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CM82/CM84 CLAMP METERS

Instruction Manual





ALWAYS READ THESE INSTRUCTIONS BEFORE PROCEEDING

Thank you for buying one of our products. For safety and full understanding of its benefits please read this manual before use. Technical support is available from 01923 441717 and support@martindale-electric.co.uk.

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Specification
CM82/CM84
Clamp meters

SPECIFICATION FOR TL16 TEST LEADS

Maximum voltage: 1000V AC/DC

Maximum current: 10A continuous

Connector: 4mm banana plug with fixed shroud

Environmental

Temperature (Operating & Storage): 0°C to 40°C

Altitude: up to 2000m

Pollution degree 2

Safety

Conforms to BS EN 61010-031,

CAT IV 600V, CAT III 1000V, 10A (Probe tip caps fitted)

CAT II 1000V, 10A (Probe tip caps removed)

Class II, Double insulation



Specification

CM82/CM84

Clamp meters

GENERAL

Display: Liquid crystal display


Digital, 4000 counts, updates 2/sec

Polarity: automatic, positive implied, '-' for negative polarity indication

Overrange: (OL) or (-OL) is displayed

Power: 9V, PP3 carbon-zinc battery (IEC 6F22, NEDA 1604D)

Battery life: 150 hours (CM82), 75 hours (CM84), typical with carbon zinc

Low battery indication:  symbol displayed

Auto power off: after 10 minutes

Jaw opening capability: conductor diameter 51mm (CM82), 57mm (CM84)
bus bar: 70 x 18mm

Dimensions: 279 x 103 x 53mm (CM82), 281 x 108 x 53mm (CM84)

Weight: approx. 515g (CM82), 570g (CM84), including battery

Includes: carrying case, set of TL16 test leads, 9V PP3 battery (installed), instructions

ENVIRONMENTAL

Temperature & Humidity: (Operating): 0°C to 50°C <70% R.H.

(Storage): -20°C to 60°C < 80% R.H.

Altitude: up to 2000m

Pollution degree 2, indoor use

SAFETY

Conforms to BS EN 61010-1 & 61010-2-032, CAT IV 600V, CAT III 1000V

Class II, Double insulation

EMC

Conforms to BS EN 61326-1

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Specifications

1 SAFETY INFORMATION

REMEMBER: SAFETY IS NO ACCIDENT

These instructions contain both information and warnings that are necessary for the safe operation and maintenance of this product. 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.

Particular attention should be paid to the Warnings, Precautions and Technical Specifications.

Please keep these instructions for future reference. Updated instructions and product information are available at: www.martindale-electric.co.uk

1.1 Meaning of Symbols and Markings



Caution - risk of danger & refer to instructions



Caution - risk of electric shock



Equipment protected by double or reinforced insulation (Class II)



Application around and removal from hazardous live conductors is permitted.

CAT II (Measurement Category II) is applicable to test and measuring equipment connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.

CAT III (Measurement Category III) is applicable to test and measuring equipment connected to the distribution part of the building's low-voltage MAINS installation.

CAT IV (Measurement Category IV) is applicable to test and measuring equipment connected at the source of the building's low-voltage MAINS installation.

For further information on measurement categories visit www.martindale-electric.co.uk/measurement_categories.php



Equipment complies with relevant EU Directives



Specification
CM82/CM84
Clamp meters

Frequency

Range	Resolution	Accuracy
4kHz	0.001kHz	0.1% + 3
40kHz	0.01kHz	
400kHz	0.1kHz	
1MHz	0.001MHz	

Sensitivity (10Hz to 1 MHz): >3.5V AC rms

Minimum input frequency: 10Hz

Minimum pulse width: >1 μ s

Duty cycle limits: >30% and <70%

Overload protection: 600V DC or AC rms

Continuity

Range	Resolution	Response time	Open circuit voltage	Audible indication
400 Ω	1 Ω	Approx. 500ms	-1.2V dc	< 25 Ω

Overload protection: 600V DC or AC rms

Diode Test

Range	Resolution	Test current	Open circuit voltage	Audible indication	Accuracy
2V	10mV	0.8mA	3.2V dc typical	< 0.25V	1.5% + 5

Overload protection: 600V DC or AC rms



Specification

CM82/CM84

Clamp meters



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

Resistance

Range	Resolution	Open circuit voltage	Accuracy
400Ω	0.1Ω	-1.2V dc	1.0% + 5
4kΩ	0.001kΩ	-0.45V dc	
40kΩ	0.01kΩ		
400kΩ	0.1kΩ		
4MΩ	0.001MΩ		2.0% + 5
40MΩ	0.01MΩ	3.5% + 5	

Overload Protection: 600V DC or AC rms

Capacitance (CM82 only)

Range	Resolution	Accuracy
4nF	0.001nF	Not specified
40nF	0.01nF	
400nF	0.1nF	
4μF	0.001μF	3.0% + 15
40μF	0.01μF	3.0% + 10
400μF	0.1μF	
4mF	0.001mF	5.0% + 10

Overload Protection: 600V DC or AC rms

1.2 Precautions

This product has been designed with your safety in mind, but please pay attention to the following warnings and cautions before use.

Warnings

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.

Where applicable other safety measures such as the use of protective gloves, goggles etc. should be employed.

The current clamp must only be used by a skilled and competent person who is familiar with the relevant regulations, the safety risks involved and the consequent normal safe working practices, and under the conditions and for the purposes for which it has been constructed and specified.

Before each use the current clamp and any associated test leads and accessories should be examined for damage, cracks, cuts or scratches. **Do not use** if damaged in any way.

Make sure the current clamp and test leads are dry, clean and free from dust, grease and moisture while in use to avoid the danger from electric shock due to surface leakage.

Always test this unit on an appropriate proving device or a known good voltage source before and after using it to determine if a hazardous voltage exists in a circuit to be tested. **Do not use** the unit if it does not function correctly during proving.

Measuring/testing for a voltage/current that exceeds the specified limits of the unit may damage the unit and may expose the operator to

a shock hazard. Always check the unit's specified limits before use. The clamp meter must only be used on CAT IV installations up to 600V to earth, CAT III and CAT II installations up to 1000V to earth, and within the operating temperature and humidity range specified.

The CAT III 1000V marking does not mean the clamp meter can be used to 1000V AC rms, but that it will be safe to the user if inadvertently connected across a voltage up to 1000V AC rms to earth.

If the removable probe tip caps are not fitted to the probes of the test leads, their measurement category becomes CAT II 1000V, and they must not be used on CAT III or CAT IV installations to avoid the risk of shorting high energy circuits and arc flash.

When this unit is used in combination with test leads, the measurement category of the combination is the lower measurement category of either this unit or the test leads used. Likewise if test lead accessories such as crocodile clips are also used, the measurement category will be the lowest measurement category in that combination.

Do not use if the battery compartment cover is not fitted.

When using test leads, **always** keep your fingers behind the finger guard on the test lead probe.

When positioning the clamp jaws around a hazardous live conductor **always** keep your fingers behind the clamp finger guard.

Cautions

Avoid severe mechanical shock or vibration and extreme temperature.

When using test leads avoid excessive stresses to the cable entry points at the probe and 4mm plug connector.

To avoid corrosion from a leaking battery, remove the battery when the unit is not in use for an extended period.



Specification CM82/CM84 Clamp meters

AC Voltage

Range	Resolution	Input impedance	Accuracy (50Hz to 500Hz)
400mV	0.1mV	>100MΩ	Not Specified
4V	0.001V	10MΩ	1.5% + 5
40V	0.01V	9.1MΩ	
400V	0.1V		
750V	1V		

Overload Protection: 1000V DC or 750V AC rms

AC Current

Range	Resolution	Accuracy	
		50Hz to 60Hz	60Hz to 400Hz
40A *	0.01A	2.0% + 6	3.0% + 6
400A	0.1A		
1000A	1A	2.0% + 6 (≤600A) 2.5% + 6 (>600A)	3.0% + 6 (≤600A) 3.5% + 6 (>600A)

* CM82 only

Overload Protection: 1000A AC rms

DC Current (CM 84 only)

Range	Resolution	Accuracy
400A	0.1A	2.0% + 5
1000A	1A	2.0% + 5 (≤600A) 3.0% + 5 (>600A)

Overload Protection: 1000A DC



Specification
CM82/CM84
Clamp meters



All specified accuracies are at 23°C ± 5°C, <70% RH for 1 year

Temperature Coefficient: 0.1 x (specified accuracy) per °C
(0°C to 18°C, 28°C to 50°C)

All accuracies below are expressed as ± (percentage of reading + digits)

DC Voltage

Range	Resolution	Input impedance	Accuracy
400mV	0.1mV	>100MΩ	0.5% + 2
4V	0.001V	10MΩ	
40V	0.01V	9.1MΩ	
400V	0.1V		
1000V	1V		

Overload Protection: 1000V DC or 750V AC rms

2. INTRODUCTION

2.1 Inspection

Examine the shipping carton for any sign of damage. Inspect the unit and any accessories for damage. If there is any damage then consult your distributor immediately.

2.2 Description

The Martindale CM82 and CM84 have the following measurement functions:

- ◆ AC current to 1000A
- ◆ DC current to 1000A (CM84 only)
- ◆ AC and DC voltage to 750V and 1000V respectively
- ◆ Resistance to 40MΩ
- ◆ Capacitance to 4mF (CM82 only)
- ◆ Frequency to 1MHz
- ◆ Continuity with audible indication
- ◆ Diode testing

Further functions are:

- ◆ Display hold
- ◆ DC current zeroing (CM84 only)
- ◆ Auto or manual ranging
- ◆ Auto power off

2.3 Accessories

The CM82/CM84 comes with the following accessories:

- ◆ Carrying case
- ◆ Set of TL16 test leads
- ◆ 9V PP3 battery (Installed)
- ◆ Instructions


3. OPERATION

3.1 General




If the magnitude of a parameter to be measured is uncertain, but known to be within the maximum safe limits of the electrical tester, manually set the range to maximum. E.g. If measuring AC voltage and the voltage magnitude is unknown, set the range to 750 V, then if required select the correct range for a satisfactory reading.

If the clamp meter displays **OL** or **-OL** then the measurement limits of the range have been exceeded.

3.2 Low Battery Indication

If the battery symbol  is displayed, the battery needs replacing as measurement accuracy can no longer be guaranteed. (See section 4.1 Battery Replacement).

3.3 Description of Press Buttons

	Selects display hold
	Zero's DC current ranges (CM84 only)
	Selects manual ranging

3.4 Description of LCD Symbols



APO	Auto power off is activated
HOLD	Display hold is activated
RANGE	Manual ranging is selected

5. WARRANTY AND LIMITATION OF LIABILITY

This Martindale product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is 2 years and begins on the date of receipt by the end user. This warranty extends only to the original buyer or end-user customer, and does not apply to fuses, disposable batteries, test leads or to any product which, in Martindale's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation, handling or storage.


Martindale authorised resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Martindale.

Martindale's warranty obligation is limited, at Martindale's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to Martindale within the warranty period.

This warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. Martindale shall not be liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory.

Since some jurisdictions do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any part of any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision or other part of that provision.

Nothing in this statement reduces your statutory rights.

 Prior to cleaning, ensure that the instrument is disconnected from any voltage source.

If contamination is found, clean with a damp soft cloth and if necessary a mild detergent or alcohol. Do not use abrasives, abrasive solvents, or detergents which can cause damage to the unit. If a mild detergent is used, the unit should subsequently be thoroughly cleaned with a water dampened soft cloth. After cleaning, dry and allow to remain in a dry environment for 2 hours before use.




4.5 Repair & Service

There are no user serviceable parts in this unit other than those that may be described in section 4. Return to Martindale Electric 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, battery, leads and poor connections.

4.6 Storage Conditions

The instrument 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.

	Diode testing function is selected
	Continuity function is selected
mV, V, A Ω, kΩ, MΩ, Hz kHz, MHz	Units of measurement being displayed
nF, μF, mF	Units of measurement being displayed (CM82 only)
	Low battery indication
AC	Indicates AC measurement
DC	Indicates DC measurement

3.5 Auto Power Off

If the clamp meter is inactive for a period of 10 minutes it will automatically power off.

If any button is pressed after the clamp meter has automatically powered off, the clamp meter will turn back on.

To disable the auto power off function hold the **RANGE** button at the same time as turning the rotary switch from **OFF** to any position. The **APO** symbol will no longer be displayed on the LCD.

3.6 Auto/Manual Ranging

To select manual ranging, press the **RANGE** button. The **RANGE** symbol will be displayed to signify manual ranging is selected.

To manually select a range when in manual mode press the **RANGE** button until the required range is selected.

To exit manual ranging, hold down the **RANGE** button for 2 seconds. The **RANGE** symbol will no longer be displayed.

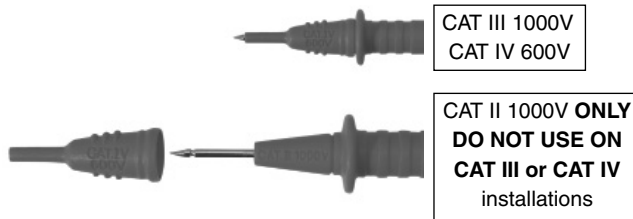
3.7 Display Hold

To hold a displayed value, press the **HOLD** button. The LCD will display **HOLD**.

To exit display hold, press the **HOLD** button again.

3.8 Use of the TL16 Leads

Where access to test points may require extended probe tips, the probe tip caps may be removed by gently pulling them forward until they unclip from the probe body.



3.9 AC Current Measurements

Set the CM82 rotary switch to the $\tilde{40A}$ or $A\sim$ position as required.

Set the CM84 rotary switch to the $\tilde{400A}$ or $\tilde{1000A}$ position as required.

Taking all necessary safety precautions, press the clamp meter trigger to open the clamp jaws, position the jaws around the conductor to be measured, and release the trigger to close the jaws.

Position the clamp meter so the conductor is central within the clamp jaws.

Read the measured ac current from the display.

Note: To avoid the possibility of an incorrect measurement only clamp around the conductor being measured.

4. MAINTENANCE

4.1 Battery Replacement

⚠ To avoid shock or injury, disconnect the clamp meter from any external circuits and remove the test leads before proceeding.

The battery compartment is underneath the unit and can be accessed by undoing the 2 screws.

Fit a new 9V, PP3 carbon-zinc battery (IEC 6F22, NEDA 1604D) observing correct polarity.

Replace the battery cover and screws.

4.2 Test Lead Replacement

If the test leads become damaged they should be replaced.

⚠ The replacement test leads must have the same (or better) overvoltage category rating as the TL16 leads supplied.

4.3 Calibration

To maintain the integrity of measurements made using your instrument, Martindale Electric recommends that it is returned at least once a year to an approved Calibration Laboratory for recalibration and certification.


Martindale Electric is pleased to offer you this service. Please contact our Service Department for details.

Email: service@martindale-electric.co.uk

Tel: 01923 650660

4.4 Cleaning

⚠ To reduce the risk of surface leakage, this instrument must be kept in a clean condition.


Set the rotary switch to the  position.

Taking all necessary safety precautions connect the test leads to the diode being tested.

If the diode is good a forward bias will give a display reading of around 0.6 V (silicon diode) and a reverse bias will give a display of **OL**. If the diode is shorted or open circuit the display will indicate approx. 0V or **OL** respectively for both forward and reverse bias.

3.10 DC Current Measurements (CM84 only)

Set the CM84 rotary switch to the $\overline{400A}$ or $\overline{1000A}$ position as required.

If required, with the clamp meter positioned away from any live conductors, zero the selected dc current range by pressing the  button.

Taking all necessary safety precautions, press the clamp meter trigger to open the clamp jaws, position the jaws around the conductor to be measured, and release the trigger to close the jaws.

Position the clamp meter so the conductor is central within the clamp jaws.

Read the measured dc current from the display.

Note: To avoid the possibility of an incorrect measurement only clamp around the conductor being measured.

3.11 AC Voltage Measurements

Connect the black test lead to the **COM** terminal and the red test lead to the **V Ω Hz** terminal.

Set the rotary switch to the **V \sim** position.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured ac voltage from the display.

3.12 DC Voltage Measurements

Connect the black test lead to the **COM** terminal and the red test lead to the **VΩHz** terminal.

Set the rotary switch to the **V $\overline{---}$** position.

The clamp meter defaults to the 4V range. To select the 400mV range, use manual ranging.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured dc voltage from the display.


3.13 Resistance Measurements


Connect the black test lead to the **COM** terminal and the red test lead to the **VΩHz** terminal.

Set the rotary switch to the **Ω** position.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured resistance from the display.

3.14 Capacitance Measurements (CM82 only)

 Be sure the capacitor being tested is completely discharged before connecting the test leads.

Connect the black test lead to the **COM** terminal and the red test lead to the **VΩHz**  terminal.

Set the rotary switch to the **\overline{C}** position.

Taking all necessary safety precautions and observing the correct

polarity for electrolytic capacitors, connect the test probes to the capacitor to be measured.

Read the measured capacitance from the display.

3.15 Frequency Measurements

Connect the black test lead to the **COM** terminal and the red test lead to the **VΩHz** terminal.

Set the rotary switch to the **Hz** position.

Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured frequency from the display.

3.16 Continuity Testing

Connect the black test lead to the **COM** terminal and the red test lead to the **VΩHz** terminal.

Set the rotary switch to the **$\bullet \overline{))}$** position.

Taking all necessary safety precautions connect the test leads to the circuit being tested.

If the resistance is $< 25\Omega$, the buzzer will sound continuously. The resistance value will be displayed if $\leq 400\Omega$.

3.17 Diode Testing

If the diode to be tested is in circuit, be sure the circuit power is switched off.

Connect the black test lead to the **COM** terminal and the red test lead to the **VΩHz** terminal.