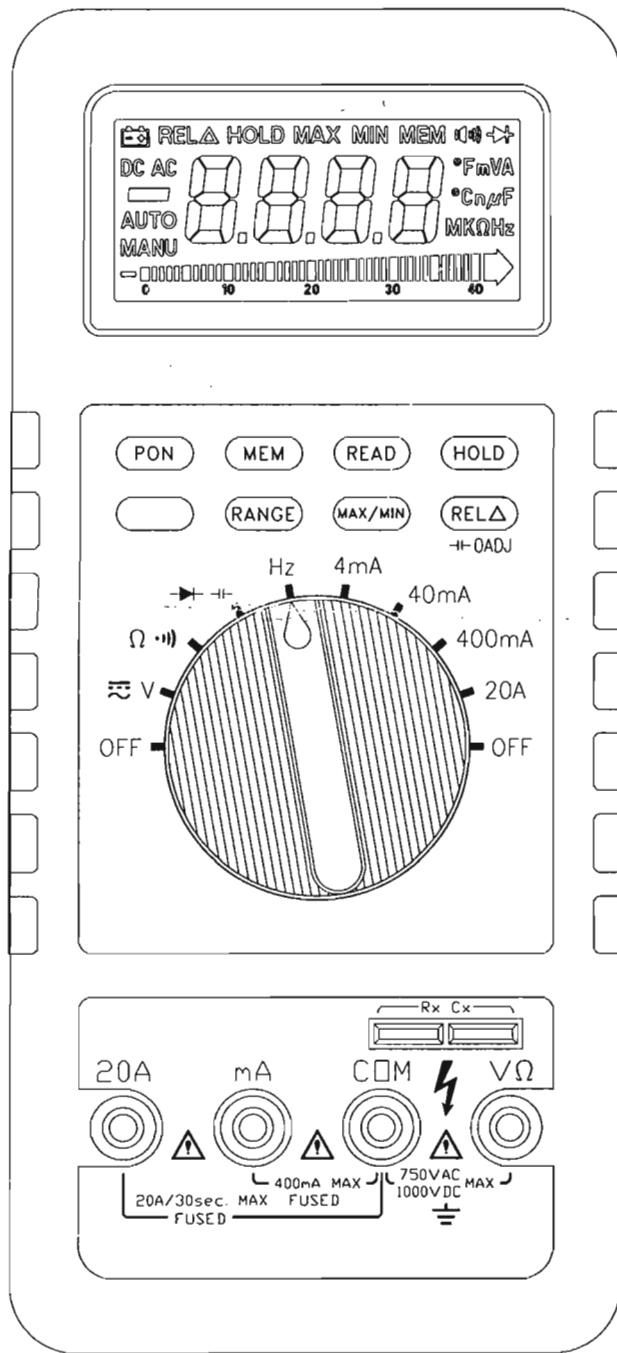


**OPERATING INSTRUCTIONS**  
**PDI MODEL 870**  
**DIGITAL MULTIMETER**



# SAFETY INFORMATION

The following safety information must be observed to insure maximum personal safety during the operation at 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. This meter is not recommended for high voltage industrial use; for example, not for measurements of 440 VAC or 600 VAC industrial power mains. The unit is intended for use with low energy circuits to 1000VDC or 750VAC or high energy circuit to 250 VAC or DC. Accidental misuse by connection across a high voltage, high energy power source when the meter is set up for mA measurement may be very hazardous.
3. Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
4. Use caution when working above 60V dc or 30V ac rms. Such voltages pose a shock hazard.
5. When Using the probes, keep your fingers behind the finger guards on the probes.
6. 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 the front of the meter.
7. If the equipment is used in a manner not specified by the manufacturer, the protection provided the equipment may be impaired.

## DC VOLTS

Ranges: 400mV, 4V, 40V, 400V, 1000V

Resolution:  $100\mu\text{V}$

Accuracy:  $\pm(0.25\% \text{ rdg} + 1\text{dgt})$  on 400mV to 400V ranges  
 $\pm(0.25\% \text{ rdg} + 3\text{dgs})$  on 1000V range

Input impedance:  $> 10\text{M}\Omega$

Overload protection: 1000VDC or 750VAC rms

## AC VOLTS

Ranges: 400mV, 4V, 40V, 400V, 750V, (400mV only Manual @50Hz-100Hz)

Resolution:  $100\mu\text{V}$

Accuracy:  $\pm(\%$  of reading + no. of digits)

Range	100Hz	1KHz	2KHz	20KHz
400mV	1.5% + 4dgs	N/A		
4V	0.75% + 5dgs		0.75% + 30dgs	
400V	0.75% + 5dgs		N/A	
750V				

Input impedance:  $> 10\text{M}\Omega$

Overload protection: 1000VDC or 750VAC rms

# SPECIFICATIONS

**Display:** 3½ digit (4000 counts), 9999counts (Frequency mode), 40 segments analog bar graph and function units sign annunciators.

**Polarity:** Automatic, positive implied, negative polarity indication.

**OVERRANGE:** "4000" or "-4000" Most Significant Digit blinks.

**LOW BATTERY INDICATION:** the "  " is displayed when the battery voltage drops below the operating level.

**MEASUREMENT RATE:** 2/sec, nominal. 1/sec, Capacitance and Frequency mode. 20/sec, Analog display.

**OPERATING ENVIRONMENT:** 0°C to 40°C at < 70% relative humidity.

**STORAGE TEMPERATURE:** -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.

**ACCURACY:** Stated accuracy at  $23^\circ\text{C} \pm 5^\circ\text{C}$ , < 75% relative humidity.

**AUTO POWER OFF:** 30minutes after rotary switch or mode changes.

**POWER:** single standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F22.

**BATTERY LIFE:** 150 hours typical with carbon-zinc.

**DIMENSIONS:** 200mm (H) x 90mm (W) x 40mm (D).

**WEIGHT:** Approx. 14 oz. (400g) including battery.

**ACCESSORIES:** One pair test leads, One spare fuse installed, 9V battery (installed) and Operating Instructions.

## DC CURRENT

Ranges: 4mA, 40mA, 400mA, 20A

Accuracy:  $\pm(0.5\% \text{ rdg} + 1\text{dgt})$  on 4mA and 40mA ranges  
 $\pm(2.0\% \text{ rdg} + 1\text{dgt})$  on 400mA and 20A ranges

**INPUT PROTECTION:** 0.5A / 250V fast blow fuse

20A / 600V fast blow ceramic fuse

## AC CURRENT (50Hz - 500Hz)

Ranges: 4mA, 40mA, 400mA, 20A

Accuracy:  $\pm(1.0\% \text{ rdg} + 4\text{dgs})$  on 4mA and 40mA ranges  
 $\pm(3.0\% \text{ rdg} + 4\text{dgs})$  on 400mA and 20A ranges

**INPUT PROTECTOR:** 0.5A / 250V fast blow fuse

20A / 600V fast blow ceramic fuse

## RESISTANCE

Ranges: 400Ω, 4KΩ, 40KΩ, 400KΩ, 4MΩ, 40MΩ

**ACCURACY:**

$\pm(0.3\% \text{ rdg} + 4\text{dgs})$  on 400Ω range

$\pm(0.3\% \text{ rdg} + 1\text{dgt})$  on 4KΩ to 4MΩ ranges

$\pm(1.0\% \text{ rdg} + 4\text{dgs})$  on 40MΩ range

**OPEN CIRCUIT VOLTS:** 0.4Vdc

**OVERLOAD PROTECTION:** 500VDC or AC rms

## CONTINUITY

**AUDIBLE INDICATION:** less than  $40\Omega \pm 20\Omega$

**OVERLOAD PROTECTION:** 500VDC or AC rms

## DIODE TEST

**Test current:**  $1.0\text{mA} \pm 0.6\text{mA}$

**Accuracy:**  $\pm(3.0\% \text{rdg} + 3\text{dgt})$

**Open circuit volts:**  $3.0\text{Vdc}$  typical

**Overload protection:**  $500\text{VDC}$  or AC rms

## CAPACITANCE

**Ranges:**  $4\text{nF}, 40\text{nF}, 400\text{nF}, 4\mu\text{F}, 40\mu\text{F}$

**Accuracy:**  $\pm(2.0\% \text{rdg} + 20\text{dgt})$  on  $4\text{nF}$  Frange(use 0ADJ)

$\pm(2.0\% \text{rdg} + 4\text{dgt})$  on  $40\text{nF}$  to  $20\mu\text{F}$  ranges

$\pm(5.0\% \text{rdg} + 4\text{dgt})$  above  $20\mu\text{F}$

**Overload protection:**  $500\text{VDC}$  or AC rms

## FREQUENCY (Autoranging)

**Ranges:**  $100\text{Hz}, 1\text{kHz}, 10\text{kHz}, 100\text{kHz}, 700\text{kHz}$

**Resolution:**  $0.01\text{Hz}$

**Accuracy:**  $\pm(0.05\% \text{rdg} + 2\text{dgt})$

**Sensitivity:**  $1.0\text{V rms min.}$

**Overload protection:**  $500\text{VDC}$  or AC rms

## OPERATION

Before taking any measurements, read the Safety Information Section. Always examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation. If any abnormal conditions exist do not attempt to make any measurements.

### PON Button

When the meter is automatic power-off, press the button to turns meter back on.

### Note: Disable Automatic Power-off

If you press and hold down the (PON) button while turning the meter from OFF to on and select a function, the automatic power-off feature is disabled.

### MEM Button

When (MEM) button is pressed, the "MEM" annunciator is displayed and the last reading is stored on the meter. If the meter power down automatically and the power back on by pressing (PON) button, these stored readings will remain in memory.

### READ Button

Press (READ) Button to recall the data you stored in memory, the readings will be displayed on the LCD, the "HOLD"annunciator turn on, and the "MEM" annunciator

### Alternate Function Button

The Alternate Function button is Blue in color. Press it to toggle to the alternate function (AC, Audible continuity and Capacitance) shown in Blue on the meter face.

### Voltage Measurements

1. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the desired voltage range and press the Blue toggle button to select AC or DC. The meter will automatically select the best voltage range.
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.

### Current Measurements

1. Set the Function/Range switch to the desired current range and press the Blue toggle button to select AC or DC.
2. For current measurements less than  $400\text{mA}$ , connect the red test lead to the mA jack and the black test lead to the COM jack.
3. For current measurements over  $400\text{mA}$  or greater, connect the red test lead to the  $20\text{A}$  jack and the black test lead to the COM jack.

4. Remove 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. Use caution when measuring  $10\text{amps}$  on  $10\text{A}$  range for  $60\text{s}$ , please waiting for  $10$  minutes for next measurement of  $10\text{amps}$  for safety reason.

### Resistance and Continuity Measurements

1. Set the Function/Range switch to the desired resistance range or continuity position.
2. Remove power from the equipment under test.
3. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
4. Touch the probes to the test points. In ohms, the value indicated in the display is the measured value of resistance.
5. Press the Blue Alternate Function button to select Audible Continuity. In continuity test, the beeper sounds continuously, if the resistance is less than  $40\Omega$ .

### WARNING

The accuracy of the functions might be slightly affected, when exposed to a radiated electromagnetic field environment, eg, radio, telephone or similar.

### Diode Tests

1. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the " $\rightarrow\leftarrow$ " position.
3. Turn off power to the circuit under test.

will be displayed with a blink. The automatic power-off feature is disabled. Press (HOLD) button to exit the READ mode.

### REL Δ Button

Press (REL) button to enter the Relative mode, the "REL Δ" annunciator turn on, zero the display, and store the displayed reading as a reference value. Press and hold down the (REL) button for 2 seconds to exit the relative mode.

### MIN / MAX button

Press (MIN / MAX) button to enter the MIN MAX Recording mode. The minimum, maximum values are then reset to the present input, the readings are stored in memory, and the "HOLD" annunciator turns on. Push the button to cycle through the minimum (MIN), maximum (MAX), and present readings. The MIN or MAX annunciator turns on to indicate what value is being displayed.

In the MIN MAX Recording mode, press (HOLD) button to stop the recording of readings, press again to restart recording. If recording is stopped, the minimum, maximum, or present values and analog display are frozen. In the MIN MAX Recording mode, when a new minimum value is exceed the actual minimum readings or a new maximum value is overload, the minimum or maximum value will held on the display, but the analog display continues to be active.

### HOLD Button

Press (HOLD) button to toggle in and out of the Data Hold mode, except if you are already in the MIN MAX Recording mode.

In the Data Hold mode, the "HOLD" annunciator is displayed and the last reading is held on the display, the beeper emits a tone, and the automatic power-off feature is disable. Pressing (MIN / MAX) button when you are in the Data Hold mode causes you to exit Data Hold and enter the MIN MAX Recording mode.

In the MIN MAX Recording mode, press (HOLD) button to stop the recording of readings, press (HOLD) again to resume recording.

### RANGE Button

Press (RANGE) button to select the Manual Range mode and turn off the "AUTO" annunciator. (The meter remains in the range it was in when manual ranging was selected).

In the Manual Range mode, each time you press (RANGE) button, the range (and the input range annunciator) increments, and a new value is displayed. To exit the Manual Range mode and return to autoranging, press and hold down (RANGE) button for 2 seconds. The "AUTO" annunciator turns back on.

4. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
5. Reverse probes. If the diode is good, display will be between 2.800V and 3.200V. If the diode is shorted, ".000" or another number is displayed.
6. If the diode is open, display will be between 2.800V and 3.200V, in both directions.
7. If the junction is measured in a circuit and a low reading is obtained with both lead connections, the junction may be shunted by a resistance of less than 1kΩ. In this case the diode must be disconnected from the circuit for accurate testing.

### Capacitance Measurements

1. Set the Function/Range switch to the desired "►►" range and press the Blue toggle button to select Cx.
2. Never apply an external voltage to the Cx sockets. Damage to the meter may result.
3. Insert the capacitor leads directly into the Cx socket.
4. Read the capacitance directly from the display.

### Frequency Measurements

1. Set the Function/Range switch to the Hz position.
2. Connect the red test lead to the "VΩ" 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.

## MAINTENANCE

### WARNING

Remove test leads before changing battery or fuse or performing any servicing.

### Battery Replacement

Power is supplied by a 9 volt "transistor" battery. (NEDA 1604, IEC 6F22). The "BAT" appears on the LCD display when replacement is needed. To replace the battery, remove the two screws from the back of the meter and lift off the battery case. Remove the battery from battery contacts.

### Fuse Replacement

If no current measurements are possible, check for a blown overload protection fuse. There are two fuses; F1 for the "mA" jack and F2 for the "20A" jack. For access to fuses, remove the two screws from the back of the meter and lift off the battery case. Replace F1 only with the original type 0.5A/250V, fast acting fuse. Replace F2 only with the original type 20A/600V, fast acting ceramic fuse.

### Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.