

3 3/4 DIGITAL MULTIMETER OPERATION MANUAL

1. SAFETY INFORMATION

SAFETY SYMBOLS

 **Warning!** Dangerous Voltage (Risk of electric shock).

 **Caution!** Refer to the user's manual before using this Meter.

 **Double Insulation** (Protection Class II).

 Alternating Current (AC).

 Direct Current (DC).

 Either DC or AC.

 **Ground** (maximum permitted voltage between terminal and ground).

The following safety information must be observed to insure maximum personal safety during the operation at this meter.

- 1.1 Do not operate the meter if the body of meter or the test lead look broken.
- 1.2 Check the main function dial and make sure it is at the correct position before each measurement.
- 1.3 Do not perform resistance, capacitance, temperature, diode and continuity test on a live power system.
- 1.4 When making current measurements ensure that the circuit not "live" before opening it in order to connect the test leads.
- 1.5 Do not apply voltage between the test terminals and test terminal to ground that exceed the maximum limit record in this manual.
- 1.6 Exercise extreme caution when measuring live system with voltage greater than 60V DC or 30V AC.
- 1.7 Change the batteries when the  symbol appears to avoid incorrect data.

2. SPECIFICATIONS

2.1 GENERAL SPECIFICATIONS

Display: 3 3/4 digits LCD with a max. reading of 4000.

Range control: Auto range & Manual range control

Polarity: Automatic negative polarity indication.

Zero adjustment: Automatic.

Overrange indication: The "OL" or "-OL" display.

Low battery indication: Display  sign.

Data hold: Display "DH" sign.

Relative measurement: Display "RELΔ" sign.

Auto Power Off: When measurement exceeds 15 minutes without switching mode and pressing key, the meter will switch to standby mode. Press any key or switch selector switch to exit standby mode. When restart the system, press and hold "FUNC" key to disable auto power off.

Safety standards:  **EMC/LVD**. The meter is up to the standards of IEC1010 Double Insulation, Pollution Degree 2, Overvoltage Category II.

Operating environment: Temperature 32 to 104°F (0°C to 40°C),

Humidity ≤ 80% RH.

Storage environment: Temperature -4 to 140°F (-20°C to 60°C),

Humidity ≤ 90% RH.

Power supply: 3 × 1.5V AA type batteries.

Dimension: 180 x 87 x 50 mm

Weight: Approx. 357g (including battery).

2.2 ELECTRICAL SPECIFICATIONS

Accuracies are ± (% of reading + number in last digit)

at 23 ± 5°C, ≤ 75% RH.

2.2.1 DC Voltage

Range	Accuracy	Resolution
400mV	± (0.5%+2)	0.1mV
4V		1mV
40V		10mV
400V		100mV
1000V	± (0.8%+3)	1V

Overload protection: 1000V DC or 750V AC rms

Impedance: 10MΩ, More than 100MΩ on 400mV range

2.2.2 AC Voltage

Range	Accuracy	Resolution
400mV	± (1.5%+3)	0.1mV
4V		1mV
40V		10mV
400V		100mV
750V	± (1.5%+3)	1V

The 400mV range be selected by press "RANGE" key only

Average sensing, calibrated to rms of sine wave

Frequency: 40~400Hz

Overload protection: 1000V DC or 750V AC rms

Impedance: 10MΩ, More than 100MΩ on 400mV range

2.2.3 DC Current

Range	Accuracy	Resolution
400μA	± (1.2%+2)	0.1μA
4000μA		1μA
40mA	± (1.5%+2)	10μA
400mA		100μA
4A	± (2.0%+3)	1mA
10A		10mA

Overload protection: 0.5A/250V fuse,

10A/250V fuse (10A up to 15 seconds)

2.2.4 AC Current

Range	Accuracy	Resolution
400μA	± (1.5%+3)	0.1μA
4000μA		1μA
40mA	± (2.0%+3)	10μA
400mA		100μA
4A	± (2.5%+5)	1mA
10A		10mA

Average sensing, calibrated to rms of sine wave

Frequency: 40~400Hz

Overload protection: 0.5A/250V fuse,

10A/250V fuse (10A up to 15 seconds)

2.2.5 Resistance

Range	Accuracy	Resolution
400Ω	± (1.0%+2)	0.1Ω
4kΩ		1Ω
40kΩ		10Ω
400kΩ		100Ω
4MΩ		1kΩ
40MΩ	± (2.0%+3)	10kΩ

Overload protection: 250V DC or AC rms

2.2.6 Capacitance

Range	Accuracy	Resolution
5nF	± (5.0%+10)	1pF
50nF	± (3.0%+5)	10pF
500nF		100pF
5μF	± (2.5%+5)	1nF
50μF		10nF
100μF		100nF

Overload protection: 250V DC or AC rms

2.2.7 Diode and Audible continuity test

Range	Description	Test condition
	Display read	Forward DC current
	Built-in buzzer sounds if resistance is less than 50Ω	Open circuit voltage approx. 0.5V

Overload protection: 250V DC or AC rms

2.2.8 Frequency

Range	Accuracy	Resolution
10Hz	± (0.1%+5)	0.01Hz
100Hz		0.1Hz
1000Hz		1Hz
10kHz		10Hz
100kHz		100Hz
1MHz		1000Hz

The Frequency range be selected by press "Hz%" key only on voltage or current range.

Sensitivity: sine wave 1.5V rms

Overload protection: 250V DC or AC rms

2.2.9 Duty cycle

The Duty cycle range be selected by press "Hz%" key only on voltage or current range.

0.1%~99.9%: $\pm (2.0\%+2)$ Frequency lower than 10kHz

Sensitivity: sine wave 1.5V rms

Overload protection: 250V DC or AC rms

2.2.10 Temperature (Only has the function of temperature)

Range	Accuracy		Resolution
°C	-20~150°C	$\pm (3^{\circ}\text{C}+1)$	1°C
	150~800°C	$\pm (3\%+1)$	

NiCr-NiSi sensor

Overload protection: 0.5A/250V fuse

3. OPERATION

3.1 DC/AC Voltage and Hz/DUTY Measurement

- 1) Connect the black test lead to "COM" socket and red test lead to the "VΩHz" socket.
- 2) Set the selector switch to desired "V" position.
- 3) Press "FUNC" key to choose "DC" or "AC" measurement.
- 4) Measure the voltage by touch the test lead tips to the test circuit where the value of voltage is needed.
- 5) Read the voltage result from the LCD panel.
- 6) Press "Hz%" key to select **frequency** or **duty cycle** measurement.
- 7) Connect the probe across the source or load under measurement.
- 8) Read the frequency or duty cycle result from the LCD panel.

3.2 DC/AC Current and Hz/DUTY Measurement

- 1) Connect the black test lead to "COM" socket and red test lead to the "mA/C" socket.
- 2) For measurement up to 400mA, set the selector switch to desired "μA" or "mA" position, and press "FUNC" key to choose "DC" or "AC" measurement.
- 3) For current measurement from 400mA to 10A, connect the red test lead to the "10A" socket, set the selector switch to desired "A" position, and press "FUNC" key to choose "DC" or "AC" measurement.
- 4) Connect the probes across the source or load under measurement.
- 5) Read the current result from the LCD panel.
- 6) Press "Hz%" key to select **frequency** or **duty cycle** measurement.
- 7) Connect the probe across the source or load under measurement.
- 8) Read the frequency or duty cycle result from the LCD panel.

3.3 Resistance Measurement

- 1) Connect the black test lead to "COM" socket and red test lead to the "VΩHz" socket.
- 2) Set the selector switch to desired "Ω" position.
- 3) Connect tip of the test leads to the points where the value of the resistance is needed.
- 4) Read the result from the LCD panel.

Note:

- a) When take resistance value from a circuit system, make sure the power is cut off and all capacitors need to be discharged.
- b) Under the Low Resistance Range, the Users are requested to short the meter probes to get the resistance of test leads, which is needed to deduct from this measurement.

3.4 Capacitance Measurement

- 1) Connect the black test lead to "COM" socket and red test lead to the "VΩHz" socket.
- 2) Set the selector switch to desired "F" position.
- 3) Connect tip of the test leads to the points where the value of the capacitance is needed.
- 4) Read the result from the LCD panel.

Note:

- a) Before testing, discharge the capacitor by shorting its leads together. Use caution in handling capacitors because they may have a charge on them of considerable power before discharging.
- b) Before testing, press "REL" key to eliminate the zero error.
- c) When testing 200μF capacitor, note that there will be approx. 30 seconds time lag.

3.5 Diode and Audible continuity Test

- 1) Connect the black test lead to "COM" socket and red test lead to the "VΩHz" socket.
- 2) Set the selector switch to desired "D" position.
- 3) Press "FUNC" key to choose **Diode** or **Audible continuity** measurement.

- 4) Connect the test leads across the diode under measurement, display shows the approx. forward voltage of this diode.
- 5) Connect the test leads to two point of circuit, if the resistance is lower than approx. 50Ω, the buzzer sounds.

Note:

Make sure the power is cut off and all capacitors need to be discharged under this measurement.

3.6 Temperature Measurement (Only has the function of temperature)

- 1) Connect the black test lead of the sensor to "COM" socket and red test lead to the "mA/C" socket.
- 2) Set the selector switch to desired "C" position.
- 3) Put the sensor probe into the temperature field under measurement.
- 4) Read the result from the LCD panel.

3.7 Data Hold

On any range, press the "HOLD" key to lock display value, and the "DH" sign will appear on the display, press it again to exit.

3.8 Back Light and Pen Light

On any range, press the "HOLD" key over 2 seconds to light the back light and the pen light, press it again for more than 2 seconds to wink the light.

3.9 Relative measurement

Press the "REL" key, you can measure the relative value and "RELΔ" sign will appears on the display, the auto range mode be changed to manual range mode. Press it again to exit relative measurement and "Δ" sign disappears, but you can not go back to auto range mode.

3.10 Auto/Manual range

The auto range mode is a convenient function, but it might be faster to manually set the range when you measure values that you know to be within a certain range.

To select manual range, repeatedly press "RANGE" key until the display shows the desired range. The range steps upward as you press "RANGE" key. The meter will go back to auto range mode when you press "RANGE" key for more than 2 seconds. It can not select manual range mode on **capacitance** and **temperature** range.

Caution: while using the manual range mode, if "OL" sign appears on the display, immediately set range to a higher.

4. Battery replacement

- 1) When the battery voltage drop below proper operation range, the  symbol will appear on the LCD display and the battery need to be changed.
- 2) Before changing the battery, set the selector switch to "OFF" position. Open the cover of the battery cabinet by a screwdriver.
- 3) Replace the old batteries with the same type (1.5V AA) battery.
- 4) Close the battery cabinet cover and fasten the screw.

5. Fuse replacement

- 1) This meter is provided with a 0.5A/250V fuse to protect the current measuring circuits which measure up to 400mA, with a 10A/250V fuse to protect the current measuring on "A" range.
- 2) Ensure the instrument is not connected to any external circuit. Set the selector switch to "OFF" position and remove the test leads from the terminals.
- 3) Open the cover of the battery cabinet by a screwdriver.
- 4) Remove the old fuse from the holder and replace it with the same type (5×20mm 0.5A/250V or 6×30mm 10A/250V) fuse.
- 5) Close the battery cabinet cover and fasten the screw.

6. MAINTENANCE

- 1) Before open the battery door, disconnect both test lead and never uses the meter before the battery door is closed.
- 2) To avoid contamination or static damage, do not touch the circuit board without proper static protection.
- 3) If the meter is not going to be used for a long time, take out the battery and do not store the meter in high temperature or high humidity environment.
- 4) Repairs or servicing not covered in this manual should only by qualified personal.
- 5) Periodically wipe the case with a dry cloth and detergent. Do not use abrasives or solvents on the meter.