UT39E Operating Manual

Modern Digital Multimeter

Safety Information

This Meter complies with the standards IEC61010: in pollution degree 2, overvoltage category (CAT. I 1000V, CAT. II 600V) and double insulation.

CAT. I: Signal level, special equipment or parts of equipment, telecommunication, electronic, etc., with smaller transient overvoltages than overvoltages CAT. II.

CAT. II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transien t 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 below.

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:

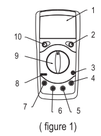
- **Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.**
- **Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads with identical model number or electrical specifications before using the Meter.**
- **Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.**
- **The rotary switch should be placed in the right position and no any changeover of ra nge shall be made during measurement is conducted to prevent damage of the Meter.**
- **When the Meter working at an effective voltage over 60V in DC or 30V rms in AC, special care should be taken for there is danger of electric shock.**
- **Use the proper terminals, function, and range for your measurements.**
- **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.**
- **When using the test leads, keep your fingers behind the finger guards.**
- **Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, capacitance or current.**
- **Before measuring current, check the Meter's fuses and turn off power to the circuit before connecting the Meter to the circuit.**
- **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.**
- **Remove test leads from the Meter and turn the Meter power off before opening the Meter case.**
- **When servicing the Meter, use only the same model number or identical electrical specifications replacement parts.**
- **The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.**
- **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.**
- **The Meter is suitable for indoor use.**
- **Turn the Meter power off when it is not in use and take out the battery when not using for a long time.**
- **Constantly check the battery as it may leak when it has been using for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.**

Interational Electrical Symbols

Low Battery	DC Current
AC Current	Continuity Test
Double Insulation	⚠ Warning
AC or DC	Fuse
Earth Grounding	Diode
CE Conforms to Standards of European Union	

The Meter Structure (see figure 1)

1. LCD Display
2. Data Hold Button
3. Transistor Jack
4. **COM** Input Terminal
5. Other Input Terminals
6. **mA** Input Terminal
7. **20A** Input Terminal
8. Capacitance Jack
9. Rotary Switch
10. Power



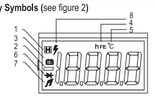
(figure 1)

Functional Buttons

Below table indicated for information about the functional button operations

Button	Operation Performed
POWER (Yellow Button)	Turn the Meter on and off. • Press down the **POWER** to turn on the Meter. • Press up the **POWER** to turn off the Meter.
HOLD (Blue Button)	• Press **HOLD** once to enter hold mode. • Press **HOLD** again to exit hold mode. • In Hold mode, **H** is displayed and the present value is shown.

Display Symbols (see figure 2)



(figure 2)

No.	Symbol	Meaning
1	H	Data hold is active.
2	−	Indicates negative reading.
3		The battery is low. ⚠ **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.**
4	hFE	Unit of Transistor.
5	°C	Centigrade temperature.
6		Test of diode.
7		The continuity buzzer is on.
8		Dangerous Voltages.

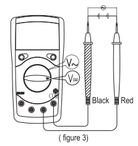
Measurement Operation

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

A. DC Voltage Measurement (see figure 3)

⚠ **Warning**

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V or 750V rms although readings may be obtained.
Take extra attention when measuring high voltages to avoid electric shock.



(figure 3)

To measure DC voltage, connect the Meter as follows:

1. Insert the red test lead into the **VΩ** input terminal and the black test lead into the **COM** input terminal.
2. Set the rotary switch to an appropriate measurement position in **V⎓** range.
3. Connect the test leads across with the object being measured.

The measured value shows on the display.

Note

- If the value of voltage to be measured is unknown, use the maximum measurement position (1000V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays "1" indicating the existing selected range is overloaded, it is required to select a higher range in order to obtain a correct reading.
- In each range, the Meter has an input impedance of approx. 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).
- 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 3 with dotted line)

⚠ **Warning**

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V or 750V rms although readings may be obtained.
Take extra attention when measuring high voltages to avoid electric shock.

To measure AC voltage, connect the Meter as follows:

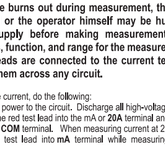
1. Insert the red test lead into the **VΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to an appropriate measurement position in **V～** range.
3. Connect the test leads across with the object being measured.

The measured value shows on the display, which is effective value of sine wave (mean value response).

Note

- If the value of voltage to be measured is unknown, use the maximum measurement position (750V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays "1" indicating the existing selected range is overloaded, it is required to select a higher range in order to obtain a correct reading.
- In each range, the Meter has an input impedance of approx. 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).
- When AC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

C. DC Current Measurement (see figure 4)



(figure 4)

⚠ **Warning**

Never attempt an in-circuit current measurement where the open circuit voltage between terminals and ground is greater than 60V DC or 30V rms.
If the fuse burns out during measurement, the Meter may be damaged or the operator himself may be hurt. Disconnect power supply before making measurement. Use proper terminals, function, and range for the measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

To measure current, do the following:

1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Insert the red test lead into the **mA** or **20A** terminal and the black test lead into the **COM** terminal. When measuring current at 200mA below, insert the red test lead into **mA** terminal while measuring current 200mA or above, insert the red test lead into **20A** terminal
3. Set the rotary switch to an appropriate measurement position in **A⎓** range.
4. Break the current path to be tested. Connect the red test lead to the more positive side of the break and the black test lead to the more negative side of the break.
5. Turn on power to the circuit.

The measured value shows on the display.

Note

If the value of current to be measured is unknown, use the maximum measurement position (20A) and 20A terminal, and reduce the range step by step until a satisfactory reading is obtained.

- Replace appropriate rating fuse when the fuse is burnt. Fuse specification: 0.315A, 250V fast type fuse, Φ 5×20mm
- At 10A Range: For continuous measurement ≤10 seconds and interval not less than 15 minutes.
- When current measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

D. AC Current Measurement (see figure 4 with dotted line)

⚠ **Warning**

Never attempt an in-circuit current measurement where the voltage between terminals and ground is greater than 60V or 30V rms.
If the fuse burns out during measurement, the Meter may be damaged or the operator himself may be hurt. Disconnect power supply before making measurement. Use proper terminals, function, and range for the measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

To measure current, do the following:

1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Insert the red test lead into the mA or **20A** terminal and the black test lead into the **COM** terminal. When measuring current at 200mA below, insert the red test lead into **mA** terminal while measuring current 200mA or above, insert the red test lead into **20A** terminal
3. Set the rotary switch to an appropriate measurement position in **A～** range.
4. Break the current path to be tested. Connect the red test lead to the more positive side of the break and the black test lead to the more negative side of the break.
5. Turn on power to the circuit.

The measured value shows on the display.

Note

- If the value of current to be measured is unknown, use the maximum measurement position (20A) and 20A terminal, and reduce the range step by step until a satisfactory reading is obtained.
- Replace appropriate rating fuse when the fuse is burnt. Fuse specification: 0.315A, 250V fast type fuse, Φ 5×20mm
- At 10A Range: For continuous measurements≤10 seconds and interval not less than 15 minutes.
- When current measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

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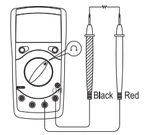
E. Measuring Resistance (see figure 5)



(figure 5)

⚠ **Warning**

To avoid damages 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. Insert the red test lead into the **VΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to an appropriate measurement position in Ω range.
3. Connect the test leads across with the object being measured.

The measured value shows on the display.

Note

- The test leads can add 0.1Ωto 0.3Ω of error to the resistance measurement. To obtain precision readings in low-resistance, that is the range of 200Ω, 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.

- For high resistance (>1MΩ), it is normal taking several seconds to obtain a stable reading.
- When there is no input, for example in open circuit condition, the Meter displays "1".
- When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

F. Measuring Diodes & Continuity

⚠ **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 input over 60V in DC or 3V rms in AC to avoid personal dangerous.

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. Insert the red test lead into the **VΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to .
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

- 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.
- Connect the test leads to the proper terminals as said above to avoid error display. The LCD displays "1" indicating open-circuit for wrong connection. The unit of diode is Volt (V), displaying the positive-connection voltage-drop value.
- When diode testing has been completed, disconnect the connection between the testing leads and the circuit under test.

Testing for Continuity

To test for continuity, connect the Meter as below:

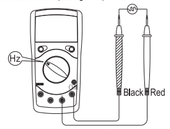
1. Insert the red test lead into **VΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to .
3. Connect the test leads across with the object being measured.
4. The buzzer sounds continuously if the resistance of a circuit under test is ⩽70Ω, .

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

Note

- The LCD displays "1" indicating the circuit being tested is open.
- When continuity testing has been completed, disconnect the connection between the testing leads and the circuit under test.

G.Frequency Measurement (see figure 6)



(figure 6)

⚠ **Warning**

To avoid harm to you or damages to the Meter, do not attempt to measure voltages higher than 60V in DC or 30V rms in AC although readings may be obtained.
When the frequency signal to be tested is higher than 30V rms, the Meter cannot guarantee accuracy of the measurement.

To measure frequency, connect the Meter as follows:

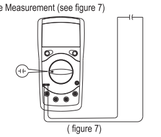
1. Insert the red test lead into the **VΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to an appropriate measurement position in **kHz** range.
3. Connect the test leads across with the object being measured.

The measured value shows on the display.

Note

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

H.Capacitance Measurement (see figure 7)



(figure 7)

⚠ **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 input over 60V in DC or 3V rms in AC to avoid personal dangerous.

To measure capacitance, connect the Meter as follows:

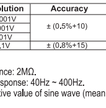
1. Insert the capacitor to be tested into the capacitance jack.
2. Set the rotary switch to an appropriate measurement position in +|– range.
3. Connect the test leads across with the object being measured.

The measured value shows on the display.

Note

- For testing the capacitor with polarity, connect the red test lead to anode & black test lead to cathode
- When the tested capacitor is shorted or the value is overloaded, the LCD display "1".
- To minimize the measurement error caused by the distributed capacitor, the connection should be as short as possible.
- It is normal to take a while for zeroing when changing over the measurement range. This process will not affect the accuracy of the final readings obtained.

I.Measuring Transistor (see figure 8)



(figure 8)

To measure transistor, connect the Meter as follows:

1. Set the rotary switch to hFE.
2. Insert the NPN or PNP type transistor to be tested into the transistor jack.
3. The measured nearest transistor value shows on the display.

Note

- When transistor measeurement has been completed, remove the transistor from the transistor jack.

Sleep Mode

To preserve battery life, the Meter automatically turns off if you do not turn the rotary switch or press any button for around 15 minutes. At that time, the Meter consumes around 10μA current.

The Meter can be activated by pressing the **POWER** two times.

General Specifications

- Maximum voltage between any Terminals and Grounding: 1000VDC or 750VAC.
- ⚠ Fused Protection for mA Input Terminal: 0.315A, 250V fast type , Φ 5×20mm.
- ⚠ Fused Protection for 20A Input Terminal: Un-fused.
- Range: Manual ranging.
- Maximum Display: 19999.
- Measurement Speed: Updates 2~3 times/second.
- Temperature:

Operating: 0 °C ~ 40 °C (32 °F ~ 104 °F);
Storage: -10 °C ~ 50 °C (14 °F ~ 122 °F);

- Relative Humidity: ≤75% @ 0 °C~30 °C; ≤ 50% @ 31 °C ~ 40 °C
- Altitude: Operating: 2000m; Storage: 10000m.
- Battery Type: 9V NEDA1604 or 6F22 or 006P.
- Battery Deficiency: Display "".
- Data Holding: Display "H"
- Negative reading: Display "−"
- Overloading: Display "1".
- Dimensions (H x W x L): 172 x 83 x 38mm.
- Weight: Approx.310g (battery included).
- Safety/Compliances: EC61010 CAT I 1000V, CATII 600V overvoltage and double insulation standard.
- Certificate: CE

Accuracy Specifications

Accuracy: ±（a% reading + b digits）, guarantee for 1 year.
Operating temperature: 23 °C ± 5 °C.
Relative humidity: <75%.
Temperature coefficient: 0.1 x (specified accuracy) / 1 °C

A. DC Voltage

Range	Resolution	Accuracy	Overload Protection
200mV	0,01mV	± (0.05%+3)	250V DC or AC rms
2V	0,0001V	± (0.1%+3)	1000V DC or 750V rms
20V	0,001V		
200V	0,01V		
1000V	0,1V	± (0.15%+5)	

Remark:

- Input impedance: 10MΩ.

B. AC Voltage

Range	Resolution	Accuracy	Overload Protection
2V	0,0001V	± (0.5%+10)	1000V DC or 750V rms
20V	0,001V		
200V	0,01V		
750V	0,1V	± (0.8%+15)	

Remarks:

- Input impedance: 2MΩ.
- Frequency response: 40Hz ~ 400Hz.
- Display effective value of sine wave (mean value response).

C. DC Current

Range	Resolution	Accuracy	Overload Protection
2mA	0,0001mA	± (0,5%+5)	0.315A, 250V fast type fuse, Φ 5×20mm
200mA	0,01mA	± (0,8%+5)	
20A	0,001A	± (2%+10)	Un - Fused

Remarks:

- At 20A Range: For continuous measurements≤10 seconds and interval not less than 15 minutes
- Measurement voltage drop: Full range at 200mV.

D. AC Current

Range	Resolution	Accuracy	Overload Protection
2mA	0,0001mA	± (0,8%+10)	0.315A, 250V fast type fuse, Φ 5×20mm
200mA	0,01mA	± (1,2%+10)	
20A	0,001A	± (2,5%+10)	Un - Fused

Remarks:

- At 20A Range: For continuous measurements≤10 seconds and interval not less than 15 minutes
- Measurement voltage drop: Full range at 200mV.
- Frequency reaponse: 40Hz~400Hz
- Display effective value of sine wave (mean value response).

E. Resistance Test

Range	Resolution	Accuracy	Overload Protection
200Ω	0,01Ω	± (0,5%+10)	250V rms
2KΩ	0,0001KΩ	± (0,3%+1)	
20KΩ	0,001KΩ		
2MΩ	0,0001MΩ		
200MΩ	0,01MΩ	± (5%(reading-100)+10)	

Remarks:

- At 200MΩ range, test lead is in short circuit, and it is normal to display 100 digits. During measurement, subtract the 100 digits from the reading.
- When measuring at the range of 200Ω, short-circuit the red and black test leads beforehand to display the test lead's resistance value. Then use the measured value minus this test lead's resistance value to obtain the correct tested resistance value.

F. Diodes and Continuity Test

Function	Range	Resolution	Input Protection	Remark
Diode		0.1mV	250V rms	Open circuit voltage approx.2.8V
Continuity Buzzer		0.1Ω		Approx. ≤ 70 Ω buzzer beeps continuously

G. Frequency

Range	Resolution	Accuracy	Overload Protection
2kHz	0,0001kHz	± (2%+5)	250V rms
20kHz	0,001kHz	± (1.5%+5)	

Remarks:

- Input Sensitivity: ≤200mV.
- When the input voltage is ≥30V rms, no guaranteed accuracy.

H. Capacitance

Range	Resolution	Accuracy	Overload Protection
2nF	0,0001nF	± (4%+10)	250V rms
20nF	0,001nF		
200nF	0,01nF		
20uF	0,001uF		

Remarks:

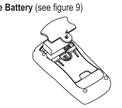
- Testing signal: approx. 400Hz, 40mV rms.

I. Transist Tester

Range	Remarks	Testing Conditions
hFE	Can measure NPN or PNP transistor. Display range: 0 - 1000β	Vce ≈ 2,8V I bo ≈ 10 μ A

Maintenance

A. Replacing the Battery (see figure 9)

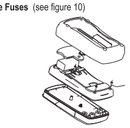


(figure 9)

⚠ **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.

B. Replacing the Fuses (see figure 10)



(figure 10)

⚠ **Warning**

To avoid electrical shock or arc blast, or personal injury or damage to the Meter, use specified fuses ONLY in accordance with the following procedure.

*** END ***

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