

(9) Data Hold

Press the "D.HOLD" button on the meter to enter the data hold mode and press this button again and the meter exits the data hold mode.

(10) Auto Power Off and Disable

1. When the meter has been turned on for 15 minutes without any action from the users, the meter will automatically turn itself off.
2. To disable the Auto Power Off function, press any button when the meter is on or switch the selector switch.

4. Care and Maintenance

4-1. Caring for Your Multimeter

Your digital multimeter 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.

1. Keep the multimeter dry. If it gets wet, wipe it dry immediately. Liquids can contain minerals that can corrode electronic circuits.
2. Use and store the multimeter only in normal temperature environments. Extreme temperatures can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.
3. Handle the multimeter gently and carefully. Dropping it can damage the circuit boards and case and can cause the multimeter to work improperly although the holster can provide enough protection.
4. Keep the multimeter away from dust and dirt, which can cause premature wear of parts.
5. Wipe the multimeter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the multimeter.
6. Use only fresh batteries of the required size and type. Always remove old or weak batteries. They can leak chemicals that destroy electronic circuits.

4-2. Maintenance

9V Battery Replacement

1. Make sure that the instrument is not connected to any external circuit. Set the selector switch to the OFF position and remove the test leads from the terminals.
2. Remove the screws from the bottom case and lift the case. Remove the spent battery and replace it with a battery of the same type.

Fuse Replacement

Remove the screws from the bottom case and lift the case. Replace the fuse with the same type and rating: 5 x 20mm 0.5A/250V fast-blow fuse or 5 x 20mm 10A/250V fast-blow fuse as the replacements.

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OPERATOR'S INSTRUCTION MANUAL

M-2795

DIGITAL MULTIMETER



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WARNING



PLEASE READ THIS INSTRUCTION MANUAL CAREFULLY

Misuse and/or abuse of this instruction cannot be prevented by any printed word and may cause injury and/or equipment damage.

Please follow all these instructions and measurement procedures faithfully, and adhere to all standard industrial safety rules and practices.

The multimeter shall be used in over voltage category II !

1. Safety Information

To ensure that the meter is used safely, follow all of the safety and operation instructions in this manual. If the meter is not used as described in the manual, the safety features of the meter might be impaired.

- Turn off the power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
- Use caution when working above 60VDC or 30VAC rms. Such voltages pose a shock hazard.
- When using the test lead, keep your fingers behind the guards on the test lead.
- Disconnect the live test lead before disconnecting the common test lead.
- To avoid damage to the meter, do not exceed the input limits.
- This digital multimeter is designed for indoor use only.
- This digital multimeter has a measuring deviation of 2.3% by immunity test according to EN50082-1.

(3) Resistance Measurement and Diode, Continuity Test

1. Connect the black test lead to the "COM" socket and the red test lead to the "VΩCAP" socket.
2. Set the selector switch to the desired "Ω", "→|—" or "•|•" position.
3. Remove the power from the equipment under test, connect the probes across the circuit to be tested.

CAUTION: Be sure that the circuit to be tested is "dead". Max. input overload: 250Vrms and <10sec.

NOTE: When testing 400MΩ resistance, short the test leads and press the "REL" button, then test.

(4) Capacitance Measurement

1. Before testing, discharge the capacitor by shorting its leads together. Use caution in handling the capacitors because they may have a charge on them of considerable power before discharging.
2. Connect the black test lead to the "COM" socket and the red test lead to the "VΩCAP" socket.
3. Set the selector switch to the "F" position.
4. Press the "REL" button. You can use the relative function to eliminate the zero error.
5. Connect the probes across the capacitor to be tested.

NOTE: When testing a 200μF capacitor, note that there will be approx. 30 sec. time lag.

(5) Frequency and Duty Cycle Measurement

1. Connect the black test lead to the "COM" socket and the red test lead to the "VΩCAP" socket.
2. Set the selector switch to the "Hz" or "Duty" position.
3. Connect the probes across the source or load under measurement.
4. When using the 80KP-2 Adapter, the correct reading should be the reading on the LCD display times 128.

(6) hFE Test

1. Set the selector switch to the desired "hFE" position (PNP or NPN type transistor).
2. Never apply an external voltage to the hFE sockets. Damage to the meter may result.
3. Plug the transistor directly into the hFE socket. The socket is labeled E, B, and C for Emitter, Base, and Collector.
4. Read the hFE (beta or DC current gain) in the display.

(7) Logic (TTL/CMOS) Test

1. Connect the black test lead to the "COM" socket and the red test lead to the "VΩCAP" socket.
2. Set the selector switch to the desired "TTL" or "CMOS" position.
3. Connect the probes across the source or load under measurement.
4. With a logic high pulse (1), the ▲ indicator will display on LCD. With a logic low pulse (0), the ▼ indicator will appear on the LCD.

(8) Relative Value Display

Press the "REL" button on the meter to use the relative measurement mode. The present value will be stored in memory. The new display value is equal to the measurement value minus the stored value.

Example:


When you test the capacitance, you can use the Relative function to eliminate the zero error.

3. Operation

WARNING

1. When measuring voltage, be sure that the instrument is not connected to the resistance range. Always ensure that the correct terminals are used for the type of measurement to be made.
2. Use extra care when measuring voltage above 50V, especially from sources where high voltage is present.
3. Avoid making connections to live circuits whenever possible.
4. When making current measurements, be sure that the circuit is not live before opening it to connect the test leads.
5. Before making resistance measurements or diode test, ensure that the circuit under test is discharged.
6. Always ensure that the correct function and range is selected. If in doubt on which range to use, start with the highest and work your way down.
7. Extreme care should be taken when using the instrument in conjunction with a current transformer connected to the terminals if an open circuit occurs.
8. Ensure that the test leads and probes are in good condition with no damage to the insulation.
9. Take care not to exceed the overload limits as shown in the specifications.
10. Before opening the case of the instrument to replace the battery, disconnect the test leads from any external circuit, set the selector switch to the OFF position.

3-1. Check the Battery

If the battery is weak, a  symbol will appear on the right of the display. It means that the battery should be replaced.

3-2. How to Make a Measurement

(1) DC/AC Voltage Measurement

1. Connect the black test lead to the "COM" socket and the red test lead to the "VΩCAP" socket.
2. Set the selector switch to the desired "V" position, and press the "DC/AC" button to choose the function. If the magnitude of the voltage is not known, set the selector switch to the highest range and reduce until a satisfactory reading is obtained.
3. Connect the probes across the source or load under measurement.

(2) DC/AC Current Measurement

1. Set the selector switch to the desired "A" position, and press the "DC/AC" button to choose the function. If the magnitude of the current is not known, set the selector switch to the highest range and reduce until a satisfactory reading is obtained.
2. For current measurements less than 400mA, connect the black test lead to the "COM" socket and the red test lead to the "μA/mA" socket.
3. For current measurements over 400mA, connect the black test lead to the "COM" socket and the red test lead to the "10A" socket.
4. Disconnect the power from the circuit under test and open the normal circuit path where the measurement is to be taken. Connect the meter in series with the circuit.
5. Do not continually measure 10A as the shunt wire will heat up. Allow 30 seconds max. At 5A or less, continuous use is okay.

NOTE: BE SURE TO MEASURE WITHIN 30 SECONDS TO AVOID HIGH CURRENT HAZARD.

Safety Symbols and Relative Symbols



This marking adjacent to another marking, terminal, or operating device indicates that the operator must refer to the explanation in the operating instructions to avoid damage to the equipment and/or to avoid personal injury.

WARNING

This WARNING sign denotes a hazard. It calls attention to a procedure, practice or the like, which if not correctly performed or adhered to, could result in personal injury.

CAUTION

This CAUTION sign denotes a hazard. It calls attention to a procedure, practice or the like, which, if not correctly adhered to, could result in damage to or destruction of part or all of the instrument.



This marking advises the user that the terminal(s) so marked must not be connected to a circuit point at which the voltage, with respect to earth ground, exceeds (in this case) 500 volts.



This symbol, adjacent to one or more terminals, identifies them as being associated with ranges that may in normal use be subjected to particularly hazardous voltages.

For maximum safety, the instrument and its test leads should not be handled when these terminals are energized.



This marking indicates that equipment is protected completely by the double insulation.



European safety standard.



DC (direct current).





DC and AC



AC (alternating current).


2. Specifications

2-1. General Specifications

Display	3 3/4 digit LCD with a max. reading of 4000.
Range Control	Manual range control.
Polarity	Automatic negative polarity indication.
Zero Adjustment	Automatic.
Overrange Indication	“OL” on LCD is displayed.
Low Battery Indication	“  ” sign on LCD readout.
Auto Power Off	Approximately 15 minutes.
Safety Standards	 EMC/LVD. The meter is up to the standards of IEC1010 Pollution Degree 2, Overvoltage Category II.
Operation Temperature	32°F to 104°F (0°C to 40°C) less than 85% relative humidity
Storage Temperature	-4°F to 140°F (-20°C to 60°C) less than 95% relative humidity
Power	9V battery.
Dimensions	7 5/8” (H) x 3 9/16” (W) x 1 3/4” (D) (w/o holster)
Weight	Approximately 0.66 lb. (w/o holster)
Accessories	Safety Test Leads - 1 pair Operator’s Manual - 1 pc. Holster - 1 pc.

2-2. Electrical Specifications

Accuracy is \pm (% or reading + number in last digit) at 23 \pm 5°C, <75% RH.

DC Voltage		 Max. voltage from “V Ω mA” socket to “COM” socket is 1000V= from “COM” socket to earth is 500V=.
400mV, 4V, 40V, 400V	$\pm(0.5\% + 3)$	
1000V	$\pm(0.8\% + 3)$	
Impedance	10M Ω	
Max. input: 250V= on 400mV range; 1000V= on all other ranges.		


AC Voltage

4V, 40V, 400V	$\pm(0.8\% + 3)$
400mV, 750V	$\pm(1.2\% + 3)$
Impedance	10M Ω
Max. input: 250V= on 400mV range; 1000V= on all other ranges.	


Resistance

400 Ω , 4k Ω , 40k Ω , 400k Ω , 4M Ω	$\pm(1\% + 3)$
40M Ω	$\pm(2\% + 3)$
400M Ω	$\pm(5\% + 10)$
Overload Protection	250V DC/ACrms

DC Current

40 μ A, 400 μ A, 4000 μ A	$\pm(1.2\% + 3)$
40mA, 400mA	$\pm(1.5\% + 3)$
10A	$\pm(2\% + 5)$  Caution: Max. operation time 15s.
Overload Protection	Fast 0.5A/250V, 10A/250V fuse.

AC Current

40 μ A, 400 μ A, 4000 μ A	$\pm(1.5\% + 3)$
40mA, 400mA	$\pm(2\% + 3)$
10A	$\pm(2.5\% + 5)$  Caution: Max. operation time 15s.
Overload Protection	Fast 0.5A/250V, 10A/250V fuse.
Frequency Response	40 - 400Hz

Capacitance

4nF	$\pm(5\% + 10)$
40nF	$\pm(3\% + 10)$
400nF, 4 μ F, 40 μ F	$\pm(2\% + 5)$
200 μ F	$\pm(4\% + 5)$
Overload Protection	250V DC/ACrms

Frequency

Frequency 10Hz - 10MHz	$\pm(0.1\% + 5)$
Sensitivity	Sine wave 0.6Vrms
Overload Protection	250V DC/ACrms

Duty Cycle

Duty Cycle 0.1% - 99.9%	$\pm(2\% + 2)$ Frequency lower than 10kHz
Sensitivity	Sine wave 0.6Vrms
Overload Protection	250V DC/ACrms

Diode Test

Test Current: 1 \pm 0.6mA	Test Voltage: Approx. 1.5V
Overload Protection	250V DC/ACrms

Continuity Test

Audible Indication	Less than 120 Ω approx.
Overload Protection	250V DC/ACrms

hFE Test

I _b	10mA
V _{ce}	2.5V approx.
Test Range	0 - 1000

Logic Test

TTL Logic 1: 2.5V \pm 0.8V	Logic 0: 0.8V \pm 0.5V
CMOS Logic 1: 4.0V \pm 1.0V	Logic 0: 2.0V \pm 0.5V
Frequency Response: 20MHz	
Detectable Pulse Width: 25ns min	