DIGITAL MULTIMETER AND PHASE ROTATION TESTER

INSTRUCTION MANUAL

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1. INTRODUCTION

NOTE

This meter has been designed and tested According to CE Safety Requirements for Electronic Measuring Apparatus, IEC / EN 61010-1 and other safety standards. Follow all warnings to ensure safe operation.

WARNING

READ "SAFETY NOTES" (NEXT PAGE) BEFORE USING THE METER.

CAT IV - Is for measurements performed at the source of the low voltage installation.

CAT III - Is for measurements performed in the building installation.

CAT II - Is for measurement performed on circuits directly connected to the low voltage installation.

CAT I - Is for measurements performed on circuits not directly connected to mains.

2. SAFETY NOTES

- Read the following safety information carefully Before attempting to operate or service the meter.
- Use the meter only as specified in this manual. Otherwise, the protection provided by the meter may be impaired.
- Rated environmental conditions :
  (1) Indoor Use.
  (2) Installation Category III.
  (3) Pollution Degree 2.
  (4) Altitude up to 2000 meters.
  (5) Relative humidity 80% max.
  (6) Ambient temperature 0~40°C.
- Observe the International Electrical Symbols listed below :


Meter is protected throughout by double insulation or reinforced insulation.


Warning ! Risk of electric shock.


Caution ! Refer to this manual before using the meter.


AC... Alternating current.


DC... Direct current.

3. FEATURES

- 4000 - count LCD.
- Auto ranging
- Voltage, Resistance, Current, Continuity, Diode measurement
- Can measure Resistance up to 200.0 Mohm
- Checks a wide range of 3-phase power sources (80~750VAC)
- Phase Rotation indication : clockwise and counter-clockwise on LCD
- The LCD will show AC voltage between phases and Phase Rotation
- Wide range for capacitance test: 0~40000μF(40.00mF)
- REL / Auto-Zero function
- MAX / MIN function
- VAHz function
- Frequency : 40.00 MHz
- Data hold function
- Over range indication
- Low battery detection
- Auto power off in 15 minutes
- Convenient stand for viewing
- Comply with EN 61010-1, CAT III 600V for the range of 600V AC/DC

★ To disable the "auto power off" function, press the "RNG" button and turn on the digital multimeter simultaneously.

4. SPECIFICATIONS

AC Voltage :

Ranges	Resolution	Accuracy
400 mV	0.1 mV	±(1.0% rdg+5dgt)
4 V	1 mV	
40 V	10 mV	
400 V	100 mV	
750 V	1 V	

Input impedance : 10 MΩ

DC Voltage :

Ranges	Resolution	Accuracy
400 mV	0.1 mV	±(0.5% rdg+3dgt)
4 V	1 mV	
40 V	10 mV	
400 V	100 mV	
1000 V	1 V	

Input impedance : 10 MΩ

AC μA, mA :

Ranges	Resolution	Accuracy
400 μA	0.1 μA	±(1.2% rdg+5dgt)
4000 μA	1 μA	
40 mA	0.01 mA	
400 mA	0.1 mA	

Overload Protection 0.5A/600V fast blow fuse for 400mA.

DC μA, mA :

Ranges	Resolution	Accuracy
400 μA	0.1 μA	±(1.0% rdg+5dgt)
4000 μA	1 μA	
40 mA	0.01 mA	
400 mA	0.1 mA	

Overload Protection 0.5A/600V fast blow fuse for 400mA.

Continuity:

Range	Audible threshold
400 Ω	Less than 30 Ω

Diode :

Range	Accuracy
2V	±(1.5% rdg+3dgt)

Resistance :

Ranges	Resolution	Accuracy
40 Ω	0.01 Ω	±(1.2% rdg+3dgt)
400 Ω	0.1 Ω	
4 kΩ	1 Ω	
40 kΩ	10 Ω	
400 kΩ	100 Ω	
4 MΩ	1 kΩ	
40 MΩ	10 kΩ	±(2.0% rdg+4dgt)
200 MΩ	100 kΩ	±(2.3% rdg+4dgt)

Capacitance :

Ranges	Resolution	Accuracy
4 nF	1 pF	±(3.0% rdg+10dgt)
40 nF	10 pF	
400 nF	100 pF	
4 μF	1 nF	
40 μF	10 nF	
400 μF	100 nF	
4 mF	1 μF	
40 mF	10 μF	

Frequency :

Ranges	Resolution	Accuracy
400 Hz	0.1 Hz	±(0.5% rdg+2dgt)
4 kHz	1 Hz	
40 kHz	10 Hz	
400 kHz	100 Hz	
4 MHz	1 kHz	
40 MHz	10 kHz	

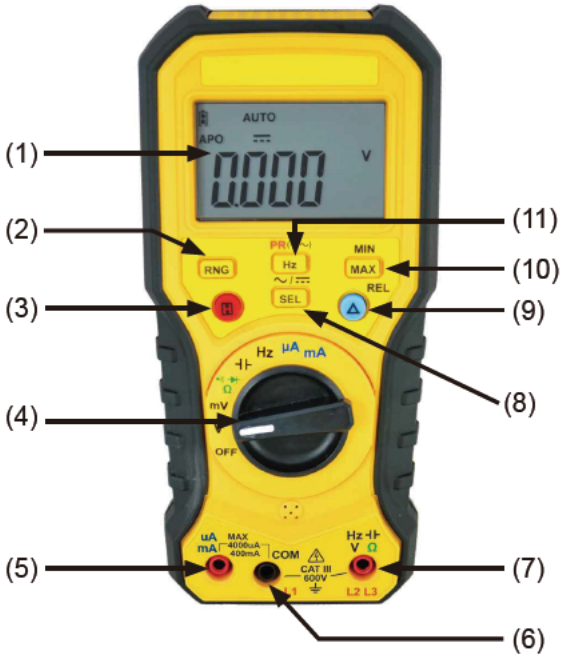
Phase Rotation:

Input voltage	80~750VAC
Frequency range	40~80Hz
Circuit structure	All electronic (not mechanical)

5. GENERAL

- **Dimensions :**
  188(L) x 90(W) x 54(D)mm
- **Weight :**
  Approx. 346g (battey included)
- **Power source :**
  1.5V (AAA) battery x 2
- **Low Battery Indication :**
  When the " [ ] " sign blinks on the LCD, this means the battery voltage drops below accurate operating level.
- **Operating temperature :**
  0°C ~ 40°C, 80% Max.
- **Storage temperature & humidity :**
  -10°C ~ 50°C, 80% Max.
- **Safety standard :**
  EN 61010-1 CAT III 600V
  EN 61010-2-030
  EN 61326-1
- **Accessories :**
  Instruction Manual
  Batteries
  Test leads

6. INSTRUMENT LAYOUT



(1) LCD
(2) RNG Button
(3) " H " HOLD Button
(4) Function Rotary Switch
(5) mA μA Terminal
(6) COM & L1 Terminal
(7) V Ω Hz ⊣⊢ & L2, L3 Terminal
(8) SEL & ⏦/⎓ Button
(9) " Δ " REL Button
(10) MAX & MIN Button
(11) Hz & PR(V⏦) Button

(1) LCD

4000-count LCD with low battery indication.

(2) RNG Button

This is the Range button. Press the RNG button to select the manual range mode and to turn off the AUTO annunciator. The manual annunciator will be turned on and the full scale range will be changed. In manual range mode, each time press the RNG button (less than one second), the range increases and a new value is displayed. To exit the manual range mode and to return to the AUTO mode, press the RNG button for more than one second.

※ AUTO mode = Auto ranging mode.

(3) " H " HOLD Button

Pressing the HOLD button (HOLD annunciator turns on) makes the meter stop updating the reading on the LCD. This mode can be nested in most of the special modes. Enabling HOLD function in automatic mode makes the meter switch to manual mode, but the full scale range remains the same. HOLD function can be cancelled by changing the measurement mode, pressing the RNG button, or pressing the HOLD button again.

(4) Function Rotary Switch

The function rotary switch is for selecting different functions.

(5) mA μA Terminal

This is the positive input terminal for current measurement. Use the RED test lead to connect . The Maximum is 4000uA for μA measurement. The Maximum is 400mA for mA measurement.

(6) COM & L1 Terminal

This is the ground input terminal. Use the BLACK test lead to connect.
This is the L1 (for phase rotation test) terminal. Use the BLACK test lead to connect.

(7) V Ω Hz ⊣⊢ & L2, L3 Terminal

This is the positive input terminal for voltage / resistance / frequency / capacitance measurement. Use the RED test lead to connect.
This is the L2, L3 (for phase rotation test) terminal. Use the RED test lead to connect.

(8) SEL & ~/⎓ Button

Press the SEL button to select AC/DC function for voltage (V/mV) or current (mA/μA) measurement. At the position of Ω •)) ⊣▶, press the SEL button to select resistance, continuity or diode measurement.

(9) "△" REL Button

The "REL" mode means relative mode. Press the REL button (less than one second), the "△" sign shows on the LCD, the REL annunciator turns on, zero the display, and store the displayed reading as a reference value.

Press the REL button (less than one second) again, the DMM will go back to the original mode. The "△" sign disappears.

(10) MAX & MIN Button

Press this button (less than one second) to enter into the "MAX" mode, the "MAX" annunciator turns on, and the LCD shows the maximum value. Press this button (less than one second) again to enter into the "MIN" mode, the "MIN" annunciator turns on, and the LCD shows the minimum value. Press this button for more than one second to go back to the original mode.

(11) Hz & PR(V~) Button

- Select the function of ACV, ACmV, ACμA or ACmA. Then press the Hz button for less than one second to enter into the frequency measurement mode.
  Press the Hz button again (less than one second), the DMM will go back to ACV, ACmV, ACμA or ACmA measurement function.
- Select the function of ACV, press the Hz / PR(V~) button for more than one second to enter into the phase rotation testing mode. Press the Hz / PR(V~) button again (more than one second), the DMM will go back to ACV measurement function.

7. MEASUREMENT

Before proceeding with measurement , read the safety notes.

(1) Voltage measurement

Insert the BLACK test lead to COM terminal and the RED test lead to V Ω Hz ⊣⊢ terminal. Switch to **V** function for ACV or DCV measurement.
Connect the test leads to the circuit or device for testing and get the reading on the LCD directly.
If want to measure mV, please switch to mV function. Then follow the same steps.

(2) Current measurement

Insert the BLACK test lead to COM terminal and the RED test lead to mA μA terminal. Switch to mA or μA function for current measurement.
Connect the test leads to the circuit or device for testing and get the reading on the LCD directly.

(3) Resistance measurement

Insert the BLACK test lead to COM terminal and the RED test lead to V Ω Hz ⊣⊢ terminal.
Switch to **Ω** •)) ⊣◀ function for resistance measurement. Make sure there is no voltage in the circuit or device that you want to measure.
Connect the test leads to the resistor or circuit for testing and get the reading on the LCD directly.

(4) Continuity Check •))

Continuity check shares the same configuration with 400.0Ω manual resistance measurement mode, but with buzzer output to indicate continuity. The audible threshold is 30Ω.

(5) Diode measurement →|-

Diode measurement mode shares the same configuration with 4.000V manual voltage measurement mode.
If the test circuit is open or the voltage drop between the two ports of the device (diode) under test are larger than 2V, the LCD will show "OL".
The buzzer generates a 2kHz sound whenever the reading is less than 30mV.

(6) Frequency measurement

Insert the BLACK test lead to COM terminal and the RED test lead to V Ω Hz ⊣⊢ terminal.
Switch to Hz function for frequency measurement.
Connect the test leads to the circuit or device for testing and get the reading on the LCD directly.

(7) Capacitance measurement

Insert the BLACK test lead to COM terminal and the RED test lead to V Ω Hz ⊣⊢ terminal.
Switch to ⊣⊢ function for capacitance measurement. Connect the test leads to the capacitor for testing and get the reading on the LCD directly.

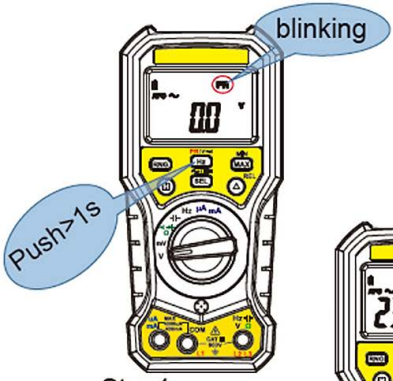
(8) Phase Rotation test (PR)

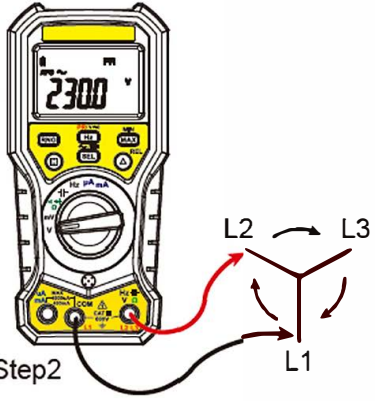
Insert the BLACK test lead to L1(COM) terminal and the RED test lead to L2, L3(V Ω Hz ⊣⊢) terminal for phase rotation test.

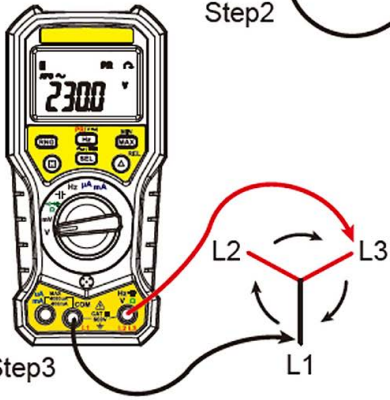
Switch to **V** function, then press the SEL button for ACV(V~) test. Then press the **PR**(V~)/ Hz button for more than one second to enter into the "Phase Rotation" test mode, the "PR" sign starts blinking on the LCD.

Connect the BLACK test lead(COM) to the first voltage source and the RED test lead to the second voltage source. The "PR" sign will stop blinking and it means the first phase is locked. Then connect the RED test lead to the third voltage source within 5 seconds. The phase rotation sequence will be determined, and the " " or " " signs will be showed on the LCD to indicate the phase rotation sequence.

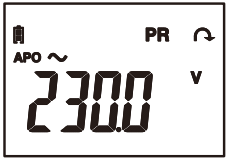
Input voltage of phase rotation: 80~750VAC.


blinking
Push>1s
Step1

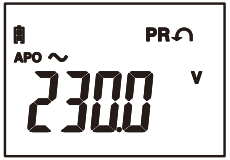

L2
L3
L1
Step2


L2
L3
L1
Step3

Phase Rotation Indication



Rotating Right L1 L2 L3
(clockwise)



Rotating Left L1 L3 L2
(counter-clockwise)

8. MAINTENANCE

a) Battery replacement :

When the low battery warning symbol " ⊓ " appears, change new batteries as follows :

(1) Disconnect the test leads from the multimeter and turn off the power.

(2) Unscrew the battery cover and replace with new batteries(1.5V AAA×2).

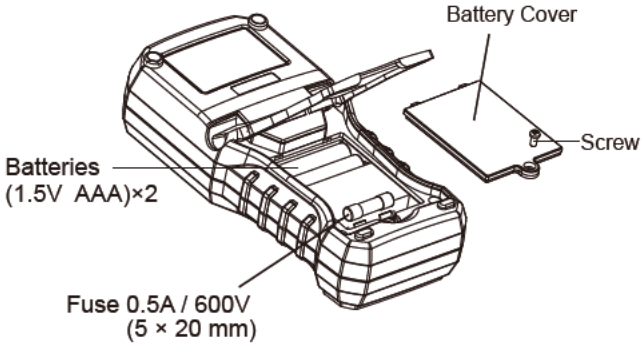
(3) Re-install the battery cover.

b) Fuse replacement :

(1) Disconnect the test leads from the multimeter and turn off the power.

(2) Unscrew the battery cover and replace with new fuse(0.5A/600V, 5×20mm).

(3) Re-install the battery cover.



Cleaning and Storage :

⚠ WARNING
To avoid electrical shock or damage to the meter, do not get water inside the case.

Periodically wipe the case with a damp cloth and detergent. Do not use abrasives or solvents.
If the meter is not used for over 60 days, remove the batteries for storage.

Due to our policy of constant improvement and development, we reserve the right to change specifications without notice.

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