English User manual

Digital clamp meter

elma 945

Measuring limits

- DC A 0,01A to 1000A
- AC A 0,01A to 1000A
- DC V 0,1mV to 600V
- AC V 0,1mV to 600V
- Resistance 0,1Ωto 40MΩ
- Capacitance 0,001nF to 40mF
- Frequency 1Hz to 4kHz
- Temperature -40°C to 1000°C

Safety information

This manual contains information that must be followed for operating the meter safely and maintaining the meter in a safe operation condition. If the meter is not used in a manner specified in this manual, the protection provided by the meter may be impaired.
The meter has been designed and complies with IEC 61010-1 and EN61010-1 Safety requirements for electronic measuring apparatus.

Warning
Read through the operating instructions and understand the instructions before operating the meter.
Keep the manual at hand so as to enable quick reference when necessary.
Ensure that the use of the meter is in its intended applications and follow measurement procedures described in this manual.
Follow all safety and operating instructions to ensure maximum personal safety during the use and operation of the meter.
Failure to follow the above instructions may cause injury, instrument damage and damage to equipment under test.
The symbol indicated on the meter means that the user must refer to related parts in the manual for safe operation of the meter. Be sure to carefully read the instructions following each symbol in this manual.

DANGER is reserved for conditions and actions that are likely to cause serious or fatal injury.
WARNING is reserved for conditions and actions that are likely to cause serious or fatal injury.
CAUTION is reserved for condition and actions that are likely to cause minor injury or damage.

DANGER

- Never use the meter to measure voltages on a circuit above the maximum allowable input value on any function
- Do not exceed the maximum allowable input of any measurement range.
- Never touch exposed wiring, connections or any live circuit when attempting to take measurements.
- Do not attempt to make measurement in areas with flammable gasses, fumes, vapor or dusk. The use of the instrument in these areas may cause sparking which can lead to an explosion.
- Do not attempt to use the instrument if its surface or your hand is wet.
- Never open the battery compartment cover when making measurements.

WARNING

- Always inspect he meter and test leads for any signs of damage or abnormality before use. If the meter or its accessories have any structural defects such as broken test leads, cracked cases, exposed metal parts or the display is not reading, do not attempt to make measurements.
- Do not turn the function switch whilst test leads are connected to the meter.
- Do not install substitute parts or make modification to the meter. Return the meter to your distributor for repair or re-calibration.
- Ensure the meter is switch off before opening the battery cover when replacing the battery.
- Never replace a battery if the surface of the meter is wet or moist.

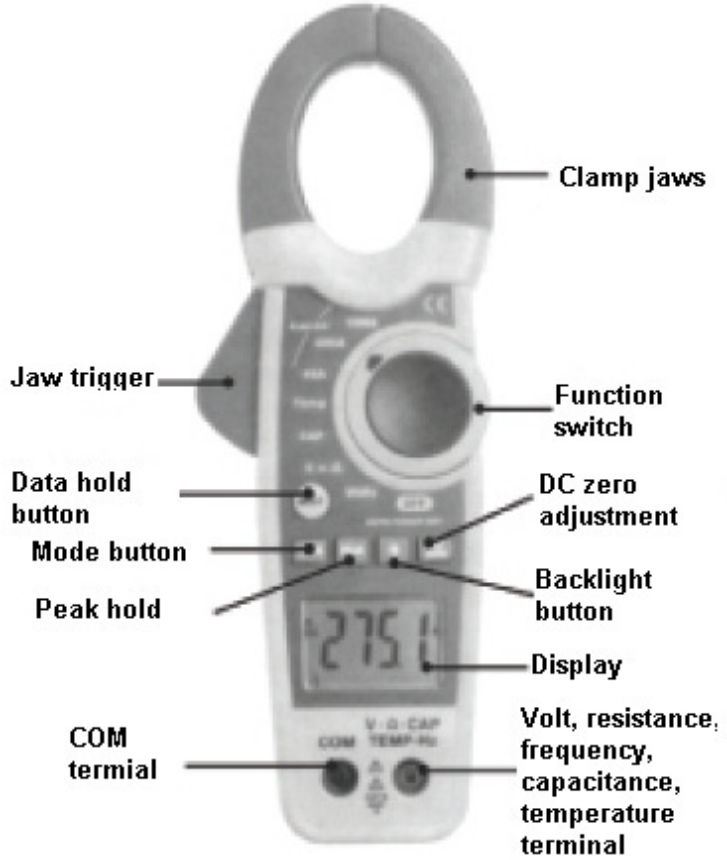
CAUTION

- Before making measurements ensure that the function selector switch is set on the appropriate range position.
- Always make sure that the plug of each test lead is inserted fully into the appropriate terminal of the meter
- Ensure that the function selector switch is set to the OFF position after use. When the meter is stored for extended periods the battery should be removed.
- Do not expose the meter to direct sunlight, extreme temperatures or moist.
- Do not use abrasives or solvents on the meter. To clean it use a damp cloth and mild detergent only,
- Qualified and trained service technicians should only perform calibration and repair of the meter.

Features

- True RMS measurement of AC current and AC voltage. Large 4000 count LCD display with a bar graph and a bright white LED backlight.
- Wide measuring range from 0,01A AC/DC to 1000A AC/DC.
- Measures AC and DC voltage up to 600V
- Measures resistance from 0,01Ω to 40MΩ.
- Capacitance measurements up to 40mF.
- Temperature measurements from -40°C to 1000°C
- Designed to the international safety standard IEC61010 CATIII 600V CATII 1000V, Pollution degree 2.
- Auto power off after approximately 20 minutes to conserve battery life.
- Continuity buzzer and diode test.
- Frequency measurement up to 4kHz.
- Peak hold to record the minimum and maximum readings for current and voltage.
- Data hold switch used to freeze reading on display.

Instrument layout



Specifications

Clamp size	30mm opening approx.
Diode test	Test current 0,3mA typical, open circuit voltage 1,5V DC
Continuity	Threshold <35Ω, Voltage 1,5V typical
Low battery indication	
Over range indication	OL
Measurement rate	2/s nominal
Input impedance	10MΩ (VDC and VAC)
Display	4000 count LCD
AC Current	50/60 Hz AC
AC voltage bandwidth	50/60 Hz AC
Operating temperature	-10°C to 50°C
Storage temperature	-30°C to 60°C
Relative humidity	<85%
Over voltage	CATIII600V
Battery	1 pcs. 9V battery
Auto power off	Approx. 2 min.
Dimensions	229x80x49mm
Weight	303g

Specifications

DC Current

Range	Measuring range	Resolution	Accuracy % rdg
40A	0-40,00A	0,01A	±2,8%+10dgt
400A	0-400,0A	0,1A	±2,8%+8dgt
1000A	0-1000A	1A	±3%+8dgt

AC Current

Range	Measuring range	Resolution	Accuracy % rdg
40A	0-40,00A	0,01A	±2,8%+10dgt
400A	0-400,0A	0,1A	±2,8%+8dgt
1000A	0-1000A	1A	±3,0%+8dgt

DC Voltage

Range	Measuring range	Resolution	Accuracy % rdg
400mV	0-400,0mV	0,1mV	±0,8%+2dgt
4V	0-4,000V	0,001V	±1,5%+2dgt
40V	0-40,00V	0,01V	
400V	0-400,0V	0,1V	
600V	0-600V	1V	±2,0%+2dgt

AC Voltage

Range	Measuring range	Resolution	Accuracy % rdg
400mV	0-400,0mV	0,1mV	±1,0%+10dgt
4V	0-4,000V	0,001V	±1,5%+8dgt
40V	0-40,00V	0,01V	
400V	0-400,0V	0,1V	
600V	0-600V	1V	±2,0%+8dgt

Note: No autorange on 400mV AC range

Resistance

Range	Measuring range	Resolution	Accuracy % rdg
400Ω	0-400,0Ω	0,1Ω	±1,0%+4dgt
4kΩ	0-4,000kΩ	1Ω	±1,5%+2dgt
40kΩ	0-40,00kΩ	10Ω	
400kΩ	0-400,0Ω	100Ω	
4MΩ	0-4,000MΩ	1kΩ	±2,5%+5dgt
40MΩ	0-40,00MΩ	10kΩ	±3,5%+10dgt

Capacitance

Range	Measuring range	Resolution	Accuracy % rdg
4nF	0-4,000nF	0,001nF	±5,0%+30dgt
40nF	0-40,00nF	0,01nF	±5,0%+20dgt
400nF	0-400,0nF	0,1nF	±3,0%+5dgt
4µF	0-4,000µF	0,001µF	
40µF	0-40,00µF	0,01µF	
400µF	0-400,0µF	0,1µF	±4,0%+10dgt
4mF	0-4,000mF	0,001mF	±4,5%+10dgt
40mF	0-40,00mF	0,01mF	±5,0%+10dgt

Frequency

Range	Measuring range	Resolution	Accuracy % rdg
4kHz	0-4,000kHz	0,001kHz	±1,5%%+2dgt

Temperature

Range	Measuring range	Resolution	Accuracy % rdg
°C	-40°C-1000°C	1°C	±2,5%%+3°C
°F	-40°F-1800°F	1°F	±2,5%%+5°F

Measurements

DC Current measurement

WARNING: Ensure that the test leads are disconnected from the meter before making current measurements.

1. Set the function switch to 1000A, 400A or 40A range position and make sure that the current under test does not exceed the upper limit of the measuring range you have selected. The meter automatically defaults to DC current.
2. Press the Zero button once. The Δ sign will appear on the LCD indicating range is zero.
3. Press the trigger to open up the current clamp jaws and clamp it around the single conductor under test.
4. Read the display.

Note: During current measurements keep the transformer jaws fully closed, otherwise this will affect the accuracy of the measurement.
When large currents are measured, the jaws may buzz. This is normal.

AC True RMS current measurement

WARNING: Ensure that the test leads are disconnected from the meter before making current measurements.

1. Set the function switch to 1000A~, 400A~ or 40A~ range position and make sure that the current under test does not exceed the upper limit of the measuring range you have selected.
2. Press the MODE button to select AC current range. The meter automatically defaults to DC current.
3. Press the trigger to open up the current clamp jaws and clamp around the single conductor under test.
4. Read the display

Note: During current measurements keep the transformer jaws fully closed, otherwise this will affect the accuracy of the measurement.
When large currents are measured, the jaws may buzz. This is normal.
The meter is set to default Autorange”
Pressing the PEAK hold button will allow the user to record the peak maximum and minimum reading on the AC volt range.

DC voltage measurement

1. Set the function switch to V~HZ range position. The meter will automatically defaults to DC Volts.
2. Insert the red test lead into the V Ω TEMP HZ input terminal and the black test lead to the COM terminal.
3. Connect the other end of the test leads to the circuit under test.
4. Read the display. If a – (minus) sign is displayed, reverse the polarity.
5. Read the display.

AC True RMS voltage measurement

1. Set the function switch to V-HZ range position.
2. Press the MODE button to select the AC volt range. The meter automatically defaults to DC volts.
3. Insert the red test lead into the V Ω TEMP HZ input terminal and the black test lead to the COM terminal.
4. Connect the other end of the test leads to the circuit under test.
5. Read the display.

Note: The meter is default set to Autorange.
Pressing the PEAK hold button will allow the user to record the peak maximum and minimum reading on the AC volt range.

Resistance measurement

1. Set the function switch to  range position. The meter automatically defaults to resistance range.
2. Insert the red test lead into the V Ω TEMP HZ input terminal and the black test lead to the COM terminal.
3. Connect the other end of the test leads to the circuit or component under test.
4. Read the display.

Note: The meter is default set to Autorange mode.
WARNING: Before attempting to make a resistance measurement ensure there is no voltage present on the circuit under test.

Capacitance measurement

1. Set the function switch to the CAP range position.
2. Insert the red test lead into the V Ω TEMP HZ input terminal and the black test lead to the COM terminal
3. Connect the other end of the test leads to the circuit or component under test.
4. Read the display

Note: In capacitance range the meter is Autoranging only.
CAUTION: To avoid damage to the meter or the equipment under test, remove all power from the circuit and discharge all capacitors before measuring capacitance.
Large value capacitors should be discharged through a appropriate resistance load. Use the DC voltage function to confirm that the capacitor is discharged.

Frequency measurement

1. Set the function switch to the V~Hz range position.
2. Pres the mode button to select frequency range. The meter automatically defaults to DC volts.
3. Insert the red test lead into the V Ω TEMP HZ input terminal and the black test lead to the COM terminal.
4. Connect the other end of the test leads to the circuit or component under test.
5. Read the display.

Note: In frequency range the only option is autorange.

Temperature measurement

1. Set the function switch to TEMP range position. The instrument automatically defaults to °C range.
2. Push the MODE button to switch between °C and °F
3. Insert the temperature adapter into the V Ω TEMP HZ input terminal and the COM terminal. Be aware of correct polarity.
4. Connect any K-Type probe into the meter adaptor
5. Read the display.

Diode test

1. Set the function switch to  range position.
2. Press the MODE button to select the Diode test. The meter automatically defaults to resistance.
3. Insert the red test lead into the V Ω TEMP HZ input terminal and the black test lead to the COM terminal.
4. Connect the other end of the test leads to the component under test.
5. Read the display.

Note: Use the diode test to check diodes, transistors, silicon controlled rectifiers and other semiconductor devices.
Normal forward voltage drop for a good silicon diode is between 0,4V to 0,9V. A reading higher than that indicates a leaky (defective) diode. A zero reading indicates a shorted diode.
Reverse the test leads connection (reverse bias) across the diode. The display shows “OL” if the diode is good. Any other reading indicates the diode is shorted or resistive (defective)

Continuity testing

1. Set the function switch to the  range position.
2. Press the MODE button to select the continuity test range. The meter automatically defaults to resistance.
3. Insert the red test lead into the V Ω TEMP HZ input terminal and the black test lead to the COM terminal
4. Short the tip of the test leads and make sure the display reads 0 (zero) and the buzzer beeps.
5. Connect the tip of the test leads to the circuit or component under test. The display reads the resistance and the buzzer beeps when the reading is not more than about 35Ω

WARNING: Before attempting to make a resistance measurement ensure there is no voltage present on the circuit under test.

Data hold

This is a function used for freezing the actual value on the display.

1. Press the HOLD button once. The meter beeps and HOLD is displayed.
2. Pres HOLD button once again to disable the hold function

Peak hold
This function is used to freeze the max and min reading for voltage and current.

1. Press the PEAK button once. Pmax is displayed and max value will freeze on the display
2. Press PEAK once again. Pmin is displayed and min value will freeze on the display.
3. Press and hold the PEAK button to turn peak function off.

LCD backlight

1. Press the  button for 3 seconds and the light will come on.
2. Press the  button for 3 seconds and the light will come off.

Auto power off
This feature automatically turns off the meter after 20 minutes of no activity.

Battery replacement

When the  sign shows in the display, the battery should be replaced.

1. Disconnect testleads from instrument.
2. Set the function switch to OFF
3. Remove the battery cover in the bottom by removing the screws.
4. Replace the battey with a 9V battery.
5. Replace the battery cover.

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