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CM56 CLAMP METER

INSTRUCTION MANUAL

MARTINDALE ELECTRIC

Trusted by professionals

SAFETY INFORMATION: Always read before proceeding.

WARNING

This manual contains both information and warnings that are necessary for the safe operation and maintenance of the clampmeter. It is recommended that you read the instructions carefully and ensure that the contents are fully understood. Failure to understand and to comply with the warnings and instructions can result in serious injury, damage or even death.

In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding 30V AC rms, 42V AC peak or 60V DC.

The clampmeter must only be used under the conditions and for the purposes for which it has been constructed. Particular attention should be paid to these warnings, the precautions, the technical specifications and the use of the CM56 in dry surroundings.

Always inspect your clampmeter, test leads and accessories for any sign of damage before use. If any abnormal conditions exist (e.g: broken test leads, cracked case, display not reading, etc.), do not attempt to use it. Do not expose it to direct sunlight, excessive temperature or moisture.

Keep this manual for future reference. Updated instructions and product information are available at: www.martindale-electric.co.uk

SYMBOLS:


Equipment complies with relevant EU Directives


AC (Alternating Current)


Ground


Direct Current


Equipment protected by Double Insulation (Class II)


Caution - refer to accompanying documents


Caution - risk of electric shock


End of life disposal of this equipment should be in accordance with relevant EU Directives

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1. INTRODUCTION

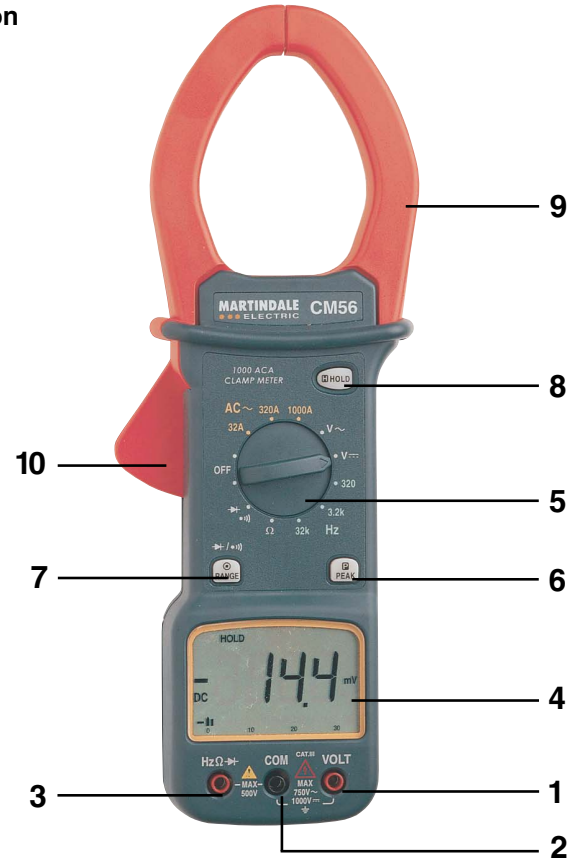
This manual contains information and warnings which must be followed to ensure safe operation of the clampmeter.

WARNING

READ "SAFETY INFORMATION" BEFORE USING THE METER

This clampmeter is a handheld 3200-count instrument that is designed for use in the laboratory, field servicing and any circumstance where high current measurement is required. The clampmeter incorporates a finger guard which ensures the safety of the user whilst operating the instrument, a rugged case that is shock resistant and fire retardant and electronic overload protection for all functions and ranges. In addition, a protective carrying case is included for protection of the meter whilst not in use.

1.1 Description



1. Volt - Input Terminal
This is the positive input terminal for VOLT measurements. Connection is made to it using the red test lead.

2. COM - Common Terminal
This is the negative (Ground) input terminal for all measurement modes except current. Connection is made to it using the black test lead.

3. HzΩ Frequency, Ohms, Diode Input Terminal
This is the positive input terminal for frequency, Ohms and diode measurements. Connection is made to it using the red test lead.

4. Display
The display indicates the measured value of signal, function mode, low battery, range, peak and hold settings.

5. Function / Range selector rotary switch
The rotary switch selects the function and desired range

6. PEAK - Peak recording mode
This function is used to measure the peak value of an AC current signal. To use this function select the current range and press the PEAK button. The "PEAK" indicator will appear on the display. When the instrument detects current, the peak value will be displayed and held in the internal memory. To cancel the function, press the PEAK button once again.

7. RANGE Button
Press the RANGE button to select the manual ranging mode. The "◉" indicator will be displayed. In the manual ranging mode, each time the RANGE button is pressed, the range and the input indicator change. To exit the manual ranging mode and return to autoranging, press and hold the RANGE button for 2 seconds. The "◉" indicator clears from the display.

When the rotary switch is set to or , press the RANGE button to toggle between audible continuity and diode test modes.

8. Hold Button
Press (HOLD) to toggle in and out of data hold mode. In the data hold mode, the "HOLD" indicator is displayed and the last reading is frozen on the display. Press the (HOLD) button again to exit and resume taking readings.

9. Clamp Jaws
Detect AC current flowing through the conductor on test.

10. Trigger
Press the lever to open the clamp jaws. When the lever is released, the jaws will close.

11. Other Functions
Auto Power Off
Automatic power-off extends the life of the battery by turning the meter off after approximately ten minutes of inactivity. To Turn the meter back on, simply push the range button, or turn meter off then back on.

1.2 Unpacking and Inspection
Before unpacking the clampmeter, examine the shipping carton for any sign of damage. Unpack and inspect the clampeter and any associated leads for damage. If there is any damage then consult your distributor immediately.

Upon removing your new Digital Clamp Meter (DCM) from its packaging, you should have the following items:

1. Digital clampmeter
2. Test lead set (one black, one red)
3. 9-Volt battery (installed in meter)
4. Instruction manual
5. Protective carry case

If any of the above items are missing, please contact your distributor immediately.

1.3 REPLACING THE BATTERY

WARNING

To avoid electrical shock, disconnect the test leads and any input signals before replacing the battery. Replace only with same type of battery.

AC Volts (Average sensing RMS indicating)
Frequency Response: 50Hz to 300Hz

Range	Resolution	Accuracy	Input Impedance
3.2V	1mV	±(1.5% rdg+4d)	11MΩ / 20PF
32V	10mV	±(1.5% rdg +1d)	10MΩ / 20PF
320V	100mV	±(1.5% rdg +1d)	10MΩ / 20PF
750V	1V	±(1.5% rdg +1d)	10MΩ / 20PF

Overload protection: 1000V DC or 750V AC rms

AC Current (Average sensing RMS indicating)

Range	Resolution	Accuracy (50Hz-60Hz)
32A	10mA	0-600A±(1.5% rdg+5d)50-60Hz
320A	100mA	>600A±(2.0% rdg+5d)50-60Hz
1000A	1A	0-600A±(3.0%rdg+5d)61-400Hz
		>600A±(3.5%rdg+5d)61-400Hz

Overload Protection: 1200A for 60 seconds Maximum

Continuity Test

Range	Audible Threshold	Response Time	Test Current
320Ω	Less than 20Ω	Approx. 500ms	<0.7mA

Overload Protection: 500V DC or AC rms

* Accuracy is given as ± ([% of reading]+[number of least significant digits]) at 18°C to 28°C with relative humidity up to 70%.

Resistance

Range	Resoiution	Accuracy	Test Current
320Ω	0.1Ω	±(1.0% rdg+3d)	<0.7mA
3.2kΩ	1Ω	±(1.0% rdg+3d)	<0.13mA
32kΩ	10Ω	±(1.0% rdg+3d)	<13μA
320kΩ	100Ω	±(1.0% rdg+3d)	<1.3μA
3.2MΩ	1kΩ	±(1.5% rdg+3d)	<0.13μA
30MΩ	10kΩ	±(2.5% rdg+5d)	<0.13μA

Overload Protection: 500V DC or RMS AC

Diode Test

Range	Resolution	Accuracy	Test Current	Open Circuit Volts
3.2V	1mV	±(10% rdg + 2d)	0.6mA	3.0VDC typical

Overload Protection: 500V DC or RMS AC

Frequency

Range: 320Hz. 3200Hz, 32KHz

Resoloution: 0.1Hz

Accuracy: ±(1.0% rdg + 4dgts) on all ranges

Sensitivity: 3.5V rms min at >20% and <80% duty cycle

Effect Reading: More than 100 digits at pulse width >2μsec

Overload Protection: 500V DC or RMS AC

DC Volts

Range	Resolution	Accuracy	Input Impedance
320mV	100μV	±(0.5% rdg +1d)	>1000MΩ
3.2V	1mV	±(0.5% rdg +1d)	11MΩ
32V	10mV	±(0.5% rdg +1d)	10MΩ
320V	100mV	±(0.5% rdg +1d)	10MΩ
1000V	1V	±(0.5% rdg +1d)	10MΩ

Overload protection: 1000V DC / 750VRMS on all other range

This meter is powered by a NEDA type 1604 or equivalent 9-volt battery. When the meter shows the "  " the battery must be replaced to maintain correct operation. Follow the procedure below to replace the battery.

1. Disconnect the test leads from any live source, turn the rotary switch to off and remove the test leads from the input terminals

2. The battery cover is secured to the bottom case by a screw. Using a Phillips head screwdriver, remove the screw from the battery cover. The cover will now come away from the instrument.

3. Replace the battery with a new equivalent 9-volt one observing correct polarity.

4. Replace the battery cover and re-install the screw.

2 SAFETY INFORMATION

The instrument complies with class II overvoltage CAT III 1000V of the IEC1010-1 (EN61010-1) ; UL3111-1; and CAN/CSA C22.2 #1010.1-92 standards, pollution degree 2 in accordance with IEC-664 indoor use. If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.

This product complies with the requirements of the following European Community Directives: 89/336/EEC (Electromagnetic Compatibility) and 73/23/EEC (Low Voltage) as amended by 93/68/EEC (CE Marking).

Electrical noise or intense electromagnetic fields in the vicinity of the equipment may disturb the measurement circuit. Measuring instruments will also respond to unwanted signals that may be present within the measurement circuit. Users should exercise care and take appropriate precautions to avoid misleading results when taking measurements in the presence of electromagnetic interference.

3. OPERATION

WARNING

To avoid possible electric shock, instrument damage and / or equipment damage, do not attempt to take any voltage measurements if the voltage is above 1000V DC or 750VAC. These are the maximum voltages that this instrument is designed to measure. The "COM" terminal potential should not exceed 500V measured to ground.

3.1 VOLTAGE MEASUREMENTS

1. Turn off power to the circuit/device under test and discharge all capacitors.

2. Plug the black test lead into the COM input jack on the meter and connect the test lead tip to a grounded point (the reference point for measured voltage).

3. Select the desired AC voltage range (V~), or DC voltage range (V⎓). If the magnitude of the voltage to be measured is unknown, always start with the highest range.

4. Plug the red test lead into the volt input jack on the meter and connect to the circuit where a voltage measurement is required. Voltage is always measured in parallel across a test point.

5. Energise the circuit or device under test and make the voltage measurements. Reduce the range setting if set too high until a satisfactory best resolution reading is obtained.

6. After completing the measurement, turn off the power to the circuit / device under test, discharge all capacitors and disconnect the meter test leads.

MARTINDALE ELECTRIC

Specification
CM56 Clamp Meter

Display: 3½ 17mm large LCD, maximum reading 3200 with function and units sign annunciators. Display update rate 2 times per second, nominal.

Analogue bar graph: 34 segments with measurements 12 times per second

Polarity Indication: Automatic, positive implied, negative indicated.

Overrange Indication: (OL) is displayed.

Low Battery Indication: The "⊟" is displayed when the battery voltage drops below accurate operating level

Auto Power Off: Clampmeter automatically shuts down after approx 10 minutes of inactivity.

Operating Environment: 0°C to 50°C at <70% Relative Humidity.

Storage Environment: -20°C to 60°C at <80% Relative Humidity with battery removed from meter.

Temperature Coefficient: 0.1 X (specified accuracy) / °C (<18°C or >28°C)

Altitude: 6561.7 Feet (2000M)

Power: Standard 9-volt battery, NEDA 1604, IEC 6F22, JIS 006P PP3.

Battery Life: 300 hours typical with alkaline battery.

Jaw Opening Capability: 57mm conductor, 70 X 18mm bus bar.

Size (H x W x D): 10.9 x 4.0 x 1.9 inches (277 x 102 x 49mm)

Weight: Approx: 18.9 OZ/ 540grams (including battery).

4. MAINTENANCE

Maintenance consists of periodic cleaning and battery replacement. The exterior of the instrument can be cleaned with a dry clean cloth to remove any oil, grease or grime. Never use liquid solvents or detergents.

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

4.1 Cleaning

The CM56 may be cleaned using a soft dry cloth. Do not use abrasives, solvents, or detergents, which can be conductive. Allow to dry completely before using.

4.2 Repair & Service

There are no user serviceable parts in this unit. Return to Martindale Electric Company Ltd if faulty. Our service department will quote promptly to repair any fault that occurs outside the guarantee period.

Before the unit is returned, please ensure that you have checked the unit and associated leads thoroughly for flat batteries (check & replace), blown fuses (check & replace) and other poor connections.

4.3 Storage Conditions

The clampmeter should be kept in warm dry conditions away from direct sources of heat or sunlight, and in such a manner as to preserve the working life of the unit. It is strongly advised that the unit is not kept in a tool box where other tools may damage it.

5. WARRANTY

The CM56 is guaranteed against faults in manufacture and materials for 24 months from date of invoice and will be rectified by us free of charge, provided the unit has not been tampered with and is returned to us with its housing unopened. Damage due to dropping, abuse or misuse is not covered by this guarantee. Batteries and fuses are not covered by this guarantee.

WARNING

The clamp jaws are designed to take current measurements on circuits with a maximum voltage difference of 500VAC between any conductor and ground potential. Using the clamp jaws for current measurements on circuits above this voltage may cause electric shock, instrument damage and / or damage to the equipment under test. Before measuring current, make sure that the test leads are removed from the instrument.

The clamp jaws are overload protected up to 500VAC for up to 1 minute. Do not take current readings on circuits where the maximum current potential is not known. Do not exceed the maximum current that the instrument is designed to measure.

3.2 CURRENT MEASUREMENTS

1. Set the rotary function switch to ACA 1000A Range.

2. Press the trigger to open the clamp jaws and clamp them around a conductor. Jaws should be completely closed before taking a reading.

3. The most accurate reading will be obtained by keeping the conductor across the centre of the clamp jaws.

4. The reading will be indicated on the display

5. Reduce the range if set too high until a satisfactory best resolution reading is obtained.

Peak Button

This function is used to measure the peak value of an AC current signal. To use this function, select the current range and press the PEAK button. The "PEAK" indicator will appear on the display. When the instrument detects current, the peak value will be displayed and held in the internal memory. To cancel the function, press the PEAK button once again.

Hold Button

Press (HOLD) to toggle in and out of data hold mode. In the data hold mode, the "HOLD" indicator is displayed and the last reading is frozen on the display. Press the (HOLD) button again to exit and resume taking readings.

3.3 RESISTANCE MEASUREMENTS

WARNING

Attempting resistance or continuity measurements on live circuits can cause electrical shock, damage to the instrument and damage to the equipment under test. Resistance measurements must be made on de-energised (DEAD) circuits only, for maximum personal safety. The electronic overload protection installed in this instrument will reduce the possibility of damage to the instrument but not necessarily avoid all damage or shock hazards.

1. Isolate any power which may be present at the resistance to be measured and discharge any capacitors. Any voltage that may be present during a resistance measurement will cause inaccurate readings and could damage the meter if the voltage exceeds the overload protection of 500V DC or AC.

2. Insert the black & red test leads into the COM and Ω input terminals respectively.

3. Select the desired ohms (Ω) range

4. Connect the black & red test probe tips to the circuit or device under test, making sure it is de-energised first.

5. Open circuits will be displayed as an overload condition.
6. Test lead resistance can affect low resistance measurements and should be subtracted from resistance measurements for accuracy. Select the lowest resistance range and short the test leads together. The value displayed is the test lead resistance which should subtracted from the resistance measurement.

7. After completing the measurement, disconnect the test leads.

3.4 CONTINUITY TESTING

1. Select the ( ) /) position by turning the rotary selector switch and press the "range" button to enter continuity testing.

2. Follow steps 2 & 4 as for resistance measurements

3. The clampmeter emits a tone when measuring resistance of approximately 20Ω or less. After measurements have been carried out, disconnect the test leads from the circuit and from the input terminals of the clampmeter.

3.5 DIODE TESTING

CAUTION
Measurements must only be made with the circuit power OFF

1. Set the (/) position by turning the rotary switch and press the RANGE button to enter Diode testing.

2. Follow steps 2 & 4 as for resistance measurements.

3. The RED lead should be connected to the anode and the black lead to the cathode. For a silicon diode, the typical forward voltage should be about 0.6V silicon diode or 0.3V for germanium diode.

4. If the diode is reverse biased or there is an open circuit, the display shows "OL"

3.6 FREQUENCY MEASUREMENTS

1. Set the rotary selector switch to the desired position

2. Plug the black and red test leads into the "COM" and "Hz" input terminals respectively

3. Determine that the amplitude level of the signal to be measured is not greater than the input voltage limit (500Vac/Vdc). The signal amplitude must also be greater than the sensitivity level.

4. Attach the probe tips to the points across which the frequency is to be measured, and read the result directly from the display.

5. Disconnect the test leads.