

True RMS Inductance /Capacitance

SPECIALIST

Digital Multimeter User Manual





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Digital Multimeter User Manual

Thank you for purchasing this Digital Multimeter. A powerful true RMS multimeter that includes non-contact voltage testing, and a backlit LCD.

Please familiarise yourself with the functions of the multimeter before use. We recommend retaining this manual for ease of reference.

- Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
- Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential.
- Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
- Turn off power to the circuit under test before cutting, de-soldering, or breaking the circuit. Small amounts of current can be dangerous.
- Use caution when working above 60V DC or 30V AC rms, such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.
- Never apply voltage or current to the meter that exceeds the specified maximum.

FUNCTIONS

Max. Display	2000 Counts
Basic Accuracy	0.5%
DC Voltage Range	200mV-1000V
AC Voltage Range	200mV-750V
DC Current Range	200 μ A-10A
AC Current Range	200 μ A-10A
Resistance(Ω)	200 Ω >200M Ω
Capacitance (CAP)	10nF-100mF
Frequency (Hz)	10Hz-10MHz
Inductance	2mH-20H
Temperature	-20°C - 1000°C
Data Hold	Yes
Diode Test	Yes
Duty Cycle	Yes
Continuity Check	Yes
NCV (Non-Contact Voltage Detection)	Yes
Line Test	Yes
Max/Min	Yes
Hz/%	Yes
Range	Manual
LCD Backlight	Yes
Auto Power Off	Yes
Auto Power Off Disable	Yes

SAFETY

This symbol  indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.

CAUTIONS

- Improper use of this meter can cause damage, shock, injury or death. Read and understand this user manual before operating the meter.
- Always remove the test leads before replacing the battery or fuses.
- Inspect the condition of the test leads and the meter itself for any damage before operating the meter.
- Do not measure voltage if the voltage on the terminals exceeds 1000V above earth ground.
- Use great care when making measurements if the voltages are greater 30VAC RMS or 60VDC, these voltages are considered a shock hazard.
- Always discharge capacitors and remove power from the device to be tested before performing Diode, Resistance or Continuity tests.
- To avoid damages to the meter, do not exceed the maximum limits of the input values shown in the specifications.
- If the multimeter is going to be unused for an extended period of time, remove the batteries to prevent them from draining.

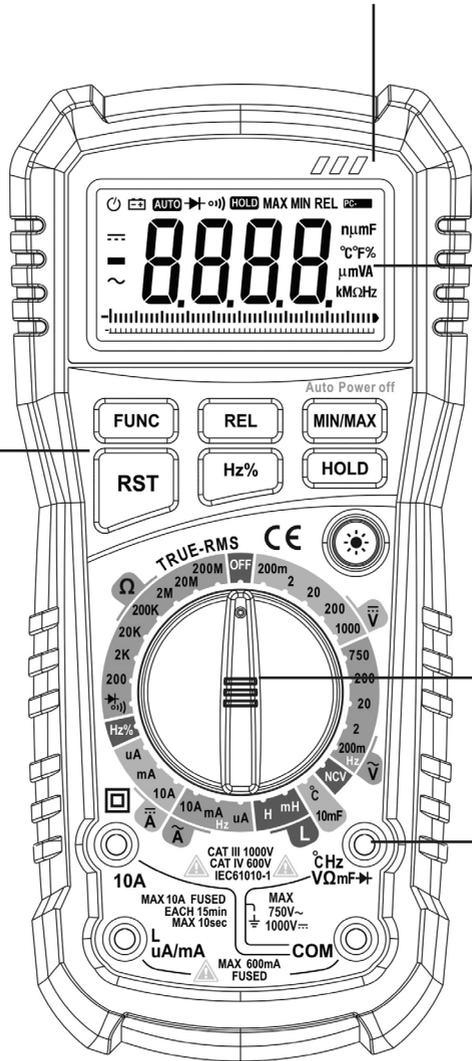
LED Indicator

LCD Display

Function Buttons

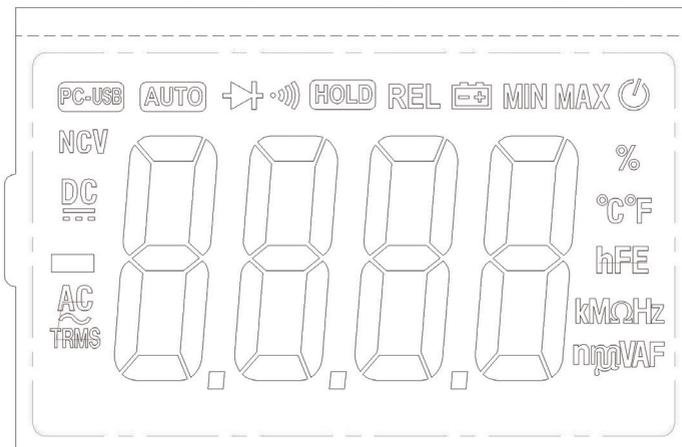
Rotary Switch

Input Jacks



FUNCTIONS

LCD Screen	Readings and measurements taken by the multimeter will display in this area.
Function Buttons	HOLD: Press this button to lock the readings in the LCD, press again to exit the hold mode. Press "☀️" to switch the back light mode, around 15 second exit from back light mode.
Rotary Switch	Moving the rotary switch to each individual range of measurement or to the range needing to be measured will also power on the unit.
Input Jacks	V/Ω: The positive input terminal for voltage, resistance, diode, temperature, frequency, capacitance, etc. COM: the negative input terminal for voltage, diode, temperature, etc. mA: the input terminal for lower 200mA current A: 10A input terminal.
Functions	FUNC: Activates secondary functions where available - primarily for use with diode or continuity testing REL: Stores reading and resets display to zero. Sets a relative reference point to measure against the next reading. MIN/MAX: Stores input values; beeps when a value is breached and a new value is set.



SYMBOL	DESCRIPTION
HOLD	Data Hold
	Diode Test
mV V	Unit of Voltage
Hz KHz MHz	Unit of Frequency
Ω K Ω M Ω	Unit of Resistance
hFE	Transistor
TRMS	True RMS Measurement
%	Duty Cycle Measurement
	Low Voltage Indication
	Continuity Check
μ A mA A	Unit of Current
pF nF μ F mF	Unit of Capacitance
μ H mH H	Unit of Inductance
$^{\circ}$ C	Centigrade Temperature
$^{\circ}$ F	Fahrenheit Temperature
REL	Relative Value Measurement

GENERAL SPECIFICATIONS

Max. Input Voltage:	AC750VRMS, DC1000V
Sampling Rate:	Approx. 2 times/sec
Operating Temperature:	0°C-40°C (32°F~104°F)
Operating Humidity:	<80%RH
Storage Temperature:	-10°C-60°C (14°F~122°F)
Storage Humidity:	<70%RH
Power Supply:	9V Battery (6F22) x 1pc
Dimension:	200 x 92 x 60mm (L x W x H)
Weight:	Approx. 230g (include battery)

BOX CONTENTS

- 1 x Digital Multimeter
- 1 x Temperature Probe
- 1 x User Manual

MEASUREMENT SPECIFICATIONS

Accuracy: \pm (%readings + digit),
Environment temperature: 18°C~28°C; humidity: \leq 80%

DC VOLTAGE

RANGE	RESOLUTION	ACCURACY
200mV	0.1mV	±(0.8% reading + 3 digits)
2V	0.001V	
20V	0.01V	
200V	0.1V	
1000V	1V	±(1.0% reading + 5 digits)

Input Impedance: 10MΩ
Max. Input Voltage: 1000VDC

AC VOLTAGE

RANGE	RESOLUTION	ACCURACY
200mV	0.1mV	±(1.0% reading + 5 digits)
2V	0.001V	
20V	0.01V	
200V	0.1V	
750V	1V	±(1.2% reading + 5 digits)

Input Impedance: 10MΩ
Max. Input Voltage: 750V ACRMS
Frequency Range: 40-1000Hz

DC CURRENT

RANGE	RESOLUTION	ACCURACY
200μA	0.1μA	±(1.0% reading + 5 digits)
2mA	0.001mA	
20mA	0.01mA	
200mA	0.1mA	
2A	0.001A	±(1.5% reading + 10 digits)
10A	0.01A	

Overload Protection: Fuse FF200mA/500V for mA range
Fuse FF10A/500V for A range

AC CURRENT

RANGE	RESOLUTION	ACCURACY
200 μ A	0.1 μ A	$\pm(1.2\%$ reading + 5 digits)
2mA	0.001mA	$\pm(1.5\%$ reading + 5 digits)
20mA	0.01mA	
200mA	0.1mA	
2A	0.001A	$\pm(1.8\%$ reading + 15 digits)
10A	0.01mA	

Overload Protection: Fuse FF200mA/500V for mA range
Fuse FF10A/500V for A range

Frequency Range: 40-1000Hz

RESISTANCE

RANGE	RESOLUTION	ACCURACY
200 Ω	0.1 Ω	$\pm(0.8\%$ reading + 5 digits)
2k Ω	0.001k Ω	
20k Ω	0.01k Ω	
200k Ω	0.1k Ω	
2M Ω	0.001Mk Ω	
20M Ω	0.01M Ω	$\pm(1.0\%$ reading + 10 digits)
200M Ω	0.1Mk Ω	$\pm \{(5.0\% + 10d) - 10d\}$

Overload Protection: 250VDC or 250VAC RMS

DIODE & CONTINUITY

RANGE	FUNCTION
	Display approximate forward voltage of diode.
	Built-in buzzer will sound if resistance is less than 100 Ω .

TEMPERATURE

RANGE	RESOLUTION	ACCURACY
-20° ~ 400°	1°C	±(2.0% reading + 3 digits)
400° ~ 1000°		
0° ~ 752°	1°F	±(3.0% reading + 3 digits)
752° ~ 1832°		

Overload Protection: 250VDC or 250VAC RMS

FREQUENCY

RANGE	RESOLUTION	ACCURACY
10Hz	0.01Hz	±(0.1% reading + 2 digits)
100Hz	0.1Hz	
1kHz	0.001kHz	
10kHz	0.01kHz	
100kHz	0.1kHz	
1MHz	0.001MHz	
10MHz	0.01MHz	

Overload Protection: 250VDC or 250VAC RMS

CAPACITANCE

RANGE	RESOLUTION	ACCURACY
10nF	0.001nF	±(4.0% reading + 25 digits)
100nF	0.01nF	±(4.0% reading + 25 digits)
1μF	0.001μF	
10μF	0.01μF	
100μF	0.1μF	
1mF	1μF	±(5.0% reading + 25 digits)
10mF	10μF	
100mF	100μF	

Overload Protection: 250VDC or 250VAC RMS

NOTE: It is normal for small capacitance measurements to display a reading once removed from the component being measured. Deduct the reading from the reading shown when measuring the capacitance for an accurate measurement.

INDUCTANCE

RANGE	RESOLUTION	ACCURACY
2mH	0.001mH	±(3.0% reading + 15 digits)
20mH	0.01mH	
200mH	0.1mH	±(3.5% reading + 15 digits)
2H	0.001H	±(3.5% reading + 20 digits)
20H	0.01H	

Overload Protection: 360VDC or AC RMS

OPERATING INSTRUCTIONS

AC AND DC VOLTAGE MEASUREMENT

WARNING:

Risk of electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

- To avoid electrical shock and/or damage to the instrument, do not attempt to take any voltage measurement that might exceed 1000VDC or 750VAC RMS.
- To avoid electrical shock and/or damage to the instrument, do not apply more than 1000VDC or 750VAC RMS between the common terminal and the earth ground.

1. Set the rotary switch to the voltage position.
2. Insert the black test lead banana plug into the negative COM jack; insert the red test lead banana plug into the positive V/ Ω jack.
3. Touch the black test probe tip to the negative side of the circuit; touch the red test probe tip to the positive side of circuit.
4. Read the voltage in the LCD display. The polarity of the red test lead connection will be indicated when making DC Voltage measurement eg. a reverse polarity reading will show as negative on the display.

NOTE: Unstable display may occur, especially at the low voltage range measurement, even no test leads inset at input terminals, if an erroneous reading is suspected, short the **V** jack and **COM** jack and make sure the zero displayed at LCD.

CURRENT MEASUREMENT

WARNING:

- To avoid damage to the meter, check the internal fuse before measuring current.
 - Use the proper terminals, function and range for any current measurement
 - Never attempt an open circuit potential to earth that is greater than 250V.
 - Do not place the test leads in parallel with a circuit or component when the test leads are plugged into the current terminals.
1. Remove the power from the circuit you are testing and discharge the capacitors of the circuit prior to setting the rotary switch to measure current.
 2. Insert black test lead banana plug into the negative COM jack. For current measurement less than 200mA, insert the red test lead banana plug into the mA jack. For current measurement between 200mA to 10A insert the red test lead banana plug into 10A jack.
 3. Place the red test lead on the anode of the diode and the black test lead on the cathode of diode. The meter will show the approximate forward voltage of diode while reverse voltage will indicate **OL**.
 4. Touch the test probe tips to the circuit or wire you wish to check, and the maximum value of resistance will be shown in the display. If the resistance is less than 100 Ω , the audible signal will sound.

NOTE:

- In a circuit, a good diode should produce a forward bias reading of voltage, however, the reverse-bias reading can be variable based on resistance of other pathways between the probe tips.
- To avoid electric shock, never measure continuity on circuits of wires with voltage.

RESISTANCE MEASUREMENT**WARNING:**

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements.

Remove the batteries and unplug the line cords.

1. Set the rotary switch to the desired resistance range.
2. Insert the black test lead banana plug into the negative **COM** jack, insert the red test lead banana plug into the positive **V** jack.
3. Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
4. Read the resistance in the LCD display.

NOTE:

- The measured value of a resistor in a circuit usually is different from the rated value of resistor, it is because the test current of the meter flows through all possible paths between the probe tips.
- In order to ensure the best accuracy in measurement of low resistance, short the test leads before the measurement and subtract this resistance value of the test leads.
- For high resistance measurement, the meter may take a few seconds to stabilize.
- In the open circuit, the meter display **OL** to indicate the over range.

CAPACITANCE MEASUREMENT**WARNING:**

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements.

1. Set the rotary switch to desired capacitance range.
2. Insert the black test lead banana plug into the negative **COM** jack, insert the red test lead banana plug into the positive **mA CX** jack.
3. Touch the test leads to the capacitor to be tested and read the capacitance value in the display.

NOTE:

- The test may take more time for large capacitors to charge, wait until the readings settle before removing the leads.
- To improve the accuracy of measurement less than 10nF, subtract the residual capacitance of the meter and test leads.

TEMPERATURE MEASUREMENT**WARNING:**

To avoid electrical shock, do not perform temperature measurement when the input voltage exceeds 36VDC or 36VAC RMS.

1. Set the rotary switch to °C / °F position, LCD displays values of environmental temperature.
2. Insert the temperature probe into the input jack, insert red plug of thermo probe into V °C/°F jack, black plug of thermo probe into COM jack, making sure to observe the correct polarity.
3. Place the temperature probe head onto the part you wish to measure, keeping the probe touching the surface until the reading stabilises.
4. Read the temperature in the LCD display.

FREQUENCY MEASUREMENT**WARNING:**

To avoid electric shock, do not apply more than 250VDC or 250VAC RMS before taking frequency measurement.

1. Set the rotary switch to desired frequency range.
2. Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive Hz jack.
3. Touch the test lead tips to the circuit under test.
4. Read the frequency value in the LCD display.

INDUCTANCE MEASUREMENT

1. Set the rotary switch to desired inductance range.
2. Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive ma LX jack.
3. Touch the test lead tips to the circuit under test.
4. Read the inductance value in the LCD display.

DISPLAY BACKLIGHT

Press the  button for 1 or 2 seconds to turn on or off the display backlight function, the backlight will automatically turn off after 10 seconds.

HOLD FUNCTION

The hold function freezes the reading in the display, press the **HOLD** button momentarily to activate or to exit the hold function.

AUTO POWER OFF

The auto off feature will turn the meter off after 15 minutes.

LOW BATTERY INDICATION

The  icon will appear in the LCD display when the battery voltage becomes low, replace the battery when this icon appears.

MAINTENANCE

WARNING:

- To avoid the electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery or fuse covers.
- To avoid electric shock, do not operate the meter until the battery and fuse covers are in place and fastened securely.

BATTERY INSTALLATION

To avoid the false readings, replace the battery as soon as the battery indicator  appears.

1. Turn power off and disconnect the test leads from the meter.
2. Open the rear battery cover by using screwdriver.
3. Insert the battery into battery holder, observing the correct polarity.
4. Put the battery cover back in place, secure with the screws.

REPLACING THE FUSES

1. Turn power off and disconnect the test leads from the meter.
2. Remove the battery cover and the battery.
3. Remove the screws securing the rear cover.
4. Gently remove the old fuse and install the new fuse into fuse holder.
5. Replace and secure the rear cover, battery and battery cover.

NCV (NON-CONTACT VOLTAGE) DETECTION

Due to external interference sources, this test may detect the wrong voltage. Please use as an estimate only. Detection may be interfered by socket design, insulation thickness and other variable conditions. External sources such as flashlights, motors, etc may interfere with reading and cause the wrong detection.

- 1) Set the rotary switch to NCV position and wait for EF to display on screen.
- 2) Contact the top part of meter with the circuit being tested.
- 3) The LED light will flash and an audible signal will sound, with the signal strength displayed on screen.