

# **H718**

## **Calibrator Volt/mA Operating instruction**

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## 一、 Safe Information

This Calibrator complies with IEC 61010, CAT I 30 V and Pollution Degree II instrument.

### 1.1 Warnings and Notes

- To avoid electric shock, injury or damage to the Calibrator.
- Please use this Calibrator only as described in this instruction sheet or the protection provided by this instrument may be impaired.
- Do not use this Calibrator around explosive gas, vapor or dust.
- Never apply more than 30 V between any two terminals or between any terminal and earth ground.
- Please select the appropriate port and scale span before using it.
- Never use this Calibrator when the case cover open.
- Once the symbol  (low battery) appears, replace the battery to avoid false readings that can lead to electric shock.
- Remove test lead from the Calibrator before opening the case or battery cover.
- If charge the Calibrator, must be use the power adapter that is provided from Calibrator.
- Disconnect the power immediately and return it to detect and maintain if discover abnormal situations or excessive local temperature on charging.







## 1.2 Symbols and Marks







Symbol	Meaning
	Earth ground
	Caution: Important information. Refer to instruction sheet
	Double insulated
	Low battery
CE	Conforms to European Union requirements













## 二、Description

Volt/mA Calibrator (hereafter to be referred as “Calibrator”) is an accurate tool for current or voltage supplying and measuring. The Calibrator can sourcing (output) 0-24mA or simulates a two-wire transmitter output 0-24mA , it can measures 0-20mA or 4-20mA current loop as well as measure voltage dc 0-100mV/0-10V. It is widely used to calibrate various loop current or voltage/current equipment.

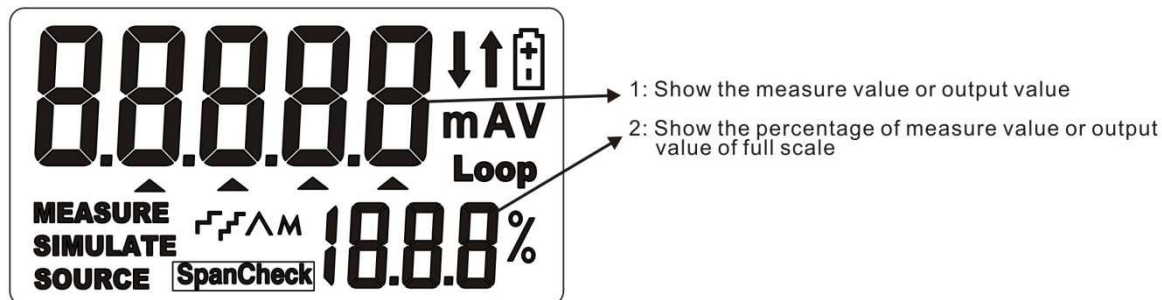
## 2.1 Pushbutton Functions

Pushbutton	Function
	Power ON/OFF pushbutton.
  	Set up the auto power-off time : Set up the power-off time after power on, refer to power section for details please.
	Backlight ON / OFF pushbutton.
	<p>Press to step through modes:</p> <ul style="list-style-type: none"> <li>• SOURCE mA mode ,display “<b>SOURCE mA</b>”</li> <li>• SIMULATE mA mode,display “<b>SIMULATE mA</b>”</li> <li>• Output voltage dc,display “<b>SOURCE V</b>”</li> <li>• Output millivolt dc,display “<b>SOURCE mV</b>”</li> <li>• MEASURE voltage dc,display “<b>MEASURE V</b>”</li> <li>• MEASURE milivolt dc,display “<b>MEASURE mV</b>”</li> <li>• MEASURE current dc,display “<b>MEASURE mA</b>”</li> <li>• Measure current dc with Loop Power, display “<b>MEASURE mA LOOP</b>”</li> </ul> <p>It would storage the current setting status before your turn off the calibrator and keep it on when you using it again.</p>

	<p>By pressing the knob  <b>SOURCE mA mode:</b> the current output could be adjusted to the resolution of <b>1<math>\mu</math>A /10<math>\mu</math>A/100<math>\mu</math>A/1000<math>\mu</math>A</b> (default value is <b>1<math>\mu</math>A</b>);</p> <p><b>SOURCE V mode:</b>the voltage output could be adjusted to the resolution of <b>1mV/10mV/100mV/1000mV</b>. (default value is <b>1mV</b>);</p> <p><b>SOURCE mV mode:</b>the voltage output could be adjusted to the resolution of <b>0.01mV/0.1mV/1mV/0mV</b>. (default value is <b>0.01mV</b>);</p> <p>By rotating the knob , the current or voltage signal output could be increased or decreased in current setting resolution. If turn the knob into auto ramp function or 25% stepping mode, the direction and value could be changed for output signal.</p>
	<p>Press  to increase the current or voltage with a stepping of 25% of full scale.</p> <p>When at full scale point, press  key again to decrease the current or voltage with stepping of 25% of full scale (0-20mA/4-20mA) / (0-100mV) / (0-10V) .</p>

	<p>Press  to enter into auto ramp current/voltage output function and select a ramp output type. Press this pushbutton repeatedly could cycle through select a ramp output type. stepped ramp display “”, slow ramp display “”, fast ramp display “”.</p>
	<p>Press  to select “<b>SpanCheck</b>” function . “<b>SpanCheck</b>” is displayed. From 0% and press it again to 100%. For example: The 0-20mA SpanChecks ,starting from 0% is 4mA and press it again to 100% is 20mA.</p>
  	<p>Press  and  simultaneously to select the “<b>SpanCheck</b>” Span for example:</p> <ul style="list-style-type: none"> <li>• 4 mA-20 mA =0%-100% (default value)</li> <li>• 0 mA-20 mA =0%-100% (optional)</li> </ul> <p>The selection will be saved until next change.</p>



## 2.2 Display





## Volt/mA Calibrator

## Description

Symbol	Explanation
<b>MEASURE</b>	Measure current or voltage
<b>SIMULATE</b>	Simulate mA current
<b>SOURCE</b>	Sourcing output current
<b>SpanCheck</b>	Check of the full scale (0%-100%)
<b>Loop</b>	Loop power
<b>mAV</b>	The combination of unit symbol: mA /mV/V
	Auto ramp type
	Stepping direction indicate symbol
	Low battery



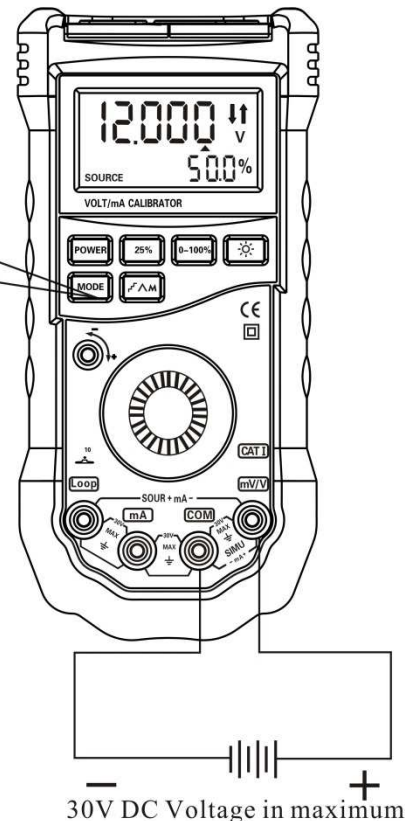
### 3、 Using

#### 3.1 Input

##### 3.1.1 Measure Voltage dc (MEASURE V)

**⚠ Caution**  
**To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.**

Press **MODE** until the MEASURE(measure voltage)with unit: V is displayed



To measure voltage dc

- 1) Press **MODE** to step to **MEASURE** mode.  
 The display shows “**MEASURE V**”.
  - 2) Touch test lead probes to the circuit across the load or power source as shown in right figure.
  - 3) If the voltage over 10V the LCD will show “**-OL-**”.
- The lower display area ,shows the voltage value percentage.

### 3.1.2 Measure Millivolt dc (MEASURE mV)

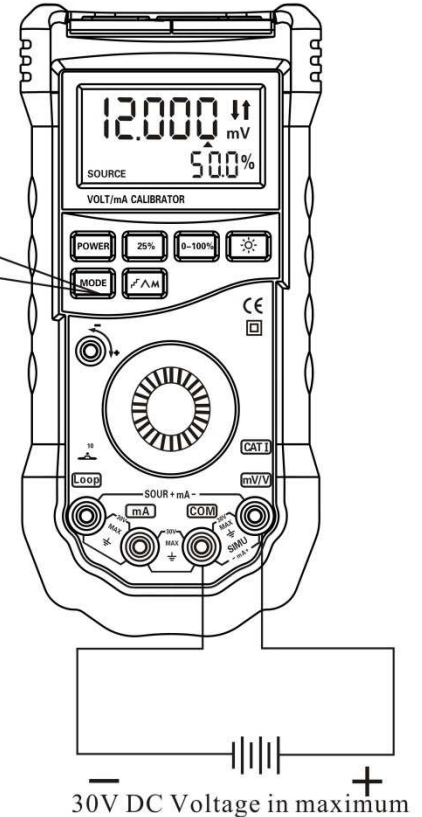
**⚠ Caution**

To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

To measure voltage dc

- 1) Press **MODE** to step to **MEASURE** mode.  
The display shows "**MEASURE mV**".
- 2) Touch test lead probes to the circuit across the load or power source as shown in right figure.
- 3) If the voltage over 100mV the LCD will shows "**-OL-**".  
The lower display area ,shows the current value percentage.

Press **MODE** until the MEASURE(measure voltage)with unit: mV is displayed



### 3.1.3 Measure Current dc (MEASURE mA)

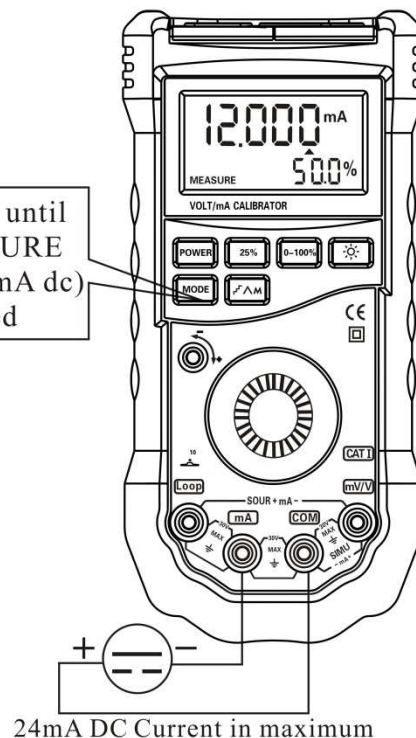
#### ⚠ Caution

To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

To test mA dc:

- 1) Press **MODE** to step to **MEASURE** mode.  
The display shows "**MEASURE mA**"
- 2) Touch test lead probes to the circuit across the load or power source as shown in right figure.
- 3) If the current over 24mA, the LCD will show "**-OL-**".  
The lower display area, shows the current value percentage.

Press **MODE** until the **MEASURE** (measure mA dc) is displayed




### 3.1.4 Measure mA with Loop Power

#### ⚠ Caution

To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

Follow this mode the Calibrator can supply +24V loop power to the transmitter and read the loop current value simultaneously.


The wire connecting as shown below:  
To Measure mA dc current with Loop Power

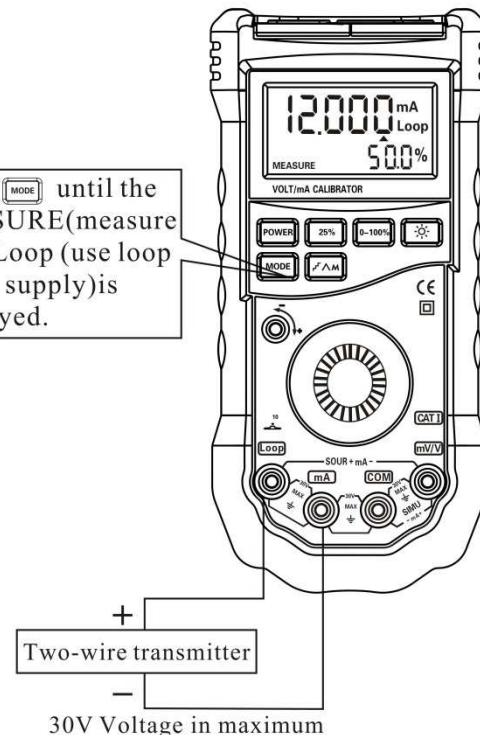
- 1) Press  to step to “**MEASURE mA LOOP**” mode.

The display shows “**MEASURE**” with unit “**mA**” (measure mA) and **Loop** symbol.

- 2) Touch test lead probes to the circuit across the load or power source as shown below.
- 3) If the current over 24mA, the display will show “**-OL-**”.

The lower display area ,shows the current value percentage.

Press  until the MEASURE(measure mA )Loop (use loop power supply)is displayed.







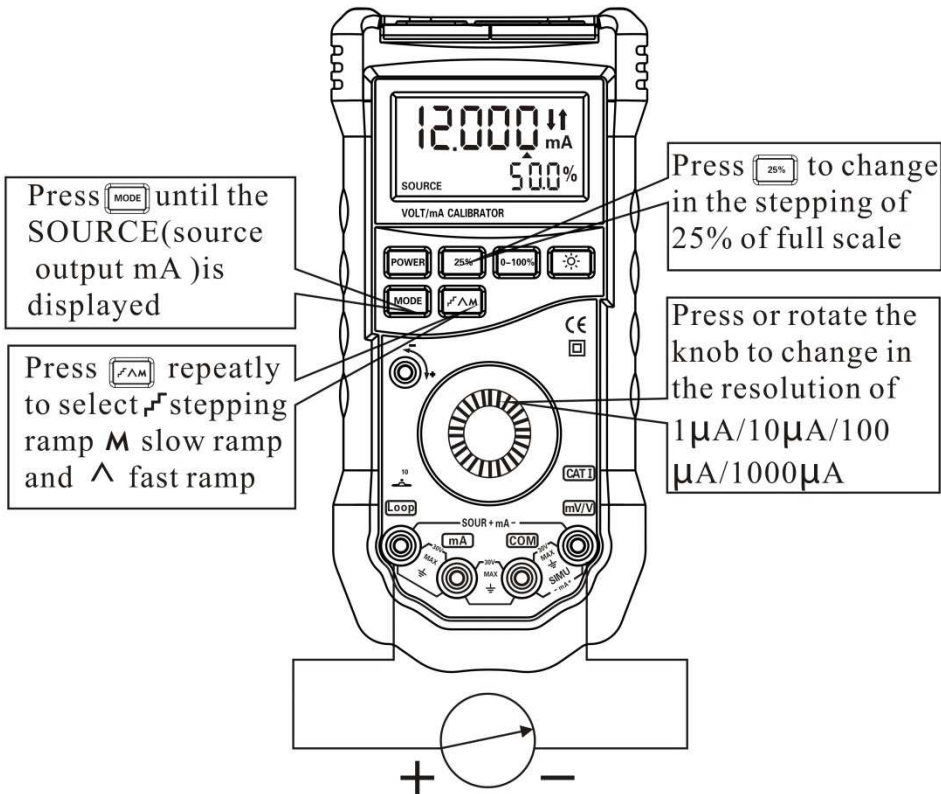
## 3.2 Output

### 3.2.1 SOURCE mA Mode (Source mA)

Use this mode to supply current to a passive circuit.





There must be a path which allows the current to flow between "LOOP" terminal and "mV/V" terminal, otherwise it will show overload (figure flashing) when you set an output value.

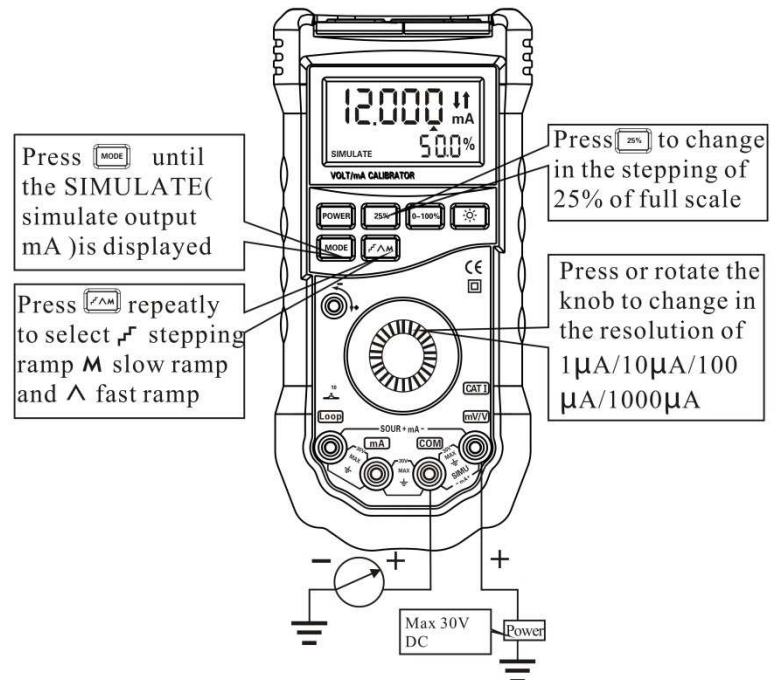
- 1) Press  to step to **SOURCE mA** mode. The display shows "**SOURCE**" with unit "**mA**"
- 2) The test leads connected as shown in the right figure, the red test wire connected to "LOOP" and the black test wire connected to "mV/V" socket.
- 3) If the current over 24mA, the display will show "**-OL-**".
- 4) Press in and rotary the knob to step up/down in different increments.
- 5) Press  key, stepping up/down 25% of full scale for output value.
- 6) Press  key to select auto ramp output type.
- 7) Press  key to select "**SpanCheck**" function.



### 3.2.2 Simulate a Transmitter





When the Calibrator is used as simulate a two-wire transmitter, it can adjust the output loop current by adjusting the Calibrator. There must be a 12V-28 V loop power to supply. Connect the test leads as shown in figure.


- 1) Press  to step to **SIMULATE mA** mode. The display shows “SIMULATE” with unit “mA”.
- 2) The general connection is that red is positive and black is negative, the red test wire connected to " mV/V " and the black test wire connected to "COM" socket.
- 3) If the current over 24mA, the display will show “-OL-”.
- 4) Press in and rotary the knob to step up/down in different increments.
- 5) Press  key , stepping up/down 25% of full scale for output value.
- 6) Press  key to select auto ramp output type.
- 7) Press  key to select “SpanCheck” function.

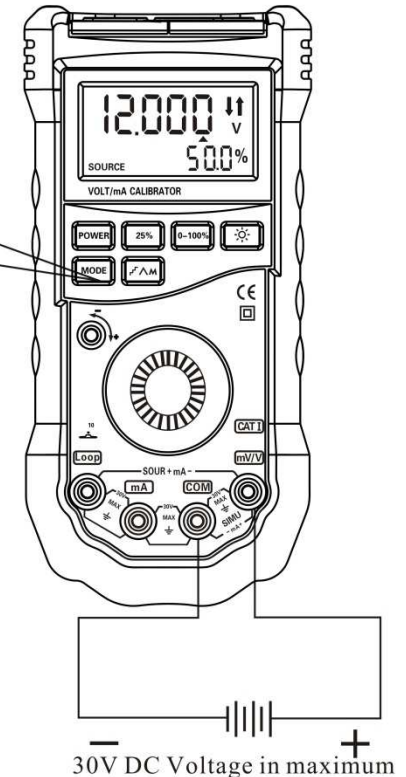








### 3.2.3 Output Voltage dc (SOURCE V)

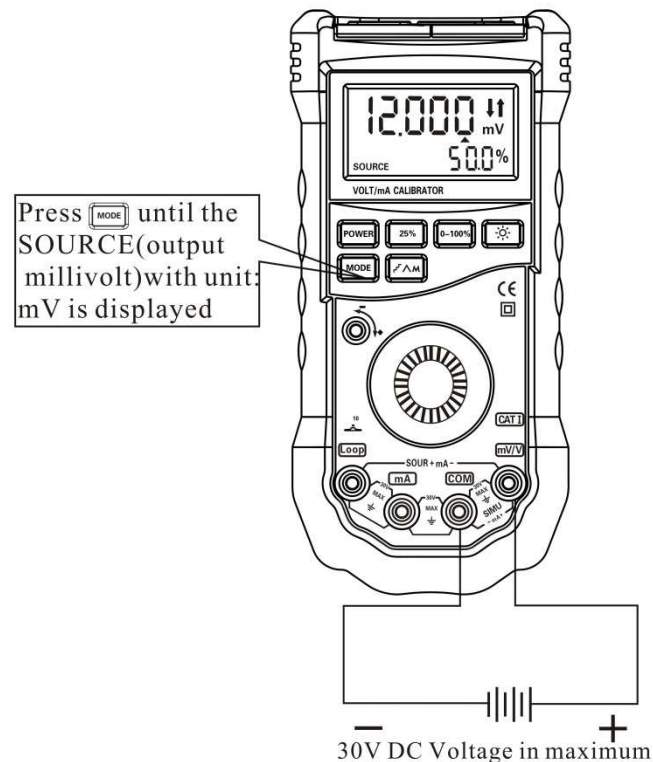
- 1) Press  to step to **SOURCE V** mode.  
The display shows "**SOURCE**" with unit "**V**".
- 2) The test leads connected as shown in the right figure, the general connection is that red is positive and black is negative, the red test wire connected to "**mV/V**" and the black test wire connected to "**COM**" socket.
- 3) If the current over 10V, the display will show "**-OL-**".
- 4) Press in and rotary the knob to step up/down in different increments.
- 5) Press  key, stepping up/down 25% of full scale for output value.
- 6) Press  key to select auto ramp output type.
- 7) Press  key to select "**SpanCheck**" function.

Press  until the SOURCE(output voltage) with unit: V is displayed



### 3.2.4 OUTPUT Millivolt dc (SOURCE mV)

- 1) Press  to step to **SOURCE mV** mode.  
The display shows "**SOURCE**" with unit "**mV**".
- 2) The test leads connected as shown in the right figure, the general connection is that red is positive and black is negative, the red test wire connected to " **mV/V** " and the black test wire connected to "**COM**" socket.
- 3) If the current over 100mV, the display will show "**-OL-**".
- 4) Press in and rotary the knob to step up/down in different increments.
- 5) Press  key , stepping up/down 25% of full scale for output value.
- 6) Press  key to select auto ramp output type.
- 7) Press  key to select "**SpanCheck**" function.



### 3.2.5 Auto Ramp Function

Auto Ramp function is applied to all of output signal.


**In SOURCE mA mode** Auto ramp function allows you to apply a varying current signal continuously from the Calibrator to a passive (sourcing) or active (simulate) loop and you can still leave your hands free to test the transmitter's response.


Similarly **In SOURCE V/SOURCE mV mode**, auto ramp function apply a varying voltage signal continuously from the Calibrator to load circuit.

Press  to enter into "Auto Ramp" mode and select a ramp type.

The Calibrator applies or controls a continuously repeating current or voltage signal in one of three ramp types in the span range.

Step  25% stepping ramp with 5s of pause per step.

Slow  ramp: Smooth ramp with rate of change 0%-100%-0% within 40s.



Fast  ramp: Smooth ramp with rate of change 0%-100%-0% within 15s.

Press any pushbutton (except  pushbutton) or turn off the Calibrator to exit this function.


### 3.2.6 The “SpanCheck” Function (0%-100%)


The “**SpanCheck**” Function apply to all of output signal.

It realize the current/voltage signal from zero to full scale point transition /step output.

In **SOURCE V/SOURCE mV** mode,proess  key, calibrator can execute 0% point of full scale output,press  key again,it can execute 100% point of full scale output, cycle repeatedly.



“**SpanCheck**” function can be used to check the zero points or span spacing of a transmitter under **SOURCE** or **SIMULATE** mode.

Press  to select “**SpanCheck**”.

Press any pushbutton (except  pushbutton) or rotate the knob to exit this function.

The Calibrator has two mA output spans:

4 mA-20 mA (0%-100% ) [default value] ; 0 mA-20 mA (0%-100%) [optional];

To change the output span, press  and  simultaneously. The setting value for selection will be saved until next change.

### 3.3 Power

Any of 7.4V polymer lithium battery or 9V alkaline battery can be used in the calibrator.

Alkline Battery: 6F22

Battery Life: **SOURCE** mode: 6 hours, 12 mA into 500  $\Omega$ .

Polymer Lithium Battery: Two lithium batteries in series




Rated voltage:7.4V

Battery life (typical) (fully charged):**SOURCE** mode: 8 hours, 12 mA into 500  $\Omega$ .


**MEASURE / SIMULATE** mode: 12 hours

The Calibrator turns off automatically after 15 minutes of inactivity on default.

To decrease this time or disable this feature:

- 1) When the Calibrator off, press  +  simultaneously.  
The display shows “PS-XX”, in which “XX” indicates the tun-off time with the unit of minute, “OFF” indicates that the power saver is disabled.
- 2) Rotate the knob  to decrease or increase the tun-off time of which the shortest is 5 minutes while the longest is 30 minutes.
- 3) To disable this function, rotate the knob until the display shows “OFF”.
- 4) The Calibrator will exit automatically about 5s later or you press the knob.

### 3.4 Charging Function

When the symbol  (low battery) is displayed, needs to charge or change the battery . Normally the Calibrator should be off firstly when charging and then to charge the Li-Polymer battery pack by using the power adapter that is provided for Calibrator. The charging steps instruction:


- 1) Insert the power adapter to 220V AC socket, the power adapter indicator will be green.
- 2) Another side of the power adapter insert to the “**Charge**” connect interface where on the top of the Calibrator then the indicator of the power adapter turn red indicate that the Calibrator is being charged.
- 3) When the indicator where on the top of the Calibrator from red to green indicate that the charging has been completed and the charging time is about two to three hours.

Must be charged fully when charging otherwise it may affect the life of the Li-Polymer battery pack. If the running time of the Calibrator is lower obviously, should be replace the Li-Polymer battery pack with a new one.

If found the Li-Polymer battery pack damaged or charging circuits abnormal , use an alkaline 9V battery to replace it and will not affect normal using.

### 3.5 Backlight

If low light On-site environmental, this instrument has backlight function. In normal mode,

Press  button , The backlight open, repeat this operations can close backlight.

#### 4、 Technical Index

The accuracy is only applicable to 1 year after calibration with operation temperature 18°C-28°C, which shown as  $\pm$  ([% of reading]+[counts]).

##### 4.1 MEASURE V dc

Range	Resolution	Accuracy	Input Impedance
0 ---- +10V	1mV	$\pm$ (0.02% of reading+4 Counts)	1M $\Omega$

##### 4.2 MEASURE mV dc

Range	Resolution	Accuracy	Input Impedance
0 ---- +100mV	0.01mV	$\pm$ (0.02% of reading+4 Counts)	1M $\Omega$

##### 4.3 MEASURE mA dc

Range	Resolution	Accuracy	Sampling resistor
0 ---- +24 mA	1 $\mu$ A	$\pm$ (0.02% of reading+4 Counts)	10 $\Omega$

**4.4 SOURCE / SIMULATE mA dc**

<b>Range</b>	<b>Resolution</b>	<b>Accuracy</b>
0 ---- +24 mA	1 $\mu$ A	$\pm$ (0.02% of reading+4 Counts)
<b>SOURCE</b> mode with load ability: Compliance: To 1000 $\Omega$ at 20 mA. External loop voltage specification under <b>SIMULATE</b> mode: Typically 24V, max 30V, min 12V.		

**4.5 SOURCE V dc**

<b>Range</b>	<b>Resolution</b>	<b>Accuracy</b>
0 ---- +10V	1mV	$\pm$ (0.02% of reading+4 Counts)

**4.6 SOURCE mV dc**

<b>Range</b>	<b>Resolution</b>	<b>Accuracy</b>
0 ---- +100 mV	0.01 mV	$\pm$ (0.02% of reading+4 Counts)

**4.7 Loop Power:  $\geq 24V$  ,  $\leq 26V$ .**



#### **4.8 General Specifications**

The voltage between any two terminals or between any terminal and earth ground: Max 30V

**Storage temperature:** -40°C to 60°C

**Operation temperature:** -10°C to 55°C

**Operation elevation:** Max 2000m in height

**Temperature coefficient:** 0.005%× range /°C (-10°C to 18 °C or 28 °C to 55°C).

**Relative humidity:** 95% up to 30°C, 75% up to 40°C,  
45% up to 50°C, 35% up to 55°C.

**Vibration:** Random sampling 2 grams, 5-500Hz

**Impact:** 1m free drop test

**Size:** 195(L)×92(W)×55(H) mm

**Weight:** About 400g, (including the rubber cover).

**Conformity to safety standards:** Meet the standard of IEC 61010-1-95 CAT I, 30V;  
Meet the standard of EN61010-1 EN61326.

## 5、 Maintenance and Calibration

### 5.1 Repair

To avoid electric shock, injury or damage to the Calibrator, must be sure to make this product repaired by qualified technician according to the instruction sheet and the necessary tools and service information must be prepared. It must remove all the test leads before opening case.

### 5.2 Cleaning


Periodically wipe the case with a damp cloth and detergent; Do not use abrasives or solvents.

### 5.3 Replace the Battery or Fuse

If the symbol  (low battery ) is displayed, need to replace the battery immediately.

If replace the battery ,use the same specification (alkaline 9V battery or 7.4V Li-Polymer battery pack)

Steps are as follows:


- 1) Press  to turn the Calibrator off.
- 2) Remove the test leads from the terminals.
- 3) Remove the holster.
- 4) Lift off the battery cover on the back of the Calibrator as shown in figure.
- 5) Remove the battery.
- 6) Insert the battery cover make sure it is securely in place (check the polarity).

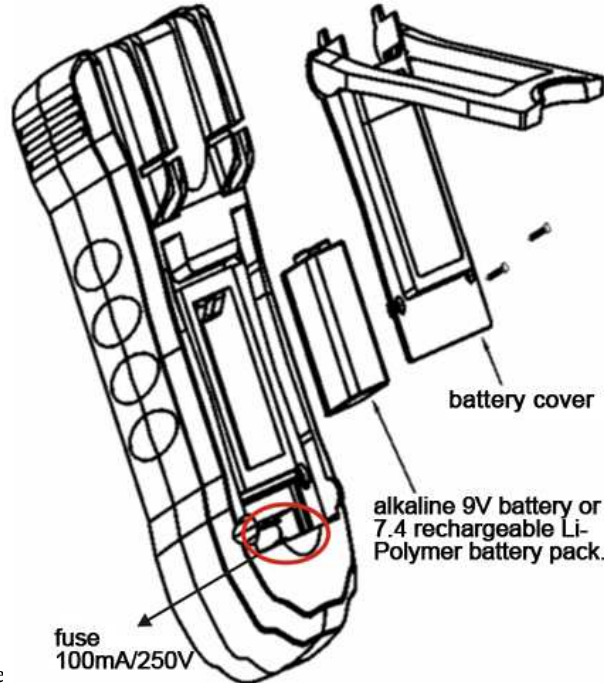
7) Restore the calibrator to its holster.

## Volt/mA Calibrator

## Maintenance and Calibration

If replace the fuse,the steps are as follows:

- 1) Press  to turn the Calibrator off.
  - 2) Remove the
  - 3) Lift off the
- the Calibrator as shown
- 4) Remove the
  - 5) Insert the
- the battery cover make



test leads from the terminals.  
battery cover on the back of  
in figure.  
damaged fuse.  
replacement fuse and restore  
sure it is securely in place.

**6、 Accessories Included**

<b>Item</b>	<b>Description</b>	<b>Quantity</b>
1	A 7.4V Li-Polymer battery	1
2	Test lead (red) Test lead (black)	1 1
3	Bending test plug wire clip (red) Bending test plug wire clip (black)	1 1
4	Adapter(DC 10V 1A)	1
5	Instruction sheet	1
6	Certification	1

