FINEST 115 CLAMP METER

USER'S MANUAL

FINEST®

FINEST® a world leader in test & measurement

FINE INSTRUMENTS CORPORATION

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WARNING!

SOURCES LIKE SMALL HAND-HELD RADIO TRANSCEIVERS, FIXED STATION RADIO AND TELEVISION TRANSMITTERS, VEHICLE RADIO TRANSMITTERS AND CELLULAR PHONES GENERATE ELECTROMAGNETIC RADIATION THAT MAY INDUCE VOLTAGES IN THE TEST LEADS OF THE MULTIMETER. IN SUCH CASES THE ACCURACY OF THE MULTIMETER CANNOT BE GUARANTEED DUE TO PHYSICAL REASONS.

Measurement Limits:

AC Amperes	:	True-RMS 0.3A to 1000A
DC Amperes	:	0.3A to 1000A
AC Voltage	:	True-RMS 10mV to 600V
DC Voltage	:	10mV to 600V
Frequency	:	1Hz to 3999kHz
Resistance	:	0.1Ω to 399.9Ω
Continuity Check	:	Beep at Approx. $<15\Omega$ in the 400Ω range

WARNING!

READ "SAFETY CONSIDERATIONS" BEFORE USING THIS METER.

CONTENTS

1. INTRODUCTION

This Meter is a handheld and battery operated True-RMS Clamp-on Meter that is designed and tested according to IEC Publication 1010-2-032 (1994-12) (Overvoltage Category III), Safety Requirements for Hand-held Current Clamps for Electrical Measurement and Test, the EMC Directive (EN 50081-1 and EN 50082-1), and other safety standards (see "Specifications").

This Meter measures the True-RMS value of Alternating Current from 0.3A to 1000A. AC measurements are from 45Hz to 1kHz. True-RMS sensing provides more accurate readings on current flow containing harmonics or distorted waveforms. Household electrical appliances, personal computers, switching power supplies, and adjustable speed motor drives are some examples of non-linear equipment (loads) that generates harmonics or distorted waveforms.

Because True-RMS current flow directly relates to the amount of heat dissipated in wiring, transformers, and system connections, an instrument with True-RMS sensing indicates the true heat-providing capability of a distorted current (or voltage) waveform, which causes overheated conductors, transformers, and system connections.

This Meter also provides:

- Auto Ranging for amperes, volts, and frequency.
- Peak Hold function to capture the Peak value of AC or DC and freeze it on the LCD.
- Low-battery indicator.
- DC/AC toggle switch.
- DC amperes zero adjustment dial switch.
- 600 volt input protection on Ohm range.
- Continuity beeper and diode test.
- Protective soft carrying case.

2. SAFETY CONSIDERATIONS

Observe the International Electrical Symbols listed below.

Warning! Risk of electric shock.

Caution! Refer to this manual before using this Meter.

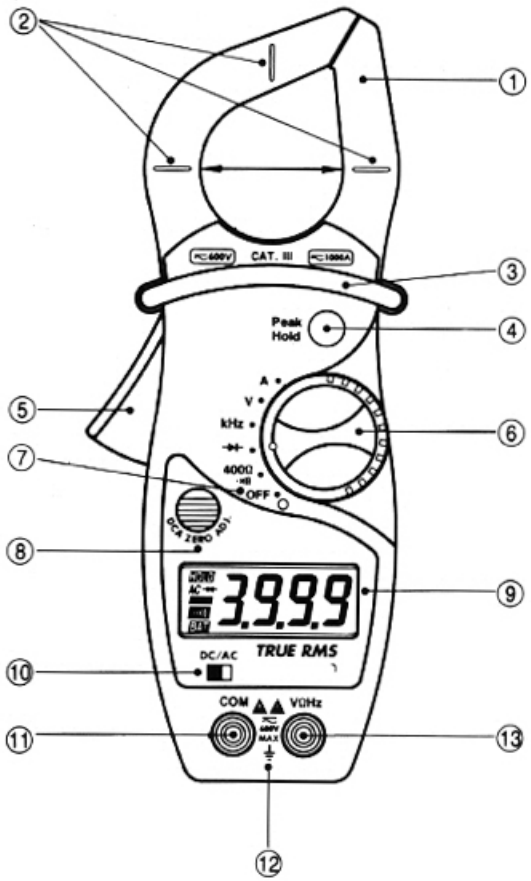
Double Insulation (Protection Class II)
The Meter is protected throughout by double insulation or reinforced insulation. When servicing the Meter, use only the specified replacement parts.

CAT III – Per IEC 1010-2-032 (1994-12)

Safety Tips:

- Never use the Meter on a circuit with voltages higher than 600V rms.
- Never use a Meter whose insulating protection has been impaired.
- Be extremely cautious when clamping around uninsulated conductors or bus bars. Accidental contact with the conductor could result in electric shock.
- Use the Meter only as specified in this manual. Otherwise, the protection provided by this Meter may be impaired.
- Observe the safety messages in this manual.
- Avoid working alone.
- Inspect the test leads for damaged insulation or exposed metal. Check test lead continuity. Damaged leads should be replaced.
- Disconnect the live test lead before disconnecting the common test lead.
- Voltages above 60V DC or 30V AC RMS may create a serious shock hazard.

3. EXPLANATION OF CONTROLS AND INDICATORS



① **CLAMP.** Opens 32mm (1.25 inches) to enclose conductors.

② **CENTERING MARKS.** Position the conductor within the jaws at the intersection of the indicated marks as much as possible in order to meet the Meter's accuracy specs.

③ **BARRIER (Hand Guard).** Provides a protective distance and reduces the danger of touching the lower jaw opening or the conductor under test.

④ **PEAK HOLD.** Captures the peak value to freeze it in digital display. PEAK HOLD is available for AC or DC readings only and cannot be selected when in the other modes.

⑤ **LEVER.** Opens and closes clamp jaws.

⑥ **FUNCTION SWITCH.** Desribes functions that are selected by setting the rotary switch.

- **A** Amperes dc/ac (Autoranges to the 400A or 1000A range.)
- **V** Volts dc/ac (Autoranges to the 400V or 600V range.)
- **400Ω** Resistance (Single 400Ω range)
- **kHz** Frequency (Autoranges to the 4kHz, 40kHz, 400kHz, or 4MHz range.)
- →|← Diode test
- ·))) Continuity test

⑦ **OFF.** Power to the Meter is turned off.

⑧ **DC A ZERO ADJUSTMENT SWITCH.** Used for zero value adjustment when measuring dc amperes.

⑨ **DISPLAY.** Liquid crystal display (LCD).

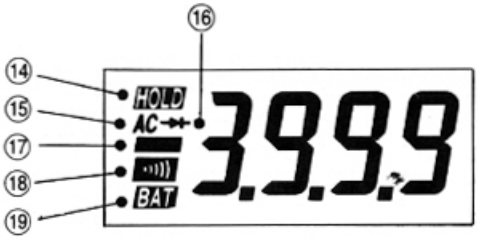
⑩ **DC/AC.** Toggles between dc and ac.

⑪ **COM (Common Terminal).** The black test lead is plugged into this terminal for all measurements except amperes.

⑫ **MAX 600V.**

⏚ To avoid electrical shock or instrument damage, do not connect the COM input terminal to any source of more than 600V with respect to earth/ground.

⑬ **VΩHz (Volts, Ohms, Diode Test and Frequency Input Terminal).** The red lead is plugged into this terminal for volts dc/ac, ohms, continuity test, diode test and frequency functions.



⑭ **HOLD** . Displayed when the Peak Hold mode is selected.

⑮ **AC.** Displayed when ac measurement function is selected.

⑯ **→+ (Diode test).** The value displayed is the forward voltage of semiconductor junction(s).

⑰ **(Negative Polarity).** Automatically indicates negative inputs.

⑱ . Displayed when the Meter is in the continuity test function.

⑲ **BAT (Low Battery).** Battery life warning. When **BAT** is first turned on, at least 8 hours of battery life remain. Replace the battery immediately. Never leave a weak or dead battery in the Meter. Even leak-proof types can leak and damage the Meter.

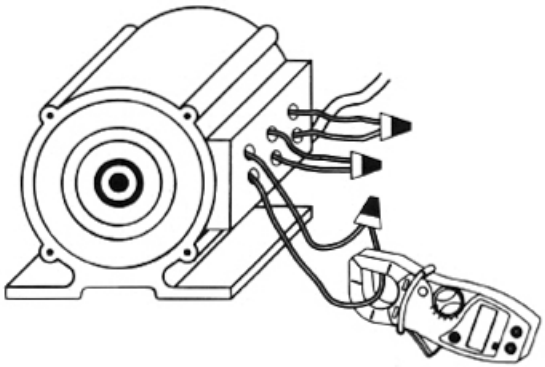
⑳ **0.L (Overload Indication).** Displayed on the LCD when input value is too large to display.

4. APPLICATIONS

MEASURING AC CURRENT

WARNING!

BEFORE TAKING MEASUREMENTS MAKE SURE THAT ALL TEST LEADS ARE DISCONNECTED FROM THE INPUT TERMINALS.



Follow these steps to measure ac Amps.

1. Set the function switch to A.
2. Toggle DC/AC switch to select ac. (AC appears on the LCD.)
3. Press the lever to open the clamp jaws and clamp around a conductor. Position the conductor within the jaws at the intersection of the centering marks as much as possible to obtain the most accurate reading.
4. Read the display.

MEASURING DC CURRENT

When measuring dc Amps, the display reads a non-zero dc Amps (positive or negative) value due to the presence of the Earth's magnetism. This value is variable according to the location measuring dc Amps. Thus, this non-zero dc Amps value should be zeroed by using the DC A Zero Adjustment switch before clamping around a dc current-carrying conductor.

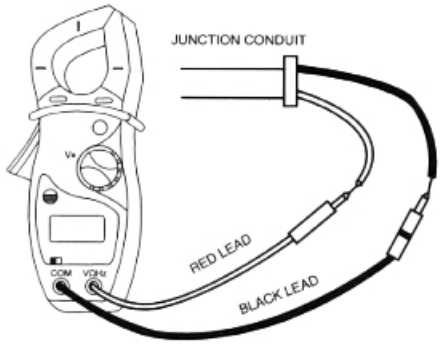
When measuring a dc current-carrying conductor, the dc Amps value has a positive or negative polarity according to the direction of dc current flow. The value is positive when the current flows through the conductor in the forward-moving direction of a right-hand threaded screw. And it is negative when the current flows through the conductor in the backward-moving direction of a right-hand threaded screw.

Use the arrow direction mark on the insulated guard of the lower jaw opening to identify the direction of dc current flow.

Follow these steps to measure dc Amps.

1. Set the function switch to A.
2. Toggle DC/AC switch to select dc. (AC disappears on the LCD.)
3. Set the Meter display zero value by using the DC A Zero Adjustment switch.
4. Press the lever to open the clamp jaws and clamp around a conductor. (If necessary, use the arrow direction mark to identify the direction of dc current flow.)
5. Read the display.

MEASURING AC/DC VOLTAGE



Follow these steps to measure ac/dc voltages.

1. Insert the red test lead into the VΩHz input terminal and the black test lead into the COM terminal.
2. Set the function switch to V.
3. Toggle DC/AC switch to select dc or ac voltage measurement function.
4. Touch the test probes to the test points and read the display.

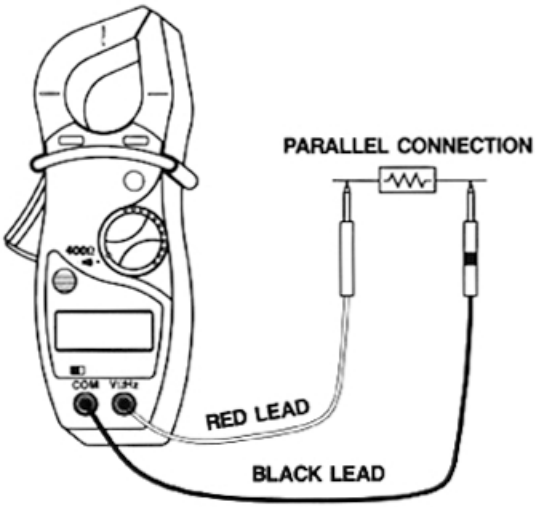
PEAK HOLD FUNCTION

For all AC or DC readings, the PEAK reading can be held in the display when the Peak Hold button has been activated. However, when in Peak Hold Mode, the product will not read above 400 Amps or 400 Volts. When the input exceeds 400, the LCD reads " OL ".

1. Ensure that the Peak Hold button has not been activated.
2. Make AC or DC amperes or volts measurement using the Meter.
3. Press and release the Peak Hold button hen the Meter is still connected to the circuit.
4. The Meter will hold the PEAK reading in the display until the Peak Hold button is pressed and released again or the function switch is set to another position.

NOTE: When using the Peak HOld function in AC Amps, set the Meter display zero value by using the DC A zero Adjustment switch before using the Peak Hold function.

MEASURING RESISTANCE AND CONTINUITY TESTING



When measuring resistance, make certain that the contact between the test leads and the circuit under test is good. Dirt, oil, solder, flux, or other foreign matter seriously affect the reading value.

Follow these steps to measure ohms and test continuity.

1. Insert the red test lead into the VΩHz input terminal and the black test lead into the COM terminal.
2. Set the function switch to 400Ω/·))). With the leads open, the Meter should display OL (the overrange sign) on the LCD.
3. Short the leads and see that the display reads ≤ 0.2Ω and the continuity beeper sounds. If not, check the test leads insertion or position of the function switch again.
4. Touch the test leads to the circuit under test and read the resistance measurement in the display. A reading of 15Ω or less will cause the continuity beeper to sound.

DIODE TESTING

WARNING!

NEVER CONNECT THE TEST LEADS TO A SOURCE OF VOLTAGE (when the function switch is set to →+←).

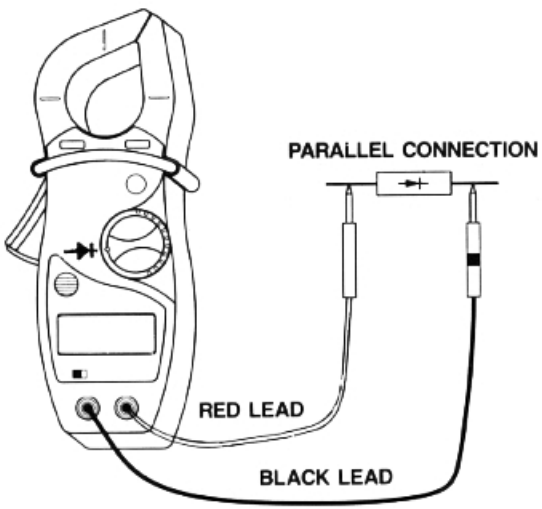
- In diode test, drop voltage in the forward direction is displayed when a diode is connected in the forward direction. For a germanium diode, the typical forward voltage is about 0.4V and in case of a silicon diode, about 0.6V.

- Judge the semiconductor device as follows:

  If the digital reading in one direction shows a value and the reading in reverse direction shows an overrange sign (OL), the device is good.

  If the digital reading is the same in both directions, the device is probably shorted.

  If the display reads OL in both directions, the device is probably open.

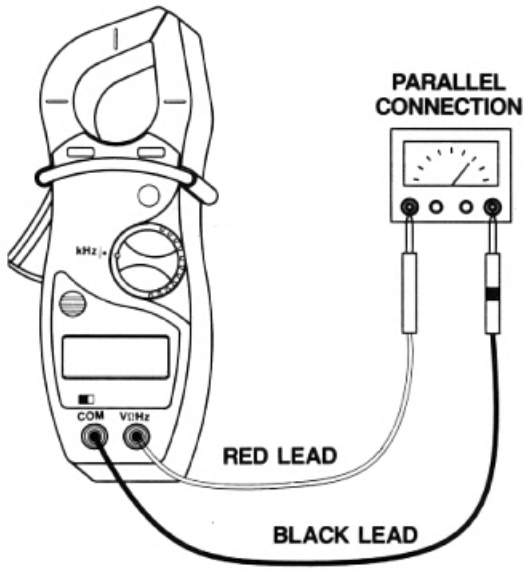


Follow these steps to check a diode.

1. Insert the red test lead into the VΩHz input terminal and the black test lead into the COM terminal.
2. Set the function switch to ⊣◀ .
3. Touch the red lead to the Anode (+ side, non-banded end) and the black lead to the Cathode (– side, banded end).
4. If the diode is good, the reading should indicate 0.3V to 0.8V on the LCD.
5. Reverse the red and black leads on the diode. If the LCD reads OL , the diode is good.

NOTE: A defective diode will read OL or 0.00 no matter how the test leads are connected.

MEASURING FREQUENCY



Follow these steps to measure frequency.

1. Insert the red test lead into the VΩHz input terminal and the black test lead into the COM terminal.
2. Set the function switch to kHz.
3. Touch the test probes to the test points and read the display. If the measured frequency is greater than 4MHz, OL (the overrange sign) is displayed.

5. MAINTENANCE AND BATTERY REPLACEMENT

MAINTENANCE

WARNING!

REMOVE THE TEST LEADS AND ANY INPUT SIGNALS BEFORE OPENING THE CASE. TO AVOID ELECTRICAL SHOCK OR DAMAGE TO THE METER, DO NOT GET WATER INSIDE THE CASE.

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

SERVICE AND REPLACEABLE PARTS

WARNING!

TO AVOID ELECTRIC SHOCK, REPAIRS OR SERVICING NOT COVERED IN THIS MANUAL SHOULD ONLY BE PERFORMED BY QUALIFIED PERSONNEL. WHEN SERVICING THIS METER, USE ONLY THE REPLACEABLE PARTS SPECIFIED.

This Meter should be calibrated annually. Regarding the service/calibration information on this Meter, contact the nearest distributor of this Meter.

BATTERY REPLACEMENT

The Meter uses a 9V battery (NEDA 1604 or IEC 6LR61). To replace the battery, remove the screw of the battery compartment from the back of the Meter and lift off the cover of the compartment. Replace the battery. Reattach the battery compartment cover to the back of the Meter, and reinstall the screw.

6. SPECIFICATIONS

MEASUREMENT SPECIFICATIONS

Accuracy is given as ±([% of reading] + [number of least significant digits]) at 18°C to 28°C with relative humidity up to 80%, for a period of one year after calibration. AC conversions of this Meter are True-RMS responding and calibrated to the RMS value of a sine wave input.

FUNCTION	RANGE	RESOLUTION	ACCURACY	OVERLOAD PROTECTION
AC A * (45Hz to 1kHz)	400A	0.1A	2.0% ± 5dgts	1000A CONTINUOUS
	1000A	1A	2.5% ± 10dgts	
DC A	400A	0.1A	1.5% ± 5dgts	
	1000A	1A	1.5% ± 10dgts	
AC V (45Hz to 1kHz)	400V	0.1V	1.0% ± 3dgts	600V RMS
	600V	1V	1.2% ± 5dgts	
DC V	400V	0.1V	0.5% ± 2dgts	
	600V	1V	0.8% ± 3dgts	
Ohms	400Ω	0.1Ω	0.8% ± 5dgts	600V
Continuity	OPEN CIRCUIT TEST VOLTAGE: < 1.2V THRESHOLD: Approx: < 15Ω			600V
Diode Check	OPEN CIRCUIT TEST VOLTAGE: < 3.0V MAX TEST CURRENT: < 1.0mA			600V
Frequency	4kHz	1Hz	0.5% ± 3dgts	600V
	40kHz	10Hz		
	400kHz	100Hz		
	4MHz	1kHz	1.0% ± 5dgts	

*CREST FACTOR: 0-400A ≤3
400-1000A ≤2

GENERAL SPECIFICATIONS

Maximum voltage between any terminal and earth/ground: 600V rms.

Digital Display	: Counts – 4000 Updates 3 times/sec
Storage Temperature	: – 20°C to 60°C (– 4°F to 140°F)
Operating Temperature	: 0°C to 45°C (32°F to 113°F)
Altitude	: 2000m (6,562 Feet)
Relative Humidity	: 0% to 80% (°C to 35°C; 32°F to 95°F) 0% to 70% (35°C to 45°C; 95°F to 113°F)
Temperature Coefficient	: 0.1 x (Specified Accuracy)/°C (<18°C or >28°C; <64°F or >82°F)
Battery Type	: 9V, NEDA 1604 or IEC 6LR61
Battery Life	: 200 hrs. typical (alkaline)
Maximum Conductor Size	: ϕ38mm (1.5") can accept one 750 MCM cable or two 350 MCM cables.
Maximum Jaw Opening	: 32mm (1.25")
Size (H x W x L)	: 3.4cm x 8.5cm x 20.8cm
Weight	: 380g
Vibration & Shock	: Designed to MIL-T-28800 for a class II instrument
Case Protection	: IEC 529, IP30
Safety Standards	: Designed to both IEC 1010-2-032 (Overvoltage Category III), and the EMC Directive, UL 3111, CAN/CSA C22.2 No. 1010.1-92 and ISA-DC82.