

**VALUE**<sup>®</sup>

**VDM151**

**Operating Manual**



**Modern Digital Multimeters**



P/N:110401105438

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## OVERVIEW

3 1/2-bit DDM in the brand-new “VDM151” series is a kind of hand-held 3 1/2-bit digital universal meter with stable performance and high reliability. The large-scale integrated circuits and dual integral A/D transducer are the core design of circuits of the overall instrument and overload protection with full range of functions is also provided. It can be used to measure the DC voltage and AC voltage, electric current, resistance, capacitance, diode, triode, temperature, and the circuit break-make. It's your ideal tool.


## SAFETY RULES AND PRECAUTIONS

- This instrument is designed and manufactured in strict accordance with safety requirements of electronic measuring instrument in GB4793 as well as safety standards of IEC61010-1 and IEC100-2-032. It also complies with the safety standards of double insulation, over voltage CAT II 600V and pollution class 2. Follow the instructions of this Manual, or the protection of the instrument will be damaged.
- Ensure that it cannot be operated before the back cover is put in the place, otherwise there is a risk of electric shock.
- The range switch shall be installed at the correct position.
- Check and ensure the insulation layer of the pen is in good condition without damage and broken line.
- The red and black pens should be inserted in the hole which meet the measurement requirement; ensure well contact.
- The input signal is not allowed to exceed the limit value to avoid electric shock and damage.
- Changing range switch shift is strictly prohibited during the measurement of voltage and current in order to avoid damaging the instrument.

- If you want to change the bad fuse and you must use the one of the same type.
- In order to avoid electric shock, the potential difference between common port “COM” and the “ $\perp$ ” earth is not exceeded 600V.
- When the voltage to be measured is more than 60 DC or 30 Vrms AC, you must be careful to avoid electric shock.
- When the LCD shows the symbol of , you must change the battery in time to ensure the measuring accuracy.
- Turn off the power after finishing the measurement. If you do not use it for a long time, take out the battery.
- Don't operate this instrument under high temperature or high humidity. Especially, it cannot be stored in damp environment. If the instrument is affected with damp, its performance will be damaged.
- Don't change the circuits of the instrument at random, otherwise, you will damage the instrument and be in danger.
- Maintenance: Clean the shell of the instrument with wet cloth or mild cleaning agent rather than abrasive objects or solvent.
- Symbols

	Lower battery level		Grounding		Warning
	Buzzer		AC		DC
	Fuse		Double insulation		Diode

## I.CHARACTERISTICS


1. There are 30 ranges for function selection.
2. LCD display with visible zone 63×29mm
3. Over-range indication “1” .
4. The maximum value displayed of 1999(three and half digits)
5. Overload protection for the full range.
6. Automatic power cut-off
7. Temperature range Working temperature: 0℃~40 ℃ (32℉~104℉) Storage temperature: -10℃~50 ℃ (14℉~122℉)
8. Indication of lower battery level: The upper-left corner of LCD will show the symbol of “”
9. The function to keep number of all shifts.
10. Physical dimensions: 186mm x 91mm x 39mm
11. Weight: Approximate 300g (instrument +protection sleeve + bracket+ battery, excluding pens)

## II. TECHNICAL DATA

Accuracy: ±(a% reading +digit); the guarantee period is 1 year.  
 Ambient temperature: 23℃±5℃  
 Relative humidity: <75%


### 2-1. DC voltage

Range	Resolution	Accuracy
200mV	100μV	±(0.5%+1)
2 V	1 mV	
20 V	10mV	
200 V	100mV	±(0.8 %+2)
600 V	1 V	

 Input impedance: 10MΩ for all ranges  
 Overloading protection: For 200mV range, 250V, DC or AC effective value. For other ranges, 600Vrms or 600Vp-p peak value.

### 2-2. AC voltage

Range	Resolution	Accuracy
2 V	1 mV	±(0.8%+3)
20 V	10mV	
200 V	100mV	
600 V	1 V	±(1.5%+5)

 Input impedance: 10 MΩ for all ranges  
 Frequency range: 45Hz-400Hz  
 Overloading protection: 600 Vrms or 600Vp-p peak  
 Display: Mean value (sine-wave effective value)

**2-3 Direct current**

Range	Resolution	Accuracy
2 mA	1μA	±(0.8%+1)
20 mA	10μA	±(0.8%+1)
200 mA	100μA	±(1.5%+1)
10 A	10 mA	±(2.0%+5)

⚠ Overloading protection: uA, mA input: 200 mA /600V Φ 5 X 20 mm  
 A input end: 10A/600V Φ 6 X 25 mm  
 Maximum input current: 10A (For current over 5A, measuring time shall not exceed 15 seconds)  
 Measured voltage drop: 200mV for full range

**2-4. Alternating current**

Range	Resolution	Accuracy
20 mA	10μA	±(1.0%+3)
200 mA	100μA	±(1.8%+3)
10 A	10 mA	±(3.0%+5)

Overloading protection: uA, mA input: 200 mA /600V Φ 5 X 20 mm  
 A input end: 10A/600V Φ 6 X 25 mm  
 Maximum input current: 10A (For current over 5A, measuring time shall not exceed 15 seconds)  
 Measured voltage drop: 200mV for full range  
 Display: Mean value (sine-wave effective value)

**2-5. Resistance**

Range	Resolution	Accuracy
200 Ω	0.1 Ω	±(1.2%+2)
2 kΩ	1 Ω	±(1.0%+2)
20 kΩ	10 Ω	
200 kΩ	100 Ω	
2 MΩ	1 kΩ	±(1.2%+2)
20 MΩ	10 kΩ	±(1.5%+2)

⚠ Open circuit voltage: ≤ 700mV  
 Overloading protection: 600V for all ranges, DC or AC effective value  
 Notice: At 200 MΩ shift, the pen is short-circuited. It is normal for the display to show 10 digits. During measurement, these 10 digits shall be subtracted from the reading.  
 Relative humidity for measurement in 200MΩ shift ≤ 65%

### 2-6. Capacitance

Range	Resolution	Accuracy
2 nF	1 pF	$\pm(4.0\%+3)$
20 nF	10 pF	$\pm(4.0\%+3)$
200 nF	100 pF	$\pm(4.0\%+3)$
2 $\mu$ F	1 nF	$\pm(4.0\%+3)$
200 $\mu$ F	100 nF	$\leq 50 \mu\text{F} \pm(5.0\%+4)$ > 50 $\mu$ F reference

Testing signal: About 175Hz 40 mVrms

Measured capacitance > 100 $\mu$ F; Note: Testing is made after capacitor discharge

### 2-7. Temperature

Range	Resolution	Accuracy
TEMP $^{\circ}\text{C}$ (-40 $^{\circ}\text{C}$ ~1000 $^{\circ}\text{C}$ )	1 $^{\circ}\text{C}$	-40 $^{\circ}\text{C}$ ~0 $^{\circ}\text{C}$
		0 $^{\circ}\text{C}$ ~400 $^{\circ}\text{C}$
		400 $^{\circ}\text{C}$ ~1000 $^{\circ}\text{C}$
TEMP $^{\circ}\text{F}$ (-40 $^{\circ}\text{F}$ ~1832 $^{\circ}\text{F}$ )	2 $^{\circ}\text{F}$	-40 $^{\circ}\text{F}$ ~32 $^{\circ}\text{F}$
		32 $^{\circ}\text{F}$ ~752 $^{\circ}\text{F}$
		752 $^{\circ}\text{F}$ ~1832 $^{\circ}\text{F}$



### 2-8 Continuity testing for diode and buzzer

Range	Description	Testing conditions
	Display the forward voltage of diode (approximate value), unit "mV"	Forward DC current about 1 mA Reverse DC voltage about 2.8 V
	At On-resistance $\leq 10 \Omega$ , buzzer inside the instrument rings; At On-resistance > 10 $\Omega$ , the buzzer either rings or not to show approximate value of resistance, unit " $\Omega$ "	Open circuit voltage about 2.8V

Overloading protection: 600V DC or AC effective value

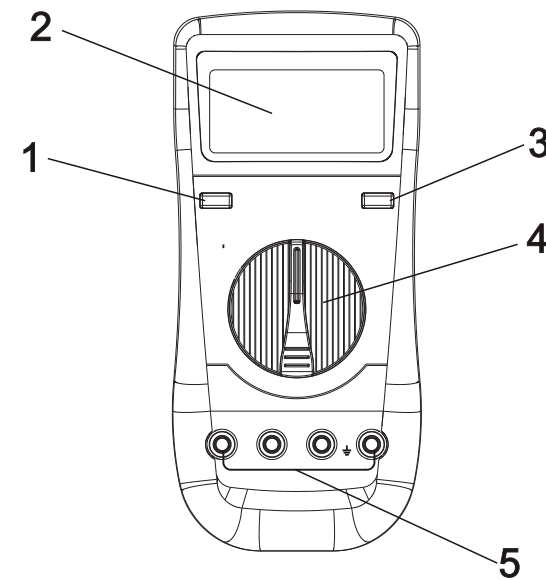
### III. OPERATING METHOD

Precautions before operation:

- 1) Press the POWER switch to check 9v battery. In case of lower battery voltage level, “” will be shown on the display. In this case, you need to replace the battery.
- 2) “” symbol beside the pen hole means that input voltage or current shall not exceed the indicated value so that the internal circuits can be protected from damage.
- 3) Prior to the testing, the functional switch shall be placed at the needed range.

4) Introduction of the instrument:


- ① Power switch
- ② LCD display
- ③ Data hold
- ④ Functional switch
- ⑤ Input socket



### 3-1 Measurement of DC voltage

1. Insert the black pen into the COM hole and the red pen into the V hole.
2. Place the functional switch at range scope; and connect the test pen to the power or load to be tested. Polarity of the terminal connecting with the red pen will be shown at the same time.


Notice

- 1) If the scope of voltage to be tested is not known, the functional switch shall be placed at the maximum range which will be gradually lowered for testing.
- 2) If the display only shows “1”, it indicates over-range. In this case, the functional switch shall be placed at higher range.
- 3) “” indicates that you must not input a voltage more than 600 V. It is possible to show a higher voltage, but it has a risk of damaging the internal circuits.
- 4) Special attention shall be given to measurement of high voltage to avoid electric shock.

### 3-2 Measurement of AC voltage

1. Insert the black pen into the COM hole and the red pen into the V hole.
2. Place the functional switch at V~ range scope; and connect the test pen to the power or load to be tested.


Notice

- 1) Refer to Notice 1, 2 and 4 in the AC Voltage Measurement
- 2) “” indicates that you must not input a voltage more than 600 V. It is possible to show a higher voltage, but it has a risk of damaging the internal circuits.

### 3-3 Measurement of direct current

1. Insert the black pen into the COM hole. When the current for which the maximum value is below 200 mA is measured, insert the red into mA hole. When the current for which the maximum value is 10 A is measured, insert the red pen into 10 A hole.
2. Place the functional switch at range; and connect test pen to the circuit of load to be tested in series. The polarity of red pen will be displayed together with the current.

Notice

- 1) If the scope of current to be tested is not known, the functional switch shall be placed at the maximum range which will be gradually lowered for testing.
- 2) If the display only shows “1”, it indicates over-range. In this case, the functional switch shall be placed at higher range.
- 3) “” indicates that the maximum input current is 200Ma. The built-in fuse of 200mA/600V Φ5 x 20 mm can effectively protect the circuit from burn-out. 10A range use fuse of 10A/600V Φ6 x 25 mm for protection.

### 3-4 Measurement of alternating current

1. Insert the black pen into the COM hole. When the current for which the maximum value is below 200 mA is measured, insert the red into mA hole. When the current for which the maximum value is 10 A is measured, insert the red pen into A hole.
2. Place the functional switch at A~ range; and connect test pen to the circuit of load to be tested in series.



 Notice

- 1) Refer to Notice 1, 2 and 3 in the Direct Current Measurement.

**3-5 Resistance measurement**

1. Insert the black pen into COM hole and red pen into  $\Omega$  hole.
2. Place the functional switch at  $\Omega$  range. Connect the test pen to the resistance to be test in parallel.

 Notice

- 1) If the resistance to be tested is more than the maximum value of the range selected, over-range “1” will be shown. You shall select higher range. For resistance more than 1M $\Omega$  and above, the reading can become stable after several seconds; this is normal for high resistance reading.
- 2) When input is not made, such as open-circuit conditions, the instrument shows “1” .
- 3) When you check the impedance of internal circuits, power supply to the circuit to be tested must be cut off and capacitor charges must be totally discharged.
- 4) There are 10 digits at 200 M $\Omega$  short-circuit which shall be subtracted from the reading. For example, 101.0 is shown in measurement of 100 M $\Omega$  resistance and the 10 digits shall be subtracted.

**3-6 Capacitance testing**

Prior to connection to the capacitance to be tested, note that time for zero reset is needed for each change of range. Existing drift reading cannot influence the testing precision.

 Notice

- 1) Although protection to the capacitance shift is set by the instrument, testing shall still be carried out after capacitor discharge to avoid damage to the instrument or causing measuring error.
- 2) In measuring capacitance, insert the capacitor into the capacitance testing seat.
- 3) In measuring large capacitance, it will take a certain time period to get stable reading.
- 4) Unit: 1pF=10<sup>-6</sup>  $\mu$ F, 1nF=10<sup>-3</sup>  $\mu$ F

**3-7 Temperature measurement**

1. In measuring the temperature, insert the cold end (free end) of thermocouple sensor into the temperature test seat and at the same time note the polarity. Place the working end (temperature measuring end) on or inside the object to be tested. You read the temperature directly from the display which is expressed in  $^{\circ}$ C or  $^{\circ}$ F.

**3-8 Diode testing and buzzer continuity testing**

1. Insert the black pen into COM hole and red pen into V $\Omega$  hole (polarity of red pen “+” ); place the function switch at shift; connect the pen to the diode to be tested. The reading is the approximate value of forward voltage of diode.
2. Connect the pen to both ends of circuit to be tested. If the resistance between both ends is lower than about 10  $\Omega$ , the built-in buzzer rings.

### 3-9 Instructions for use of automatic power cut-off

1. Automatic power cut-off circuit is set for the instrument. When working time of the instrument is about 15min, the power is automatically cut off. Then the instrument goes into sleeping state. In this case, the instrument consumes about 7 $\mu$ A current.
2. If you want to restart the power after power cut-off to the instrument, press the power switch twice.

## IV. MAINTENANCE

This digital universal meter is an electronic precision instrument. Do not change circuits as desired and note the following aspects:

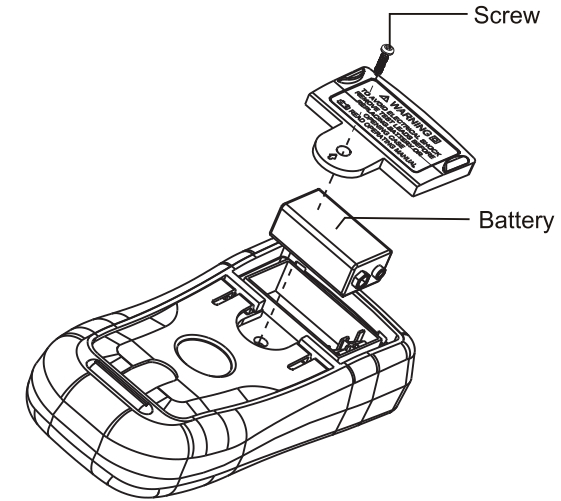
1. Do not connect to DC voltage more than 600V or AC effective voltage higher than 600V.
2. Do not connect to the voltage source when the function switch is at “Current Shift”, “ $\Omega$ ” and “ $\rightarrow$ ,  $\cdot$ ,  $\cdot$ )”.
3. Do not use this instrument when the battery is not well connected or its back cover is not tightly installed.
4. You can only change the battery or fuse when the test pens are removed and power is cut-off.

### Battery installation or replacement

This product adopts 9V battery. Refer to Fig. 2, install or replace the battery as per the following sequence.

- a. Shut down this product and remove the test bar at input end.
- b. Place the product to make its panel face down; unscrew screws on the battery box cover; remove the cover and take the battery out.

- c. After the new battery is installed, install the battery cover and tighten the screws.



The VALUE logo is displayed in white on a dark grey background. It features a stylized 'V' with a circular element inside, followed by the word 'VALUE' in a bold, sans-serif font with a registered trademark symbol.

VDM151 OPERATING MANUAL

## V. ACCESSORIES

1. Operating Guide-----One book
2. Pen----- One pair
3. Cross point-type thin-line K thermocouple sensor----- One suit

Content of this manual is subject to changes without notice.

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