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Operating Instructions

 The unit complies
with the applicable
EC regulations



Fig. 1: 07123-12 Digital multimeter, 750V AC/DC, 10 A AC/DC, 40 M Ω , 100 mF, 30 MHz, -20...1000°C

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1 SAFETY INSTRUCTIONS



- When measuring voltage ensure that the instrument is not connected or switched to a current or resistance range or to the diode check. Always ensure that the correct terminals are used for the type of measurement to be made.
- Use only safety connecting cords.
- Take extreme care when measuring voltage above 50V, especially from sources with high energy.
- Avoid making connections to circuits under current whenever possible.
- When connecting the test leads ensure that the circuit is not under current.
- Before making resistance measurements or a diode test, ensure that the circuit is not under current.
- Always ensure that the correct function and range is selected. If in doubt about the correct measurement range to use, start with the highest range and work downwards.
- Extreme care should be taken when using the instrument together with a current transformer connected to the terminals if there is an open circuit.
- Ensure that the test leads and probes are in good condition with no damage to the insulation.
- Take care not to exceed the overload limits as given in the specification.
- THE FUSE FOR REPLACEMENT MUST BE OF THE CORRECT TYPE AND RATING.
- Before opening the case of the instrument to replace the battery or fuse, disconnect the test leads from any external circuit and set the selector switch to "OFF" position.

- Check the multimeter cover before use. The multimeter must not be used if it is damaged or the rubber part is missing.
- Check the insulation of the test leads, whether it is damaged or its plain conductor is exposed and whether the test leads are undamaged. If the test leads are broken, change to a new one first and only then use this multimeter.
- Check the multimeter if it works well by measuring the voltage. If the multimeter does not work, do not use it and send it back for repair.
- Do not input voltage which exceeds the rated voltage of the multimeter on the input terminal.
- Be careful to operate the multimeter when it is under 60V DCV or 30V ACV. This may cause electric shock.
- Choose a correct input terminal and range.
- Do not measure voltage and current which is above the measurement range. When not sure about the range, turn to the MAX range and test. Before continuity measurement (online), cut off the power of the circuit which is under test and keep all capacitances out of power.
- When using test leads, you must keep your fingers behind the ring guard.
- Do not use or store the multimeter under high temperature, high humidity, in flammable and combustible environments and strong electromagnetic fields.
- When performing maintenance, use a soft cloth and neutral detergent to clean the surface. Do not use any abrasive or solvent, otherwise the cover will be corroded and cause damage.

Safety symbol



Dangerous voltage



GND



Dual insulation



Refer to safety instructions



Low battery

2 PURPOSE AND CHARACTERISTICS

The instrument is a stable and high performance digital multimeter powered by battery. It uses a LCD with 42mm for clear readings. It includes a backlight function and overload protection to make operation convenient.

The instrument measures DCV, ACV, DCA, ACA, resistance and capacitance, frequency, temperature, and it has transistor, diode and continuity test capabilities.

3 GENERAL CHARACTERISTIC

Accuracy is $\pm(\text{RDG} \times a\% + \text{the lowest digit})$ at $(23 \pm 5)^\circ\text{C}$, $<75\% \text{RH}$.

DC Voltage

Range	Accuracy	Resolution
400 mV	$\pm(0.5\%+4)$	0.1 mV
4 V		1 mV
40 V		10 mV
400 V		100 mV

1000 V	$\pm(1.0\%+6)$	1 V
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- Input impedance: 400 mV range $>40 \text{ M}\Omega$, other ranges: $10 \text{ M}\Omega$
- Overload protection: 1000V DC or 750V AC peak value

DC mV

Range	Accuracy	Resolution
400 mV	$\pm(0.5\%+4)$	0.1 mV

AC mV (True RMS)

Range	Accuracy	Frequency range	Resolution
400 mV	$\pm(1.6\%+8)$	40 Hz-1 kHz	0.1 mV

ACV (True RMS)

Range	Accuracy	Frequency range	Resolution
4 V	$\pm(0.8\%+10)$	40 Hz-1 kHz	1 mV
40 V			10 mV
400 V			100 mV
750 V			1 V

- Input impedance: 400 mV range $>40 \text{ M}\Omega$; other ranges: $10 \text{ M}\Omega$
- Overload protection: 1000V DC/750V AC peak value.
- Frequency response: 40Hz-1kHz (apply to standard sine wave and triangular wave)
- Display: True RMS (waves above 200Hz are for reference only)

DCA

Range	Accuracy	Resolution
400 μA	$\pm(1.0\%+10)$	0.1 μA
4000 μA		1 μA
40 mA	$\pm(1.2\%+8)$	10 μA
400 mA		100 μA
10 A	$\pm(1.2\%+10)$	10 mA

- Max. measuring voltage drop: full scale mA range: 400mV; A range : 100 mV
- Max. input current: 10 A (less than 10 seconds)
- Overload protection: F400mA/250 V fuse, F10A/250V fuse

ACA (True RMS)

Range	Accuracy	Frequency range	Resolution
400 μA	$\pm(1.5\%+10)$	40 Hz-1 kHz	0.1 μA
4000 μA			1 μA
40 mA			10 μA
400 mA			100 μA
10 A	$\pm(2.0\%+15)$		10 mA

- Max. measuring voltage drop: full scale mA range: 400mV ; A range: 100mV
- Max. input current: 10A (less than 15 seconds)
- Overload protection : F400mA/250 V fuse, F10A/250V fuse
- Frequency response: 40 Hz-1 kHz (for standard sine wave and triangular wave. Waves above 200 Hz are for reference only)

Resistance

Range	Accuracy	Resolution
400 Ω	$\pm(0.8\%+5)$	0.1 Ω
4 k Ω	$\pm(0.8\%+4)$	1 Ω
40 k Ω		10 Ω
400 k Ω		100 Ω
4 M Ω		1 k Ω
40 M Ω	$\pm(1.2\%+10)$	10 k Ω

- Overload protection: 250V DC/AC peak value
- Open circuit voltage: 400mV
- Note: at 400 Ω range the test leads must be short-circuited, measure the down-lead resistance then subtract from the real measurement

Capacitance

Range	Accuracy	Resolution
10 nF	$\pm(5.0\%+20)$	10 pF
100 nF	$\pm(3.5\%+8)$	100 pF
1 μ F		1 nF
10 μ F		10 nF
100 μ F		100 nF
1 mF/10 mF/100 mF	$\pm(5.0\%+10)$	1 μ F/ 10 μ F/ 100 μ F

- Overload protection : 250V DC/AC peak value

Frequency

Range	Accuracy	Resolution
100 Hz	$\pm(0.5\%+10)$	0.01 Hz
1000 Hz		0.1 Hz
10 kHz		1 Hz
100 kHz		10 Hz
1 MHz		100 Hz
30 MHz		1 kHz

- Input sensitivity: 1.5V
- Overload protection: 250V DC/AC peak value

Diode and continuity test

Range	Display value	Test condition
	Positive voltage drop of diode	The positive DC current is approx. 1.5mA. The negative voltage is approx. 3 V.
	When buzzer sounds the resistance is less than 40 $\pm$ 30 Ω .	Open circuit voltage: 3 V

- Overload protection: 250V DC/AC peak value
- Warning: for safety reasons do not input voltage at this range.

Temperature

Range	Displaying value	Test condition
(-20-1000) $^{\circ}$ C	$<400^{\circ}\text{C} \pm(1.0\%+5)$ $\geq 400^{\circ}\text{C} \pm(1.5\%+15)$	1 $^{\circ}$ C
(-4-1832) $^{\circ}$ F	$<752^{\circ}\text{F} \pm(1.0\%+5)$ $\geq 752^{\circ}\text{F} \pm(1.5\%+15)$	1 $^{\circ}$ F

- Sensor: K type
- Warning: for safety reasons do not input voltage at this range.

4 TECHNICAL DESCRIPTION

4.1 FRONT PANEL AND DESCRIPTION

1. LCD: displays the measuring value and unit.
2. Function key
 - 2.1. "Select" key: select DC/AC, frequency and duty cycle. Hz/DUTY key: when measuring DCA, press the key to switch to ACA. When measuring frequency, press the key to switch to frequency/duty cycle (1~99%).
 - 2.2. RANGE key: select working mode of automatic measurement and manual measurement. The default mode is automatic measurement and "AUTO" is displayed, press the key to move to manual measurement, press the key for 2 sec. to return to the automatic measurement condition.
 - 2.3. Press the key at voltage, current and capacitance range to reset the reading and enter into relative value measurement. The LCD displays the "REL" symbol, Press again to exit the function.
 - 2.4. HOLD key: press the key to keep the current value reading on the LCD. "HOLD" is displayed. Press again to exit the function. Press the key for 2 sec. to switch on the backlight.
3. Rotary switch: to select measuring function and range.
4. Voltage, resistance, frequency socket.
5. GND.
6. COM for measuring current less than 400mA.
7. COM for measuring current 10A.

4.2 DCV measurement

1. Insert the BLACK test lead into the "COM" jack and the RED test lead into the "V Ω Hz" jack.
2. Set the FUNCTION switch to "V $\overline{\text{---}}$ " range.
3. The default range is auto range. "AUTO" is displayed. Press the RANGE key to switch to manual range, and 400mV/4V/40V/400V/1000V can be selected.
4. Connect the test leads to the test points. Voltage and polarity which are connected with the red lead will appear on the LCD.

Note:

1. Manual measurement mode: if the LCD displays "OL", the measurement is above range. In this case set the range knob to a higher range.
2. Do not measure DCV above 1000V. In this case the multimeter will be damaged.
3. Avoid contact with high voltage circuits when measuring high voltage.

4.3 DC mV measurement

1. Insert the BLACK test lead into the "COM" jack and the RED test lead into the "V Ω Hz" jack.
2. Set the FUNCTION switch to "mV" range.
3. Measure voltage at less than 400mv. Automatic measurement is not available at this range.
4. Connect the test leads to the test points. Voltage and polarity which are connected with the red lead will appear on the LCD.

Note:

1. If the LCD displays "OL", the measurement is above range. In this case set the range knob to a higher range.
2. Do not measure above 1000V. Otherwise the multimeter will be damaged.
3. Avoid contact with high voltage circuits when measuring high voltage.

4.4 AC mV RMS measurement

1. Insert the BLACK test lead into the "COM" jack and the RED test lead into the "VΩHz" jack.
2. Set the FUNCTION switch to "mV" range and press the "select" key. The LCD displays AcV. The automatic measurement function is not available at this range. Do not measure voltage above 400mV.
3. Connect the test leads to the test points. The voltage of the two points which are connected with the test leads will be displayed.

Note:

1. If the LCD displays "OL", the measurement is above range. Set the range knob to automatic AC voltage.
2. Do not measure AC above 400mV. Otherwise the multimeter will be damaged.

4.5 ACV RMS measurement

1. Insert the black test lead into "COM" jack and the red one into "VΩHz" jack.
2. Set the function switch to "V ~" range.
3. The default range is auto range, and "AUTO" is displayed. Press the RANGE key to switch back to manual range. 400mV/4V/40V/400V/700V can be selected.
4. Connect the test leads to the test points, and the voltage of the two points which are connected with the test leads will be displayed.

Note:

1. Manual measurement: if the LCD displays "OL", the measurement is above range. Set the range knob to a higher range.
2. Do not measure ACV above 750V. Otherwise the multimeter will be damaged.
3. Avoid contact with high voltage circuits when measuring high voltage.

4.6 DCA measurement

1. Insert the BLACK test lead into the "COM" jack and the RED test lead into the "mA" (max. 400mA) or "10A" jack (max. 10A).
2. Set the FUNCTION switch to current range. Press the "SELECT" key to select DC measure mode. Connect the leads across to the tested circuit. This will display the current value and polarity of the red lead on the LCD.

Note:

1. If the current range is unknown beforehand, set the FUNCTION switch to a high range and move down to lower measurement ranges.
2. When only "OL" is displayed, this indicates above range and the FUNCTION switch must be set to a higher range.
3. The maximum input current is 400mA or 10A depending upon the jack used. Excessive current will blow the fuse.
4. Do not input a value above DCV 36V or ACV 25V on the "COM", "mA" or "A" terminals.

4.7 AC current true RMS measurement

1. Insert the BLACK test lead into "COM" jack and the RED test lead into the "mA" (max. 400mA) or "10A" jack (max. 10A).
2. Set the FUNCTION switch to the current range. Press the "SELECT" key to select AC measure mode, connect the leads across to the tested circuit. The current value will appear on the LCD.

Note:

1. If the current range is unknown beforehand, set the FUNCTION switch to a high range and work down.
2. If the LCD displays "OL", measurement is above range. Set the range knob to a higher range.

3. The maximum input current is 400mA or 10A depending on the jack used. Excessive current will blow the fuse.
4. Do not input a value above DCV 36V or ACV 25V on the "COM", "mA" or "A" terminals.

4.8 Resistance measurement

1. Connect the BLACK test lead to the "COM" jack and RED test lead to the "VΩHz" jack.
2. Set the FUNCTION switch to "Ω" range.
3. Press "RANGE" to select Auto/Manual measurement.
4. If measuring small resistances, short test leads first, press "REL" one time and measure the unknown resistance to ensure value accuracy.

Note:

1. When using the manual method, if the resistance range is unknown beforehand, set the FUNCTION switch to a higher range and work down.
2. If "OL" is displayed on the LCD, the measurement is above range. When measuring resistance higher than 1 MΩ, the multimeter may take a few seconds to stabilize. This is normal for high resistance readings.
3. When the input is not connected, i.e. at open circuit, "OL" will be displayed for the above range condition.
4. When checking in-circuit resistance, be sure the power has been switched off and all capacitors are fully discharged.
5. Do not input any voltage at this range.

4.9 Capacitance measurement

1. Set the FUNCTION switch to the "—H—" position.
2. Press "REL" once to adjust to zero.
3. Connect the tested capacitor to the "COM", "VΩHz" input sockets in accordance to the leads (the polarity of the red lead is "+"). The value will be displayed on the LCD.
4. If the displayed figure on the LCD is not zero, press the "REL" key to reset.

Note:

1. The capacitance range does not have a manual measurement function.
2. Before measuring each time, press "REL" to ensure measurement accuracy.
3. Discharge all capacitors completely before capacitance measurement to avoid damage.
4. The 200uF range input reading is stable for up to 15 seconds.

4.10 Frequency measurement

1. Connect the test leads or shielded cable to the "COM" and "VΩHz" jacks. Set the FUNCTION switch to the "Hz" range and connect the test leads or cable across the source load tested. Press "Hz/DUTY" to switch between frequency and duty cycle and to display the reading of frequency or duty cycle.

Note:

1. The frequency range is not available in the manual measurement function.
2. Do not apply more than 250V DC/AC peak value to the input. Indication is possible at voltage higher than 10V AC rms, but readings may be out of specification.
3. In a noisy environment, it is preferable to use a shielded cable for measuring small signal.
4. Avoid contact with high tension circuits when measuring high voltage.

4.11 hFE measurement

1. Set the function switch to hFE range.
2. Define if the transistor is of NPN or PNP type, insert the emitter, base and collector separately to the correct hole. The approximate value will be displayed on the LCD.

4.12. Diode and continuity test

1. Connect the BLACK test lead to the "COM" jack and the RED test lead to the "VΩHz" jack.
2. Set the FUNCTION switch to the "→|→)" position. Press the "DC/AC" key which selects the diode measurement method.
3. Forward measurement: connect the RED test lead to the positive test diode and the BLACK test lead to the negative one to display the reading of the approximate forward voltage of this diode.
4. Reverse measurement: connect the BLACK test lead to the positive test diode and the RED test lead to the negative one. This will display "OL" on the LCD.
5. Proper diode testing should include both steps.
6. Connect the test probes to two points of the circuit if the resistance is approx. 50Ω. The buzzer will sound.

Note: Do not input voltage at the →|→) or →+ ranges.

4.13. Temperature measurement

1. Set the function key to the "C" range.
2. Insert the cold point of the thermocouple into the "K TEMP" hole, and the work point to the place where you want to take the temperature reading. The value will be displayed on the LCD.

Note:

1. When the input terminal is in open circuit, it will display "normal temp."
2. Do not change the thermocouple. Otherwise the accuracy may be reduced.
3. Do not input voltage at this range.

4.14. Data hold

Press the "Hold" key. The current data will be displayed on the LCD. Press the key again to undo the hold function.

4.15. Backlight

Press the hold key for 2 sec. to turn on the backlight. It automatically switch off after 10 sec.

4.16. Auto power off

1. After 15mins, the instrument will switch off automatically and go into the sleep mode. The buzzer will sound before power off. Press any key to turn on the power.
2. Press the "SELECT" key before switching on the multimeter. This will cancel the function of auto power off.

5 MAINTENANCE

Do not try to modify the inner circuit.

1. Keep the multimeter dry. Keep the multimeter away from dust and dirt.
2. Use and store the multimeter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.
3. Handle the multimeter gently and carefully. Dropping it can damage the circuit boards and case and can cause the multimeter to work improperly although the holster can provide enough protection.
4. Wipe the multimeter with a damp cloth occasionally. Do not use harsh chemicals, cleaning solvents, or strong detergents

to clean the multimeter.

Changing the battery and fuses

5. Remove the battery if you do not use the multimeter for a long time. When the LCD displays "E3", the battery should be replaced.
 - a. Ensure the instrument is not connected to any external circuit. Set the selector switch to the OFF position and remove the test leads from the terminals.
 - b. Remove the screw on the bottom case and lift the bottom case.
 - c. Remove the spent battery and replace it with a battery of the same type.
6. Replace the fuse with the same type and rating as the original fuse.
7. Spare parts:
 - Fuses: F400mA/250V, Φ5*20mm, F10A/250V, Φ5*20mm. The exchange of the F10/250V should be performed by a specialist.
 - Battery: 9V battery



Caution:

1. Do not input voltage above 1000V DC/AC peak value.
2. Do not measure voltage at current range, resistance range, diode and buzzer range.
3. Do not use the multimeter if the battery is not inserted properly or the battery case is not fixed.
4. Before replacing battery or fuse, release the test leads from the test point and turn power off.

6 WARRANTY

We give a warranty of 24 months for units supplied by us inside the EU, and a warranty of 12 months outside the EU. The following is excluded from the warranty: Damage that is due to non-compliance with the operating instructions, improper use, or natural wear.

The manufacturer can only be held liable for the function and safety-relevant properties of the unit, if the maintenance, service, and modifications of the unit are performed by the manufacturer or by an institution that is expressly authorised by the manufacturer.

7 PRODUCER

Xi'An BeiCheng Electronics Co., Ltd.
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8 WASTE DISPOSAL

The packaging consists predominately of environmentally compatible materials that can be passed on for disposal by the local recycling service.



Should you no longer require this product, do not dispose of it with the household refuse. Please return it to the address below for proper waste disposal.

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