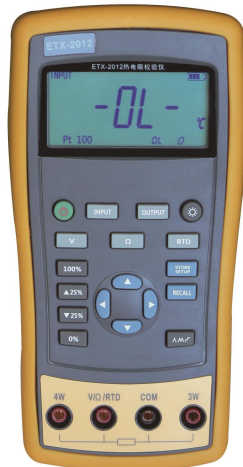


East Tester[®]

ET-2712 RTD Calibrator ET-1712 RTD Calibrator Users Manual



Hangzhou Zhongchuang Electron Co., Ltd.

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1 Basic Introduction

1.1 Function

- It allows you to measure voltage, resistance, and RTD.
- Outputs resistance, simulation of RTD.
- Manual stepping, automatic stepping, 0~100% phase step and ramp output.
- Support for PC communication

1.2 Summary of Source and Measure Functions

Function	Measure	Source
DC V	0~30V	Not available
Resistance	0~3200Ω	0~3200Ω
RTD	Pt100, Pt1000, Cu50, Cu100	Pt100, Pt1000, Cu50, Cu100
Others	Stepping output, ramp, phase step output, user-defined range	

1.3 Terminal Description

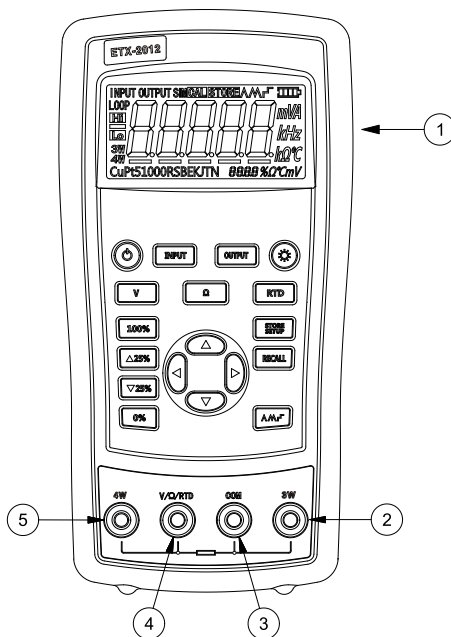


Figure 1.3-1

No.	Name	Description
①	Communication and charging connector	Connect power adaptor to charge batteries or connect the calibrator to the computer.
②	3W and 4W terminal	Terminal used during 3-wire and 4-wire electric and thermal resistance measurement.
③	COM Public terminal	All measurement and output public terminal.
④	V, Ω, and RTD terminal	Measurement of voltage and 2-wire resistance, thermal-electric as well as resistance and thermal-resistance output terminal.
⑤	4W+ Slot	Resistance and thermal resistance 4-wire measurement terminal.

1.4 Key Description

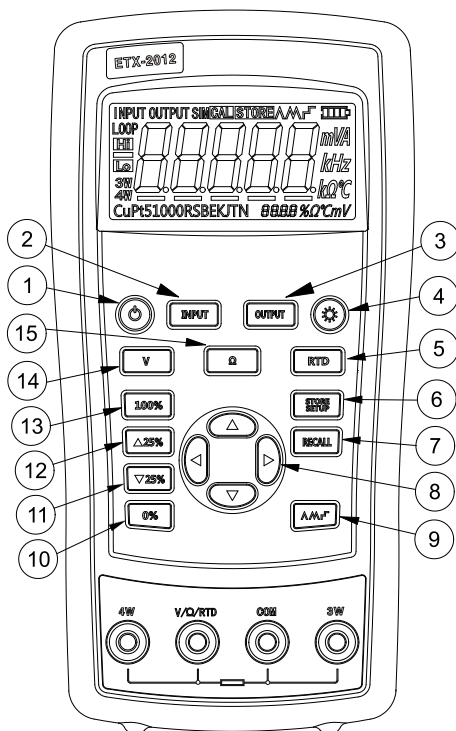


Figure 1.4-1

No.		Description
①		Turns the power on or off
②		Selects the measurement mode
③		Selects output and analog transmitter mode.
④		Enables backlight switch display during start, enters backlight brightness control mode.
⑤		Selects thermal resistance mode

⑥		Sets and saves calibrator parameters setting
⑦		Recovers factory default setting
⑧		Sets manual output
⑨		Cycles through: \wedge slow repeating 0%-100%-0% ramp \mathcal{M} Fast repeating 0 % - 100 % - 0 % ramp \ulcorner Repeating 0 % - 100 % - 0 % ramp in 25 % steps
⑩		Set output by 0% of span, Press and hold to store the source value as the 0 % value
(11)		Decrements output by 25% of span.
(12)		Increments output by 25% of span.
(13)		Sets output by 100% of span, Press and hold to store the source value as the 100 % value.
(14)		Selects voltage mode
(15)		Selects resistance mode

1.5 Display Screen

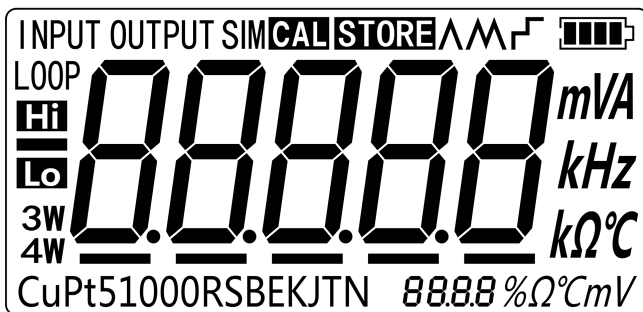


Figure 1.5-1

2 Basic Operation

2.1 Measure and Source

This section acquaints you with some basic operations of ETX-2012/ ETX-1812.

Proceed as follows:

1. The connection of the calibrator as shown in Figure 2.1-1.

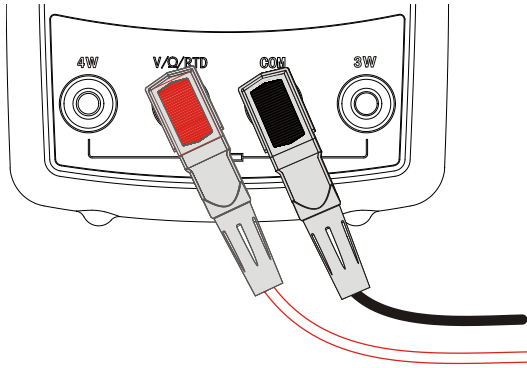



Figure 2.1-1

2. Press  for more than 2 seconds to turn on the calibrator. The calibrator checks itself, including check on internal circuit and LCD, during which, LCD displays all contents for 1s, the interface is shown in Figure 2.1-2:

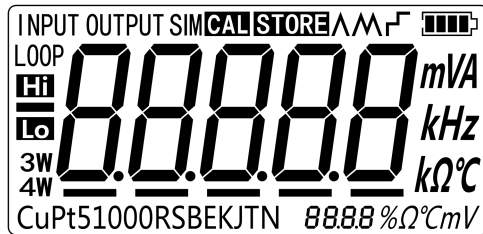


Figure 2.1-2

- Then the type of product and automatic shutdown time will be displayed for 2 seconds as shown in Figure 2.1-3.



Figure 2.1-3

- Press **RTD** and **OUTPUT** to switch to the thermal resistance output mode. The screen will display as shown in Figure 2.1-4.

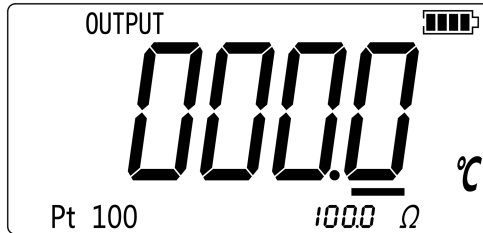


Figure 2.1-4

- Press **▲** and **▼** to increase or decrease 1 of the horizontal line position (the number will be based on automatic stepping without change of horizontal line position); press **◀** or **▶** to change the position of horizontal line.
- Press **0%** until the buzzer works to enter 0.0 °C as the 0% value.
- Likewise, press **▲▼◀▶** to increase output value to be 100.0 °C, and then press **100%** until the buzzer works to enter 100.0 °C as 100% value.
- Press **▲25%** or **▼25%** to make output increase or decrease within the range of 0% to 100% based on 25% advance amplitude. The screen will display as shown in Figure 2.1-5.

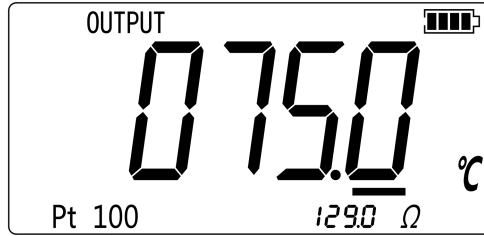


Figure 2.1-5



2.2 Shutdown Mode

The calibrator comes with the shutdown mode enabled for a time duration set to 30 minutes (displayed for about 2 seconds when the calibrator is initially turned on). When the shutdown mode is enabled, the calibrator will automatically shutdown after the time duration has elapsed from the time the last key was pressed. To disable the shutdown mode, press \odot and \leftarrow simultaneously. To enable the mode, press \odot and \rightarrow simultaneously. To adjust the time duration, press \odot and \rightarrow simultaneously, the screen will display as shown in Figure 2.2-1, then press \uparrow and/or \downarrow to adjust the time between 1 and 30 minutes and then press $\boxed{\text{STORE SETUP}}$ to store the new time duration (Without pressing any key for 5 seconds, the calibrator will quit from the adjustment automatically).



Figure 2.2-1

2.3 Backlight Brightness Adjustment

1. To adjust the brightness of backlight, proceed as follows:
2. Please press  and  simultaneously until the buzzer work, then the screen will display as shown in Figure 2.3-1:

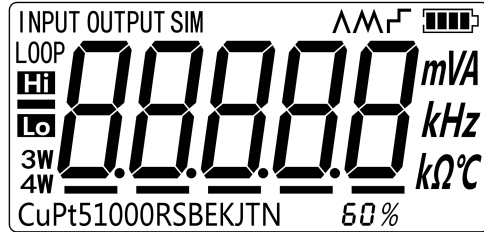





Figure 2.3-1

3. Press  and  to adjust the brightness of backlight.
4. Press  to save brightness level, **STORE** will appear and then the calibrator will enter into the work mode(Without pressing key for 5 seconds, the calibrator will exit from the adjustment automatically).

3 Function Usage

3.1 DC V Measurement

The default function after turn on is DC V measurement. If it is required, press to re-select the voltage measurement (the display unit is V).Please connect the lines after all functions are selected. The connection mode and interface are shown in Figure 3.1-1:

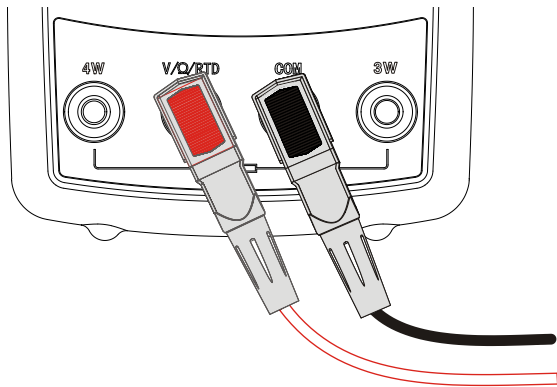


Figure 3.1-1

3.2 Resistance Measurement

Press to reselect the DC mV measurement function (Display unit is Ω)

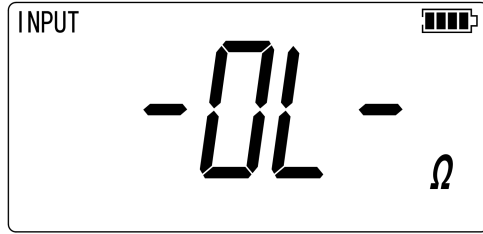


Figure 3.2-1

The Over Range under Open Circuit

Resistance measurement supports the connection type of two-wire system, three-wire system and four-wire system. The calibrator can be switched to three-wire system or four-wire system according to actual connecting type. The respective connecting types are listed in Figure 3.2-2: Press ▲ and ▼ to select the connection mode forcibly.

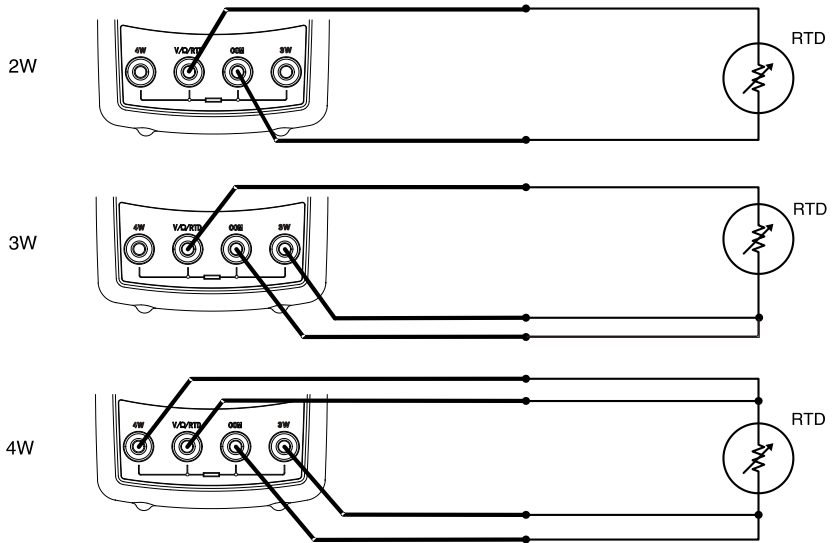


Figure 3.2-2

Press ▲ or ▼ to force the calibrator to adopt two-wire system, three-wire system or four-wire system. Afterwards, the calibrator will not detect connecting type automatically unless you quit the mode of resistance measurement and reenter.

3.3 Resistance Output

Press and to select the resistance output function, the connection mode is same to that of voltage measurement.

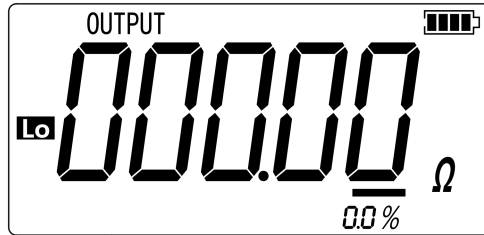


Figure 3.3-1

Lo It indicates the undersize of exciting current, meanwhile, the main value flashes

Continuously press to switch the resistance output range, 3200Ω range is shown as below.

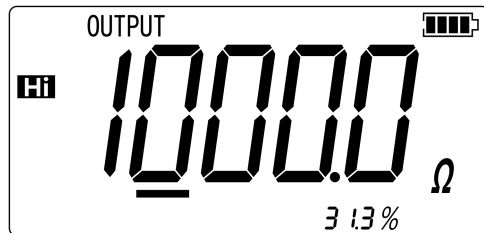


Figure 3.3-2

Hi It indicates the oversize of exciting current, meanwhile, the main value flashes

4 Using Resistance Temperature Detector (RTD)

The calibrator accepts Pt100, Pt1000, Cu50 and Cu100, etc. RTD measurements of two-wire system, three-wire system or four-wire system are available to calibrator, among which the three-wire system is particularly applicable to the industrial worksite. A four-wire configuration provides the highest in accuracy and the two-wire system the lowest.

To measure temperature using an RTD input, proceed as follows:

1. Press to enter into mode.
2. Press to indicate RTD reading. Then the screen will display as shown in Figure 4-1. If necessary, pressing continuously to select RTD type.
3. If connection is based on three-wire system or four-wire system, the calibrator will switch to three-wire system or four-wire system according to your connecting type. Press or to force the calibrator not to execute automatic switching.
4. Connect RTD to the corresponding port according to the connecting type of 'resistance measurement'.

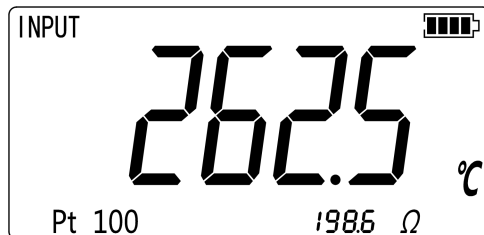


Figure 4-1

5 Application of Resistance Temperature Detector (RTD)

Connect the calibrator and the instrument to be tested according to the Figure 5-1. Simulation of RTD should be based on the following steps:

1. If necessary, press **OUTPUT** to select **OUTPUT** mode.
2. Press **RTD** to select RTD graduation.
3. Press \uparrow or \downarrow to select temperature. Press \leftarrow or \rightarrow to select digit.

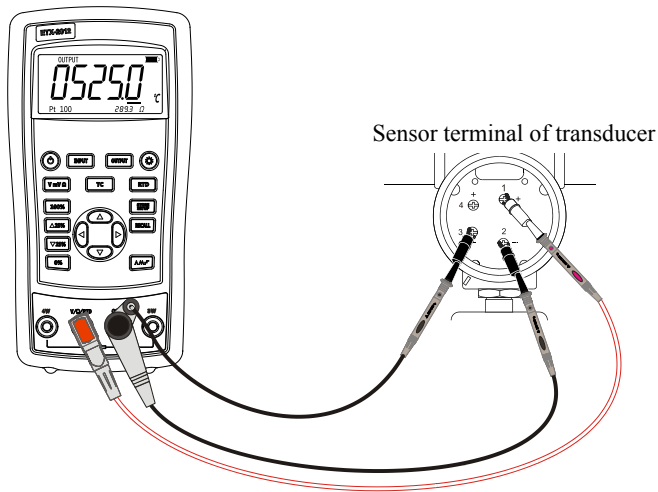


Figure 5-1




Note: Three-wire (3 W) and four-wire (4 W) terminals are just for measurement, not output simulation. The calibrator can simulate a two-wire RTD output in the front panel. To be connected to a three-wire or four-wire transducer, use folding cable to provide extra wiring.





6 Advanced Application

6.1 Setting 0 % and 100 % output parameters

As for stepping operation and percentage display, 0% and 100% should be set before using. Some level values have been set when it is out of the factory and set values are shown as below:


Output function	0% value	100% value
Resistance 400Ω	0.00 Ω	400.00 Ω
Resistance 3200Ω	0.0 Ω	3200.0 Ω
Pt100	0.0 °C	500.0 °C
Pt1000	0.0 °C	400.0 °C
Cu50	0.0 °C	150.0 °C
Cu100	0.0 °C	150.0 °C




The set values may not meet your requirements, so which can be reset. Then you can display the percentage with stepping or slope output as well as display the percentage. Adjust the output value with keys , press  or  for a long time until the buzzer works to enter into 0% or 100% values. The new defined range value is saved in the calibrator storage automatically and remains effective after restart. The following operations are available with the setting:

- Press  or  for manual stepping (increase or decrease) output based on 25% increment.
- Press  or  instantly to make output jump within the range of 0% to 100%.

6.2 Auto Ramping the Output

Auto ramping gives you the ability to continuously apply a varying stimulus from the calibrator to a transmitter, while your hands remain free to test the response of the transmitter. When you press **_**, the calibrator produces a continuously repeating 0 % - 100 % - 0 % ramp in your choice of three ramp waveforms:

The calibrator will produce a continuous, repeated slope output ranging from 0% - 100% - 0% when  is pressed. Three slope wave shapes are available for your selection:


-  0%-100%-0% 40-second smooth ramp
-  0%-100%-0% 15-second smooth ramp
-  0%-100%-0% 25% stepping ramp. Each step remains 5 seconds.

Exit the slope output function, please press any key.

6.3 Factory Reset

Factory reset consists of the following default setting:

- The working status recovers to the voltage measurement.
- Automatic shutdown time is reset to be 30 min, which is effective.
- LCD backlight brightness is set to be 60%.
- Output range is recovered to be factory default.





Start the calibrator and press  until the buzzer works and the recovery of factory default will enter working mode when the recovery is completed.

7 Power

The calibrator needs 6 disposable LR03 model (size 7) alkaline batteries or 6 R03 model (size 7) nickel-metal hydride batteries (or nickel-cadmium batteries). The longest service life of alkaline batteries can reach 50 hours.

A 12V/1A power adaptor is used for charging and providing working power for the calibrator.

7.1 Charge

When the battery indicator is pointed at , the remaining electric quantity is less than 20%. Charge is necessary for normal operation of the calibrator. The LCD backlight will start operation and the  will display on the screen when the power adaptor is used. If the battery indicator  flashes, the calibrator will be in the charging process, after which the battery indicator  will stop flashing.

The calibrator will stop charge automatically in case of the following circumstances:

- Disposable batteries are used.
- Electric quantity is enough.

8 Specifications

Specifications are based on a one year calibration cycle and apply from +18°C to +28 °C unless stated otherwise. All specifications assume a 10 minute warmup period.

8.1 DC Voltage Measurement

Range	Maximum measurement range	Resolution	Accuracy (% of reading + Count)	
			ETX-1812	ETX-2012
30V	0V~31V	0.001V	0.05+2	0.02+2

*-10 °C~18 °C, +28 °C~55 °C temperature coefficient, ±0.005%FS/ °C.
Input resistance: >1MΩ.*

8.2 Resistance Measurement

Range	Maximum measurement range	Resolution	Accuracy (Ω)			
			ETX-1812		ETX-2012	
			2-wire, 3-wire	4-wire	2-wire, 3-wire	4-wire
400Ω	0~440Ω	0.01Ω	0.25	0.15	0.15	0.10
3200Ω	420Ω~3600Ω	0.1Ω	1.5	1.0	1.0	0.5

*-10 °C~18 °C, +28 °C~55 °C temperature coefficient, ±0.005%FS/ °C.
Exciting current during measurement:
400Ω: 1.0mA±10%;
3200Ω: 0.2mA±10%;
Two-wire: Conductor resistance is excluded from errors.
Three-wire: Matching test line should be used. The total resistance of conductor should not be larger than 25Ω.*

8.3 Resistance Output

Range	Maximum output range	Resolution	External exciting current	Accuracy (Ω)	
				ETX-1812	ETX-2012
400 Ω	0~440 Ω	0.01 Ω	0.4mA~4.0mA	0.25	0.15
3200 Ω	400~3600 Ω	0.1 Ω	0.1mA~0.5mA	1.0	0.50

-10 °C ~ 18 °C, +28 °C ~ 55 °C temperature coefficient, $\pm 0.005\%$ FS/°C.

8.4 RTD

Graduation	Range	Resolution	Accuracy ($^{\circ}\text{C}$)					
			ETX-1812			ETX-2012		
			2-wire 3-wire	4-wire	Output	2-wire 3-wire	4-wire	Output
Pt100	-200 $^{\circ}\text{C}$ ~ 850 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	0.7	0.4	0.7	0.4	0.3	0.3
Pt1000	-200 $^{\circ}\text{C}$ ~ 650 $^{\circ}\text{C}$		0.4	0.3	0.3	0.3	0.15	0.15
Cu50	-50 $^{\circ}\text{C}$ ~ 150 $^{\circ}\text{C}$		1.2	0.8	0.8	0.8	0.5	0.5
Cu100	-50 $^{\circ}\text{C}$ ~ 150 $^{\circ}\text{C}$		0.7	0.4	0.4	0.4	0.25	0.25

As for exciting current during measurement, please refer to resistance measurement function.

As for allowable external exciting current during output, please refer to resistance output function.

2-wire: Does not include lead resistance.

3-wire: Assumes matched leads with a total resistance not exceeding 25 Ω .

9 Product Accessories

9.1 Standard accessories

A set of ETX-2012/ETX-1812 calibrator also includes the following items:

- hard spot test leads (one set)
- alligator clip (one set)
- one 12V/1A power adaptor
- ETX-2012/ETX-1812 user manual

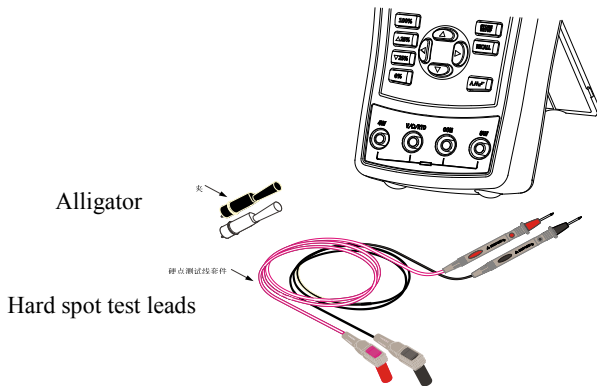


Figure 9.1-1

9.2 Optional Accessories

- 6 R03-model rechargeable batteries
- 1 Metal Box
- Communication line

10 Warning

To avoid possible electric shock or personal injury:

- Test a given voltage to confirm its normal operation before using. Mutual authentication of the upper and lower display data, for instance.
- Please follow all the safety operation procedures.
- Select correct function and range gear according to measurement requirements.
- Confirm that the battery door has been closed before application.
- Remove the test line of calibrator before opening the battery door.
- Check whether damaged or exposed metal exists in the test line and whether the test line has been conducted. Replace the damaged test line before using.
- Fingers should not touch the metal contact when the detector is used. Fingers should be behind the finger-protecting device.
- Connect the common line and then electric test line. As for wire removal, electric test line should be first removed.
- Don't use the calibrator in case of abnormal operation. Have the calibrator repaired because it may have been damaged.
- Don't use the calibrator near explosive gases.
- Remove the test line before changing measurement or output function.
- 6 LR03 (7 size) alkaline batteries or R03 nickel-metal hydride batteries (or nickel-cadmium batteries) should be used in the calibrator and the battery should be placed inside the meter housing.
- Replace or charge the battery when the screen displays low pressure of battery, to avoid reading error and possible electric shock or personal injury.
- During measurement and current output, the right slot, function level and range level shall be used.

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