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## Overview



### Warning

**To avoid the risk of injury from electric shock, read the “Safety Information” and “Rules For Safe Operation” carefully before using the meter.**

The Digital Multimeter Model 72-7935 (hereafter referred to as the meter) is a highly reliable handheld measuring instrument featuring a variety of functions in a compact design. Features include a 3-3/4 digit LCD display and dual A/D converters and will measure AC/DC voltage, resistance, capacitance, frequency, duty cycle, diode and continuity. Additional capabilities include relative mode, data hold, full icon display and sleep mode.

**Unpacking Inspection****Inspection**

This meter includes the following items:

<b>Item</b>	<b>Description</b>	<b>Qty</b>
1	English Operating Manual	1 piece
2	Built-In Test Lead	1 pair
3	Vinyl Holder	1 piece
4	3V Button Battery (CR2032)	1 piece

In the event items missing or damaged, please contact your dealer immediately.



## **Safety Information**

This Meter complies with the standards IEC61010: in pollution degree 2, overvoltage category (CAT. II 300V) and double insulation.

CAT. II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient voltage overvoltages than CAT. III

Use the Meter only as specified in this operating manual, otherwise the protection provided by the Meter may be impaired.

In this manual, a **Warning** identifies conditions and actions that pose hazards to the user, or may damage the Meter or the equipment under test.

A **Note** identifies the information that user should pay attention on.


International electrical symbols used on the Meter and in this Operating Manual are explained on page 9.

## Rules For Safe Operation

### Warning

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules:

- 1 Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.
- 1 Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity.
- 1 Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.
- 1 The rotary switch should be placed in the desired position prior to connecting leads. This position should not be changed while leads are connected.












- 1 When using the Meter at an effective voltage over 60V DC 30V rms AC, special care should be taken for there is danger of electric shock.
- 1 Use the proper terminals, function, and range for your measurements.
- 1 Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after dampened.
- 1 When using the test leads, keep your fingers behind the finger guards.
- 1 Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes or capacitance.
- 1 Replace the battery as soon as the battery indicator  appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- 1 Remove the connection between the testing leads and the circuit being tested, and turn the Meter power off before opening the Meter case.



**Rules For Safe Operation (3)**

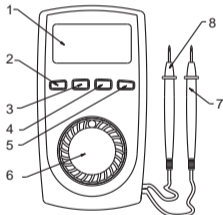
- 1 **When servicing the Meter, use only the same model number or identical electrical specifications replacement parts.**
- 1 **The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.**
- 1 **Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing. No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.**
- 1 **The Meter is suitable for indoor use only.**
- 1 **Turn the Meter power off when it is not in use and take out the battery when not using for a long time.**
- 1 **Periodically check the battery for leaks, a leaking battery will damage the meter.**

## International Electrical Symbols

	Low Battery
	AC (Alternating Current)
	Capacitance
	Double Insulated
	Warning. Refer to the Operating Manual
	Conforms to Standards of European Union
	Ground
	DC (Direct Current)
	Diode
	Continuity Test
	Fuse



**The Meter Structure****The Meter Structure** (see figure 1)

1. LCD Display
2. **SELECT** Button
3. **RELATIVE** Mode Button
4. **DATA HOLD** Button
5. **Hz/DUTY** Button
6. Rotary Switch
7. Black Test Lead
8. Red Test Lead





( figure 1)

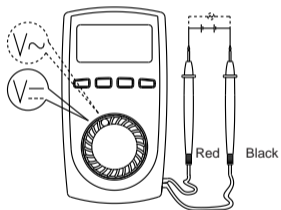
## Functional Buttons

Button	Operation Performed
<b>SELECT</b>	Press <b>SELECT</b> to switch between resistance, capacitance, continuity buzzer and diode measurement modes; the Meter beeps. Resistance measurement is default.
<b>RELATIVE</b>	Press <b>RELATIVE</b> to enter and exit the REL mode in any measuring mode except in frequency/duty cycle; the Meter beeps.
<b>DATA HOLD</b>	<ul style="list-style-type: none"> <li>1 Press <b>HOLD</b> once to enter hold mode.</li> <li>1 Press <b>HOLD</b> again to exit hold mode.</li> <li>1 In Hold mode, <b>H</b> is displayed and the present value is shown.</li> </ul>
<b>Hz/DUTY</b>	<ul style="list-style-type: none"> <li>1 Press <b>Hz/DUTY</b> at DCV  to step through DCV, frequency and duty cycle measurement mode. <b>AUTO</b> on the LCD will disappear.</li> <li>1 Press <b>Hz/DUTY</b> at ACV  to step through ACV, frequency and duty cycle measurement mode. <b>AUTO</b> on the LCD will disappear.</li> <li>1 The Meter will be at DCV: 400mV or ACV: 4V after stepping through frequency and duty cycle measurement mode. Therefore it is necessary to turn the rotary switch or turn off and on the Meter to resume to autoranging mode when measuring higher voltage.</li> </ul>

## Measurement Operation

- 1 Make sure the Sleep Mode is not on if there is no display on the LCD after turning on the Meter.
- 1 Make sure the Low Battery Display  is not on, otherwise false readings may occur.
- 1 Pay extra attention to the  symbol which is located besides the input terminals of the Meter before carrying out measurement.

A. DC Voltage Measurement (see figure 2)



( figure 2)

**Warning**

To avoid harm to you or damage to the Meter from electric shock, please do not attempt to measure voltages higher than 300V although readings may be obtained, and take extra care when measuring high voltage.

To measure DC voltage, connect the Meter as follows:

1. Set the rotary switch to **DCV** range.
2. Connect the test leads across with the object being measured with red test lead to the positive and black test lead to the negative.

The measured value shows on the display.

**Note**

- 1 The LCD displays the negative reading when the test lead connection is reversed.
- 1 When DC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

**B. AC Voltage Measurement** (see figure 2 with dotted line)



**Warning**

**To avoid harm to you or damage to the Meter from electric shock, please do not attempt to measure voltages higher than 300V although readings may be obtained and take extra care when measuring high voltage.**

To measure AC Voltage, connect the Meter as follows:

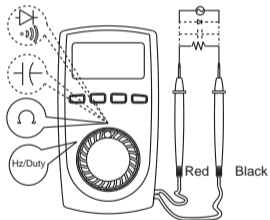
1. Set the rotary switch to **ACV**  $\sim$  range.
2. Connect the test leads across with the object being measured.

The measured value shows on the display

**Note**

- 1 The LCD displays the negative reading when the test lead connection is reversed.
- 1 When AC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.



**C. Measuring Resistance (see figure 3)**

( figure 3)



Warning

To avoid damage to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.

To measure resistance, connect the Meter as follows:

1. Set the rotary switch to  $\bullet \parallel \Omega \rightarrow$  range.
2. Connect the test leads across with the object being measured.  
The measured value shows on the display.

Note

- 1 The test leads can add  $0.1\Omega$  to  $0.3\Omega$  of error to the resistance measurement. To obtain precision readings in low-resistance, that is the range of  $400\Omega$ , short-circuit the red and black test leads beforehand and record the reading obtained (called this reading as X).  
Then use the equation:  
measured resistance value (Y) – (X) = precision readings of resistance.



## Measurement Operation(7)

- 1 For high resistance ( $>1\text{M}\Omega$ ), it normally requires several seconds to obtain a stable reading.
- 1 When there is no input, for example in open circuit condition, the Meter displays "OL".
- 1 When resistance measurement has been completed, disconnect the connection between the leads and the circuit under test.

#### D. Frequency and Duty Cycle Measurement (see figure 3 with dotted line)

##### Warning

To avoid harm to you or damage to the Meter, do not attempt to measure voltages higher than 60V DC or 30V rms AC although readings may be obtained.

The testing resolution may vary from the inputted frequency and waveform, the Meter resolution is based on the sine wave.

To measure frequency and duty cycle, connect the Meter as follows:

1. Set the rotary switch to ACV $\sim$  or DCV $\text{---}$  range.
2. Press Hz/DUTY button select Frequency or Duty Cycle measurement mode.
3. Connect the test leads across with the object being measured.

The measured value shows on the display.

##### Note

- 1 When Hz or Duty Cycle measurement has been completed, disconnect the connection between the leads and the circuit under test.

### E. Measuring Diodes & Continuity (see figure 3 with dotted line)



#### Warning

To avoid damage to the Meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring diodes and continuity.

Never attempt to test over 60V DC or 30V rms AC to avoid personal injury .

#### Testing Diodes

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, and then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

To test out a diode out of a circuit, connect the Meter as follows:

1. Set the rotary switch to    $\Omega$   range.




2. Press SELECT button to select diode test.
3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode.  
The LCD displays the nearest value of diode forward voltage drop.

#### Note

- 1 In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V; however; the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- 1 Connect the test leads properly as said above to avoid error display. The LCD will display "OL" indicating open-circuit for wrong connection. The unit of diode is Volt (V), displaying the positive-connection voltage-drop value.
- 1 When diode testing has been completed, disconnect the connection between the leads and the circuit under test.

### Testing for Continuity

To test for continuity, connect the Meter as below:

1. Set the rotary switch to    $\Omega$   range.
2. Press SELECT button to select continuity test.
3. Connect the test leads across with the object being measured.

The buzzer sounds continuously if the resistance of a circuit under test is less than 100 $\Omega$ .

The LCD displays the resistance value of a circuit under test.

### Note

- 1 When continuity testing has been completed, disconnect the connection between the leads and the circuit under test.

#### F. Capacitance Measurement (see figure 3 with dotted line)



##### Warning

To avoid damage to the Meter or to the equipment under test, disconnect the tested circuit power when measuring on line capacitors and discharge all high-voltage capacitors before measuring capacitance.

Use the DC voltage function to confirm that the capacitor is discharged. Never attempt to test over 60V DC or 30V rms AC to avoid personal injury .

To measure capacitance, connect the Meter as follows:

1. Set the rotary switch to  $\bullet \cdot \cdot \cdot \leftarrow \Omega \rightarrow \bullet \cdot \cdot \cdot$  range.
2. Press SELECT button to select capacitance test.
3. Capacitance range open circuit has display value, please select relative measurement mode by pressing RELATIVE button once.
4. Connect the test leads across with the object being measured.  
The measured value shows on the display.



**Note**




- 1 For testing the capacitor with polarity, connect the red test lead to anode & black test lead to cathode
- 1 For measuring capacitance higher than 100 $\mu$ F, it normally requires several seconds to obtain a stable reading.
- 1 When capacitance measurement has been completed, disconnect the connection between the leads and the circuit under test.



## Sleep Mode

To preserve battery life, the meter enters sleep mode after 15 minutes of inactivity. In this mode, the battery current draw is approximately  $10\mu\text{A}$ . The meter can be reactivated by pressing the SELECT button.

## General Specifications

- 1 Maximum voltage between any Terminals and Ground: 300VAC RMS or 300VDC
- 1 Range: Auto ranging.
- 1 Maximum Display: 3999. (3 3/4 digits)
- 1 Measurement Speed: Updates 3 times/second.  
Operating Temperature: 0°C~40°C(32°F~104°F), Relative Humidity:≤75  
Storage Temperature: -10°C~50°C( 14°F~122°F).
- 1 Altitude: Operating: 2000m; Storage: 10000m.
- 1 Battery Type: 3V button battery (CR2032).
- 1 Battery Deficiency: At around < 2.4, VDisplay “  ”.
- 1 Data Holding: Display “  ”
- 1 Negative reading: Display “—“
- 1 Overloading: Display “OL”.
- 1 Dimensions (HxWxL): 4.25" x 2.25" x 0.5" .
- 1 Weight: Approx.4.4OE (battery and test lead included).
- 1 Safety/Compliances: IEC61010 CAT II 300V overvoltage and double insulation standard.
- 1 Certificate: 



## Accuracy Specifications

Accuracy:  $\pm(a\% \text{ reading} + b \text{ digits})$ , guarantee for 1 year.

Operating temperature:  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .

Relative humidity:  $<75\%$ .

Temperature coefficient:  $0.1 \times (\text{specified accuracy}) / 1^{\circ}\text{C}$

**Accuracy Specifications(2)****A. DC Voltage**

Range	Resolution	Accuracy	Overload Protection	Remarks
400mV	0.1mV	$\pm(0.8\%+3)$	300V DC 300V AC.	Input Impedance: $\geq 10M\Omega$
4V	1mV	$\pm(0.8\%+1)$		
40V	10mV			
300V	100mV			

## B. AC Voltage

Range	Resolution	Accuracy	Overload Protection	Remarks
4V	1mV	±(1.2%+3)	300V DC 300V AC.	1 Input Impedance: 10MΩ. 1 Frequency response: 40Hz~400Hz. 1 Display effective value of sine wave (mean value response).
40V	10mV			
300V	100mV			

**Accuracy Specifications(4)****C. Resistance Test**

Range	Resolution	Accuracy	Overload Protection	Remarks
400Ω	0.1Ω	±(1.2%+2)	250V AC	Open circuit voltage: approx. 0.45V
4kΩ	1Ω	±(1%+2)		
40kΩ	10Ω			
400kΩ	100Ω			
4MΩ	1kΩ	±(1.2%+2)		
40MΩ	10kΩ	±(1.5%+2)		

## D. Frequency



Range	Resolution	Accuracy	Overload Protection	Remarks
99.99Hz	0.01Hz	±(0.5%+3)	250V AC	1 The inputted voltage is sine wave
999.9Hz	0.1Hz			1 When 10Hz ~10kHz: ≥1V rms
9.999kHz	0.001kHz			1 When 10kHz~100kHz: ≥30V rms.
99.99kHz	0.01kHz			



**E. Duty Cycle**

Range	Resolution	Overload Protection	Remarks
0.1% ~ 99.9%	0.1%	250V AC	1 Press Hz/DUTY button at ACV $\sim$ or DCV $\equiv$ range to select Duty Cycle measurement mode. 1 Reading is only for reference,

**F. Diodes and Continuity Test**

Function	Range	Resolution	Input Protection	Remarks
Diode		1mV	250V AC	Open circuit voltage approx.1.5V
Continuity Buzzer		0.1 $\Omega$		1 Open circuit voltage approx. 0.45V, f=2.7kHz 1 Approx. $\leq 120\Omega$ buzzer beeps continuously

Model 72-7935: OPERATING MANUAL  
Accuracy Specifications(7)



G. Capacitance

Range	Resolution	Accuracy	Overload Protection	Remarks
4nF	0.001nF		250V AC	Reading is only for reference
40nF	0.01nF	±(4%+3)		1 Open circuit voltage: around 0.45V 1 Measuring under Relative mode.
400nF	0.1nF			
4μF	0.001μF			
40μF	0.01μF			
200μF	0.1μF	±(5%+10)	When the tested capacitor is greater than 100μF, the reading is only for reference	

## Maintenance

This section provides basic maintenance information including battery and fuse replacement instruction.

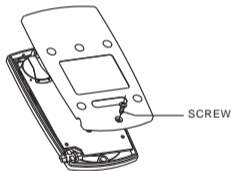


### Warning

Do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service information. To avoid electric shock or damage to the Meter, do not allow water inside the case.


#### A. General Service

- 1 Periodically wipe the case with damp cloth and mild detergent. Do not use chemical solvent.
- 1 To clean the terminals with cotton bar with detergent, as dirt or moisture in the terminals can affect readings.
- 1 Clean terminals with cotton ball with detergent, as dirt or moisture in the terminals can affect readings.
- 1 Do not store the Meter in place of humidity, high temperature, explosive, inflammable and strong magnetic field

**B. Replacing the Battery (see figure 4)****(figure 4)**



Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator  appears.

To replace battery:

1. Disconnect the connection between the leads and the circuit under test.
2. Turn the Meter OFF
3. Remove the screw from the case bottom; separate the case bottom from the case top.
4. Remove the battery and replace with a new 3V Button Battery (CR2032).
5. Rejoin the case bottom and the case top, and install the screw

**\*\* END \*\***

This operating manual is subject to change without notice.



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# Compact Solar LED Torch

**DURATOOL**



## Specifications

- Charged through any lights source anytime, anywhere as easy as calculator
- Built-in Lithium battery / LIR2450, 3.6V, 110mAh
- Tested by fully charged battery: 3 LEDs could light up to 2H
- LED: 15,000mcd  $\Phi$ 5
- Product size: 117mm  $\times$  44mm  $\times$  13.9mm

## Part Number Table

Description	Part Number
Compact Solar LED Torch	ET-0630

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**DURATOOL**



# Wire Stripper



## Features:

- For 22AWG to 10AWG Copper and Aluminum wire
- Three tools in one-wire stripper, cutter, and pliers
- Red cushion grip handle provides maximum leverage
- Length : 6-1/4"

## Part Number Table

Description	Part Number
Wire Stripper	22-8850

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