

Smart

MULTIMETER

Model : DM-9950



Your purchase of this MULTIMETER marks a step forward for you into the field of precision measurement. Although this MULTIMETER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.



OPERATION MANUAL

Caution Symbol



Caution :

- * Risk of electric shock !



Caution :

- * Do not apply the overload voltage, current to the input terminal !
- * Remove test leads before open the battery cover !
- * Cleaning - Only use the dry cloth to clean the plastic case !

Environment Conditions

- * ***Installation Categories III-1000V.***
- * ***Pollution Degree 2.***
- * ***Altitude up to 2000 meters.***
- * ***Indoor use.***
- * ***Relative humidity 80% max.***

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1. FEATURES

- * Meet IEC 1010 CAT III 1000 V safety requirement.
- * 6000 counts A/D, high resolution.
- * ACV, ACA, DCV, DCA, ohms, continuity, Hz, Capacitance, Diode.
- * Smart function, Auto range or manual range with hold.
- * Smart operation, Build in 5 intelligent function :
" V ", " Ω ", " uA ", " mA ", " A ".
- * " V " function can automatically select ACV / DCV with auto range.
- * " Ω " function can select the Resistance , Diode, Continuity beeper, Capacitance automatically with auto range.
- * "10A" " mA " " uA " function, can automatically select ACA / DCA with auto range.
- * Data hold .
- * Auto shut off is available to save battery life.
- * Both 10 A, mA,uA current range are build fuses for safety consideration.
- * 10 M ohm impedance for voltage circuit.
- * Built-in overload protection for most ranges.
- * LSI circuit provides high reliability and durability.
- * Uses durable, long-lasting components, enclosed in strong, light weight ABS-plastic housing.
- * Full line optional adapters : Clamp adapter, Pressure adapter, Light adapter, EMF adapter, Sound level adapter, Anemometer adapter.

2. SPECIFICATIONS

2-1 General Specifications

Display	65 mm x 48 mm large LCD display
Measurement	DCV, ACV, DCA, ACA, Resistance, Capacitance, Frequency, Diode, Continuity beeper.
A/D counts no.	6000 counts.
Smart function	" V " function can select ACV, DCV automatically with auto range.
	" Ω " function can select the Resistance, Diode, Continuity, beeper, Capacitance automatically with auto range.
	" 10A " " mA " " μ A " function can measure ACA, DCA with auto range.
MAX./MIN.	Records Maximum & Minimum readings with recall.
Data hold	To freeze the display reading on the LCD display
Power On/Off management	Auto power off or manual power off. <i>@ Details please refer page 7</i>
Hz button	When execute the voltage or current function also can measure the frequency of signal.
Selection	Smart function or auto function .
Range	manual range selecting.
Polarity	Automatic Switching, " - " indicates negative polarity.
Sampling time	Approx. 0.5 to 1 second.
Operating Temp. & humidity	0 °C to 50 °C (32 °F to 122 °F) Max. 80% RH.
Power supply	DC 9 V battery 006P, MN1604
Power consumption	Approx. DC 3 mA.

Dimension	190 x 88 x 40 mm (7.5 x 3.5 x 1.6 inch).
Weight	377 g/0.83 LB (w.o battery).
Accessories Included	Red and Black Test Leads (CAT III 1KV Test Leads)..... 1 Set 0.63 Amp Spare Fuse..... 1 PC Instruction Manual..... 1 PC
Optional accessories	Full line adapters : ACA/DCA current adapter, Pressure adapter, Light adapter, EMF adapter, Sound level adapter, High voltage probe. Soft carrying case..... CA-05A

2-2 Electrical Specifications (23±5 °C)

DC Voltage		
Range	600.0 mV /6 V/60 V/600 V /1000 V	
Resolution	0.1 mV /0.001V /0.01V /0.1V/1 V	
Accuracy	± (0.5% + 2d)	600 mV
	± (0.8% + 1d)	6 V, 60 V, 600 V, 1000 V
Input impedance	10 M ohm.	
Over load protection	600 mV range	± 500 DCV, 350 ACV
	other ranges	±1000 DCV, 1000 ACV

AC Voltage		
Range	600.0 mV /6 V/60 V/600 V/1000 V	
Resolution	0.1 mV /0.001V /0.01V /0.1V/1 V	
Accuracy	± (1% + 2d) * Spec. are tested under 50/60 Hz.	
Input impedance	10 M ohm.	
Over load protection	600 mV range	± 500 DCV, 350 ACV
	other ranges	±1000 DCV, 1000 ACV

DC Current, AC Current	
Range	10 A/ 600 mA/60 mA/ 6000 uA/600 uA
Resolution	0.01A / 0.1 mA /0.01mA /1 uA /0.1 uA
Accuracy	600 uA : $\pm (1.5\% + 2d)$. 6000 uA : $\pm (1.5 \% + 2d)$ 60 mA : $\pm (1 \% + 2d)$ 600 mA : $\pm (1 \% + 2d)$ 10 A : $\pm (1.5 \% + 2d)$ <i>* ACA spec. are tested under 50/60 Hz.</i>
Over load	10A range : 10A fuse.
protection	uA, mA range : 630 mA fuse.

Diode (Forward voltage, VF)	
Range	3 V DC.
Accuracy	$\pm (0.5\% + 2d)$

Capacitance	
Range	6 nF/60 nF/600 nF/6 uF/60 uF/ 600uF
Resolution	0.001nF/0.01nF/0.1 nF/0.001uF/0.01uF/ 0.1uF
Accuracy	$\pm (3 \% + 5d)$

Frequency	
Range	40Hz to 1KHz
Resolution	0.001KHz
Accuracy	$\pm (0.5\% + 2d)$
Over load protection	AC/DC 600V

OHMS	
Range	600Ω/6 K/60 K/600 K/6 M/60M
Resolution	0.1Ω/0.001K/0.01K/0.1K/0.001M/0.01M
Accuracy	600 ohm : $\pm(1\% + 2d)$ 6K/60K/600K/6 M : $\pm(1.5\% + 2d)$ 60M : $\pm(3\% + 2d)$ for auto range mode.
Over load protection	± 350 DCV, 350 ACV.

Continuity Beeper
Beeper will sound if measured resistance less than 20 ohm.

Max. & Min. Measurement
During the operation can memorize the maximum and the minimum measurement value.

Remark :

- * **Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.**
- * **Accuracy is based on reading value.**

3. FRONT PANEL DESCRIPTION

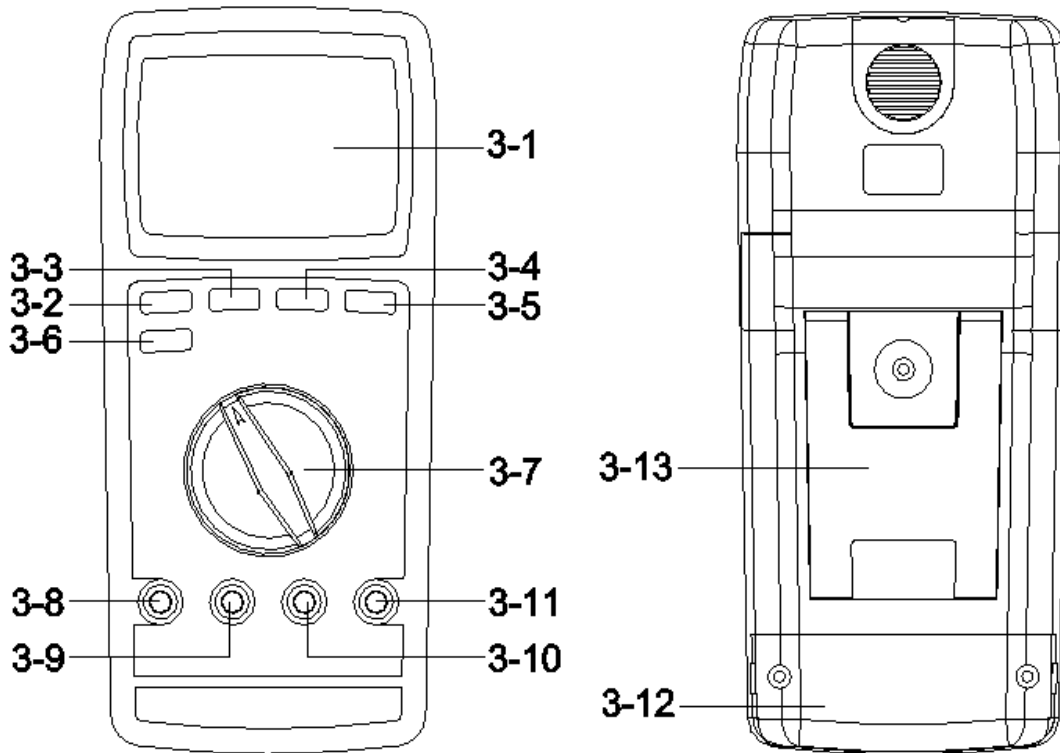


Fig. 1







- | | |
|----------------------------|--|
| 3-1 Display | 3-10 COM input terminal |
| 3-2 SELECT button | 3-11 V/ohm/Diode/Continuity/Cap.
input terminal |
| 3-3 HOLD button | 3-12 Battery compartment/Cover |
| 3-4 MAX/MIN button | 3-13 Stand |
| 3-5 Hz button | |
| 3-6 RANGE button | |
| 3-7 Function rotary switch | |
| 3-8 10A input terminal | |
| 3-9 mA/uA input terminal | |

4. PRECAUTIONS & PREPARATIONS FOR MEASUREMENT

- 1) Ensure that the DC 9V battery are connected with the right polarity and placed in the battery compartment correctly.
- 2) Place the Red & Black Test Leads into the proper input terminal before making measurement.
- 3) Remove either of the test leads from the circuit when changing the measurement range.
- 4) Except operate the " Data Hold " function, it should cancel the " Data Hold " function, otherwise the display reading will freeze permanently.
- 5) Do not exceed the maximum rated voltage and current to the input terminal.
- 6) Always switching the " Function Rotary Switch " to the " Off " position when the instrument is not operation.
- 7) Remove the battery if the instrument is not to be used in a long period of time.
- 8) For safety consideration, when change the new test leads, it should use the replace test leads that already approval of " CATIII-1000 V " at least.
- 9) Power On/Off management :
 - a. When not use the meter, should rotate the " Function rotary switch " (3-7, Fig. 1) to the " OFF " position.
 - b. During the measurement, after 10 minutes the meter will auto power off. If intend to power on again, it should rotate the " Function switch " to " OFF " position then set to the new desiring function position.
 - c. ***Disabling auto power off (not auto power off)***
Press the " Hz button " (3-5, Fig. 1) while turning the " Function switch " from the " OFF " position to the desiring function position.

5. MEASURING PROCEDURE

5-1 Symbols & units of display

Symbols Units	Descriptions
SMART	Appears when selecting " Smart " mode. The meter default mode is " Smart "
AUTO	Appears when selecting " Automatic range " mode.
MANU	Appears when selecting " Manual range " mode.
	Appears when selecting DC mode. (DC voltage or DC current)
	Appears when selecting AC mode. (AC voltage or AC current)
	Appears when the " Data hold " function is operated.
Max Min	Appears when the " Max Min " is operated
Max	Appears when " Max " shows the maximum value of the record
Min	Appears when " Min " shows the minimum value of the record
	Power voltage is already under the low condition.
	Appears when the " Continuity beeper " is operated.
V	Units for voltage measurements.
mA,A	Units for " Current " measurements.
Ω ,K Ω ,M Ω	Units for resistance measurements.
nF,uF	Units for " Capacitance " measurements.
KHz	Units for " Frequency " measurements.
	Appears when the " Diode " function is operated.
—	Appears when measuring a DCV or DCA value is negative.
OL	Over range indicator for voltage and current, ohm function.

5-2 DC Voltage, AC voltage Measurement

- 1) Connect BLACK test lead into " COM " terminal (3-10, Fig. 1)
- 2) Connect RED test lead into " V " terminal (3-11, Fig. 1).
- 3) Select the " Function rotary switch " (3-7, Fig. 1) to the " V " position, Display will show " SMART " marker. meter is under " Smart " mode for voltage AC/DC auto scanning.
- 4) The meter can measure the ACV, DCV value automatically and with auto range selection.
- 5) Push the " SELECT button " (3-2, Fig. 1) to select the " ACV " or " DCV " measurement.
- 6) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.
- 7) Under the operation of " auto range " mode, push the " Range button " (3-6 Fig. 1) once will execute the " Manual Range " mode and hold the range, the LCD will show the " MANU " marker.
Under the manual range operation, push the " SELECT button " will return to SMART mode.

Remark :

During the measurement, if push the " Hz button " (3-5 Fig. 1) once, until the LCD show the " Hz " marker and the display will show the frequency value of the measurement signal.

5-3 Resistance Measurement

- 1) Connect BLACK test lead into " COM " terminal (3-10, Fig. 1).
- 2) Connect RED test lead into " Ω " terminal (3-11, Fig. 1).
- 3) Select the " Function rotary switch " (3-7, Fig. 1) to the " Ω " position.
- 4) When LCD show the " SMART " marker, the meter is under the " SMART " mode. Meter will select the suitable measurement range automatically.

- 5) Under the operation of " SMART " mode, push the " SELECT button " (3-2 Fig. 1) will execute the "AUTO Range" mode, the LCD will show the " AUTO "marker.
Under the auto range operation, push the " SELECT button " will return to SMART mode.

5-4 DC Current, AC Current Measurement

mA : 600 mA range, 60 mA range.

uA : 6000 uA range, 600 uA range.

- 1) Connect BLACK test lead into " COM " terminal (3-10, Fig.1)
- 2) For the " mA, uA " measurement, connect RED test lead into " mA uA " terminal (3-9, Fig. 1).
For the " 10 A " current measurement, connect RED test lead into " 10A " terminal (3-8, Fig. 1).

Open the circuit in which current is to be measured. Now securely connect test leads in series with the load in which the current is be measured.

- 3) For the " uA " measurement (600 uA, 6000 uA), select the " Function rotary switch " (3-7, Fig. 1) to " uA " position.
For the " mA " measurement (60 mA, 600 mA), select the " Function rotary switch " (3-7, Fig. 1) to " mA " position.
For the " 10 A " measurement, select the " Function rotary switch " (3-7, Fig. 1) to " 10A " position.
- 4) When LCD show the " SMART " marker, the meter is under the " SMART " mode. for ACA,DCA auto scanning
- 5) Push the " SELECT button " (3-2, Fig. 1) to select the " ACA " or " DCA " measurement,
- 6) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.

- 7) Under the operation of " auto range " mode, push the " Range button " (3-6 Fig. 1) once will execute the " Manual Range " mode and hold the range, the LCD will show the " MANU " marker.
Under the manual range operation, push the " SELECT button " will return to SMART mode.

Remark :

During the measurement, if push the " Hz button " (3-5 Fig. 1) once, until the LCD show the " Hz " marker and the display will show the frequency value of the measurement signal.

5-5 Continuity Check

- 1) Connect BLACK test lead into " COM " terminal (3-10, Fig 1.)
- 2) Connect RED test lead into " $\bullet \rightarrow$ " terminal (3-11, Fig. 1).
- 3) Select the " Function rotary switch " (3-7, Fig. 1) to the " $\bullet \rightarrow$ " position.
- 4) The LCD display will show the " SMART " , the meter is under " Smart " mode for Continuity measurement.
- 5) when the resistance value is less than 20 ohm, the beeper sound will be generated. The display will show " $\bullet \rightarrow$ " indicator.

5-6 Diode Test

- 1) Connect BLACK test lead into " COM " terminal (3-10, Fig 1.)
- 2) Connect RED test lead into " Ω " terminal (3-11, Fig 1.)
- 3) Select the " Function rotary switch " (3-7, Fig. 1) to the " \rightarrow " position.
- 4) The LCD display will show the " SMART " , the meter is under " Smart " mode for Diode measurement.
- 5) a. When connected with polarity as shown in Fig. 2, a forward current flow is established and the approx. Diode Forward Voltage (VF) value in volt will appears on the display reading. If the diode under test is defective, " 0.000 " or near " 0.000 " value (short circuit) " OL " (open circuit) will be displayed.

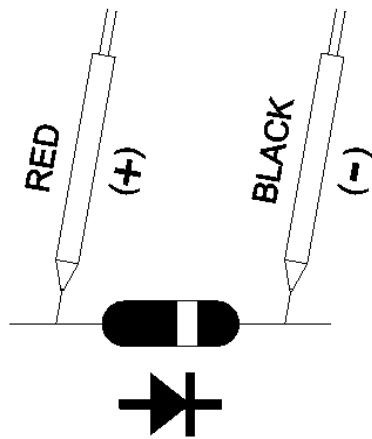


Fig. 2

- b. When connected as shown in Fig. 3, a reverse check on the diode is made. If the diode under test is good, " OL " will be displayed. If the diode under test is defective, " 0.000 " or other numbers will be displayed. Proper diode testing should include both steps a. and b. above.

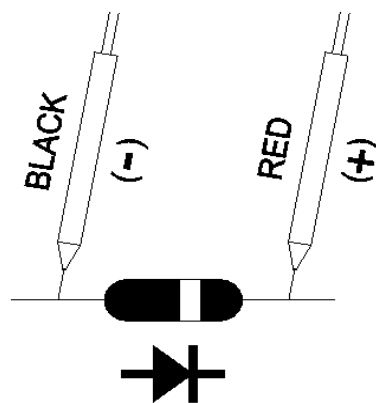


Fig. 3

5-7 Capacitance Measurement

- 1) Select the " Function rotary switch " (3-7, Fig. 1) to the " $\text{--}\text{+}$ " position.
- 2) Connect the tested capacitor to " Input terminals " directly.
 - * *If the measured capacity existing the polarity, then should connect the " + " polarity of the measured capacitor to the " V " terminal (3-11, Fig. 1), connect the " - " polarity of the measured capacitor to the " COM " terminal (3-10, Fig. 1),*
 - * *Full discharge the measured capacitor before the make the measurement.*
- 3) The LCD display will show the " SMART " , the meter is under " Smart " mode for Capacitance measurement.
- 4) The meter can measure the capacitance value automatically and with auto range selection.

5-8 Smart/Auto function selection

When the Display show the " SMART " , the meter is ready for the Smart mode. Under the " Smart " mode if press the " SELECT button " (3-2, Fig. 1) once (or once in sequence) then can select the individual function, for example ACV, DCV, ACA, DCA , Diode, Capacitance, Continuity...testing. In the same time the Display will show the " AUTO " indicator (auto range)

Under the SELECT operation, push the " SELECT button " (3-2 Fig. 1) > 2 seconds, the meter will enter power off.

5-9 Range selection

Under the " Auto range " mode (Display show the " AUTO " indicator), if press the " Range button " (3-6, Fig. 1) once (or once in sequence) then can select the desired range (manual range) and also hold the measurement range. Display will show the " MAMU " indicator.

5-10 Max and Min. value record

- 1) Application : To record the maximum and the minimum reading value during the measurement.
- 2) Used the " SELECT button " 3-2, Fig. 1 " to select the desired manual range.
 - * *For the 10 A (AC/DC) range, it is only one range, do not necessary to use the " Range button " to select the range.*
- 3) Push the " MAX/MIN button " (3-4, Fig. 1) once 3 times, the display will show the " Min Max " two markers together with flash, now the meter is ready for recording the " Max. " and " Min. " value.
- 4) Push the " MAX/MIN button " (3-4, Fig. 1) once again the display will show the " Max " maker along with the maximum measured value.
Push the " MAX/MIN button " (3-4, Fig. 1) once again the display will show the " Min " maker along with the minimum measured value.
- 5) If intend to cancel the " Max/Min Record function" just push the " MAX/MIN button " (3-4, Fig. 1) > 2 seconds continuously.

5-11 Hz measurement

During the measurement :

Voltage (ACV/DCV) measurement (Chapter 5-2)

Current mA (AC/DC) measurement (Chapter 5-4)

Current 10A (AC/DC) measurement (Chapter 5-4)

if press the " Hz button " (3-5, Fig. 1) once, the Display will show " AUTO " and " Hz " indicator, now the meter is ready for frequency measurement of the measurement signal with auto range indication.

5-12 Data Hold Operation


- 1) During the measurement, pushing the " Hold button " (3-3, Fig. 1) once a while will freeze the measured value & the LCD will indicate " HOLD " symbol.
- 2) Push the " Hold Button " again to cancel the data hold function.

6. MAINTENANCE

6-1 Battery replacement



Caution : ***Remove test leads before opening the battery cover !***

- 1) When the LCD display showing the mark of "  " it is necessary to replace the battery, However in-spec. measurement may still be made for several hours after " Low battery indicator " appears before the instrument become inaccurate.
- 2) Open the screw of " Battery Cover " (3-12, Fig. 1) by loosening the screws, then move the battery.
- 3) Replace with 9 V (006P, MIN1604) and reinstate the cover.

6-2 Cleaning



Caution : ***Cleaning - Only use the dry cloth to clean the plastic case !***

6-3 Replacement of Fuse



Caution :

a. Fuse A -

Rating : 630 mA, Size : 5 mm dia. x 20 mm
--

To be protected the circuit from overload current at
" 600 uA, 6000 uA, 60 mA, 600 mA " range.
in other overload protection circuit).

b. Fuse B -

Rating : 10 A, Size : 6.4 mm dia. x 32 mm
--

- 1) To be protected the circuit from overload current at
" 10 A " range.
- 2) When the uA, mA current range can not operation,
please check if the Fuse A is broken or not:
When the 10 A current range can not operation,
please check if the Fuse B is broken or not:
- 3) When replace the fuse should take the test leads from the
measuring circuit and power off the meter.
- 4) Take the screws away from the down case, loose the
housing case, the fuses are install on the fuse socket on
the PCB.
- 5) For safety consideration, when replace the fuse according
the spec. (should use the approval fuse) and reinstall the
cover.
- 6) Make sure the housing case is secured with the screw
after replace the fuse.

7. OPTIONAL ACCESSORIES & ADAPTERS

<i>Item</i>	<i>Model</i>
<i>Carrying Case</i>	<i>CA-05A</i>
<i>Light Adapter</i>	<i>LX-02</i>
<i>EMF Adapter</i>	<i>EMF-824</i>
<i>Pressure Adapter</i>	<i>PS-403</i>
<i>Anemometer Adapter</i>	<i>AM-402</i>
<i>Sound Adapter</i>	<i>SL-406</i>
<i>High Voltage Probe</i>	<i>HV-40</i>

**8. THE ADDRESS OF AFTER SERVICE
CENTER**