

SMART DIGITAL MULTIMETER



Before using the instrument, please read this manual carefully, and save it well for future using.

<i>Safety statement</i>	1
Safety Instructions.....	1
Safety specification.....	2
<i>Overview</i>	6
Power on / off.....	8
Range selection.....	8
Gear selection.....	9
Max / min measurement.....	10
Relative value measurement.....	11
Data hold.....	12
Flashlight.....	12
Warning of fuse burning out.....	12
Input jack indicator.....	13
Auto power off.....	13
<i>Measurement operation</i>	14
Smart (AUTO) measurement.....	15

Professional measurement.....	16
AC/DC voltage measurement	16
Resistance measurement...	17
Continuity test.....	18
Diode test.....	19
Capacitance measurement	21
AC/DC mV voltage measurement.....	22
Frequency/Duty measurement.....	23
Temperature measurement	24
Non-contact AC voltage detection.....	25
Live wire detecting.....	26
mA current measurement...	27

Ampere (A) current measurement.....	29
<i>General Technical Specifications.....</i>	31
<i>Accuracy Specifications.....</i>	32
DC voltage.....	33
AC voltage.....	33
AC/DC current.....	34
Diode/ Continuity.....	34
Resistance.....	35
Capacitance.....	36
Frequency/Duty.....	37
Temperature.....	38
<i>Maintenance.....</i>	39
Clean.....	39
Replace battery.....	40
Replace fuse.....	41

Safety statement

Caution:

Operation that may cause damage to meter or equipment.

"Warning":

operation that may cause danger to users.

Safety Instructions

The meter conforms to IEC61010-1 international electrical safety standard. The design and manufacture of meter comply with IEC61010-1 CAT.III 1000V, CAT.IV 600V overvoltage safety standard and pollution level 2.

Safety specification



To avoid possible electric shock or personal injury, please observe the following specifications:

- Please read this manual carefully and pay special attention to safety warning information before using the meter.
- Operate the meter according to the manual, otherwise the protection function provided by the instrument may be damaged or weakened.
- Take special care when measuring values that exceed 60VDC, 30vac RMS, or 42V. This kind of voltage

has the danger of electric shock.

- Do not measure voltage higher than the rated value between terminals or between terminals and ground.
- Measure the known voltage to check whether the meter works normally. If it is not normal or damaged, please do not use it again.
- Before using the meter, please check whether there are cracks or damaged plastic parts in the instrument shell. If so, please do not use it again.
- Before using the meter, please check whether the probe is cracked or damaged. If so, please replace the probe with the same model and the

same electrical specification.

- Please use the meter according to the measurement category, voltage or current rating specified in the meter or manual.
- Please observe local and national safety regulations. Wear personal protective equipment (such as approved rubber gloves, masks and flame retardant clothing, etc.) to prevent injury caused by electric shock and electric arc when dangerous live conductors are exposed.
- When the "a" symbol is displayed on the meter, please replace the battery in time to prevent measurement

error.

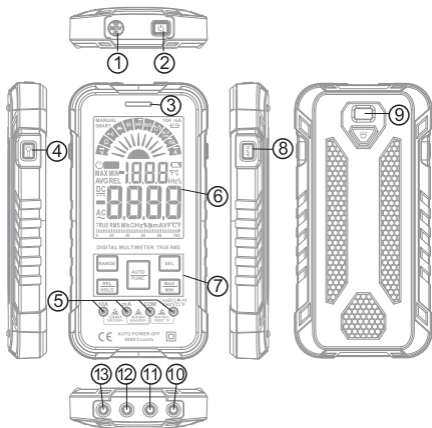
- Do not use the meter in the environment with explosive gas or steam or humid environment.
- When using the probe, please hold your fingers behind the probe finger guard.
- When measuring, please connect the null or ground wire first, then the live wire; when disconnected, please disconnect the live wire first, and then the null or ground wire.
- Remove the probe from the meter before opening the case or battery cover. Do not use the meter when the meter is disassembled or the battery cover is opened.

- The meter can only be used together with the probe provided to meet the requirements of the safety standard. If the probe is damaged and needs to be replaced, the probe of the same model and electrical specification must be replaced.

Overview

This meter is an intelligent true RMS digital multimeter. It has intelligent and professional measurement function. Full function, with gear display, analog bar multiple display.


- ① NCV Sensor area
- ② Power key



- ③ Warning indicator
- ④ Flashlight key
- ⑤ Input jack indicator
- ⑥ Display
- ⑦ Function key

- ⑧ Auto power off key
- ⑨ Flashlight
- ⑩ Jack other than current and NCV
- ⑪ COM jack
- ⑫ mA(<600mA) jack
- ⑬ 10A jack

Power on / off

Press and hold the "  " key for about 2 seconds to turn on or off.

Range selection

Press "**RANGE**" key to manual range mode, and then press to cycle select range; press and hold "**RANGE**" key for about 2 seconds to return to

automatic range.

Note 1 : This function is invalid in intelligent measurement mode.

Note 2 : Only voltage, resistance and mA gears are valid.

Gear selection

Press the "**AUTO/FUNC**" key to manual shift mode; then press to select shift position; press and hold the "**AUTO/FUNC**" key for about 2 seconds to return to the intelligent (auto) measurement mode. Power on is in intelligent measurement mode by default.

Multiple functions in one gear, press "**SEL**" key to switch.

Max / min measurement

Press the "**MAX/MIN**" key for maximum / minimum measurement mode, and then press the "**MAX/MIN**" key to display the maximum and minimum measurement values in a cycle; press and hold the "**MAX/MIN**" key for about 2 seconds to return to normal measurement.

Note 1 : Invalid in capacitance, frequency/duty cycle, temperature, NCV/Live gear.

Note 2 : Maximum / minimum measurement, the instrument will automatically enter the manual range mode.

Relative value measurement

Press "**REL/HOLD**" for about 2 seconds to turn on or off relative value measurement.

Note 1 : Invalid in continuity, frequency / duty cycle, temperature, NCV / live.

Note 2 : Relative value measurement, the meter will automatically enter the manual range


mode.

Data hold


Press "**REL/HOLD**" key to turn on or off data holding.

Note: Invalid in NCV / Live.

Flashlight

Press " " key to turn on or off flashlight.

Warning of fuse burning out

If the fuse is burnt out, the symbol " " will be displayed. When the current gear is selected, the symbol "**FUSE**" will be displayed at the same time. It is not allowed to measure the

current. Please replace the fuse in time.

Input jack indicator

When the gear is changed, the corresponding input light will flash for 5 times to prompt to insert the probe into the corresponding jack.

Auto power off

After power on, auto power off will be on by default and "⏻" symbol will be displayed. Without any key operation in about 15 minutes, the meter will automatically shut down to save battery energy.

Press the "APO" key to turn on or

off the automatic shutdown function. When no "⏻" symbol is displayed, the automatic shutdown function is turned off.



Measurement operation

Warning

- Do not measure the voltage higher than DC1000V or AC750V, otherwise the meter may be damaged.
- Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.
- Before use, test the known voltage or current with the meter to confirm that the meter is in good condition.

Smart (AUTO) measurement

This measurement mode is default when power on. In this mode, DC voltage, AC voltage, resistance, continuity can be measured, and the meter can automatically identify the measurement signal.

- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.
- 2) Insert the red probe into  jack and the black probe into the **COM** jack.
- 3) Contact the probe of the probe with

both ends of the measured power supply or resistance (parallel), and the meter will automatically recognize the measured signal.


4) Read the results from the display.

NOTE : The minimum measurable voltage of this mode is:

AC0.5V; DC0.8V

Professional measurement


AC/DC voltage measurement

- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select


" \tilde{V} " gear. Display the "**DC**" symbol to enter the DC voltage measurement; press the "**SEL**" key to display the "**AC**" symbol to enter the AC voltage measurement.

- 3) Insert the red probe into $\overset{\text{Live}}{\text{VHz}} \rightarrow \text{C/F}$ jack and the black probe into the **COM** jack.
- 4) Contact the probe with both ends of the measured power supply (parallel).
- 5) Read the results from the display.


Resistance measurement


- 1) Press  key to start the machine,

display **Auto** and enter the intelligent measurement mode.


- 2) Press "**AUTO/FUNC**" key to select "**Ω**" gear.
- 3) Insert the red probe into  jack and the black probe into the **COM** jack.
- 4) Contact the probe with both ends of the measured resistance (parallel).
- 5) Read the results from the display.

Continuity test

- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.


- 2) Press "**AUTO/FUNC**" key to select "01))" gear.
- 3) Insert the red probe into  jack and the black probe into the COM jack.
- 4) Contact the probe with both ends of the measured resistance or Circuit (parallel).
- 5) When the resistance value is less than 50 Ω, the buzzer will sound and the alarm indicator will be on.
- 6) Read the results from the display.


Diode test

- 1) Press  key to start the machine,

display **Auto** and enter the intelligent measurement mode.

2) Press "**AUTO/FUNC**" key to select

"" gear.



3) Insert the red probe into  jack and the black probe into the COM jack.

4) The red probe contacts the anode of the diode and the black probe contacts the cathode of the diode.





5) If the probe polarity is opposite to the diode polarity, the display will display "OL".

6) Read the results from the display.

Capacitance measurement

- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select "**⚡**" gear.
- 3) Insert the red probe into  jack and the black probe into the **COM** jack.
- 4) Contact the probe with both ends of the measured capacitance (parallel).
- 5) Read the results from the display.



AC/DC mV voltage measurement

- 1) Press  key to start the machine, display  and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select "" gear. Display the "**DC**" symbol to enter the DC voltage measurement; press the "**SEL**" key to display the "**AC**" symbol to enter the AC voltage measurement.
- 3) Insert the red probe into  jack and the black probe into the **COM** jack.
- 4) Contact the probe with both ends of



the measured power supply

- 5) Read the results from the display.



Frequency/Duty measurement

- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select "**Hz%**" gear.
- 3) Insert the red probe into  jack and the black probe into the **COM** jack.
- 4) Contact the probe with both ends of the measured power supply
- 5) Read the results from the display.

Temperature measurement



- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select "**°C/°F**" gear.
- 3) Insert the positive pole of the K-type thermocouple into the  jack and the negative pole into the **COM** jack.
- 4) The thermocouple probe contacts the measured object.
- 5) Read the results from the display.

Non-contact AC voltage detection

- 1) Press  key to start the machine, display  and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select "**NCV/Live**" gear. Display the "**NCV**" symbol.
- 3) The NCV sensor area is gradually close to the conductor.
- 4) When the weak electric field signal is detected, it will display "**---L**"; the buzzer will sound slowly and the green light on.
- 5) When the strong electric field signal


is detected, it will display "---H"; the buzzer will sound quickly and the red light on.

Live wire detecting

- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select "**NCV/Live**" gear. Press the "**SEL**" key to display the "**LIVE**" symbol.
- 3) Insert the red probe into  jack and remove the black probe.
- 4) Use the red probe contact the conductor.

- 5) When the weak electric field signal is detected, it will display "---L"; the buzzer will sound slowly and the green light on.
- 6) When the strong electric field signal is detected, it will display "---H"; the buzzer will sound quickly and the red light on.

mA current measurement

- 1) Press  key to start the machine, display **Auto** and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select **$\tilde{m}A$** gear. Or insert the red probe

into the **mA** jack to automatically select the " **$\tilde{m}A$** " gear.





- 3) Display "**DC**" symbol is DC current measurement; press "**SEL**" key, display "**AC**" symbol is AC current measurement.
- 4) Insert the red probe into **mA** jack and the black probe into the **COM** jack.
- 5) Connect the meter in series to the measured power supply.
- 6) Read the results from the display.

 **Caution**

Do not measure current > 600mA in this gear, otherwise mA fuse will be

burnt out

Ampere (A) current measurement

- 1) Press  key to start the machine, display  and enter the intelligent measurement mode.
- 2) Press "**AUTO/FUNC**" key to select " " gear. Or insert the red probe into the **10A** jack to automatically select the " " gear.
- 3) Display "**DC**" symbol is DC current measurement; press "**SEL**" key, display "**AC**" symbol is AC current measurement.
- 4) Insert the red probe into **10A** jack

and the black probe into the **COM** jack.


- 5) Connect the meter in series to the measured power supply.
- 6) Read the results from the display.



Do not measure current $> 10A$ in this gear, otherwise 10A fuse will be burnt out

General Technical Specifications

- Environment condition of using:
 - CAT. IV 600V; CAT. III 1000V;
 - Pollution level 2, Altitude < 2000m
 - Working temperature and humidity:
0~40°C(<80% RH, <10°C non condensing)
 - Storage temperature and humidity:
-10~60°C(<70% RH, remove the battery)
- Temperature coefficient:
0.1× accuracy /°C (<18°C or >28°C)。
- MAX. Voltage between terminals and earth ground:
DC1000V/AC750V
- Fuse protection:
 - mA: F600mA/250V fuse
 - 10A: F10A/250V fuse

- Sampling rate: approx. 3 times/second.
- Display: 9999 counts
- Over range indication: “OL”.
- Low battery indication: “” will be displayed.
- Input polarity indication: display “-”.
- Power requirement: 3 x 1.5V AAA alkalinity batteries.

Accuracy Specifications

The accuracy applies within one year after the calibration.

Reference condition: the environment temperature 18°C to 28°C, the relative humidity is no more than 80%,

accuracy: \pm (% reading + word) .

DC voltage

Range	Resolution	Accuracy
99.99mV	0.01mV	$\pm(0.5\% + 3)$ Impedance: Approx. 10M Ω
999.9mV	0.1mV	
9.999V	0.001V	
99.99V	0.01V	
999.9V	0.1V	

AC voltage

Range	Resolution	Accuracy
99.99mV	0.01mV	$\pm(0.8\% + 3)$ Impedance: Approx. 10M Ω Frequency Response: 40Hz~1kHz; TRMS
999.9mV	0.1mV	
9.999V	0.001V	
99.99V	0.01V	
750V	0.1V	

AC/DC current

Range	Resolution	Accuracy
9.999mA	0.001mA	$\pm(0.8\%+3)$
99.99mA	0.01mA	
600.0mA	0.1mA	
9.999A	0.001A	$\pm(1.2\%+3)$



Overload protection:

mA: F600mA/250V fuse

10A: F10A/250Vfuse

NOTE : The time to measure ampere current must be less than 15 seconds

Diode/ Continuity

	Display diode voltage drop
	<Approx. 50Ω, Buzzer will sound and the indicator light will be on.◦

Resistance

Range	Resolution	Accuracy
999.9 Ω	0.1 Ω	$\pm(1.0\%+5)$
9.999K Ω	0.001 K Ω	
99.99 K Ω	0.01 K Ω	
999.9 K Ω	0.1 K Ω	
9.999M Ω	0.001 M Ω	
99.99 M Ω	0.01 M Ω	$\pm(2.0\%+10)$
Overload protection: 250V		

Capacitance

Range	Resolution	Accuracy
9.999nF	0.001nF	$\pm(4.0\%+3)$
99.99nF	0.01nF	
999.9nF	0.1nF	
9.999 μ F	0.001 μ F	
99.99 μ F	0.01 μ F	
999.9 μ F	0.1 μ F	
9.999mF	0.001mF	$\pm(5.0\%+5)$
99.99mF	0.01mF	
Overload protection: 250V		

Frequency/Duty

Range	Resolution	Accuracy
9.999Hz	0.001Hz	$\pm(1.0\%+3)$
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	
9.999KHz	0.001KHz	
99.99kHz	0.01kHz	
999.9kHz	0.1kHz	
9.999MHz	0.001MHz	
1.0~99.0%	0.1%	$\pm(1.0\%+3)$

Temperature

Range	Accuracy	
°C	-40°C ~ 0°C	± 5.0% or ± 3°C
	0°C ~ 400°C	± 1.0% or ± 2°C
	400°C ~ 1000°C	± 2.0%
°F	-40°F ~ 32°F	± 5.0% or ± 6°F
	32°F ~ 52°F	± 1.0% or ± 4°F
	752°F ~ 1832°F	± 2.0%

Resolution: 1°C/1°F

Note: use K-type thermocouple probe

Maintenance

Clean

When cleaning the meter, please follow the following steps:

- 1) Turn off the meter power and remove the probes.
- 2) Wipe the case with a damp cloth or mild detergent. Do not use abrasives or solvents. Wipe the contacts in each input socket with a clean swab soaked in alcohol.



Always keep the inside of the meter clean and dry to prevent electric shock or damage to the meter.

Replace battery

- 1) Turn off the meter power and remove the probes.
- 2) Remove the screw fixing the battery cover and remove the battery cover.
- 3) Remove the old battery and replace it with a new one of the same specification. Please pay attention to the battery polarity.
- 4) Install the battery cover back to its original position, and fix and lock the battery cover with screws.



- **To avoid electric shock or personal injury caused by wrong**

reading, please replace the battery immediately when the battery is low. Do not discharge the battery by shorting it or reversing its polarity.

- **To operate and maintain the meter safely, please take out the battery when it is not used for a long time to prevent the battery leakage from damaging the product.**

Replace fuse

- 1) Turn off the meter power and remove the probes.
- 2) Remove the screw fixing the back cover and remove the back cover.
- 3) Remove the burnt out fuse, replace it

with a new one of the same specification, and ensure that the fuse is installed in the safety clip and clamped tightly.

- 4) Install the back cover and fix it with screws.

 **Warning**

To prevent electric shock, personal injury or damage to the meter, please use insurance of the same specification or specified specification.