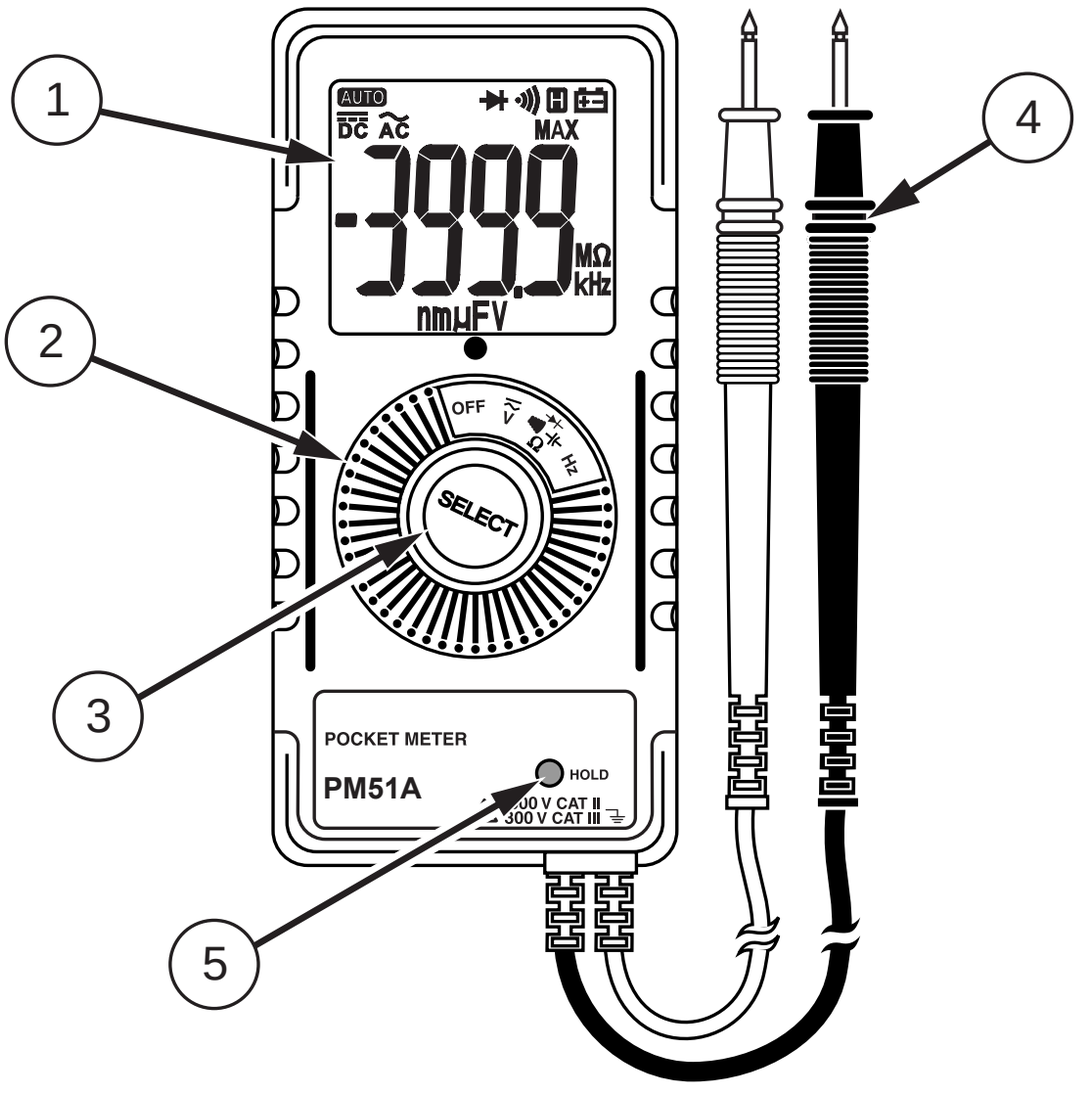
AMPROBE®

PM51A

Pocket Multimeter

Users Manual



①	LCD display
②	Rotary switch to select functions and to turn the power on or off
③	SELECT-button to select alternate functions.
④	Permanently attached red test lead for positive (+) polarity and black test lead for ground reference (-)
⑤	HOLD button to freeze the display for later viewing.

Introduction

The PM51A meter is a shirt-pocket size meter only 19 mm (.75 in) wide and weighing less than 85 g (3 oz). With full functionality offering AC and DC voltage to 600 V, resistance to 40 MΩ, capacitance to 300 μF, frequency to 1 MHz, continuity with beeper, and diode test. Fully autoranging, the PM51A offers seven different measurement functions with 27 full ranges of measurement. The digital display is oversized with large digits and icons in the display. In spite of its small size, the PM51A is full safety rated to CAT III 300 V, CAT II 600 V, and is UL listed. No other meter offers this size with such performance and high safety ratings.

Safety Information

- The PM51A Digital Multimeter is certified for cULus and EN61010-1:2001; CAT II 600 V, CAT III 300 V, class 2 and pollution deg. 2.
- This instrument is EN61010-1 certified for Installation Category II (600 V). It may only be used to make measurements on energy limited circuits within equipment and not directly connected to mains.
- This instrument is EN61010-1 certified for Installation Category III (300 V). It is recommended for use with local level power distribution, appliances, portable equipment, etc., where only smaller transient overvoltages may occur, and not for primary supply lines, overhead lines and cable systems.
- Do not exceed the maximum overload limits per function (see specifications) nor the limits marked on the instrument itself. Never apply more than 600 V between the test lead and earth ground.
- Inspect the DMM, test leads and accessories before every use. Do not use any damaged part.
- Never ground yourself when taking measurements. Do not touch exposed circuit elements or test probe tips.
- Do not operate the instrument in an explosive atmosphere.
- Exercise extreme caution when: measuring voltage >20 V // current >10 mA // AC power line with inductive loads // AC power line during electrical storms // current, when the fuse blows in a circuit with open circuit voltage > 600 V // servicing CRT equipment.
- Remove test leads from circuit before opening the case.

Symbols Used in this Manual

⎓	Battery	⚠	Refer to the manual
⧈	Double insulated	⚠	Dangerous Voltage
⎓	Direct Current	⏚	Earth Ground
~	Alternating Current	)))	Audible tone
CE	Complies with EU directives	c UL us	Underwriter Laboratories, Inc.

Making Measurements

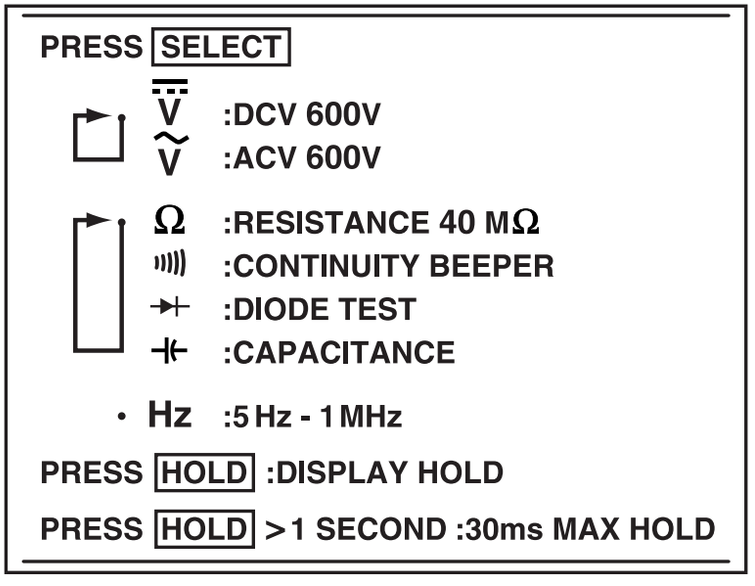
All measurements described in this manual use the red test lead for positive (+) polarity and the black test lead for ground reference (-) unless otherwise specified.

Power On and Off

Turn the rotary switch to turn the power ON or OFF.

Selecting Functions

Select measurement as shown in the diagram on the back of the meter.



V dc and V ac Functions

Rotate the rotary selector to the **V** position. V dc is the default function. The dc annunciator ⎓ appears on the display. Press the **SELECT** button momentarily to select V ac. The ac annunciator ~ appears on the display.

Resistance, Continuity, Diode, and Capacitance Functions

- Turn the rotary switch to the Ω/•))) position. Resistance is the default function.

1. Turn off power to the circuit being measured. Never measure resistance across a voltage source or on a powered circuit.
2. Discharge any capacitors that may influence the reading.
3. Connect the test probes across the resistance.
4. Read the display. If OL appears on the highest range, the resistance is too large to be measured or the circuit is an open circuit.

- A continuous beep tone indicates a complete circuit.

1. Turn off power to the circuit being measured.
2. Discharge any capacitors that may influence the reading.
3. Connect the test probes across the resistance or two measurement nodes.
4. Listen for the tone that indicates continuity (< 120 Ω).

- Press the **SELECT** button momentarily AGAIN to select Diode test function. The annunciator appears on the display. The reading shows the approximate voltage drop across the test leads. Normal forward voltage drop (forward biased) for a good silicon diode is between 0.400 V to 0.900 V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective). OL indicates an open diode (defective). Reverse the test leads connections (reverse biased) across the diode. The digital display shows OL if the diode is good. Any other readings indicate the diode is defective.

- Press the **SELECT** button momentarily AGAIN to select the Capacitance function.

1. Turn off power to the circuit being measured.
2. Discharge the capacitor using a 100 kW resistor.
3. Free at least one end of the capacitor from the circuit.
4. Connect the test probes across the capacitor.
5. Read the display.

Frequency Function

Turn the rotary switch to the **Hz** position to select the frequency function.

This function is set only at the highest input sensitivity mainly for measuring small electronic signals below 20 V ac rms.

1. Connect the test probes to the signal source.
2. Read the display.

Additional Features

HOLD and 30 ms MAX HOLD Modes

HOLD mode freezes the display for later viewing. Press the **HOLD** button momentarily to activate or to exit the Hold feature.

MAX mode captures voltage signals that have durations as short as 30 ms (milliseconds) within a single range, and has automatic up range capability. This feature is available in V dc and V ac functions. Press the **HOLD** button for 1 second or more to activate or exit MAX mode.

⚠⚠WARNING

Hazardous voltages present at test leads may not be displayed when in HOLD mode.

Auto-ranging

If the function selected has more than one range, the meter will auto-range to the best range and resolution.

Product Maintenance

Maintenance

Do not attempt to repair this meter. It contains no user serviceable parts. Repair or servicing should only be performed by qualified personnel.

Cleaning

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for periods of longer than 60 days, remove the battery and store it separately

Troubleshooting

If the instrument fails to operate, check battery, leads, and replace as necessary. Double check operating procedure as described earlier in this manual. Refer to the LIMITED WARRANTY section for obtaining warranty or repairing service.

Battery Replacement

If the meter starts up with persistent resetting display or with low battery icon turns on, replace the battery. The meter uses one 3 V coin battery, IEC-CR2032.

To replace the battery

1. Turn off the meter and disconnect the test leads from live circuits.
2. Loosen the screw on the case bottom.
3. Lift the end of the case bottom nearest the input test leads until it unsnaps from the case top. Replace the battery cover and tighten the screw. Recycle the battery using approved methods.
4. Replace the battery. Observe battery polarities with positive (+) faces up (towards the case bottom). Replace the case bottom, and ensure that the snap on the case top (near the LCD side) is engaged.
5. Replace and tighten the screw.

⚠⚠WARNING

To avoid electrical shock, disconnect test leads from live circuits before opening the case. Do not operate with open case.

Display and Update Rate: 3-3/4 digits 4000 counts; Updates 3 per second nominal
Operating Temperature: 0 °C - 40 °C
Relative Humidity: Maximum 80% R.H. up to 31 °C, decreasing linearly to 50% R.H. at 40 °C
Altitude: Operating below 2000 m
Storage Temperature: -20 °C ~ 60 °C, < 80% R.H. (with battery removed)
Temperature Coefficient: Nominal 0.15 x (specified accuracy)/ °C @ (0°C ~ 18 °C or 28 °C ~ 40 °C), or otherwise specified
Sensing: Average sensing
Overload Protection: 600 V dc and V ac rms
Low Battery: Below approx. 2.4 V
Power Supply: 3 V standard button battery x 1 (IEC-CR2032; ANSI-NEDA-5004LC)
Power Consumption (typical): 2 mA
APO Consumption (typical): 2.2 µA
APO Timing: Idle for 30 minutes
Dimension / Weight
L 113 mm x W 53 mm x H 10.2 mm / Approx. 78 gm

Special Features
Data Hold, and 30ms MAX Hold
Agency Approvals

Safety: Meets IEC61010-1, UL61010B-1, CAN/CSA-C22.2 No. 1010.1-92,
CAT II 600 V and CAT III 300 V, Pollution Degree 2, Class 2
E.M.C. Meets EN61326 (1997, 1998/A1), EN61000- 4-2 (1995), and EN61000-4-3 (1996). This product complies with requirements of the following European Community Directives: 89/ 336/ EEC (Electromagnetic Compatibility) and 73/ 23/ EEC (Low Voltage) as amended by 93/ 68/ EEC (CE Marking). However, electrical noise or intense electromagnetic fields in the vicinity of the equipment may disturb the measurement circuit. Measuring instruments will also respond to unwanted signals that may be present within the measurement circuit. Users should exercise care and take appropriate precautions to avoid misleading results when making measurements in the presence of electronic interference.

Accessories

Battery installed, and User's manual
Optional Accessories:
H-PM protective holster, and VC3 soft carrying pouch

Electrical Specifications

(Accuracy @ 23 °C ± 5 °C and < 75% R.H.)
RF Field @ 3 V/m: Specified accuracy + 45 d (Capacitance not specified)

DC Voltage

Range	Accuracy
400.0 mV	±(1.0%+2 dgt)
4.000 V, 40.00 V, 400.0 V	±(2.0%+2 dgt)
600 V	±(2.5%+4 dgt)
NMRR: > 50 dB @ 50 Hz/60 Hz CMRR: > 120 dB @ dc, 50 Hz/60 Hz; Rs=1 kΩ Input Impedance: 10 MΩ, 30 pF nominal; (1000 MΩ for 400.0 mV range)	

AC Voltage

Range	Accuracy
50 Hz – 60 Hz	
4.000 V, 40.00 V, 400.0 V	±(2.0%+5 dgt)
60 Hz – 500 Hz	
4.000 V, 40.00 V, 400.0 V	±(3.0%+5 dgt)
50 Hz – 500 Hz	
600 V	±(3.5%+5 dgt)
Input Impedance: 10 MΩ, 30 pF nominal CMRR: > 60 dB @ DC to 60 Hz, Rs=1 kΩ	

Capacitance

Range[1]	Accuracy[2]
500.0 nF, 5.000 μF, 50.00 μF, 500.0 μF, 3000 μF[3]	±.(3.5%+6 dgt[4])
[1]Additional 50.00 nF range accuracy is not specified [2]Accuracies with film capacitor or better. [3]Updates > 1 minute on large values [4]Specified with battery voltage above 2.8 V (half full battery). Accuracy decreases gradually to 12% at low battery warning voltage of approx 2.4 V	

Ohms

Range	Accuracy
400.0 Ω	±(1.5%+6 dgt)
4.000 KΩ, 40.00 KΩ, 400.0 KΩ	±(1.0%+4 dgt)
4.000 MΩ	±(1.5%+4 dgt)
40.00 MΩ	±(2.5%+4 dgt)
Open Circuit Voltage: 0.4 V dc typical	

Frequency

Range[1]	Accuracy
400 Hz, 4 kHz, 40 kHz, 400 kHz, and 1 MHz	±(0.5%+4 dgt)

[1]Specified at Input Voltage < 20 V ac rms Input Signal: Sine-wave, or Square-wave with duty cycle > 40% & < 70%

Sensitivity (V-peak):

5 Hz - 100 kHz : > 1.3 Vp
100 kHz - 500 kHz : > 2.2 Vp
500 kHz - 1 MHz : > 4.2 Vp

Diode Tester
Test Current (Typical): .25 mA
Open Circuit Voltage: 1.6 V dc

Audible Continuity Tester
Open Circuit Voltage: 0.4 V dc typical
Audible Threshold: between 10 Ω and 120 Ω