
RAGU 81D DIGITAL MULTIMETER

OPERATION MANUAL



Contents

I. General.....	- 1 -
II . Open-package Inspection.....	- 2 -
III. Safety Considerations.....	- 3 -
IV.Instrument Panel & Button Function Description.....	- 9 -
V. Other Functions.....	- 12 -
VI、 Property.....	- 13 -
1. General Property	- 13 -
2. Technical Property.....	- 14 -
2-2-1. DCV.....	- 15 -
2-2-2. ACV True RMS.....	- 16 -
2-2-3. DCA.....	- 18 -
2-2-4. ACA True RMS.....	- 20 -
2-2-5. Resistance (Ω).....	- 23 -
2-2-6.Diode and Continuity Test-	25 -
2-2-7. Capacity (C).....	- 28 -
2-2-8. Frequency (F).....	- 29 -
2-2-9. Temperature ($^{\circ}\text{C}/^{\circ}\text{F}$)....	- 31 -
VII. Instrument Maintenance.....	- 33 -
VIII. Fault Elimination.....	- 36 -

I. General

The RAGU 81D digital multimeter, equipped with the LCD display of text height 18.9mm, is a 3 3/4 digital multimeter which has merits of clear reading, stable performance and high reliability.

It could be used to measure DC voltage, AC voltage, DC current, AC current, resistance, temperature, capacity, frequency / duty cycle, diode and to make on-and-off test. Meanwhile, it is available for unit symbol display, automatic/manual range switching, automatic power off and alarm function. The complete machine takes an integrated circuit which can directly drive LCD 8-bit microprocessor and double-integrating A/D

switching and a digital display drive offering high resolution and high precision. Due to its complete functions, high measurement accuracy and convenient operation, the multimeter is the ideal tool in laboratory and factory as well as for radio fans and family.

II . Open-package Inspection

Open the package box and take out the meter, check carefully if the following accessories are absent or damaged. If there were any absence or damage, please contact the distributor immediately.

Digital Multimeter	1 PC
Instruction Manual	1 copy
Test Leads	1 pair
Temperature Probe (K-Thermocouple)	1 PC

III. Safety Considerations

The design of meter is in accordance with IEC1010 clause (the safety standard issued by International Electrotechnical Commission). Prior to the operation of the instrument, please read the safety considerations first.

1. When DC voltage is higher than 30V, AC voltage is higher than 25V, current is higher than 10mA, AC power line with inductive load or power line during electric fluctuation is measured. Please beware of electric shock.
2. Prior to measurement, check if the measurement function switch is at the

correct position. Check if the test lead is contacted reliably, connected correctly, and grounded well and etc. in order to avoid electric shock.

3. Only if the meter is used with the matched test lead, can it meet the requirements of safety standard. When the line of the test lead is damaged, it is necessary to replace another one of the same model or the same electrical specification.
4. Don't use other unconfirmed or disapproved fuse to replace the original one inside the meter. Only the fuse of the same model or same specification can be replaced. Before the replacement, the test lead must leave the measuring point and ensure there is no any signal at the input

terminal.

5. Don't use other unconfirmed or disapproved batteries to replace the batteries inside the meter. Only the batteries of the same model or same electrical specification can be replaced. Before the replacement, the test lead must leave the measuring point and ensure there is no any signal at the input terminal.
6. When the electrical measurement is made, never let your body get in touch with the ground directly, and don't touch uncovered metal terminal, output port, lead clamp etc. Dry clothes, rubber shoes, rubber cushion and other insulating material are usually used to keep your body insulated against the ground.

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7. Don't store and use it in the high-temperature, high-humidity, inflammable environment and strong magnetic field.
 8. It may cause damage to the meter and endanger the operator's safety if you take any voltage measurement that exceeds the limits. The ultimate voltage value permitted for measurement is marked on the instrument panel. Never take measurement or input the ultimate value which exceeds the standard in order to avoid electric shock and damage to the meter.
 9. When the test lead is inserted into the current socket, don't take any voltage

measurement to prevent damaging the meter and endangering the operator's safety.

10. Don't try calibrating or repairing the meter. When necessary, only the qualified professional personnel who have had special training or gained approval can make it.
11. During measurement, the requirement of measurement function must be in accordance with LCD display. Please be sure to disconnect the line of the test leads with the measured object first and ensure there is no any input signal. It is forbidden to switch the function/range selection

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- switch during measurement.
12. When “  ” is shown on LCD display, please replace battery immediately to ensure the measurement precision.
13. It is not allowed to insert the test lead into the current terminal to measure voltage!
14. Please don't change the circuits of the meter by yourself to prevent damaging the meter and endangering the operator's safety.

15. Description of Safety Symbols

	Warning!		DCA
	High Voltage! Danger!		ACA
	Ground		DCA & ACA
	Double Insulation		In accordance with the instructions of European Trade Union
	Battery Undervoltage		Fuse

IV. Instrument Panel & Button Function

Description

1. Instrument

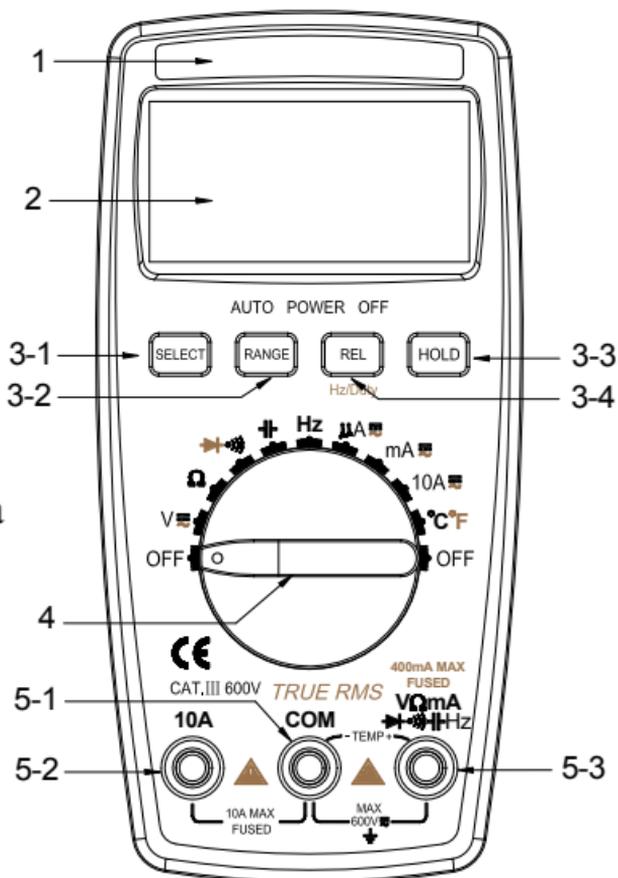
Model
Number

2. LCD

Display:
Display the
measured data
and unit.

3. Function

Button



3.1. SELECT(function

switch): Press this button, the function could switch between DC/AC/→|••))

3.2. RANGE(auto/manual range switch):

The meter is in automatic range when starts up, press the “RANGE” button to activate manual range mode. In the mode of manual range, each press lets the meter skip to the previous shift. When it goes to the highest shift, it goes back to the lowest shift automatically. The procedure repeats again in the same order. Press the “RANGE” button over 2 seconds, it will exit from manual range measurement mode and shift to automatic range measurement mode.

3.3. HOLD (Data Hold) : Press this button, the reading shall be hold and kept on LCD; Press it again, the meter enters into normal measurement status.

3.4 REL (Relative Value Measurement):

The relative value measurement of all functions could be conducted by pressing this button except the Hz/Duty function. Frequency/duty cycle: press this button to select frequency or duty cycle measurement mode.

4. Function/Range Selection Switch: It could be used to change the measurement function and range.

5. Input Terminals

5.1. Current, Voltage, Diode, Resistance, Capacity, Frequency, Buzzer, Temperature“-”Input terminal.

5.2. 10A“+”input terminal.

5.3.Voltage、 Diode、 Resistance, Capacity, Frequency, Buzzer, Temperature and“+” Input terminal with current less than 400mA.

V. Other Functions

Automatic Power off

During measurement, the meter will automatically shut down (enter sleeping mode) to save power if function buttons and function/range selection switch are not operated in 15 minutes. In auto power off mode, press any function buttons or rotate the function/range selection switch, the instrument will get into the auto power on mode (working mode); the auto power off mode will be canceled by pressing the

SELECT button to turn on the instrument.

VI、 Property

1. General Property

1-1. Display: LCD

1-2. Max Display : 3999 (3 3/4) counts
automatic polarity display and unit
display

1-3. Measuring Method : Dual integral A/D
converter

1-4. Sampling Rate: Approx. 3 times / sec.

1-5. Over Range Indication: Display “OL”

1-6. Low Battery Indication: “  ” symbol
appears;

1-7 . Operation Environment: (0 ~ 40) °C ,
Relative Humidity: < 80% ;

1-8 . Storage Environment: (0 ~ 50) °C ,

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- Relative Humidity: $< 80\%$;
- 1-9. Power: 2pcs 1.5V batteries (“AAA” 7# battery)
- 1-10. Dimension (size): $145 \times 74 \times 36\text{mm}$
- 1-11. Weight: Approx. 190g (Including 2pcs 1.5V batteries)
- 1-12. Accessories: Instruction Manual (1 pc), Holster (1 pc), Outer packing box (1 pc), 10A test leads (1 pair), K-Thermocouple and 1.5V batteries (2 pcs).

2. Technical Property

2-1. Accuracy: $\pm (a\% \times \text{reading} + \text{number of digits})$, at $(23 \pm 5)^\circ\text{C}$, relative humidity $< 75\%$. Warranty is one year, starting on shipping date.

2-2. Technic Specification

2-2-1. DCV

1. Turn the function/range selection switch to " $V_{\overline{\sim}}$ " Range;
2. The initiate state of the meter is in automatic range status, which shows "AUTO" symbol;
3. Make the test leads contacted to the testing points. The voltage and polarity of the point where the red test lead is contacted will be displayed on the screen.

Caution:

1. Don't measure voltage over 600V. Otherwise, it may cause damage to the meter.
2. When measuring high voltage, more attention should be paid to personal safety and avoid your body getting in touch with

high voltage circuit.

Range	Accuracy	Resolution
400mV	$\pm (0.5\%+4d)$	100uV
4V		1mV
40V		10mV
400V		100mV
600V	$\pm (1.0\%+4d)$	1V

Input Impedance: 400mV>40M Ω ; 10M Ω at other Ranges.

Overload Protection: 600V DC or 600V AC Peak Value.

2-2-2. ACV True RMS

1. Insert the black test lead into the hole of "COM" and red one into " $\frac{V\Omega mA}{\ast \ast \ast Hz}$ ";
2. Rotate function switch to " $V \sqrt{\text{~}}$ " gear,

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- press “SELECT” button to select the AC measurement mode.
3. The initiate state of the meter is in automatic range status, which shows “AUTO” symbol;
 4. Make the test leads contacted to the testing points. The voltage of the point where the red test lead is contacted will be displayed on the screen.

Caution:

1. Don't measure voltage over 600V. Otherwise, it may cause damage to the meter.
2. When measuring high voltage, more attention should be paid to personal safety and avoid your body getting in touch with high voltage circuit.

Range	Accuracy	Resolution
4V	$\pm (0.8\%+6d)$	1mV
40V		10mV
400V		100mV
600V	$\pm (1.0\%+6d)$	1V

Input Impedance: $>10M\Omega$;

Overload Protection: 600V DC or 600V AC

Peak Value;

Frequency Response: (50~200) Hz;

Display: Average value response (RMS of sine wave).

2-2-3. DCA

1. Insert the black test lead into the "COM" input terminal and red one into the " $\frac{V\Omega mA}{* \cdot 10 Hz}$ " input terminal (Max 400mA), or 10A input

terminal (Max 10A).

2. Rotate function switch to Current gear. The initiate state of the meter is in automatic range status, which shows "DC" symbol. Then connect the test leads to the tested circuit in serial, the tested current value and the current polarity of the point where the red one is contacted will be displayed on the screen simultaneously.

Caution:

1. If “OL” is displayed on LCD, it indicates the tested current value has exceeded the present range limit, please select higher range to complete the measurement.
2. The Max input value is 400mA or 10A. (Depending on the terminal where the red test lead is contacted)

Range	Accuracy	Resolution
400uA	$\pm (1.0\%+10d)$	0.1uA
4000uA		1uA
40mA		10uA
400mA		100uA
10A	$\pm (1.2\%+10d)$	10mA

Max measurement voltage drop: Full Range mA is 0.4V, A is 100mV;

Max input current: 10A (less than 15 seconds);

Overload Protection: 0.4A/250V restorable fuse, 10A/250V fuse.

2-2-4. ACA True RMS

1. Insert the black test lead into the "COM" input terminal and red one into the " $\frac{V\Omega mA}{\rightarrow \rightarrow \rightarrow} \text{Hz}$ " input terminal(Max 400mA), or

10A input terminal (Max 10A).

2. Rotate function switch to Current gear. Press “SELECT” button to select the AC measurement mode. Then connect the test leads to the tested circuit in serial, the tested current value and the current polarity of the point where the red one is contacted will be displayed on the screen simultaneously.

Caution:

1. If “OL” is displayed on LCD, it indicates the tested current value has exceeded the present range limit, please select higher range to complete the measurement.
2. The Max input value is 400mA or 10A.(Depending on the terminal where the red test lead is contacted.) The overrated

current will lead to fuse melt or even damage the meter.

Range	Accuracy	Resolution
400 μ A	$\pm (1.5\%+10d)$	0.1 μ A
4000 μ A		1 μ A
40mA		10 μ A
400mA		100 μ A
10A	$\pm (2.5\%+15d)$	10mA

Max measurement voltage drop: Full Range mA is 0.4V, A is 100mV; Max input current: 10A (less than 15 seconds);

Overload Protection: 0.4A/250V restorable fuse, 10A/250V fuse;

Frequency Response: True RMS response(50~200)Hz.

2-2-5. Resistance (Ω)

1. Insert the black test lead into "COM" terminal and red one into " $\overset{V\Omega mA}{\rightarrow} \parallel Hz$ " terminal.
2. Rotate the Range to " Ω " gear. Cross connect the test leads to the tested resistor.
3. When measuring the low resistance, please short-circuit the test leads at first to test the wire resistance, and then deduct it from the actual resistance.

Caution:

1. If "OL" is displayed on LCD, it indicates the tested resistance value has exceeded the present range limit, please select higher range to complete the measurement. When measuring the Resistor higher than $1M\Omega$, the instrument will take several seconds to make the reading stable. It is normal when

measuring the high resistor.

2. When the input terminal is open circuit, it will display “OL”.
3. When measuring in-line resistor, be sure that the power is off and all capacitors are discharged completely.

Range	Accuracy	Resolution
400 Ω	$\pm (0.8\%+5d)$	0.1 Ω
4k Ω	$\pm (0.8\%+4d)$	1 Ω
40k Ω		10 Ω
400k Ω		100 Ω
4M Ω		1k Ω
40M Ω	$\pm (1.2\%+10d)$	10k Ω

Open Voltage circuit: Less than 200mV;
Overload Protection: 250V DC or AC Peak Value;

Note:

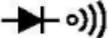
When measuring at Range 400Ω , please short-circuit the test leads at first to test the wire resistance, and then deduct it from the actual resistance.

2-2-6. Diode and Continuity Test

1. Insert the black test lead to “COM” terminal and the red one to “ $\frac{V\Omega mA}{\rightarrow \text{Hz}}$ ” terminal. (The polarity of red test lead is “+”);
2. Rotate the Range to “ $\rightarrow \text{Hz}$ ” gear. Press “SELECT” button to select the Diode measurement mode;
3. Forward Measurement: Connect the red test lead to the diode positive polarity and

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- the black one to the diode negative polarity. The approximate value of diode forward voltage drop will show on the display.
4. Backward Measurement: Connect the red test lead to the diode negative polarity and the black one to the diode positive polarity. "OL" symbol will be displayed on the screen.
 5. The complete diode testing includes forward and backward measurement, if the result does not meet the above; it means the diode is bad.
 6. Press "SELECT" button to select the Continuity measurement mode.
 7. Connect the test leads to two points of the tested circuit. If the built-in buzzer sounds, the resistance between the two points is

less than 50Ω .

Range	Display	Test Condition
	Forward Voltage Drop of Diode	Forward DC Current is Approx. 0.5mA, Backward Voltage is Approx. 1.5V
	Buzzer makes a long sound if resistance is less than 50Ω	Open circuit voltage is Approx. 0.5V

Overload Protection: 250V DC or AC Peak Value.

CAUTION: DO NOT INPUT VOLTAGE AT THIS RANGE!

2-2-7. Capacity (C)

1. Rotate function switch to "  " gear;
2. Insert the black test lead to "COM" terminal and red one to " $V\Omega mA$  " terminal;
3. Connect the tested capacity by the test leads to "COM", " $V\Omega mA$  " input terminals, the screen will show capacitance parameter. (The relative value measurement could be conducted by pressing "REL" button.)

Caution:

1. Fully discharge the tested capacitor in case it damages the meter.
2. When measuring in-line capacitor, the power should be turned off and all capacitors should be discharged completely.
3. It takes about 30 seconds to input stable

reading at 1000uF Range.

Range	Accuracy	Resolution
4nF	$\pm(5.0\%+90)$	1 pF
40nF	$\pm(4.5\%+8)$	10pF
400nF		100pF
4 μ F		1nF
40 μ F		10nF
100 μ F	$\pm(5.0\%+8)$	100nF
1000 μ F	$\pm(5.0\%+8)$	1 μ F

Overload Protection: 250V DC or AC Peak Value.

2-2-8. Frequency (F)

1. Connect test leads and shielded cable to “COM” 、 “ $\frac{V\Omega mA}{* \cdot 10 \cdot 1 Hz}$ ” terminals.
2. Rotate function switch to “Hz” gear.

Connect test leads and the cable to the signal source or the tested load. The tested signal will show on the screen.

Caution:

1. When inputting AC RMS over 10V, it could show reading, but excess vibration may appear;
2. It is recommended to test weak signals by shielded cable under noisy circumstances.
3. Press “Hz/DUTY” button to choose the frequency or duty cycle measurement mode when in the frequency range.
4. Don't input voltage of over 250V DC or AC peak value in case it damages the meter.

Range	Accur acy	Resolution
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1Hz	$\pm(0.5\%+10)$	0.001Hz
10Hz		0.01Hz
100Hz		0.1Hz
1kHz		1Hz
10kHz		10Hz
100kHz		100Hz
1MHz		1kHz
30MHz		10kHz
0.1-99.9%	For your reference	0.1V

Input Sensitivity: $>1V_{RMS}$, Overload Protection: 250V DC or AC Peak Value.

2-2-9. Temperature ($^{\circ}C/^{\circ}F$)

1. Rotate function switch to ($^{\circ}C/^{\circ}F$) gear.
2. Insert the cathode (black pin) of cold end (free end) of thermocouple into "COM"

jack and anode into “ $\frac{V\Omega mA}{\text{Hz}}$ ” terminal. Then put the working end (temperature measurement end) of thermocouple on the surface or inside the object to be tested. Then you can read temperature from the screen, and the data is in Centigrade.

Caution:

1. When the input terminal is open-circuit, it will display the normal temperature.
2. Don't change the temperature probe at random, or the value accuracy could not be guaranteed.
3. Don't measure voltage at temperature range.

Range	Accuracy	Resolution
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(-20 ~ 1000) °C	$<400^{\circ}\text{C} \pm$ $(1.0\%+5\text{d})$ $\geq 400^{\circ}\text{C} \pm$ $(1.5\%+15\text{d})$	1°C
(-4 ~ 1832) °F	$<750^{\circ}\text{F} \pm$ $(0.75\%+5\text{d})$ $\geq 750^{\circ}\text{F} \pm$ $(1.5\%+15\text{d})$	1°F

Sensor: K Type Thermocouple
(Nickel-chromium--nickel silicon) (banana
plug).

CAUTION: DO NOT INPUT VOLTAGE AT
THIS RANGE!

VII. Instrument Maintenance

This is a precision instrument and the user shall not modify the electric circuit at will.

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1. Keep the instrument away from water, dust and shock.
 2. Do not store and operate the meter under the condition of high temperature, high humidity, combustible, explosive environment and strong magnetic field.
 3. Wipe the case with a damp cloth and detergent; do not use abrasives and alcohol.
 4. If the instrument is not operated for a long time, please take out the battery to avoid leakage.
 5. Pay attention to the status of the 1.5v battery. When the LCD displays a flashing “” symbol, the battery shall be replaced;

The steps are as follows:

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- 5-1. Loosen the screw on the back cover that secures the battery door and exit the battery door;
 - 5-2. Remove 1.5V batteries and replace them with two new ones. Although a 1.5V battery of any standard can be used, but in order to extend the operation life, alkaline batteries should be used;
 - 5-3. Close the battery door and secure the screw.

Precaution:

1. Don't input voltage higher than DC 1000V or AC Peak Value.
2. Don't measure voltage at current, resistance, diode and buzzer range.

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3. Don't use the instrument when the battery has not been installed properly or the back cover has not been tightened.
 4. Prior to the replacement of battery or fuse, please remove the test leads from the measuring points and switch off the meter.

VIII. Fault Elimination

If the instrument could not work properly, please try the following tips to solve some general problems. If the problems still exist, please contact the maintenance center or the distributor. If the problems still exist, please contact our customer service team at service@iragu.net.

Fault	Solution
No Display	<ul style="list-style-type: none"> ● Turn on power; ● Replace battery.
 symbol appearance	<ul style="list-style-type: none"> ● Replace battery.
Inaccurate measuring values	<ul style="list-style-type: none"> ● Replace battery.

This Instruction is subjected to change without any further notice.

The content of this Instruction is considered correct, and in case readers find any errors and missing parts, please contact the manufacturer.

The Company shall not be held liable for any accidents and hazards resulted from the mal-operations by the user.

The function elaborated by this Instruction shall not be taken as the reasons for using the product for special purposes.