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Overview

This Operation Manual covers information on safety and cautions. Please read the relevant information carefully and observe all the **Warnings** and **Notes** strictly.

⚠Warning

To avoid electric shock or personal injury, read the "Safety Information" and "Rules for Safe Operation" carefully before using the Meter.

Digital Multimeter **Model UT20B** (hereafter referred to as "the Meter") is a pocket-size hand-held digital multimeter with advanced design, multiple functions, and reliable performance. Because of its small size, it is very convenience for user to work with it. It is very easy to operate, so it is suitable to the beginner of multimeter. Besides the basic functions, the Meter also has some extraordinary functions such as battery test and square wave output.

Unpacking Inspection

Open the packing case and take out the Meter. Check the following items carefully to see any missing or damaged part:

Item	Description	Qty
1	Operating Manual	1 piece
2	Test Lead (affixed onto the Meter)	1 pair
3	12V Battery (A23) (installed)	1 piece

In the event you find any missing or damage, 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 (1)

⚠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.**
- **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 range shall be made during measurement is conducted to prevent damage of the Meter.**

Rules For Safe Operation (2)

- 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 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, diodes 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.
- Turn the Meter power off before opening the Meter case.
- When servicing the Meter, use only the same model number or identical

Rules For Safe Operation (3)

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 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.**

International Electrical Symbols

~	AC (Alternating Current)
⎓	DC (Direct Current)
⏚	Grounding.
⧈	Double Insulated.
	Deficiency of Built-In Battery.
	Diode.
	Fuse.
⚠	Warning. Refer to the Operating Manual.
CE	Conforms to Standards of European Union.

Rotary Switch

Below table indicated for information about the rotary switch positions.

Rotary Switch Position	Function
OFF	Turn on or off the power.
V~	AC voltage measurement range from 200V to 300V.
A⎓	DC current measurement range from 2000μA to 200mA.
⊓⊔	Square wave output.
⊣⊢	Battery test (1.5V & 9V battery).
⊣▶⊢	Diode test.
Ω	Resistance measurement range from 200Ω to 2000kΩ.
V⎓	DC voltage measurement range from 200mV to 300V.

Display Symbols

Symbol	Meaning
▬	Indicates negative reading.
1	The input value is too large for the selected range.

Measurement Operation (1)

A. AC Voltage Measurement

⚠Warning

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 300V rms although readings may be obtained.

The AC voltage measurement positions are: 200V and 300V. To measure AC Voltage, connect the Meter as follows:

1. Set the rotary switch to an appropriate measurement positions in **V~** range.
2. 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).

Measurement Operation (2)

Note

- If the value of voltage to be measured is unknown, use the maximum measurement position (300V) and reduce the range step by step until a satisfactory reading is obtained.
- In each range, the Meter has an input impedance of approx. 0.5MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 1kΩ, the error is negligible (0.2% or less).
- When AC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

B. DC Current Measurement

⚠Warning

Never attempt an in-circuit current measurement where the open-circuit voltage between the circuit and ground is greater than 300V.

If the fuse burns out during measurement, the Meter may be damaged or the operator himself may be hurt. 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.

The current measurement has 3 measurement positions on the rotary switch: 2000μA, 20mA and 200mA.

To measure current, do the following:

1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Set the rotary switch to an appropriate measurement position in **A⎓** range.

Measurement Operation (4)

3. 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.
4. 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 (200mA) and reduce the range step by step until a satisfactory reading is obtained.
- When current measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

C. Square Wave Output

⚠Warning

To avoid damages to the Meter, do not allow output terminals to reach higher than 10V.

To measure square wave output proceed as follows:

1. Set the rotary switch to ⊓⊔.
2. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note

- The frequency is approx. 50Hz.
- The output voltage range will be over 3Vpp when it is loaded 1MΩ.
- When square wave output testing has been completed, disconnect the connection between the testing leads and the circuit under test.

D. Battery Test

To test the battery proceed as follows:

1. Set the rotary switch to the 1.5V or 9V measurement position in ⊣⊢ range.
2. Connect the test leads across with the battery being measured ensuring the polarity is correct.
   The measured value shows on the display, which is the voltage between the cathode and anode of the battery.

Note

l When battery testing has been completed, disconnect the connection between the testing leads and the battery under test.

E. Diodes Test

⚠Warning
To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before 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 a diode out of a circuit, connect the Meter as follows:

1. Set the rotary switch to →|←.

Measurement Operation (8)

2. 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 measured value shows on the display.

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 will display " 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.

F. Measuring Resistance

⚠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.

The resistance measurement positions are: 200Ω, 2000Ω, 20kΩ, 200kΩ and 2000kΩ. To measure resistance, connect the Meter as follows:

1. Set the rotary switch to an appropriate measurement position in Ω range.
2. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Measurement Operation (10)

Note

- If the value of resistance to be measured is unknown, use the maximum measurement position (2000kΩ) and reduce the range step by step until a satisfactory reading is obtained.
- The test leads can add 0.1Ω to 0.2Ω of error to resistance measurement. To obtain precision readings in low-resistance measurement, that is the range of 200Ω, short-circuit the input terminals beforehand and record the reading obtained (called this reading as X). (X) is the additional resistance from the test lead.
  Then use the equation:
  measured resistance value (Y) - (X) = precision readings of resistance.
- For high-resistance measurement (>1MΩ), it is normal taking several seconds to obtain a stable reading.
- If Ω reading with shorted test leads is not ≤0.5Ω, check for loose test leads, or incorrect function selection.

- The LCD displays " **1** " indicating open-circuit for the tested resistor or the resistor value is higher than the maximum range of the Meter.
- When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

G. DC Voltage Measurement

⚠Warning

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 300V / 300V rms although readings may be obtained.

The DC voltage measurement positions are: 200mV, 2000mV, 20V, 200V and 300V. To measure DC Voltage, connect the Meter as follows:

1. Set the rotary switch to an appropriate measurement positions in V⎓ range.

Measurement Operation (12)

2. 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 (300V) and reduce the range step by step until a satisfactory reading is obtained.
- In each range, the Meter has an input impedance of ≥1MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 1kΩ, 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.

General Specifications

- Maximum Voltage between any Terminals and Grounding : 300V rms.
- ⚠ Fused Protection Input Terminal: 0.2A, 250V fast type, ϕ5x20 mm.
- Maximum Display : Display: 1999.
- Measurement Speed : Updates 2.5 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: 2000 m; Storage: 10000 m.
- Battery Type : One piece of 12V Battery (A23).
- Battery Deficiency : Display: .
- Negative reading : Display: .
- Overloading : Display: 1
- Dimensions (HxWxL) : 95 x 52 x 26mm.
- Weight : Approx. 100g (battery included).
- Safety/Compliances : IEC61010 CAT.II 300V overvoltage and double insulation standard.
- Certification : CE

Accuracy Specifications (1)

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. AC Voltage

Range	Resolution	Accuracy	Overload Protection
200V	100 mV	±(2.5%+15)	300V DC or AC rms
300V	1V		

Remarks:

- Input impedance: approx. 0.5MΩ.
- Displays effective value of sine wave (mean value response).
- Frequency response 45Hz ~ 400Hz.

Accuracy Specifications (2)

B. DC Current

Range	Resolution	Accuracy	Overload Protection
2000μA	1μA	±(2.5%+10)	0.2A, 250V fast type fuse, ϕ5x20mm.
20mA	10μA		
200mA	100μA		

C. Square Wave Output

Range	Remark
⊓⊔	Output approx. at 50Hz square wave. As a simple signal source with 47kΩ resistance output.

Accuracy Specifications (3)

D. Battery Test

Range	Internal Resistance	Overload Protection
1.5V	30Ω	Maximum current: 50mA.
9V	1.8kΩ	Maximum current: 5mA.

Remark:

l Displays battery's voltage value between the cathode and anode.

E. Diodes Test

Range	Resolution	Remarks
→|←	1mV	l Open circuit voltage approximate 3V. l Displays approximate forward voltage drop: 0.5V~0.8V.

Accuracy Specifications (4)

F. Resistance Test

Range	Resolution	Accuracy
200Ω	0.1Ω	±(2.5%+5)
2000Ω	1Ω	
20kΩ	10Ω	
200kΩ	100Ω	
2000kΩ	1kΩ	

G. DC Voltage

Range	Resolution	Accuracy	Overload Protection
200mV	0.1mV	±(1.5%+2)	300V DC or AC rms
2000mV	1mV	±(2.5%+2)	
20V	10mV		
200V	100mV		
300V	1V		

Remark: Input impedance: approx.1MΩ.

Maintenance (1)

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 electrical shock or damage to the Meter, do not get water inside the case.

A. General Service

- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- To clean the terminals with cotton bar with detergent, as dirt or moisture in the terminals can affect readings.

Maintenance (2)

- Turn the Meter to **OFF** position when it is not in use and take out the battery when not using for a long time.
- Do not store the Meter in a place of humidity, high temperature and strong magnetic field.

Maintenance (3)

B. Replacing the Battery

⚠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 the battery:

1. Turn the Meter to **OFF** position.
2. Remove the screw from case bottom, and separate the case bottom from the case top.
3. Remove the battery from the battery compartment.
4. Replace the battery with a new 12V battery (A23).
5. Rejoin the case bottom and case top, and reinstall the screw.

C. Replacing the Fuses

⚠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.

To replace the Meter's fuse:

1. Turn the Meter to **OFF** position.
2. Remove the screw from case bottom, and separate the case bottom from the case top.
3. Remove the fuse by gently prying one end loose, and then take out the fuse from its bracket.
4. Install ONLY replacement fuses with the identical type and specification as follows and make sure the fuse is fixed firmly in the bracket.
   Fuse: 0.2A, 250V, fast type, ϕ5x20mm.

Maintenance (5)

5. Rejoin the case bottom and case top,and reinstall the screw .

Replacement of the fuses is seldom required.Burning of a fuse always results from improper operation.

~ END ~

This operating manual is subject to change without notice.

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