

**BENCH TYPE DIGITAL MULTIMETER
OPERATION MANUAL**



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1、 GENERAL

This instrument is a high performance, 4 1/2 digital bench multi-meter for measuring DC and AC voltage, DC and AC current, Resistance, Capacitance, Hz, hFE, Diodes and Continuity. The max. voltage measuring can up to 1000V DC or AC peak value, resolution can be 10 μ V, and current measuring can up to 20A, it also has the function of polarity auto-change, backlight displaying and directly reading.

For AC measuring, it is performed by high accuracy rms, has the feature of width measuring and to get accurate rms for AC flow of any wave shape.

2、 SPECIFICATION

1) GENERAL SPECIFICATION:

- ① Power supply: 220V/ 110V AC
- ② Manual range
- ③ 4 1/2-digit large LCD display with back light (displaying range: 75 \times 40mm) , max. reading: 19999.
- ④ Voltage measurement up to 1000V DC and 750V AC.
- ⑤ DC, AC current up to 20A.
- ⑥ AC V frequency response: 50kHz.
- ⑦ Frequency, resistance, capacitance measurement, triode, diode check and continuity test.
- ⑧ Overload protection: 250V rms.
- ⑨ Operation environment: 0 $^{\circ}$ C--40 $^{\circ}$ C , <75% R.H
- ⑩ Dimension: 260mm \times 220mm \times 82mm.
- ⑪ Weight: approx. 1kg.

2) TECHNICAL SPECIFICATION

Accuracy = \pm (reading% + the lowest effective digit) preheating time: 30 min.

Temperature for accuracy guarantee: (23 \pm 5) $^{\circ}$ C , R.H<75% , one year guaranteed from the production date

DC VOLTAGE (DCV)

RANGE	ACCURACY	RESOLUTION
200mV	$\pm(0.05\%RDG+3)$	10uV
2V		100uV
20V		1mV
200V		10mV
1000V	$\pm(0.1\%RDG+5)$	100mV

Input resistance: 10M Ω for all ranges

Overload protection: 200mV range: 250VDC or AC peak value. Other range: 1000VDC or AC peak value

AC VOLTAGE (ACV)

RANGE	INPUT FREQUENCY	ACCURACY	RESOLUTION
200mV	50Hz~50kHz	$\pm(0.8\%RDG+80)$	10uV
2V	50Hz~20kHz		100uV
20V			1mV
200V	50Hz~5kHz		10mV
750V	50Hz~400Hz	$\pm(1.0\%RDG+50)$	100mV

The input value for accuracy guarantee should be larger than 10% of range.

Input resistance: 2M Ω for all range.

Overload protection: 200mV range: 250VDC or AC peak value, other range: 1000VDC or AC peak value.

DC CURRENT (DCA)

RANGE	ACCURACY	RESOLUTION
20mA	$\pm(0.35\%RDG+10)$	1uA
200mA		10uA
2A	$\pm(0.8\%RDG+10)$	100uA
20A		1mA

Max. input voltage drop: 200mV

Max. input current: 20A (within 15s)

Overload protection: 2A/250V fused, 20A/250V fused

AC CURRENT (ACA)

RANGE	INPUT FREQUENCY	ACCURACY	RESOLUTION
200mA	50Hz~5kHz	$\pm(0.8\%RDG+80)$	10uA
2A	50Hz~400Hz	$\pm(1.0\%RDG+50)$	100uA
20A			1mA

Max. input voltage drop: 200mV

Max. input current: 20A (within 15s)

Overload protection: 2A/250V fused, 20A/250V fused

CAPACITANCE (CAP)

RANGE	ACCURACY	RESOLUTION
20nF	$\pm(3.5\%+20)$	1pF
2uF		100pF
200uF	$\pm(5\%+30)$	10nF

Measuring frequency: approx. 400Hz
 Overload protection: 36V DC or AC peak value
 RESISTNCE (Ω)

RANGE	ACCURACY	RESOLUTION
200 Ω	±(0.1%RDG+20)	0.01 Ω
2k Ω		0.1 Ω
20k Ω		1 Ω
200k Ω		10 Ω
2M Ω		100 Ω
20M Ω	±(0.4%RDG+5)	1k Ω

Open voltage: less than 3V
 Overload protection: 250V DC or AC peak value
 FREQUENCY(FREQ.)


RANGE	ACCURACY	RESOLUTION
20kHz	±(1.0%RDG+20)	1Hz
200kHz		10Hz

Input sensitivity: 500mV rms
 Overload protection: 250V DC or AC peak value (within 15s)

hFE MEASURING

RANGE	DISPLAYING	TEST CONDITION
hFE NPN or PNP	0~1000.0	Basic current is approx. 10 μ A, Vce is approx. 3 V

DIODE AND CONTINUITY TEST

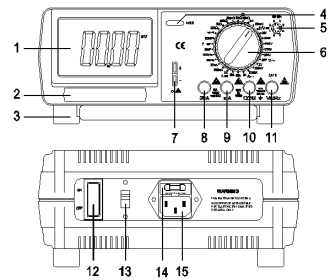
RANGE	DESCRIPTION	TEST CONDITION
	The measuring value is the approx. value for forward voltage drop. when the resistance under tested is less than 70 Ω ± 20 Ω , buzzer sounds and display the approx. value. The open voltage is approx. 3V	Forward DCA is approx. 1mA, backward DCV is less than 3V

Overload protection: 250V DC and AC peak value.

3. PANEL DESCRIPTION

SEE THE FIG.

- | | | |
|------------------------------|--------------------------|-------------------------------|
| 1.LCD display | 2.MODEL display | 3.Holder |
| 4.HOLD key | 5.hFE plug | 6.Function knob |
| 7.Capacitance measuring plug | 8.20A input terminal | 9.Less than 2A input terminal |
| 10.COM | 11.V Ω Hz input terminal | 12.Power switch |
| 13.220V/110V switch | 14.fuse | 15.Power plug |



4. OPERATION

The meter is driven by 220V/110V AC, when operating, connect the power line to power plug firstly then turn on the power. The input terminal in front panel can make measurement up to 1000V, 20A and 20M Ω.

Note: before connecting the circuit under measured, be sure that the measured value should not be over the limit specified in front panel.

4.1 DCV

- ①Connect the black test lead to “COM” terminal and the red one to “V Ω Hz” terminal.
- ②Set the knob to DCV range, connect the test leads across to the circuit under measured, the polarity will be displayed with the voltage reading value.

NOTE:

- ①If the voltage under measured is unknown beforehand, start from the highest range and work down.
- ②If only MSD displays "1", it means overrange, should set to a higher range.
- ③Do not input a voltage over 1000V, or, the circuit might be damaged.
- ④Be careful when measuring high voltage circuit.

4.2 ACV

- ①Connect the red test lead to V/ Ω terminal and the black one to "COM" terminal.
- ②Set the knob to ACV range, connect the test leads across to the circuit under measured.

NOTE:

- ①See DCV measuring NOTE 1,2,4.
- ②Do not input a voltage over 1000Vrms, in this case, reading is workable but the circuit might be damaged.
- ③To get more accuracy, it's better to select the range which the reading is more than 10% of full range.
- ④The meter might be not zero at ACV range, it's normal and has no effect on the reading.

4.3 DCA:

- ①Connect the black test lead to "COM" terminal and the red one to "mA" terminal (max.2A) or "20A" terminal.
- ②Set the knob to DCA range, connect the test leads across to the circuit under measured, the polarity will be displayed with the voltage reading value.

NOTE:

- ①If the current under measure is unknown beforehand, start from the highest range and work down.
- ②If only the MSD displays "1", it means overrange, should set to a higher range.
- ③The max. input current is 2A for "mA" and 20A for "20A", large current will blow the fuse. Be careful when measuring 20A range, large current will make the circuit heat, even make the circuit damaged.
- ④Max. measuring voltage drop is 200mV.

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4.4 ACA:

- ①Connect the black test lead to "COM" terminal and the red one to "mA" terminal (max. 2A) or "20A" terminal.
- ②Set the knob to ACA range, connect the test leads across to the circuit under measured, the polarity will be displayed with the voltage reading value.
- ③The meter might be not zero at ACA range, it's normal and has no effect on the reading.

NOTE:

- ①See DCA measuring NOTE 1 ~ 4.
- ②To get more accuracy, when selecting range, it's better to select the range which the reading is more than 10% of full range.

4.5 RESISTANCE MEASURING

- ①Connect the red test lead to V/ Ω terminal, the black one to "COM" terminal (note: the polarity of the red lead is +).
- ②Set the knob to Ω range, connect the test leads across to the resistance under measured.

NOTE:

- ①If the resistance is larger than the max. value of selected range, "1" displays. Set the knob to a higher range.
When the resistance is 1M Ω or larger than 1M Ω , it will take a few seconds to be stable, it's normal in high resistance measuring.
- ②When the input terminal is in open circuit, OL displays.
- ③When measuring resistance in-line, be sure that power of the circuit under measured is turned off and all capacitors are released completely.
- ④Open voltage is 3V.

4.6 DIODE AND CONTINUITY TEST

- ①Connect the red test lead to V/ Ω terminal and the black one to "COM" terminal (note: the polarity of the red lead is +).
- ②Set the knob to diode range, connect the test leads across to the diode or circuit under measured.

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- ③When measuring diode, the reading is forward voltage drop, if making continuity test, buzzer sounds when the resistance between the test leads is less than approx. $70\ \Omega \pm 20\ \Omega$.

NOTE:

- ①When input terminal is in open circuit, overload displays “1” .
- ②There is 1mA current flows through the diode under test.
- ③The meter displays the forward voltage drop in mili-volts and overload when the diode is reversed.

4.7 FREQUENCY MEASURING

- ①Connect the test leads or shielded cable to V/ Ω and COM terminal.
- ②Set the knob to frequency range, connect test leads or cable across to the signal source or load under tested.

NOTE:

- ①Do not input voltage over 220V/110Vrms, when input is over 10Vrms, reading is workable but the accuracy might be overrange.
- ②In noisy environment, it is preferable to use shielded cable for measuring small signal.
- ③Be careful when measuring high voltage circuit.

4.8 CAPACITANCE MEASURING

- ①Set the knob to “F” range.
- ②Insert the capacitor under tested to “Cx” terminal according to the polarity, the capacitance will be displayed on LCD.

NOTE:

- ①Do not input voltage or current at “Cx” terminal.
- ②Release the capacitor completely to avoid damaging the meter.
- ③It should take a few time to be stable when input at 200uF range.
- ④The meter may not be zero at “F” range, it's normal and has no effect on the accuracy.

4.9 TRIODE hFE MEASURING

- ①Set the knob to hFE range.
- ②Verifying the type of triode is NPN type or PNP type, insert emitter, base and collector to proper hole.

5. MAINTENANCE

Do not verify the circuit to avoid damaging.

1. Before replacing any parts of the meter, remove the input signal and AC power line, and replace fuse according to the following:

- ①Power fuse: 200mA/250V
- ②Fuse for measuring current: 2A/250V and 20A/250V.

These two fuses are in the main circuit, must be replaced by qualified personal.

2. NOTE:

- ①Keep the meter and test leads clean, dry and in good shape.
- ②Do not use the abrasives or solvents to clean the meter.
- ③Do not operate the meter in high temperature or strong magnetic place.

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