Palm Size Multimeter

User Manual

Part Number: 72-13430, 72-13435 and 72-13440

1. Overview

The new generation 72-13400 series products redefine the performance standards for entry-level digital multimeter. The innovative industrial design ensures the products have 2 meters impact resistance. The new LCD display layout provides a clear display for better user experience. The 72-13400 series ensure safe operation in CAT II 250 V environment.

The special features of each model are as follows:

72-13430: 2mF capacitance test function
72-13435: Temperature test
72-13440: NCV test

2. Open Box Inspection

Open the package box and take out the device. Please check whether the following items are deficient or damaged and contact your supplier immediately if they are.

User Manual	1 Pcs
Test Leads	1 Pair
Protective case	1 Pcs
K-type thermocouple	1 Pcs (72-13430 only)

Warning:

Please carefully read “Safe Operation Rule” before using the device.

3. Safe Operation Rule

1) Safety certification

This device strictly follows the CE standards: EN 61010-1: 2010, EN61010-2-030: 2010, EN 61326: 2013, as well as CAT II: 250V, RoHS, pollution grade II, and double insulation standards.

2) Safety instructions and precautions

a. Do not use the device if the device or test leads appear damaged or if you suspect that the device is not operating property. Pay particular attention to the insulation layers.
b. If the test leads are damaged, it must be replaced with one of the same type or the same electrical specification.
c. When measuring, do not touch exposed wires, connectors, unused inputs, or the circuit being measured.
d. When measuring the voltage higher than 60V DC or 30V ACrms, keep your fingers behind the finger guard on the test lead in order to prevent electric shock.
e. If the range of the voltage to be measured is unknown, the maximum range should be selected and then gradually decreased.
f. Never input voltage and current exceeding the value listed on the device.
g. Before switching ranges, make sure to disconnect the test leads with the circuit to be tested. It is strictly prohibited to switch the ranges during the measurement.
h. Do not use or store the device in high temperature, high humidity, flammable, explosive or strong magnetic field environments.
i. Do not change the internal circuit of the device in order to avoid the damage to the device and users.
j. To avoid false reading, replace the battery when the battery indicator appears.
k. Use dry cloth to clean the case, do not use detergent containing solvents

4. Electrical Symbols

	Low battery		High Voltage warning
⏚	Electrical ground	⎓	Direct current
⚠	Warning	~	Alternating current
⧈	Double insulation		
	Conforms to UL STD. 61010-1, 61010-2-030, Certified to CSA STD. C22.2 No. 61010-1, 61010-2-030.		
CE	Comply with European Union Standards		
CAT II	It is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.		

5. Specification

1. The maximum voltage between the input terminal and the ground: 250Vrms
2. 10A terminal: Fuse 10A 250V Fast fuse Ø5 × 20mm
3. mA/μA terminal: Fuse 200mA 250V Fast fuse Ø5 × 20mm
4. Max. display 1999, over range display “OL”, update rate: 2~3 times/second
5. Range select: Auto range 72-13430; Manual range 72-13430/435/440
6. Backlight: manual on, auto shut off after 30 seconds.
7. Polarity: “-” symbol displayin on screen represents negative polarity signal.
8. Data hold function: H symbol displays on screen when data hold function is activated.
9. Low battery power: symbol displays on screen when battery power is low
10. Battery: AAA 1.5V × 2
11. Operating temperature: 0 ~ 40°C (32°F ~ 104°F)
    Storage temperature: -10°C ~ 50°C (14°F ~ 122°F)
    Relative humidity: 0°C ~ 30°C: ≦75% RH, 30°C to 40°C: ≦50% RH
    Operating altitude: 0 ~ 2000m
12. Dimension: (134mm×77mm×47mm)
13. Weight: about 206g (battery included)
14. Electromagnetic compatibility:
    In fields with less the 1V/m radio frequency, the total accuracy = designated accuracy +5% of measurement range
    In fields with more than 1V/m radio frequency, the accuracy is not specified.

6. Structure

1.	Display screen
2.	Function keys
3.	Functional dial
4.	10A input jack
5.	COM jack
6.	Remaining inputs jack

(See Figure 1)

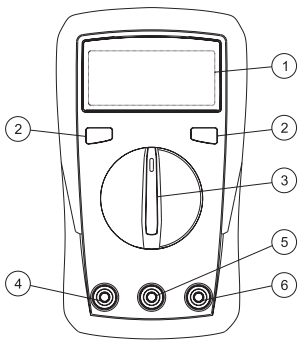


Figure 1

7. Key Functions

1) 72-13430:

SEL/REL: press this key to switch between AC and DC modes for mV⎓, I⎓ and REL positions.
HOLD/☼: Press to enter or exit data hold mode. Long press over 2 seconds to turn on/off backlight.

2) 72-13430/435/440:

HOLD/SEL: Press to enter or exit data hold mode
In continuity/diode mode, press to cycle switch between the two modes
☼: Press to turn on/off backlight.

8. Operations

To avoid false reading, replace the battery if the battery low power symbol appears. Also pay special attention to the warning sign ⚠ beside the test lead jack, indication that the tested voltage or current must not exceed the values listed on device.

1. AC/DC voltage measurement (see Figure 2b)

1) Switch the dial to “V~” position.
2) Insert the black test lead into the COM jack, the red test lead into the “VΩmA” jack. Connect test leads with the load in parallel.

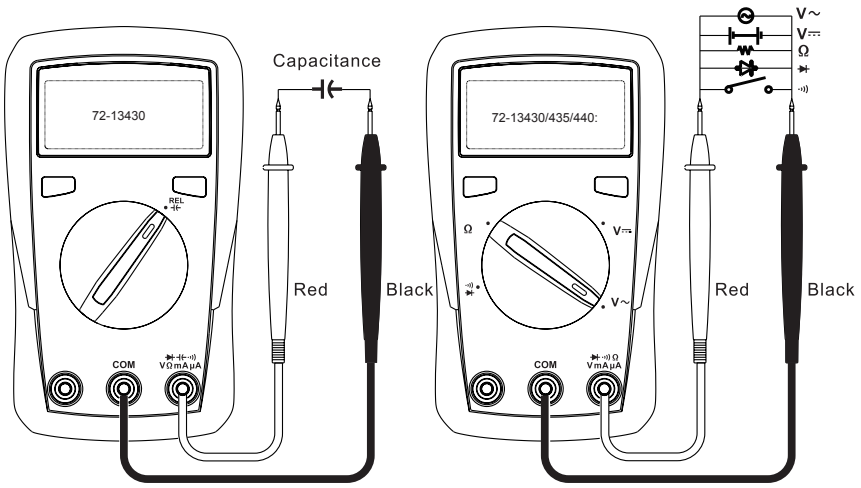


Figure 2a Figure 2b

Notes:

- Do not measure voltage over 250Vrms, or it may expose users to electric shock and damage the device. If the range of the voltage to be measured is unknown, select the maximum range and reduce accordingly.
- Please pay extra attention when measuring high voltage in order to avoid electric shock.
- Before using the device, it is suggested to measure a known voltage for verification.

2. Resistance measurement (see Figure 2b)

1) Switch the dial to “Ω” position.
2) Insert the black test lead into the COM jack, the red test lead into the “VΩmA” jack. Connect test leads with the resistor in parallel

Notes:

- Before measuring resistance, switch off the power supply of the circuit, and fully discharge of capacitors.
- If the resistance when probes are shorted is more than 0.5Ω, please check if test leads are loosened or damaged.
- If the resistor is open or over the range, the “OL” symbol will be displayed on the screen.
- When measuring low resistance, the test leads will produce 0.1Ω ~ 0.2Ω measurement error. To obtain accurate measurement, the measured value should subtract the value displayed when two test leads are shorted.
- When measuring high resistance above 1MΩ, it is normal to take a few seconds to steady the readings. In order to quickly obtain steady data, use short test wires to measure high resistance.

3. Continuity measurement (see Figure 2b)

1) Switch the dial to “ ” position.
2) Insert the black test lead into the COM jack, the red test lead into the “VΩmA” jack. Connect test leads with the points to be tested in parallel
3) If measured points’ resistance >51Ω, circuit is in open status.
   If measured points’ resistance ≤10Ω, circuit is in good conduction status, buzzer will go off

Note:

- Before measuring continuity, switch off all power supplies and fully discharge all capacitors.

4. Diode measurement (see Figure 2b)

1) Switch the dial to “ ” position.
2) Insert the black test lead into the COM jack, the red test lead into the “VΩmA” jack. Connect test leads with the diode in parallel
3) “OL” symbol appears when the diode is open or polarity is reversed. For silicon PN junction, normal value: 500 ~ 800mV (0.5 ~ 0.8V).

Note:

- Before measuring PN junction, switch off the power supply to the circuit, and fully discharge all capacitors

5. Capacitance measurement (only for 72-13430, see Figure 2a)

1) Switch the dial to capacitance test.
2) Insert the black test lead into the COM jack, the red test lead into the “VΩmA” jack. Connect test leads with the capacitor in parallel
3) When there is no input, the device displays a fixed value (intrinsic capacitance).
   For small capacitance measurement, to ensure measurement accuracy, the measured value must be subtracted from intrinsic capacitance.
   Users can measure small capacity capacitors with relative measurement functions (REL) (the device will automatically subtract the intrinsic capacitance)

Notes:

- If the tested capacitor is shorted or its capacity is over the specified range “OL” symbol will be displayed on the screen.
- When measuring large capacitors, it may take a few seconds to obtain steady readings
- Before measuring capacitors (especially for high voltage capacitors), please fully discharge them.

6. DC measurement (see Figure 3)

1) Switch the dial to DC test.
2) Insert the black test lead into the COM jack, the red test lead into the “VΩmA” jack. Connect test leads with the tested circuit in series.

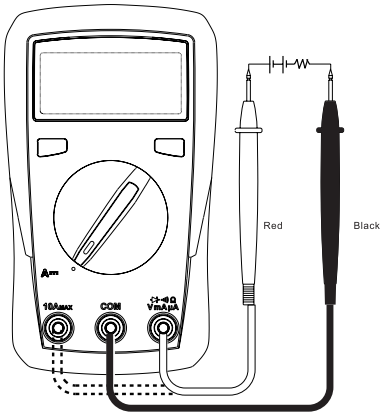


Figure 3

Notes:

- Before measuring, switch of the power supply of the circuit and carefully check the input terminal and range position.
- If the range of the measured current is unknown, select the maximum range and then reduce accordingly.
- Please replace the fuse with the same type.
  10A jack: Fuse 10A/250V Ø5mm×20mm
  VΩmA jack: Fuse 0.2A/250V Ø5mm×20mm
- When measuring, please do not connect the test leads with any circuit in parallel. Otherwise there is a risk of damage to the device and human body.
- If the tested current is over 10A, each measurement time should be less than 10 seconds and the next test should be after 15 minutes.

7. AC measurement (only for 72-13430, see Figure 3)

Similar to DC Measurement.

Please refer to Section 6 “DC measurement (see Figure 3)”

8. Temperature measurement (only for 72-13435, see Figure 5)

1) Switch the dial to temperature test.
2) Insert K-thermocouple into the device and fix the temperature probe to the measured object. Read the value when it is stable.

Notes:

- Only K-thermocouple is applicable. The measured temperature should be less than 250°C/482°F (°F=°C×1.8+32)

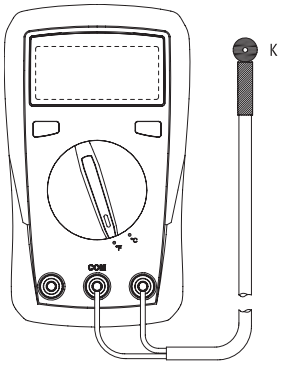


Figure 5

10. NCV measurement (only for 72-13440, see Figure 6)

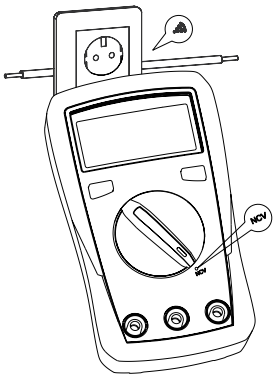
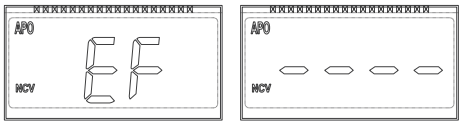


Figure 6

1) Switch the dial to NCV position
2) Place the device near the measured object. “-” symbol indicates the intensity of the electric field. More “-” and the higher the buzzer frequency, the higher the electric field intensity.
3) Intensity of electric field.



“EF” : 0 ~ 50mV
“-” : 50 ~ 100mV
“--” : 100 ~ 150mV
“---” : 150 ~ 200mV
“----” : >200mV

11. Additional features

- The device enters measurement status in 2 seconds after startup.
- The device automatically shuts down if there is no operation for 15 minutes.
  you can wake up the device by pressing any key.
  To disable auto shutdown, switch the dial to OFF position, long press HOLD key and turn on the device.
- When pressing any key or switching the dial, the buzzer will beep once.
- Buzzer Notification
  1) Input voltage ≧250V (AC/DC), buzzer will continuously beep indicating measure range is at limit
  2) Input current >10A (AC/DC), buzzer will continuously beep indicating measure range is at limit
- 1 min before auto shutdown, 5 continuous beeps.
  Before shutdown, 1 long beeps.
- Low power warnings:
  Voltage of the battery <2.5V, symbol appears and flashes for 3 seconds every 6 second period. During low power status, the device can still work. Voltage of the battery <2.2V, a solid symbol appears, the device cannot work.

9. Technical specification

- Accuracy: ±(% of reading + numerical value in least significant digit slot)
  1 year warranty

- Ambient Temperature: 23°C ±5°C (73.4°F ±9°F)
- Ambient humidity: ≦75% RH

Notes

To ensure accuracy, operating temperature should be within 18°C ~ 28°C.
Temperature Coefficient = 0.1*(Specified accuracy)/°C (<18°C or >28°C)

1. DC Voltage

Range	Part Number	Resolution	Accuracy
200mV	72-13430/13435/13440	0.1mV	±(0.7% +3)
2000mV		1mV	±(0.5% +2)
20.00V		0.01V	±(0.7% +3)
200.0V		0.1V	±(0.7% +3)
250V		1V	±(0.7% +3)

- Input impedance: about 10MΩ
- Results might be unstable at mV range when no load is connected. The value becomes stable once the load is connected. Least significant digit ≦±3
- Max. input voltage: ±250V, when the voltage≧ 610V, “OL” symbol appears.
- Overload protection: 250Vrms (AC/DC)

2. AC Voltage

Range	Part Number	Resolution	Accuracy
200mV	72-13430	0.1mV	±(1% +2)
2V		0.001V	±(0.7% +3)
20V		0.01V	±(1% +2)
200V	72-13430/13435/13440	0.1V	±(1.2% +3)
250V		1V	±(1.2% +3)

- Input impedance: about 10MΩ
- Frequency response: 40Hz ~ 400Hz, sine wave RMS (average response).
- Max. input voltage: ±250V, when the voltage 610V, “OL” symbol appears.
- Overload protection: 250Vrms (AC/DC)

3. Resistance

Range	Part Number	Resolution	Accuracy
200Ω	72-13430/13435/13440	0.1Ω	±(1% +2)
2000Ω		1Ω	±(0.8% +2)
20kΩ		0.01kΩ	±(0.8% +2)
200kΩ		0.1kΩ	±(0.8% +2)
20mΩ		0.01MΩ	±(1.2% +3)
200mΩ	72-13430/13440	0.1MΩ	±(5% +10)

- Measurement result = reading of resistor - reading of shorted test leads
- Overload protection: 250Vrms (AC/DC)

4. Continuity, diode

Range	Resolution	Remark
•))	0.1Ω	If the measured resistance is greater than 50Ω, the measured circuit will be regarded as in open status, and the buzzer does not go off. If the measured resistance is less than 10Ω, the measured circuit will be regarded as in good conduction status, and the buzzer goes off.
▶|	0.001V	Open circuit voltage: 2.1V, test current is about 1mA Silicon PN junction voltage is about 0.5 ~ 0.8V

- Overload protection: 250Vrms (AC/DC)

5. Capacitance (only for 72-13430)

Range	Resolution	Accuracy
2nF	0.001nF	Under REL mode ±(5% +5)
20nF	0.01nF	±(4% +8)
200nF	0.1nF	±(4% +8)
2μF	0.001μF	±(4% +8)
20μF	0.01μF	±(4% +8)
200μF	0.1μF	±(4% +8)
2mF	0.001mF	±(10)

- Overload protection: 250Vrms (AC/DC)
- Tested capacitance ≦200nF, adapt REL mode.

6. Temperature (only for 72-13435)

Range			Resolution	Accuracy
°C	-40°C ~ 1000°C	-40 ~ 40°C	1°C	±4°C
		>40°C ~ 500°C		±(1% +4)
		>500°C ~ 1000°C		±(2% +4)
°F	-40°F ~ 1832°F	-40°F ~ 104°F	1°F	±5°F
		>104°F ~ 932°F		±(1.5% +5)
		>932°F ~ 1832°F		±(2.5% +5)

- Overload protection: 250Vrms (AC/DC)
- K thermocouple is only applicable for temperature less than 250°C/482°F.

7. DC current

Range	Part Number	Resolution	Accuracy
200μA	72-13430	0.1μA	±(1% +2)
2000μA	72-13430/13435/13440	1μA	±(1% +2)
20mA	72-13430/13435/13440	0.01mA	±(1% +2)
200mA	72-13430/13435/13440	0.1mA	±(1% +2)
2A	72-13430	0.001A	±(1.2% +5)
10A	72-13430/13435/13440	0.01A	±(1.2% +5)

- Input current> 10A, “OL” symbol appears and buzzer beeps
- Overload protection
  250Vrms
  μA mA range: F1 Fuse 0.2A/250V Ø5×20mm
  10A range: F2 Fuse 10A/250V Ø5×20mm

8. AC current (only for 72-13430)

Range	Part Number	Resolution	Accuracy
200μA	72-13430	0.1μA	±(1.2% +3)
2000μA		1μA	±(1.2% +3)
20mA		0.01mA	±(1.2% +3)
200mA		0.1mA	±(1.2% +3)
2A		0.001A	±(1.5% +5)
10A		0.01A	±(1.5% +5)

- Frequency response: 40 - 400Hz
- Accuracy guarantee range: 5 - 100% of the range, shorted circuit allows least significant digit ≦2
- Input current >10.1A, “OL” symbol appears with beeps
- Overload protection
  250Vrms
  μA mA range: F1 Fuse 0.2A/250V Ø5×20mm
  10A range: F2 Fuse 10A/250V Ø5×20mm

10. Maintenance

Warning: Before opening the rear cover, switch of the power supply (remove test leads from the input terminal and the circuit).

1. General maintenance

1) Clean the case with a damp cloth and detergent. Do not use abradants or solvents
2) If there is any malfunction, stop using the device and send it to maintenance.
3) The maintenance and service must be conducted by qualified professionals or designated departments.

2. Replacements (see Figure 7a, Figure 7b)

Battery replacement:

To avoid false reading, replace the battery when the battery indicator appears.
Battery specification: AAA 1.5V × 2
1) Switch the dial to “OFF” position and remove the test leads from the input terminal.

2) Take off the protective case. Loosen the screw on battery cover, remove the cover to replace the battery. Please identify the positive and negative pole.

Fuse replacement:

1) Switch the dial to “OFF” position and remove the test leads from the input terminal
2) Loosen the both screws on the rear cover, then remove the rear cover to replace the fuse

Fuse specification
F1 Fuse 0.2A/250V Ø5×20mm ceramic tube
F2 Fuse 10A/250V Ø5×20mm ceramic tube

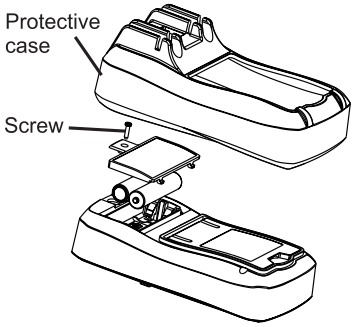


Figure 7a

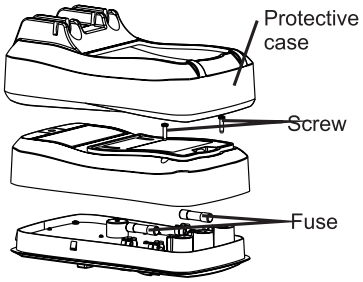


Figure 7b