INSTRUCTION MANUAL

MT985

Milliohm Meter & Multimeter

Contents

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1. SAFETY INFORMATION

- **NEVER** apply voltage or current to the meter that exceeds the specified maximum:
- **USE EXTREME CAUTION** when working with high voltages.
- **DO NOT** measure voltage if the voltage on the "COM" input jack exceeds 1000V above earth ground.
- **NEVER** connect the meter leads across a voltage source while the function switch is in the current, resistance, or diode mode. Doing so can damage the meter.
- **ALWAYS** discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.
- **ALWAYS** turn off the power and disconnect the test leads before opening the covers to replace the fuse or batteries.
- **NEVER** operate the meter unless the back cover and the battery and fuse covers are in place and fastened securely.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

2. SAFETY SYMBOLS

Caution refer to this manual before using the meter.

Dangerous voltages.

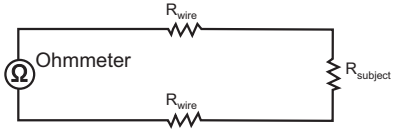
Meter is protected throughout by double insulation or reinforced insulation.

When servicing, use only specified replacement parts.

CE Comply with EN-61010-1

3. OPERATING PRINCIPLE

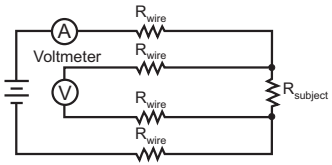
Suppose we wished to measure the resistance of some component located a significant distance away from our ohmmeter. Such a scenario would be problematic, because an ohmmeter measures all resistance in the circuit loop, which includes the resistance of the wires (R_{wire}) connecting the ohmmeter to the component being measured ($R_{subject}$):



Ohmmeter indicates $R_{wire} + R_{subject} + R_{wire}$

Usually, wire resistance is very small (only a few ohms per hundreds of feet, depending primarily on the gauge (size) of the wire), but if the connecting wires are very long, and/or the component to be measured has a very low resistance anyway, the measurement error introduced by wire resistance will be substantial.

An ingenious method of measuring the subject resistance in a situation like this involves the use of both an ammeter and a voltmeter. We know from Ohm's Law that resistance is equal to voltage divided by current (R = E/I). Thus, we should be able to determine the resistance of the subject component if we measure the current going through it and the voltage dropped across it:



$$R_{subject} = \frac{\text{Voltmeter indication}}{\text{Ammeter indication}}$$

Current is the same at all points in the circuit, because it is a series loop. Because we're only measuring voltage dropped across the subject resistance (and not the wires' resistances), though, the calculated resistance is indicative of the subject component's resistance ($R_{subject}$) alone.

4. FEATURES

Function	Range
Low resistance range	0~40Ω
Display	Large LCD with bar graph display
Maximum output current	200mA (400mΩ)
Sampling Rate	2 times per second.
Relative Measurement	
Over Range Indicator	OL of highest digit is displayed.
Low Battery Indication	The is displayed when the battery Voltage drop below the operating voltage.
Auto Power Off	To conserve battery life, the meter will automatically turn off after approx. 30 minutes of non-use. When this happens, the state of the meter is saved. In order to disable auto power off function, power on the meter when any of the push function, except for HOLD, is pressed down. The "APO" sign on the LCD panel indicates whether the auto power-off function is enabled or not.
Operating Temperature	0ºC to 40ºC (32ºF to 104ºF) and Humidity below 80% RH
Storage Temperature	-10ºC to 60ºC (14ºF to 140ºF) and Humidity below 70% RH
Power source	6x1.5V Size "AA" battery or Equivalent (DC9V)
Dimensions	200(L) x 92(W) x 50(H) mm
Weight	Approx 700g include battery
Accessories	4 sets Test kits, 4pcs iron rods, 6pcs battery, Carrying case, manual.

5. ELECTRICAL SPECIFICATIONS

Accuracies are specified in the way:
± (…% of reading +…digits) at 23°C ± 5°C,below 80% RH.

5.1. LOW RESISTANCE

Range	Resolution	Accuracy	Current
400mΩ	0.1mΩ	± (1%+10d)	200mA
4Ω	1mΩ	± (1%+5d)	20mA
40Ω	0.01Ω	± (1%+5d)	2mA

5.2. OHMS

Range	Resolution	Accuracy
400Ω	0.1Ω	± (1.0% + 4d)
4KΩ	1Ω	± (1.5% + 2d)
40KΩ	10Ω	
400KΩ	100Ω	
4MΩ	1K	± (2.5% + 3d)
40MΩ	10kΩ	± (3.5% + 5d)

5.3. DC CURRENT

Range	Resolution	Accuracy
400μA	0.1μA	± (1.5%+5d)
4000μA	1μA	
40mA	0.01mA	
400m	A 0.1mA	

5.4. AC CURRENT

Range	Resolution	Accuracy/50~60Hz	Accuracy/400Hz
400μA	0.1μA	± (1.5%+5d)	± (1.5%+5d)
4000μA	1μA	± (1.5%+5d)	± (1.5%+5d)
40mA	0.01mA	± (1.5%+5d)	± (1.5%+5d)
400mA	0.1mA	± (1.5%+5d)	± (1.5%+5d)

5.5. DC VOLTAGE

Range	Resolution	Accuracy
400mV	0.1mV	± (1%+5d)
4V	1mV	
40V	0.01V	
400V	0.1V	
1000V	1V	± (1.2%+5d)

5.6. AC VOLTAGE

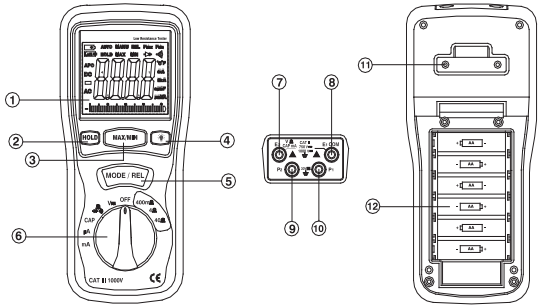
Range	Resolution	Accuracy/50~60Hz	Accuracy/400Hz
400mV	0.1mV	± (1.2%+10d)	± (2.5%+10d)
4V	1mV	± (1.0%+10d)	± (1.2%+10d)
40V	0.01V	± (1.0%+10d)	± (1.2%+10d)
400V	0.1V	± (1.0%+10d)	± (1.2%+10d)
750V	1V	± (1.0%+10d)	± (1.2%+10d)

5.7. CAPACITANCE

Range	Resolution	Accuracy
4nF	1pF	unspecified
40nF	10PF	± (5.0% + 20d)
400nF	0.1nF	± (3%+10d)
4uF	1nF	
40uF	10nF	
400uF	0.1uF	± (4%+10d)
4mF	1uF	± (10%+10d)
40mF	10uF	unspecified

6. PARTS & CONTROLS

1. Digital Display
2. Data Hold Button
3. MAX/MIN Button
4. Backlight Button
5. Mode/REL Button
6. Rotary Function switch
7. V Ω Cap mA E2 Jack
8. COM E1 jack
9. P2 Jack
10. P1 jack
11. PothooK
12. Battery Cover



7. BUTTON FUNCTION OPERATION

7.1. HOLD BUTTON

The HOLD function allows the meter to "freeze" a measurement for later reference.

1. Press the HOLD button to "freeze" the reading on the display. The "HOLD" message will be appear in the display.
2. Press the HOLD button again to return to normal operation.

7.2. MAX/MIN BUTTON

The MAX/MIN function allows the meter to capture the highest or lowest measurement for later reference.

1. Press the MAX/MIN button to begin measurement. The indicator "MAX" or "MIN" will appear in the display.
2. If the "MAX MIN" messages are flashing, the instrument is in MAX/MIN mode but not recording, press the MAX/MIN button to select a mode.
3. To return to normal AUTO measurement mode, hold down the MAX/MIN button for 2 seconds.

7.3. BACKLIGHT

Press the key for to turn on the display backlight function. The backlight will automatically turn off after 15 seconds.

7.4. MODE/REL BUTTON

To select AC or DC measurement when in Voltages, mA , uA ,Ω, , •))) .
RELATIVE ZERO BUTTON:
For convenient readings comparison & offset when in low resistance test .

7.5. AC/DC VOLTAGE MEASUREMENT

1. Insert the black test lead into the negative COM E1 jack and the red test lead into the V Ω Cap mA E2 Jack.
2. Set the function switch to the V position.
3. Use the MODE button to select AC or DC Voltage
4. Connect the test leads in parallel to the circuit under test.
5. Read the voltage measurement on the LCD display

7.6. AC/DC CURRENT MEASUREMENT

1. Insert the black test lead banana plug into the negative COM E1 jack, and the red test lead into the V Ω Cap mA E2 Jack.
2. For current measurements up to 4000uA, set the function switch to the uA position.
3. For current measurements up to 400mA, set the function switch to the mA range.
4. Press the 'MODE/REL' button until "DC" or "AC" appears in the display.
5. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
6. Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
7. Apply power to the circuit.
8. Read the current in the display. The display will indicate the proper decimal point, value and symbol.

7.7. RESISTANCE [Ω] 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 function switch to the Ω position.
2. Insert the black test lead plug into the negative (COM) socket and the red test lead plug into the positive Ω jack.
3. Press the MODE button until "Ω" appears in the display.
4. 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.
5. Read the resistance in the display. The display will indicate the proper decimal point, value and symbol.

7.8. CONTINUITY CHECK

WARNING: To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

1. Set the range switch to the •))) position.
2. Insert the black lead plug into the COM socket and the red test lead plug into the positive •))) socket.
3. Press the MODE button until "•)))" appears in the display.
4. Touch the test probe tips to the circuit or wire you wish to check.
5. If the resistance is less than 35Ω, the audible signal will sound. The display will also show the actual resistance in ohms.

7.9. DIODE TEST

WARNING: To avoid electric shock, do not test any diode that has voltage on it.

1. Set the function switch to  the position.
2. Insert the black test lead plug into the COM socket and the red test lead plug into the  socket.
3. Press the MODE button until "  " appears in the display.
4. Touch the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading.
5. Reverse the probe polarity by switching probe position. Note this reading.
6. The diode or junction can be evaluated as follows:
   A. If one reading shows a value and the other reading shows OL, the diode is good.
   B. If both readings show OL, the device is open.

C. If both readings are very small or zero, the device is shorted.
NOTE: The value indicated in the display during the diode check is the forward voltage.

7.10. CAPACITANCE MEASUREMENT

WARNING: To avoid electric shock, discharge the capacitor under test before measuring.

1 Set the function switch to the CAP capacitance position.
2 Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the CAP positive jack.
3 Touch the test probe tips across the part under test.
4 Read the capacitance value in the display.
5 The display will indicate the proper decimal point and value.
Note: For very large values of capacitance measurement time can be several minutes before the final reading stabilizes. The LCD displays DSC when discharging. Discharging through the chip is quite slow. We recommend the user to discharge the capacitor with some other apparatus.

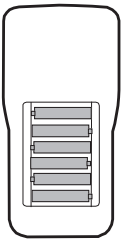
7.11. LOW RESISTANCE MEASUREMENT

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

1. Insert the red test leads banana plug into E2, P2 red com jack, and black test leads banana plug into E1, P1 black com jack.
2. At the range of 40Ω, connect the clips to the low resistance terminals, if the reading is too low then switch the range to 4Ω or 400mΩ.
3. Remove the clips from the low resistance terminals, and connect then each other, then press "MODE/REL" button.
4 . Connect the clips to the low resistance's terminal again.
5 . Read the resistance in the display. The display will indicate the proper decimal point, value and symbol.

8. BATTERY REPLACEMENT

1. When the low battery symbol appears on the LCD, the six 1.5V 'AA' batteries must be replaced.
2. Turn the meter off and remove the test leads.
3. Unsnap the tilt stand from the rear of the meter.
4. Remove the four Phillips head screws holding the battery cover.
5. Remove the battery compartment cover
6. Replace the batteries observing the polarity.
7. Fasten the rear cover by securing the screws.
8. Reattach the tilt stand.



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