

AC / DC POWER CLAMP MULTIMETER NI349PR

Manual



1. AC+DC 400/1200KW, auto-range
2. DC 2500A, AC 2100A, and AC/DC 600V.
3. ϕ 55 mm diameter jaw.
4. One touch zero for DCA,DCW adjustment.
5. Auto-range for A, V, W, and temperature (or)
6. Large 3 3/4 digits LCD
6. Fast bargraph display (20 times/sec.) for transient observation.
7. Continuity with buzzer.
8. Max/Min and Data Hold functions.
9. 600V overload protection for ohm measurement.
10. Easy single rotary switch for any function selection.

INTRODUCTION

1-1 Unpacking and Inspection

Upon removing your new Digital Clamp Multimeter from its packing, you should have the following items:

1. Digital Clamp Multimeter.
2. Test lead set (one black, one red).
3. Carrying case.
4. Instruction manual.
5. Battery.

1-2 Meter Safety

Terms as Marked on Equipment



ATTENTION — Refer to Manual.

DOUBLE INSULATION — Protection Class II.



DANGER — Risk of electric shock.

Symbols in this Manual



This symbol indicates where cautionary or other information is found in the manual.



Battery

1-3 Front Panel

Refer to Figure 1 and the following numbered steps to familiarize yourself with the meter's front panel controls and connectors.

1. Transformer Jaw
This is used to pick up current signal. To measure DC/AC current, conductor must be enclosed by the jaw.
2. Transformer Trigger
This is used to open the jaw.
3. Data Hold Button
Once this button is pushed, reading shall be held on the LCD. Press again to release it.
4. Function Selection and On/Off Switch
This is used to select the function user desired, such as DCA, ACA, AC+DC W, DCV, ACV, Temperature, and Continuity.
5. Data Hold Symbol
Once the hold button is pressed, this symbol appears on LCD.

6. Max/Min Hold Symbol
Once the max/min button is pressed, either MAX or MIN shall be displayed on LCD
7. Units Symbols
Once a function is selected, corresponding unit (V, Ω , A, or Hz) shall be displayed on LCD.
8. LCD
This is a 3 3/4 digit Liquid Crystal Display with maximum indication of 3999. Function symbols, units, bargraph, sign, decimal points, low battery symbols, max/min symbols, and zero symbol are included.
9. Zero/Relative Symbol
When this symbol appears, it means a reference value has been subtracted from the actual reading. The reading shown is a offseted value. Press and hold the zero button for 2 seconds to disable this function.
10. Low Battery Symbol
When this symbol appears, it means the battery voltage drops below the minimum required voltage. Refer to Section V for battery replacement.
11. Bargraph
Bargraph has forty segments. It displays segments proportional to the actual reading. Each segment represent ten counts.
12. Relative Button
Once this button is pressed, the current reading shall be set to zero and be used as a zero reference value for all other subsequent measurement. The function can also be used to offset value caused by the residual magnetism remained in the core for the DC current or wattage measurement. Once this button is pressed, the clamp meter will change to manual mode instead of auto-range mode. The Relative function will be disabled if Max/Min function is enabled.

13. DCA/W ZERO button
This button is used for DCA ZERO function. To zero the DCA residual value, press this button until the LCD reading shows zero value. If DCA ZERO button is used to zero DCA value, the clamp meter is still in auto-range mode. It is different from the relative button which forces the clamp meter change to manual mode.
14. Max/Min Hold Button
This button is used to enable the maximum or minimum value to be displayed and updated during measurement. Press once, minimum value shall be displayed and updated. Press again, maximum value shall be displayed and updated. Press again (the third push), clamp meter return to normal measurement mode. Zero function will be disabled if MAX/MIN is enabled.
15. RANGE button
Once the button is pressed, the clamp meter goes into manual mode. To select users' desired range, press and release the button once. To return to manual mode, press and hold the button for more than 2 seconds.
16. COM Terminal
This terminal is used as common reference input.
17. V Input Terminal
This terminal is used as input for voltage, continuity, or temperature measurements.

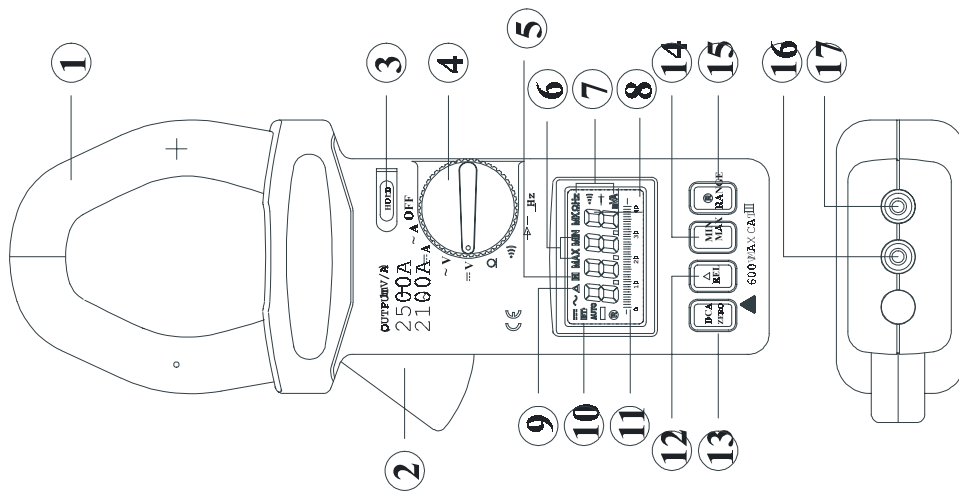


Figure 1

SPECIFICATIONS

2-1 General Specifications

Conductor Size	: Cable Φ 55mm. (approx.)
	: Bus Bar 65mm(D) x 24mm(W)
Battery Type	: 9V
Display	: 3 3/4 LCD with 40 seg. bargraph
Range Selection	: Auto and manual
Overload Indication	: left most digit blinks
Power Consumption	: 12 mA (approx.)
Low battery Indication	: B
Sampling Time	: 2 times/sec. (display) 20 times/sec. (bargraph)
Dimension	: 271mm (L) x 112mm (W) x 46mm (H)
	: 10.7" (L) x 4.4" (W) x 1.8" (H)
Weight	: 647 g/22.8 oz (batteries included)
Accessories	: Carrying bag x 1
	: Users manual x 1
	: 9V battery x 1, installed
Options:	: Thermal couple adapter
	: K-type thermal couple

2-2 Environmental Conditions

Indoor use.	
Maximum Altitude	: 2000 Meter.
Installation Category	: EN 61010-1 CAT. III 600V
Pollution Degree	: 2
Operating Temperature	: 4°C to 50°C
Operating Humidity	: less than 85% relative
Storage Temperature	: -20°C to 60°C
Storage Humidity	: less than 75% relative

2-2 Electrical Specifications

Accuracy is \pm (% reading + number of digits) at 23°C \pm 5°C at less than 80% R.H.

(1) AC Voltage : Auto-ranging

Range	Resolution	Accuracy (of reading)		Input Impedance
		50/60 Hz	40 - 1KHz	
400mV	0.1mV	-----1	-----1	-----1
4V	0.001	$\pm 1.5\% \pm 5$ dgts	$\pm 2.0\% \pm 5$ dgts	5M Ω
40V	0.01V	$\pm 1.5\% \pm 5$ dgts	$\pm 2.0\% \pm 5$ dgts	5M Ω
400V	0.1V	$\pm 1.5\% \pm 5$ dgts	$\pm 2.0\% \pm 5$ dgts	5M Ω
600V	1V	$\pm 1.5\% \pm 5$ dgts	$\pm 2.0\% \pm 5$ dgts	5M Ω

¹ 400mVAC is not designed to measured AC mV. So no accuracy is listed.
AC Voltage(True RMS, Crest Factor < 3,Autorange & Manual, Overload Protection 800VAC for all range)

(2) DC Voltage : Auto-ranging

Range	Resolution	Accuracy(of rdg)	Input Impedance
400mV	0.1mV	$\pm 1.5\% \pm 3 \text{dgts}$	10M Ω
4V	0.001V	$\pm 1.5\% \pm 3 \text{dgts}$	5M Ω
40V	0.01V	$\pm 1.5\% \pm 3 \text{dgts}$	5M Ω
400V	0.1V	$\pm 1.5\% \pm 3 \text{dgts}$	5M Ω
600V	1V	$\pm 1.5\% \pm 3 \text{dgts}$	5M Ω

Overload Protection 800VAC for all range

(3) Resistance Auto-ranging

Range	Resolution	Accuracy	Beeping	OL Protection
40-400 Ω	0.1 Ω	$\pm 1.0\%$ rdg ± 2 dgts	< 40.0 Ω	AC 600V

open voltage 0.4V

(4) Continuity

Built-in buzzer sound when measured resistance is less than 40 Ω and sound off when measured resistance is more than > 300 Ω .

Between 50 Ω to 300 Ω the buzzer maybe sound or off either.

(5) DCA : Auto-ranging

Range	Resolution	Accuracy (of rdg)	Overload Protection
400A	0.1A	$\pm 1.5\% \pm 3 \text{dpts}$	DC 3000A
0-2000A	1A	$\pm 1.5\% \pm 3 \text{dpts}$	DC 3000A
2000-2500A	1A	$\pm 2.0\% \pm 3 \text{dpts}$	DC 3000A

(6) ACA : Auto-ranging

Range	Resolution	Accuracy (of rdg)		Overload Protection
		50/60 Hz	40 - 1KHz	
400A	0.1A	$\pm 1.5\% \pm 5 \text{dpts}$	$\pm 2.0\% \pm 5 \text{dpts}$	AC 3000A
0-1000A	1A	$\pm 2.0\% \pm 5 \text{dpts}$	$\pm 2.5\% \pm 5 \text{dpts}$	AC 3000A
1000-2100A	1A	$\pm 2.5\% \pm 5 \text{dpts}$	$\pm 3.0\% \pm 5 \text{dpts}$	AC 3000A

True RMS, Crest Factor < 3

(8) Current analog output

Range	Output	Accuracy	Overload Protection
0 - 400A	1mV/A	$\pm 2.5\% \pm 0.5A$	600V AC
400 - 2100A	1mV/A	$\pm 2.5\% \pm 5A$	600V AC

(9) AC + DC power

250V max., Auto-range and Manual

Range	Resolution	Accuracy (of reading)	Overload Protection
40KW	0.01KW	$\pm 2.5\% \pm 5\text{dgts}$	600VAC
400KW	0.1KW	$\pm 2.5\% \pm 5\text{dgts}$	600VAC

600V max., Auto-range and Manual

Range	Resolution	Accuracy (of reading)	Overload Protection
400KW	0.1KW	$\pm 2.5\% \pm 5\text{dgts}$	600VAC
1200KW	1KW	$\pm 2.5\% \pm 5\text{dgts}$	600VAC

(11) Temperature

Range	Resolution	Accuracy	Overload Protection
-50 – 400 °C	0.1 °C	$\pm 1. \% \pm 2 \text{ }^\circ\text{C}$	600VAC
-400 – 1000 °C	1 °C	$\pm 1. \% \pm 2 \text{ }^\circ\text{C}$	600VAC
-50 – 400 °C	0.1 °C	$\pm 1. \% \pm 3 \text{ }^\circ\text{C}$	600VAC
-400 – 1000 °C	1 °C	$\pm 1. \% \pm 3 \text{ }^\circ\text{C}$	600VAC


OPERATION


This instrument has been designed and tested in accordance with NEN EN Publication 61010, Safety Requirements for Electronic Measuring Apparatus and has been supplied in a safe condition. This instruction manual contains some Information and warnings which have to be followed by the user to ensure safe operation and to retain the instrument in safe condition.

3-1 Preparation and Caution before Measurement

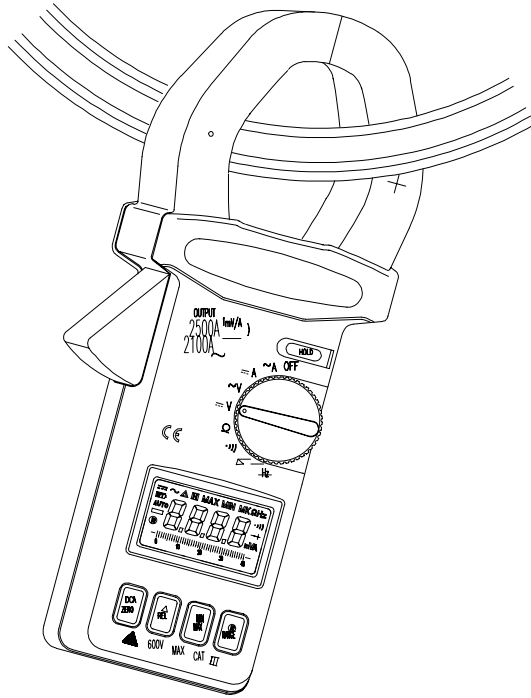
1. If the meter is used near equipment that generates electro-magnetic interference, the display may be unstable or indicate incorrect measurement values.
2. Make sure that the battery is properly connected.
3. The instrument should only be operated between 0°C ~ 50°C and at less than 80% R.H.
4. Do not use or store this instrument in a high temperature or high humidity environment and do not store the unit in direct sunlight.

5. Do not replace battery with power on condition.
6. If the unit is not to be used for a long period of time , remove the battery.
7. Do not forget to turn off after use.

8.  Maximum rated voltage to earth for voltage measurement terminals is 600V CAT.III

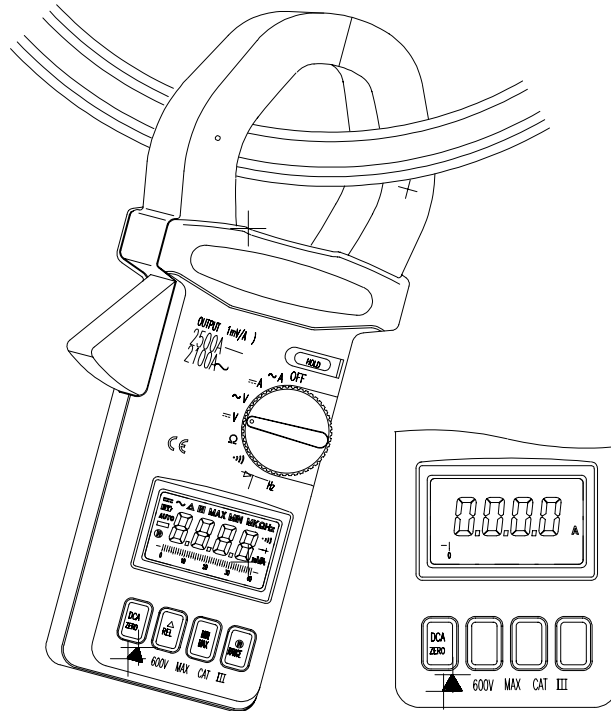
 THIS INSTRUMENT MUST NOT BE USED ON UNINSULATED CONDUCTORS AT A VOLTAGE GREATER THAN 600V ac/dc.

3-2 AC Current Measurement



- a. Set the rotary switch at AC A.
- b. In AC current measurement, ZERO is not needed. Do not press DC A ZERO button.
- c. Press the trigger to open the jaw and fully enclose the conductor to be measured. No air gap is allowed between the two half jaws.
- d. The clamp meter will automatically select proper range. If users want to select range, press the range button before pressing the DC A ZERO button.
- e. Read the measured value from the LCD display.

3-3 DC Current Measurement



- a. Set the rotary switch at DC A.
- b. Push and hold the DC A ZERO button until the reading shows zero.
- c. Press the trigger to open the jaw and fully enclose the conductor to be measured. No air gap is allowed between the two half jaws.
- d. The clamp meter will automatically select proper range. If users want to select range, press the range button before pressing the DC A ZERO button.
- e. Read the measured value from the LCD display.

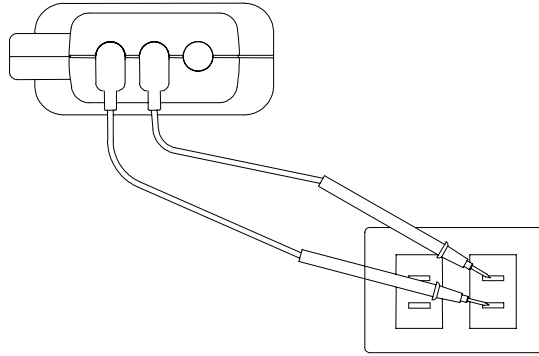
Note

There are two ways to zero the DC A residual value, If users use the DC A zero button, the clamp meter is in auto-range mode. If users use the REL button, the clamp meter will change to manual mode for DC A measurement.

3-4 Connecting to an Oscilloscope or a Datalogger

- a. Set the rotary switch at AC A or DC A
- b. Analog signal is output from the bottom terminals at the same time. The output is proportional to the current measured (1mV/A).
- c. The red terminal is the positive while the black is the negative of the signal.
- d. Connect these two terminals to an oscilloscope or a datalogger, users can observe the current wave form or do the long term data recording.

3-5 AC/DC Voltage Measurement



WARNING

Maximum input for DC V is 1000, and for AC V is 750. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage to the clamp meter.

3-5-1.DC Voltage

- a. Set the rotary switch at V DC.
- b. Insert the test leads into the input jack.
- c. Connect the test prods of the test leads in PARALLEL to the circuit to be measured.
- d. The clamp meter will automatically select proper range. If users want to select range, press the range button.
- e. Read the measured value from the LCD display.

3-5-2.AC Voltage

- a. Set the rotary switch at V AC
- b. Insert the test leads into the input jack.
- c. Connect the test prods of the test leads in PARALLEL to the circuit to be measured.
- d. The clamp meter will automatically select proper range. If users want to select range, press the range button.
- e. Read the measured value from the LCD display.

3-6 AC+DC Watt Measurement

- a. Set the rotary switch at KW/600V or KW/250V.
- b. Insert the test leads into the input jack.
- c. Connect the test probes of the test leads to the circuit to be measured (COM to ground, V to active line).
- d. Clamp on to the active line
- e. The watt clamp meter will automatically select proper range. If users want to select range, press the range button.
- f. Read the measured value from the LCD display.

3-7 Temperature Measurement

Turn the switch to the temperature position. Connect the adapter (optional) to the V terminal. Then plug in the K type thermal couple to the adapter. LCD will display the temperature measured

3-8 Continuity Measurement

- a. Set the rotary switch at Continuity
- b. Insert the test leads into the input jack.
- c. Connect the test prods of the test leads to the two ends of the resistor or circuit to be measured.
- d. Read the measured value from the LCD display.
- e. If the resistance is lower than 40Ω , a beeping sound will be heard

3.9 Change from Auto-range Mode to Manual Mode

If users want to select certain range for specific measurement, they can press the RANGE button to select appropriate range. To return to auto-range, press and hold the RANGE button for 2 seconds.

3.10 Relative Reading Measurements

The REL button can be used to make a relative measurement. Once the button is pushed, the current reading is set to zero and a zero symbol shall be displayed on LCD. All the subsequent measurement shall be displayed as a relative value with respect to the value being zeroed. Press the zero button for 2 seconds to return to normal mode. But this function is disabled if MAX/MIN function is enabled. Please watch for symbol displayed on LCD.

3.11 Holding the LCD Reading

Press the HOLD button, then the reading shall be hold and kept on LCD.

3.12 Finding the MAX/MIN Value

Press the MAX/MIN button to enable the maximum and minimum values to be recorded and updated during measurement. Push the button once, the maximum value shall be displayed and updated. Push again (second push), the minimum value shall be displayed. Push again (third push), MAX/MIN function shall be disabled and return to the normal measurement mode. If MAX/MIN button is pressed, the ZERO function will be disabled and the ZERO symbol will disappear from LCD.

MAINTENANCE



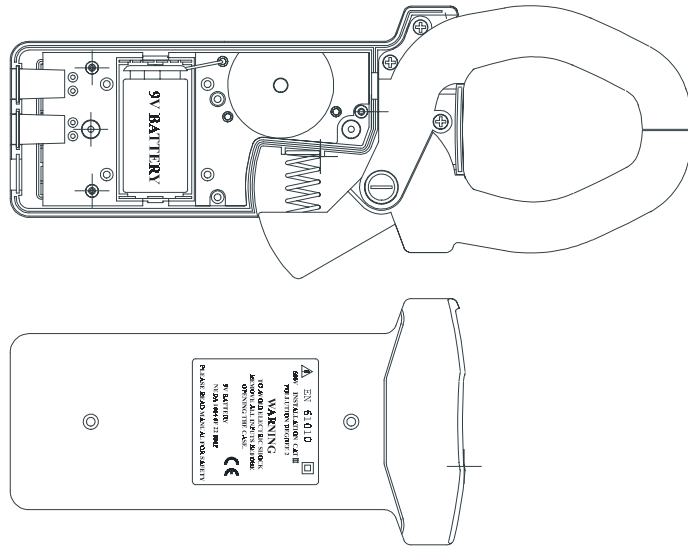
WARNING : TO AVOID ELECTRICAL SHOCK OR DAMAGE REMOVE TEST LEADS BEFORE OPENING THE COVER.

4-1 General Maintenance

Servicing not covered in this manual should only be performed by qualified personnel. Repairs should only be performed by qualified personnel.

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

4-2 Battery Installation or Replacement



When the low battery symbol is displayed on the LCD, replace the old battery with new battery.

- a. Turn the power off and remove the test leads from the clamp meter.
- b. Remove the screws of the bottom case.
- c. Lift and remove the bottom case.
- d. Remove the old battery.
- e. Insert new 9V battery.
- f. Replace the bottom case and secure the screws.

WARNING

Do not touch or adjust any parts inside the clamp meter when the bottom case is open.



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