

velleman

DVM 68

LCD Auto Range Digital Multimeter

OPERATION MANUAL
GEBRUIKERSHANDLEIDING
MANUEL D'UTILISATEUR



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LCD Auto Range Digital Multimeter

1. Description

Your DVM 68 is a autoranging professional digital multimeter with a 3 ¾ digit LCD display. It is ideally suited for field, lab, shop, and home applications. By using the latest in IC and display technology to significantly reduce the number of discrete internal components, the multimeter gives you superb measuring capability as well as the highest possible reliability.

It is capable of performing functions :

DC Voltage	AC Voltage	Resistance
AC Current	DC Current	Capacity
Frequency	Continuity	

Also diodes and transistors (amplification hFE) can be tested.

1.1 Warning

Use extreme caution in the use of this device. Improper use of this device can result in injury or death. Follow all safeguards suggested in this owner's manual in addition to normal safety precautions in dealing with electrical circuits. Do not use this device if you are unfamiliar with electrical circuits and testing procedures.

Not for commercial or industrial use.

1.2 A word about safety

This multimeter is designed to ensure the safest operation possible. However, safe operation depends on you, the operator. Make sure you follow these simple safety rules :

- Never apply a voltage to the multimeter that exceeds the limits given in the specifications. Never apply more than 1000V DC or 750V rms AC between an input jack and ground.
- Use extreme caution when working with voltages above 60V DC or 30V AC rms.
- Always discharge filter capacitors in the power supply circuit under test before you attach test leads.
- Never connect to a source of voltage when you select DCA, ACA, resistance measurement or continuity check function.
- Always turn off power and disconnect the test leads before you replace the batteries or fuse.
- Never operate the multimeter unless the battery cover is in place and fully closed.
When carrying out measurements on TV or switching power circuits, always remember that there may be high amplitude voltages pulses at test points which can damage the meter.

1.3 Maintenance

Your DVM 68 is an example of superior design and craftsmanship. The following suggestions will help you care for the multimeter so you can enjoy it for years :

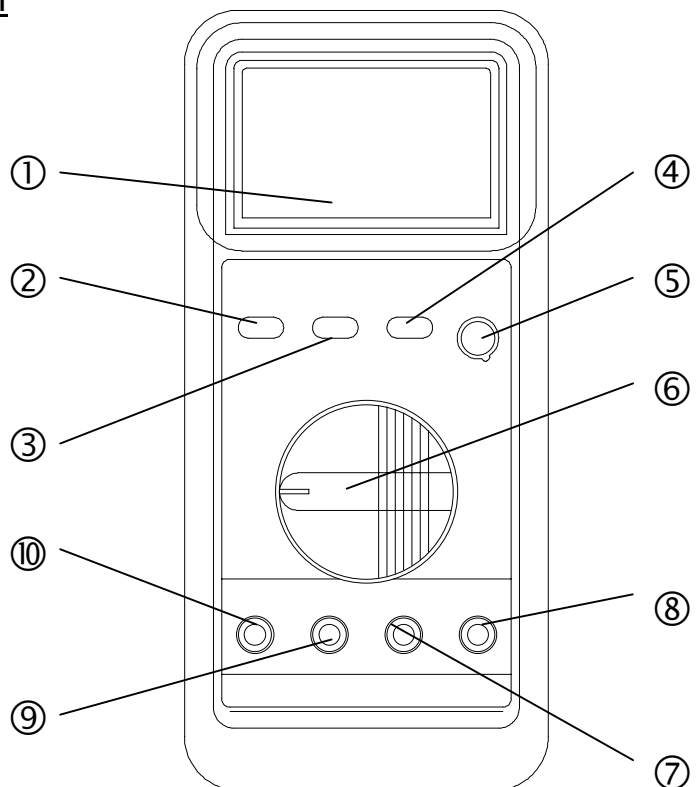
- Keep the multimeter dry. If it gets wet, wipe it dry immediately.
- Use and store the multimeter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices or damage batteries.
- Handle the multimeter gently and carefully. Dropping it can damage the circuit boards and case and can improper functioning.
- Use only fresh batteries of the required size and type. Always remove old or weak batteries.

If you do not plan to use the multimeter for a month or more, remove the batteries. This protects the multimeter from possible leakage.

- Disconnect the test probes before opening the multimeter.
- Replace blown fuses only with same size and type :
F1 : F 300mA/250V F2 : F 10A/250V
- If any faults or abnormalities are observed, do not use this device and let it check by authorised personel.
- Never use the meter unless the back cover is in place and fastened fully.
- To clean the meter, use a damp cloth and mild detergent only, do not use abrasives or solvents.

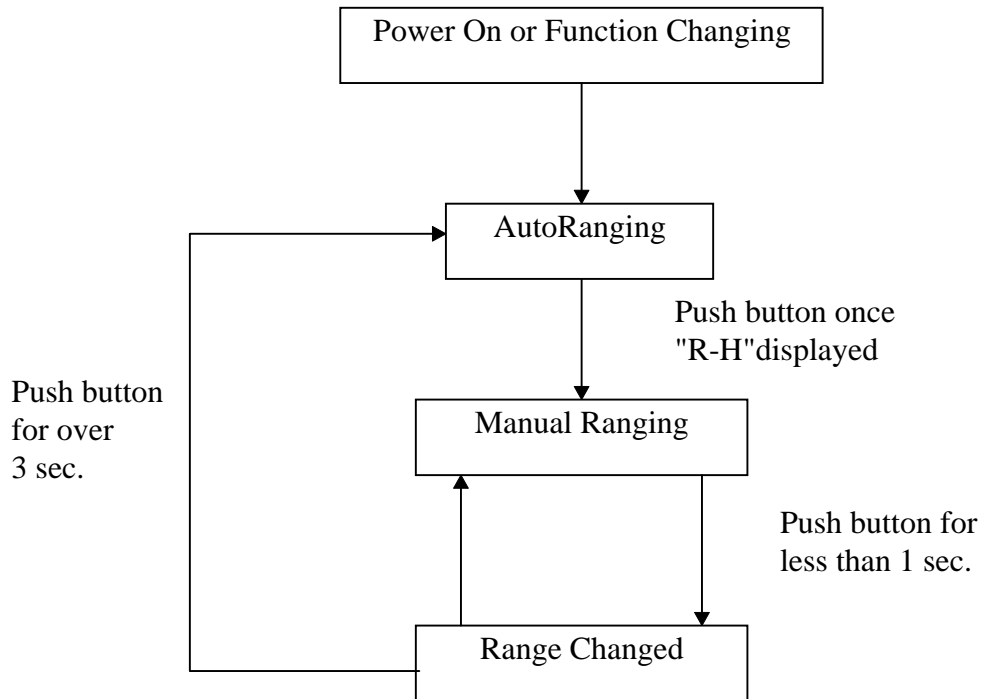
2. Description of the front panel

1. Display
2. Range Control Button
3. Data Hold button
4. AC/DC Current of
·))/▶ Selecting Button
5. Socket for Transistor Test
6. Function Switch/Power Switch
7. V/ Ω /F Input Jack
8. COM Input Jack
9. mA/Cx Input Jack
10. 10A Input Jack



2.1 Range Control Button

Range for AC/DC voltage, AC/DC current(μA and mA only), Resistance and Frequency measuring can be selected manually or autorange. Push this button as following to choose range the desired mode or range.



2.2 DATA HOLD button

When this button is pushed, the display will show the last reading and " D-H " symbol will appear until the button is pushed again.

Data holding will be cancelled automatically when the function switch is rotated.

2.3 AC/DC Current or \rightarrow / \rightarrow Selecting button

Push this button to select AC or DC current measuring function when the function switch is set at μA , mA, A positions.

Push this button to select \rightarrow) or \rightarrow measuring when the function switch is set at \rightarrow)/ \rightarrow position.

2.4 Input Jacks

This meter has four input jacks that are protected against overload to the limits. During use, connect the black test lead to the COM jack and the red test lead as shown below

Function	Red Lead Connection	Input Limits
DCV / ACV	V / Ω / F	1000V DC or 750V AC rms
kHz	V / Ω / F	250V DC or AC rms
Ω / \rightarrow) / \blacktriangleleft	V / Ω / F	250V DC or AC rms
μ A / mA	mA / Cx	300mA DC or AC rms
nF / μ F	mA / Cx	300mA fuse protected
A	A	10A DC or AC rms

μ A/ mA and A ranges are protected by fuses.

3. Operating instructions

3.1 Measuring Voltage

- 1) Connect the black test lead (-) to the COM jack and the red test lead (+) to the V/ Ω /F jack.
- 2) Set the function switch at V_{DC} or V_{AC} range to be used and connect test leads across the source or load under measurement.
- 3) Read LCD display. The polarity of red connection will be indicated when making a DC measurement.

3.2 Measuring Current

- 1) Connect the black test lead (-) to the COM jack and the red test lead (+) to the mA/Cx jack for a maximum of 300mA. For a maximum of 10A, move the red lead to the A jack.
- 2) Set the function switch at μ A, mA or A range to be used and push DC / \sim button to select DCA or ACA mode.
- 3) Connect test leads **IN SERIES** with the load in which the current is to be measured.
- 4) Read LCD display. The polarity of red lead connection will be indicated when making a DC measurement.

3.3 Measuring Resistance

- 1) Connect the black test lead (-) to the COM jack and the red test lead (+) to the V/ Ω /F jack.
- 2) Set the function switch at Ω range to be used and connect test leads across the resistance under measurement.

Remarks :

- 1) For resistance above $3.26\text{M}\Omega$, it may take a few seconds to stabilize reading. This is normal for high resistance measuring.
- 2) When the input is not connected, i.e. at open circuit, the figure "OL" will be displayed for the overrange condition.
- 3) When checking in-circuit resistance, be sure the circuit under test has all power removed and all capacitors are fully discharged.

3.4 Measuring Capacitance

- 1) Connect the black test lead (-) to the COM jack and the red test lead (+) to the mA/Cx jack.
- 2) Set the function switch at nF or μF position to be used.
- 3) Connect test leads across the capacitor under measurement and be sure that the polarity of connection is observed.

Remarks :

- 1) When checking in-circuit capacitance, be sure that the circuit has all power removed and all capacitor are fully discharged.
- 2) The range control mode in capacitance measurement is manual ranging and only two ranges (326nF , $32.6\mu\text{F}$) are provided.
- 3) If Range Control Button is used in this measuring function, decimal points may be at incorrect positions.
- 4) At the nF range, when the capacitor to be measured is not connected to test leads, the LCD may not read zero, but a few counts. These count have to be subtracted from measuring results.

3.5 Measuring Frequency

- 1) Connect the black test lead (-) to the COM jack and the red test lead (+) to the V/ Ω /F jack.
- 2) Set the function switch at the Hz position and connect test leads across the source or load under measurement.

Remark :

The input voltage should be between 200mV and 10V rms AC . If the voltage is more than 10V rms , reading may be out of the accuracy range.

3.6 Continuity & Diode Test

- 1) Connect the black test lead to the COM jack and the red test lead to the V/ Ω /F jack.
- 2) Set the function switch at $\text{buzzer}/\blacktriangleright$ position and push the $\text{buzzer}/\blacktriangleright$ button to select continuity or diode test mode.
- 3) In continuity testing, if continuity exists (i.e. resistance less than about 50Ω), built-in buzzer will sound.
- 4) If diode test mode is selected, connect the red and black to the anode and cathode of the diode under test. The forward voltage drop of this diode in V will be displayed.


3.7 Transistor Test

- 1) Set the function switch at hFE position.
- 2) Identify whether the transistor is NPN or PNP type and locate emitter, base and collector lead. Insert leads of the transistor to be tested into proper holes of the testing socket on the front panel.
- 3) LCD display will show the approximate hFE value at the test condition of base current 10 μ A and Vce 3.2V.

4. Specifications

Accuracy is specified for a period of one year after calibration and at 18°C to 28°C with relative humidity to 80%.

4.1 General

Max. voltage between terminal and earth	1000V DC or 750V AC rms (sinus)
Display	3 ³ / ₄ digit LCD, 3260 counts max, 2-3 readings / sec
Fuse protection	μ A & mA range : F 300mA/250V A range : F 10A/250V
Power Supply	9V battery
Ranging method	Auto / Manual
Polarity indication	" - " displayed
Overrange indication	" OL " displayed automatically
Low Battery indication	"  " displayed
Operating temperature	0°C to 40°C
Storage temperature	-10°C to 50°C
Dimensions	91 x 189 x 31.5 mm
Weight	310 g (incl. battery)

4.2 DC Voltage

Range	Resolution	Accuracy
326mV	0.1mV	$\pm 0.5\%$ of rdg ± 2 digits
3.26V	1mV	$\pm 0.3\%$ of rdg ± 2 digits
32.6V	10mV	
326V	0.1V	
1000V	1V	$\pm 0.5\%$ of rdg ± 2 digits

Input impedance : 10M Ω , more than 100M Ω at 326mV range

4.3 AC Voltage

Range	Resolution	Accuracy
3.26V	1mV	± 0.8% of rdg ± 3 digits
32.6V	10mV	
326V	0.1V	
750V	1V	

Input impedance : 10MΩ

Frequency range : 40 to 1000Hz, 40 to 200Hz at 3.26V range

4.4 DC Current

Range	Resolution	Accuracy	Burden Voltage
326μA	0.1μA	± 1.2% of rdg ± 3 digits	0.5mV / μA
3260μA	1μA		0.5mV / μA
32.6mA	10μA		8.0mV / mA
326mA	0.1mA		8.0mV / mA
10A	10mA	± 2.0% of rdg ± 5 digits	0.02V / A

Overload protection : F 300mA fuse for μA and mA ranges,
F 10A fuse for A range

4.5 AC Current

Range	Resolution	Accuracy	Burden Voltage
326μA	0.1μA	± 1.5% of rdg ± 5 digits	0.5mV / μA
3260μA	1μA		0.5mV / μA
32.6mA	10μA		8.0mV / mA
326mA	0.1mA		8.0mV / mA
10A	10mA	± 3.0% of rdg ± 7 digits	0.02V / A

Overload protection : F 300mA fuse for μA and mA ranges,
F 10A fuse for A range

Frequency range : 40Hz to 1000Hz

4.6 Resistance

Range	Resolution	Accuracy
326Ω	0.1Ω	± 0.8% of rdg ± 3 digits
3.26kΩ	1Ω	± 0.8% of rdg ± 3 digits
32.6kΩ	10Ω	
326kΩ	100Ω	
3.26MΩ	1kΩ	± 1.2% of rdg ± 2 digits
32.6MΩ	10kΩ	

Maximum Open Circuit Voltage : 1.3V

4.7 Capacitance

Range	Resolution	Accuracy
326nF	0.1nF	± 3.0% of rdg ± 5 digits
32.6µF	10nF	

4.8 Frequency

Range	Resolution	Accuracy
32.6kHz	10Hz	± 1.2% of rdg ± 3 digits
150kHz	100Hz	± 2.5% of rdg ± 3 digits

Sensitivity : 200mV rms up to 50kHz, 1V rms for 50kHz to 150kHz

5. Accessories

Test leads
 Battery (9V)
 Operation Manual
 Holster

5.1 How to use the holster

The holster is used to protect the meter and to make the measurement more comfortable. The following figures shows how to use the holster to :

- 1) Support the meter with a standard angle. (fig. a)
- 2) Support the meter with a small angle using the little stand.(fig. b)
- 3) Hang the meter on the wall using the little stand. (fig. c)

Take the little stand off from the back side of the large stand and insert it into holes located upper on the holster.

- 4) Hold test leads. (fig. d)

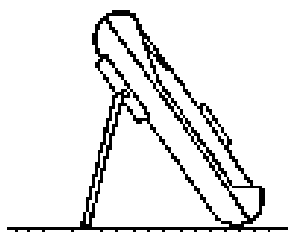


fig. a



fig. b



fig. c

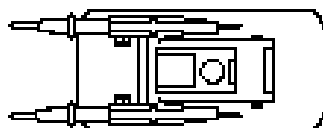


fig. d

6. Battery and fuse replacement

If the sign "⚡" appears on the LCD display, it indicates that the battery should be replaced. Remove screws on the back cover and open the case. Replace the exhausted battery with a new one.

Fuse rarely needs replacement and blows usually as a result of the operator's error. Open the case as mentioned above and take the PCB assembly out from the case. Replace the blown fuse with ratings specified.

F1 : F 300mA/250V F2 : F 10A/250V

Remark :

Before attempting to open the case, be sure that test leads have been disconnected from measurement circuit to avoid electric shock.

