

Digital Multimeter PMM-810



Operations Manual

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TABLE OF CONTENTS**PROSTAT® PMM-810 DIGITAL MULTIMETER**

<u>Title</u>	<u>Page #</u>
I. Before using the Instrument	3
II. Safety	3
III. Function	4
IV. Maintenance.....	4
V. Operation	6
VI. Individual PMM-810 Multimeters	8
General Specifications	10

PMM-810 Digital Multimeter

Before using this, or any other electronic piece of equipment, carefully read the instruction manual completely.

I. Before using the Instrument

- A. Examine the instrument for damage, contamination (excessive dirt, grease, etc..) and defects.
- B. Examine the test leads for cracked or frayed insulation.
- C. If any abnormal conditions exist, do not attempt to make any measurements.

II. Safety

- A. The following safety information must be observed to insure maximum personal safety during the operation of this meter.
 1. DO NOT use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
 2. NEVER ground yourself when taking electrical measurement.
 3. DO NOT touch exposed metal pipes, outlets, fixtures etc., which might be at ground potential while operating this meter.
 4. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats or any approved insulating material.
 5. Turn off power to the circuit under test before cutting, unsoldering or breaking the circuit.

Small amounts of current can be dangerous.

6. Use CAUTION when working above 60 V dc or 30 V ac RMS.

Such voltages pose a shock hazard.

7. Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard.

Always recognize the meter voltage limits as stated on its front panel.

- B. Input Warning Beeper

Incorrect test lead placement will cause this meter to issue a warning beeper sound.

1. The warning beeper indicates that a test lead is plugged into a current input jack and the **Function/Range** switch is not set to a current range

For example: if the red test lead is plugged into the mA current jack and the meter switch is set to 200 V, the warning beeper will sound.

2. The warning beeper is a safety feature to protect the meter and you.

III. Function

The PROSTAT® PMM-810 Digital Multimeter is five meters in one. The PMM-810 is very useful for measuring the low lead resistance of Workstation ESD common point ground connections. An ESD auditor will find it a handy wide range digital resistance meter for quick measurements of chairs, carts and other equipment, up to 2.0×10^9 ohms.

This rugged meter provides eleven functions including Diode Test, Capacitance, Transistor hFE, Frequency, Logic Test, Resistance, Voltage and Current measurements. An input warning beeper warns the user if the test leads are plugged into sockets that do not match the function selected.

The PMM-810 includes color coded safety input jacks, large 3-1/2 digit LCD display, overload protection on all ranges, Frequency Auto-ranging selection from 20 - 20M Hz, and fused protection for current inputs. It is delivered with test leads, 9V battery installed and an extra fuse.

IV. Maintenance

WARNING !!!

REMOVE TEST LEADS BEFORE CHANGING BATTERY OR
FUSE, OR PERFORMING ANY SERVICING.

A. Battery Replacement

3. Power is supplied by a 9 volt "transistor" battery.
4. The battery sign appears on the LCD display when replacement is needed.
5. Switch the power OFF and remove all the test leads.
6. To replace the battery, use a screwdriver to remove the three screws from the back of the meter. (see illustration below)
7. Carefully lift off the front case.
8. Remove the battery from the case bottom.
9. Insert new battery into the case bottom.
10. Replace the back of the meter and the three screws. Do not over tighten the screws.

PMM-810 Digital Multimeter

11. The meter is now ready for use.

B. Fuse Replacement

1. If no current measurements are possible, check for a blown overload protection fuse.
2. Turn the power off and remove all the test leads.
3. For access to fuses, use a screwdriver to remove the three screws from the back of the meter.
4. Carefully lift off the front case.
5. There are two fuses. (see illustration above)
 - a. **F1** for the mA jack
 - b. **F2** for the 10A jack
6. Replace F1 only with the original type 0.5A/250V, fast acting fuse.
7. Replace F2 only with the original type 10A/250V, fast acting ceramic fuse.
8. Replace the back of the meter and the three screws. Do not over tighten the screws.
9. The meter is now ready for use.

V. Operation

Functions of this instrument include Diode Test, Capacitance, Transistor hFE,, Frequency, Logic Test, Resistance, voltage and current measurements.

A. Voltage Measurements

1. Connect the red test lead to the "**V W**" jack and the black test lead to the "**COM**" jack.
2. Set the **Function/Range** switch to the desired voltage range and slide the "**AC/DC**" selector switch to the desired voltage type. If magnitude of voltage is not known, set switch to the highest range and reduce until a satisfactory reading is obtained.
3. Connect the test leads to the device or circuit being measured.
4. For dc a (-) sign is displayed for negative polarity; positive polarity is implied.

B. Resistance and Continuity Measurements

1. Set the **Function/Range** switch to the desired **W** resistance range or continuity position.
2. Remove power from the equipment under test.
3. Connect the red test lead to the "**V W**" jack and the black test lead to the "**COM**" jack.
4. Touch the probes to the test points. The value indicated in the display is the measured value of resistance in ohms. In continuity testing, the beeper sounds continuously, if the resistance is less than 100 ohms.

IMPORTANT NOTE Regarding the **2000 M** ohm range: The **2000 M** ohm range has a fixed 10 count offset in the reading. When the test leads are shorted together in this range, the meter will display 010. This residual reading must be subtracted from the reading. For example, when measuring 1100 MOhm on the 2000 MOhm range, the display will read 1110. Subtract the 10 residual to obtain the actual resistance of 1100 MOhms

C. Current Measurements

1. Set the **Function/Range** switch to the desired current range and slide the "AC/DC" selector switch to the desired current type.
2. For current measurements less than 200mA, connect the red test lead to the "**mA**" jack and the black test lead to the "**COM**" jack.
3. For current measurements of 200mA or greater, connect the red test lead to the "**10A**" jack and the black test lead to the "**COM**" jack.

D. Frequency Measurements

1. Set the Function/Range switch to the kHz position.
2. Connect the red test lead to the "**V W**" jack and the black test lead to the "**COM**" jack.
3. Connect the test leads to the point of measurement and read the frequency from the display.

E. Logic Measurements

1. Set the Function/Range switch to the **LOGIC** position.
2. Connect the red test lead to the "**V W**" jack and the black test lead to the "**COM**" jack.
3. Connect the red test lead to the test point and the black lead to the common buss of the logic circuit.
4. A \bar{U} on the display indicates TTL logic high and a \bar{U} indicates a TTL logic low.

PMM-810 Digital Multimeter

5. Both indicators are on when the measurement point is toggling high and low.

F. Diode Tests

1. Connect the red test lead to the "**V W**" jack and the black test lead to the "**COM**" jack.
2. Set the Function/Range switch to the \emptyset position.
3. Turn off power to the circuit under test.
4. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
5. If the diode is open, "**OL**" is displayed in both directions.
6. If the junction is measured in the circuit and a low reading is obtained with both lead connections, the junction may be shunted by a resistance of less than 1kOhm. In this case, the diode must be disconnected from the circuit for accurate testing.

G. Transistor Gain Measurements

1. Set the Function/Range switch to the desired **hFE** range (**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** sockets. The sockets are labeled **E**, **B**, and **C** for emitter, base and collector.
4. Read the transistor **hFE** directly from the display.

H. Capacitance Measurements

1. Set the **Function/Range** switch to the desired "**F**" (Capacitance) range.
2. Insert the capacitor leads directly into the **Cx** sockets.

Never apply an external voltage to the Cx sockets as damage to the meter may result.

3. Read the capacitance directly from the display.

VI. Individual PMM-810 Multimeters

If your PMM-810 Multimeter was purchased individually, (not in a pre-packed auditing kit) it is enclosed by a rubber "boot". On the boot is a handy stand with a strap.

If your PMM-810 was purchased as part of a PROSTAT® auditing kit, the PMM-810 Boot with stand and strap may be purchased as an option. Contact your PROSTAT® representative for information.

- A. Stand & Strap Use
1. Handy Stand
 - a. Pull the stand on the back of the meter boot all the way out.
 - b. If the meter is pressed hard while using the stand, the stand will rebound automatically to avoid being broken.
 2. Strap
 - a. To carry the meter on your belt, use the enclosed strap.
 - b. Insert the strap in the two slits on the back of the meter boot.
 - c. Secure strap on your belt. Failure to secure the strap can result in the meter falling.

PMM-810 Digital Multimeter Specifications

Power:	Single standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F22
Display:	3 1/2 digit liquid crystal display (LCD) with a maximum reading of 1999
Polarity:	Automatic, positive implied, negative polarity indication
Over Range:	(OL) or (-OL) is displayed
Zero:	Automatic
Low Battery:	A battery is displayed when battery voltage drops below the operating level
Measurement Rate:	2.5 times per second, nominal
Functions & Ranges:	Resistance Ranges: <200 ohms - 2000 Megohms Continuity Audible Indication: less than 100 ohms Diode Test: Test current 0.8mA± 0.3mA Capacitance: Ranges 2nF, 20nF, 200nF, 2uF, 20uF Transistor hFE: Ranges 0-1000 Base Current: 10 µAdc » (Vce=3.0Vdc) Frequency: Ranges 2kHz, 20kHz, 200kHz, 2MHz, 15MHz Logic Test: Threshold; Logic Hi (2.8± 0.8V) - Logic Lo (0.8± 0.5V) DC Volts & AC Volts Ranges: 200mV, 2V, 20V, 200V, 600V DC Current & AC Current Ranges: 20mA, 200mA 10A
Accuracy:	See Operations Manual; Stated accuracy at 23° C± 5° C, <75% Rh
Battery Life:	200 hours typical with carbon-zinc

PMM-810 Digital Multimeter

Dimensions: 147mm (H) x 70 mm (W) x 39 mm (D)

Weight: Approximately 345g (12.2 oz) with Optional "Boot"

Accessories: 2 Test Leads, One spare fuse (0.5A/250V Fast Blow) 9V battery installed

Operation
Environment: 0° C to 50° C at < 70% relative humidity

Storage
Temperature: -20° C to 60° C, 0 to 80% relative humidity with battery removed

DC Volts

Ranges: 200mV, 2V, 20V, 200V, 600V

Resolution: 100 μ V

Accuracy: $\pm(0.8\% \text{ rdg} + 1 \text{ dgt})$

Input Impedance: 10M Ω

Overload protection: 600VDC or AC rms

AC Volts (50Hz – 500Hz)

Ranges: 200mV, 2V, 20V, 200V, 600V

Resolution: 100 μ V

Accuracy:

$\pm(1.5\% \text{ rdg} + 3 \text{ dgt})$ on 200mV to 20V ranges

$\pm(2.0\% \text{ rdg} + 3 \text{ dgt})$ on 200V to 600V ranges

Input Impedance: 10M Ω

Overload protection: 600VDC or AC rms

DC Current

Ranges: 20mA, 200mA, 10A

Resolution: 100 μ V

Accuracy:

$\pm(1.0\% \text{ rdg} + 1 \text{ dgt})$ on 20mA to 200mA ranges

$\pm(3.0\% \text{ rdg} + 3 \text{ dgt})$ on 10A range

Input protection:

0.5A/250V fast blow fuse

10A/250V fast blow ceramic fuse

AC Current (50Hz – 500Hz)

Ranges: 20mA, 200mA, 10A

Resolution: 100 μ V

Accuracy:

$\pm(2.0\% \text{ rdg} + 4 \text{ dgt})$ on 20mA to 200mA ranges

$\pm(3.5\% \text{ rdg} + 4 \text{ dgt})$ on 10A range

Input protection:

0.5A/250V fast blow fuse

10A/250V fast blow ceramic fuse

Resistance

Ranges: 200 Ω , 2K Ω , 20K Ω , 200K Ω , 2000K Ω , 20M Ω , 2000M Ω

Accuracy:

$\pm(1.0\% \text{ rdg} + 4\text{dgt})$ on 200 Ω to 2000K Ω ranges

$\pm(2.0\% \text{ rdg} + 4\text{dgt})$ on 20M Ω range

$\pm(5.0\% \text{ rdg} - 10\text{dgt}) + 10\text{dgt})$ on 2000M Ω range

Open Circuit Volts: 0.3Vdc

(3.0Vdc on 200 Ω , 2000 Ω ranges)

Overload protection: 500VDC or AC rms

Continuity

Audible indication: Less than 100 Ω

Overload protection: 500VDC or AC rms

Diode Test

Test Current: 0.8mA \pm 0.3mA

Accuracy: $\pm(3.0\% \text{ rdg} + 1 \text{ dgt})$

Open circuit volts: 3.0 Vdc Typical

Overload protection 500 VDC or AC rms

Capacitance

Ranges: 2nF, 20nF, 200nF, 2 μ F, 20 μ F

Accuracy: $\pm(4.0\% \text{ rdg} + 10 \text{ dgt})$ on all ranges

Test Frequency: 400 Hz

Transistor hFE

Ranges: 0 – 1000

Base Current: 10 μ Adc approx. (Vce = 3.0Vdc)

Frequency (Autoranging)

Ranges: 2kHz, 20kHz, 200kHz, 2MHz, 15MHz

Accuracy: $\pm(0.5\% \text{ rdg} + 2 \text{ dgt})$ on all ranges

Sensitivity: 1V RMS min

Duty: <40% and >60%

Overload Protection: 500VDC or AC rms

Logic Test

Threshold: Logic Hi (2.8 \pm 0.8V)

Logic Lo (0.8 \pm 0.5V)

Indication: 40 msec beep at logic low

Overload Protection: 500VDC or AC rms



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