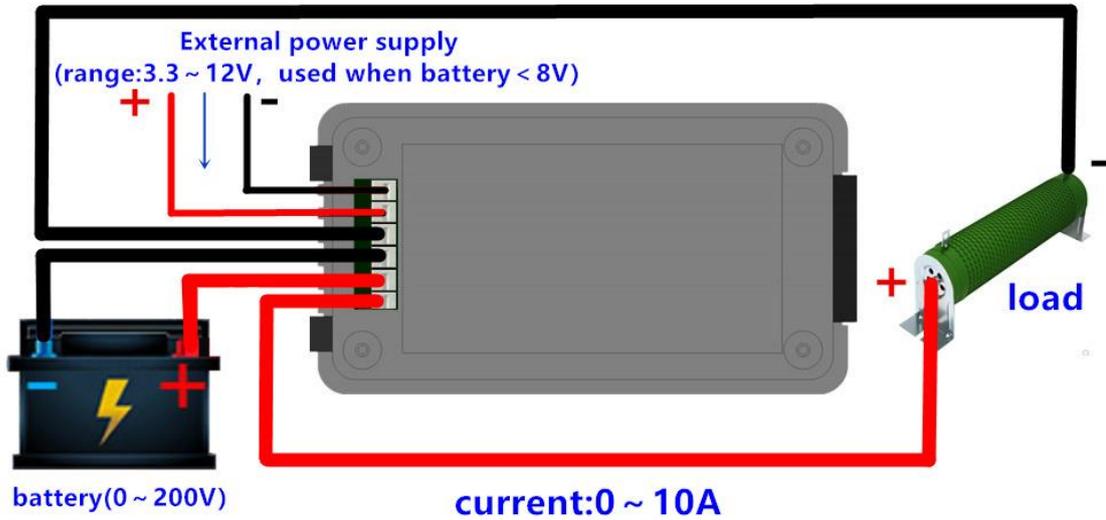


Figure 12 PZEM-013 Wiring Diagram

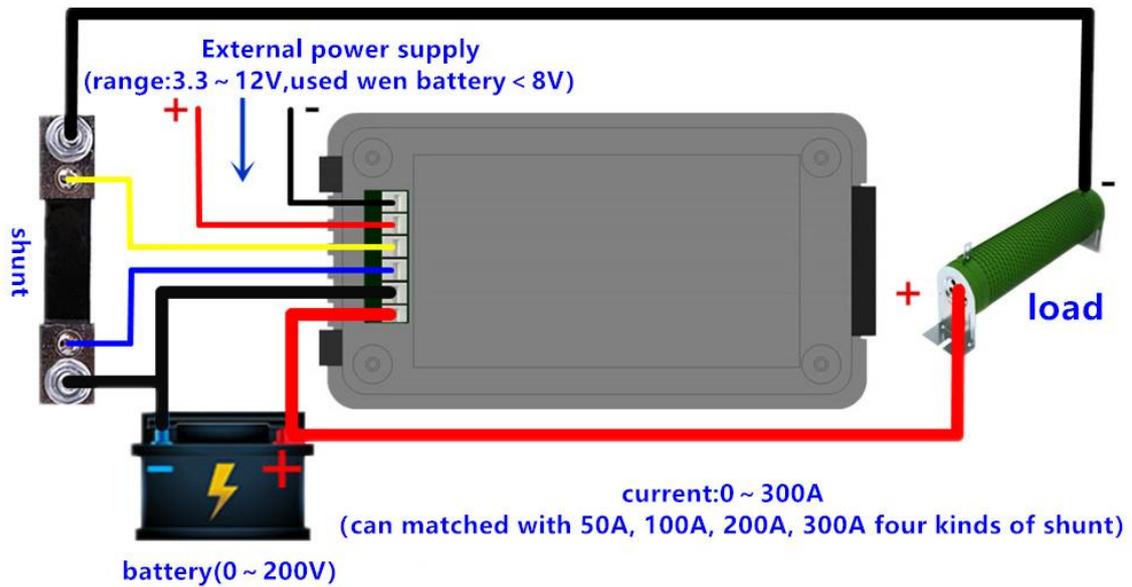


Figure 13 PZEM-015 Wiring Diagram

## 4.Dimension Figure (mm)

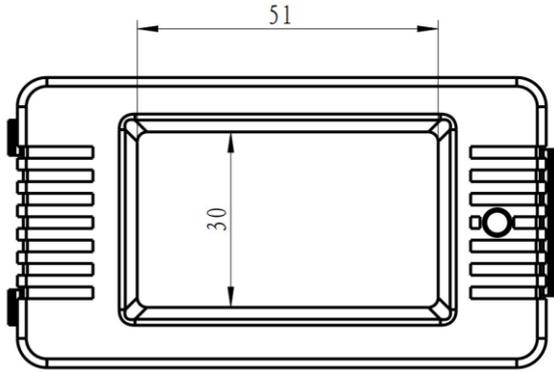


Figure 14 LCD Screen size

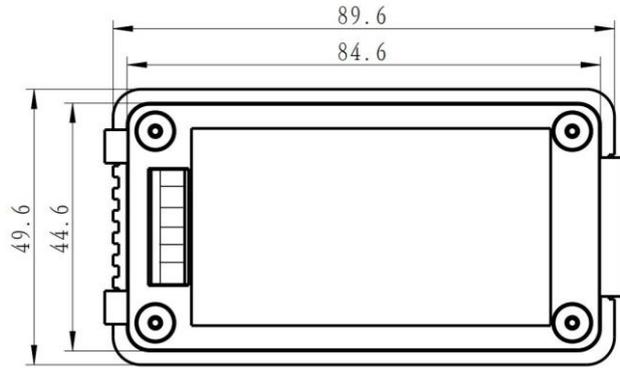


Figure 15 Out frame size

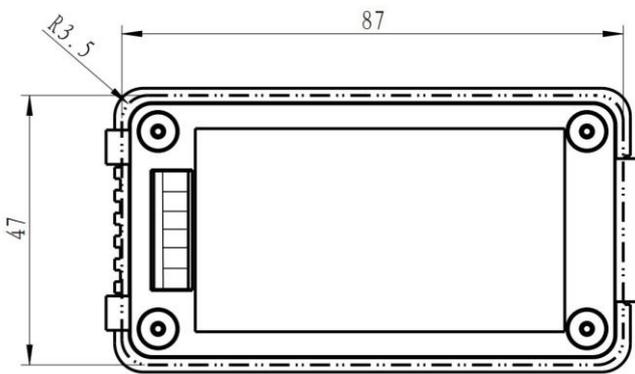


Figure 16 Hole size

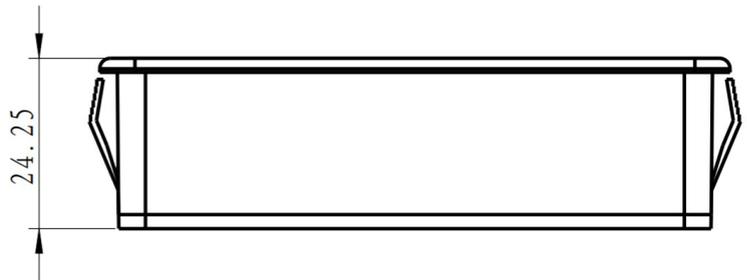


Figure 17 Height size

## 5. Matters needing attention

- 5.1 This module is suitable for indoor, please do not use outdoor.
- 5.2 Applied load should not exceed the rated voltage, current.
- 5.3 Wiring order can't be wrong.

## 6. Other specification

### 6.1 LCD full display figure

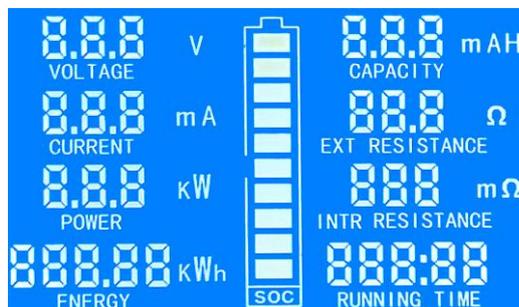


Figure 18 LCD full display figure

### 6.2 Power consumption

Normal working state: 0.03–1.2 W

Sleeping state: 0.5mW–0.5W

The power consumption is related to the test voltage value, the higher the voltage, the greater the power consumption.

### 6.3 Working temperature

-20°C ~ +60°C.