

LM82 LIGHT METER

Instruction Manual



ALWAYS READ THESE INSTRUCTIONS BEFORE PROCEEDING

Thank you for buying one of our products. For safety and a 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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1 SAFETY INFORMATION

REMEMBER: SAFETY IS NO ACCIDENT

These instructions contain both information and cautions that are necessary for the correct operation and maintenance of this product. It is recommended that you read the instructions carefully and ensure that the contents are fully understood.


Particular attention should be paid to the 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 - refer to instructions**

 **Equipment complies with relevant EU Directives**

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

1.2 Precautions

Please pay attention to the following cautions before use.

Cautions

The LM82 must only be used under the conditions and for the purposes for which it has been constructed and specified.

Before use check the unit for cracks or any other damage. Make sure the unit is free from dust, grease and moisture. Do not use if damaged.

Avoid severe mechanical shock or vibration and extreme temperature.

To avoid possible corrosion from leaking batteries, remove the batteries if discharged, or when the unit is not in use for an extended period.

Keep the plastic domed cosine corrector covered by the protective cover supplied when not in use.

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 LM82 has the following functions and features:

- ◆ Light intensity measurement to 200k lux, 18580 fc
- ◆ Spectral response: CIE photopic
- ◆ Hold, Max, Min, Max-Min and Average functions
- ◆ Auto power off
- ◆ Low battery indication
- ◆ LCD display with backlight
- ◆ Pocket-sized, compact body

2.3 Accessories

The LM82 comes with the following accessories:

- ◆ 2 x 1.5V AAA batteries
- ◆ Protective cover for safe storage
- ◆ Detachable carry strap
- ◆ Instructions


2.4 Battery Installation

Refer to Section 4.1 (Battery Replacement) for the battery installation instructions for the LM82.




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3. OPERATION

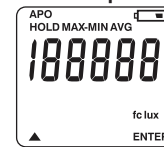
3.1 Low Battery Indication





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

3.2 Description of Press Buttons

	Selects APO setting and lux or fc
	Turns on/off the LM82, turns on backlight
	Selects Set mode and Hold mode functions


3.3 Description of LCD symbols




APO	Auto power off is active
	Indicates low batteries
HOLD	Hold mode is active
MAX	Maximum recorded reading is displayed
MIN	Minimum recorded reading is displayed
MAX-MIN	The difference between maximum and minimum recorded readings is displayed
AVG	The average of recorded readings is displayed
fc lux	Units of measurement being displayed
	Indicates press of  button required
ENTER	Indicates press of  button required

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3.4 Power On/Off

To power on in Measurement mode, press  for less than 1 second.

To power on in Set mode, press  for 2 seconds.

To power off the unit, press  for 2 seconds.

3.5 Auto Power Off (APO)

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

To disable this function refer to section 3.7.


3.6 Backlight

Press  for less than 1 second to turn on the backlight.

It will automatically turn off after 15 seconds if there is no further operation of the unit.

3.7 Set Mode


This mode sets Auto power off (APO).

The Set mode is selected by pressing  for 2 seconds with the unit powered off.

If the unit is switched off while in the Set mode, the changed setting will not be saved, and the unit will revert to the previous settings.

The LCD will display **APO** and the current setting will flash after entering the Set mode.


Press  to select **ON** or **OFF** as required.

Press  to save the setting and return to the Measurement mode.

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3.8 Measurement Mode

Referring to section 3.10, hold the LM92 so the light sensor is directed toward the light source.

Press  to select **lux** or **fc** as required.

Read the measured light intensity from the display.

While in Measurement mode, all measured values are recorded at a rate of once per second for use by the Hold mode (See section 3.9).

3.9 Hold Mode

The LM82 has the facility to display the maximum reading, the minimum reading, the difference between maximum and minimum readings and the average of the recorded readings.


To enter the Hold mode press  while in Measurement mode.

The LCD will display **HOLD** and the last measured value will be held on the display.

Successive presses of the  button will display the following in sequence:

- HOLD MAX** - maximum recorded reading;
- HOLD MIN** - minimum recorded reading;
- HOLD MAX-MIN** - difference between max and min recorded readings;
- HOLD AVG** - average of the recorded readings.

The unit will return to the Measurement mode at the end of the above sequence.

To **clear the recorded readings**, press  for 2 seconds at any point in the above sequence. The unit will return to the Measurement mode.

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Note: The Hold mode will not function until at least 3 measurements have been stored to memory.

3.10 Measurement Considerations

Keep the plastic domed cosine corrector clean and free of scratches. It may be cleaned with a soft cloth and isopropyl alcohol.

The light level measurement should be taken at the application height. In an office the LM82 should be positioned at desk height and in a corridor, it should be placed on the floor.

It is important that the light source completely fills the sensor with minimal movement of the meter during measurement.

It is also advisable where possible to hold the LM82 away from your body when taking measurements to avoid reflections or creating a shadow on the sensor.

For best accuracy, repeat the measurement several times to ensure that the light source has remained stable.

The Inverse-square Law

The illuminance E at a point on a surface varies directly with the intensity I of a point source, and inversely as the square of the distance d between the source and the point. If the surface at the point is normal to the direction of the incident light, the law is expressed by $E=I/d^2$.

Cosine Law

The illuminance on any surface varies as the cosine of the angle of incidence. The angle of incidence θ is the angle between the normal to the surface and the direction of the incident light. The inverse-square law and the cosine law can be combined as $E=(I \cos \theta)/d^2$.

3.11 Spectral Mismatch Correction Factor

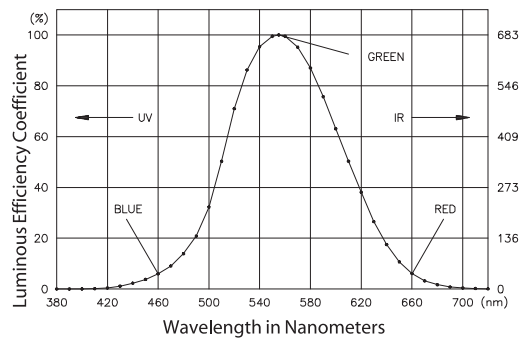
Spectral mismatch is the result of the differences between the relative spectral responsivity of a light meter's sensor and the CIE photopic curve it is designed to simulate, when the light meter is used to measure a light source with a different relative spectral power distribution to that of the light source used to calibrate the light meter.

The LM82 has been calibrated against a standard tungsten light source at a correlated colour temperature of 2856K.

Where the best possible accuracy is required when measuring another light source type, it is suggested the LM82 should be calibrated for that light source type so as to determine the spectral mismatch correction factor (previously known as colour correction factor) for that light source type.

3.12 CIE Photopic Curve

Wavelength (nm)	CIE photopic luminous efficiency coefficient V_{λ}	Photopic lumen/watt conversion factor
380	0.00004	0.027
390	0.00012	0.082
400	0.00040	0.270
410	0.00121	0.826
420	0.00400	2.73
430	0.01160	7.92
440	0.02300	15.71
450	0.03800	25.95
460	0.06000	40.98
470	0.09098	62.14
480	0.13902	94.95
490	0.20802	142.1
500	0.32300	220.6
510	0.50300	343.5
520	0.71000	484.9
530	0.86200	588.7
540	0.95400	651.6
550	0.99495	679.6
555	1.00000	683.0
560	0.99500	679.6
570	0.95200	650.2
580	0.87000	594.2
590	0.75700	517.0
600	0.63100	431.0
610	0.50300	343.5
620	0.38100	260.2
630	0.26500	181.0
640	0.17500	119.5
650	0.10700	73.08
660	0.06100	41.66
670	0.03200	21.86
680	0.01700	11.61
690	0.00821	5.61
700	0.00410	2.80
710	0.00209	1.43
720	0.00105	0.715
730	0.00052	0.355
740	0.00025	0.170
750	0.00012	0.082
760	0.00006	0.041



4. MAINTENANCE

4.1 Battery Replacement

The battery compartment is on the rear of the unit.

Push the battery cover up towards the sensor and lift away from the back of the unit.

Replace with 2 new AAA batteries (IEC LR03, NEDA 24A), observing correct polarity.

Replace the battery cover.

Note: Do not mix old and new batteries.

4.2 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

4.3 Cleaning

If contamination is found, clean with a damp soft cloth and if necessary a mild detergent. 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.

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4.4 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 provide a quotation to repair any fault that occurs outside the guarantee period.

Before the unit is returned, please ensure that you have checked the unit and batteries.

4.5 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.

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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

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the validity or enforceability of any other provision or other part of that provision.

Nothing in this statement reduces your statutory rights.

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Specification

LM82

Light Meter



All specified accuracies are at 23°C ± 5°C, <70% R.H. for 1 year.
Temperature coefficient: 0.1 x (specified accuracy) per °C, (0°C to 18°C, 28°C to 50°C).

Range: 0 to 200k lux, 0 to 18580 fc

Resolution: 1 lux (0 to 19999 lux)
10 lux (20k to 200k lux)
1 fc (0 to 18580 fc)

Spectral response: CIE photopic ^{Note 1}

Relative spectral response: $f_1' < 8\%$

Acceptance angle: $f_2 < 2\%$ cosine corrected (150°)

Total accuracy for CIE standard illuminant A (2856K) ^{Note 2} :
± (3% rdg + 10 dgts)

Note 1 The CIE photopic curve is an international standard for the colour response of the average human eye.

Note 2 The CIE standard illuminant A can be realized by means of CIE standard source A, which is defined as: A gas-filled tungsten-filament lamp operating at a correlated colour temperature of 2856K.



Specification

LM82

Light Meter

GENERAL


Display: liquid crystal display

Measurement rate: once per second

Power: 2 x 1.5V, AAA alkaline batteries (IEC LR03, NEDA 24A)

Continuous operating time: 180 hours typical.

Auto power off: after approx. 10 minutes

Low battery indication: This  is displayed when the battery voltage drops below the operating level

Dimensions: 132.9(L) x 50.9(W) x 24.7(D) mm

Weight: 116g approx. including batteries

Includes: protective cover, 2 x 1.5V AAA batteries, detachable carry strap and instructions

ENVIRONMENTAL

Operating environment: 0°C to 50°C at <70% R.H.

Storage environment: -20°C to 50°C, <80% R.H. with batteries removed.

EMC

Conforms to BS EN61326-1

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- Proving Units
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