OMEGA

HHLM-1
Digital Lightmeter

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IINTRODUCTION

This instrument is a portable easy use 3½ digit, compact-sized digital lightmeter designed for simple one hand operation. The meter provides measurements in Lux units and features backlight LCD display, MAX-HOLD and DATA-HOLD facilities.

SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the lightmeter.

WARNING

- To avoid electric shock, do not operate this product in wet or damp conditions.
- To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.
- To avoid eye injury, wear eye protection if there is a possibility of exposure to high-intensity rays.
- Do not immerse in liquids, clean the sensor head using only a damp cloth.
- Cover sensor head when not in use to extend silicon photodiode sensor life.

The ⚠ symbol on the instrument indicates that the operator must refer to an explanation in this manual.

SPECIFICATIONS

GENERAL

Display: 3½ digit liquid crystal display (LCD) with maximum reading of 1999.
Overrange: (OL) is displayed.
Low battery indication: the "  " is displayed when the battery voltage drops below the operating level.
Measurement rate: 2.5 times per second, nominal.
Operating Environment: 0°C to 50°C at < 70% relative humidity.
Storage Temperature: -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.
Accuracy: Stated accuracy at 23°C ± 5°C, <70% relative humidity.
Analog Output: 0.1mV/counts 
Battery: 4 pcs 1.5V (AAA size).
Battery Life: 200 hours typical.
Dimensions: 170mm(H) x 44mm(W) x 40mm(D).
Weight: 220g including batteries.

ELECTRICAL

Photometric Formulas:

10.764·footcandles=lux (lumens/meter^2)

0.0929·lux=footcandles (lumens/foot^2)

Range: 20lux,200lux,2000lux,20000lux,200000lux

Resolution: 0.01lux

Spectral response: CIE photopic

The CIE photopic curve is an international standard for the color response of the average human eye

Acceptance angle: ⧼$_2$<2% cosine corrected (150°)

Total accuracy for CIE standard illuminant A (2856K): ±(3%rdg + 10dgts)

CIE standard illuminant A can be realised 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

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

OPERATING INSTRUCTIONS

Push buttons

Back-Light (☼>2sec) and MAX-Hold Switch :

Press this button to toggle in and out of the MAX-HOLD mode. The "MAX" annunciator is displayed.

Press this button for two seconds to turn the Back-Light on. As this also activates the MAX-HOLD mode, briefly press the button to return to normal display. To turn the Back-Light off press again for two seconds.

Range Select Button

Press "RANGE" button to select the desired lux range. Each time you press "RANGE" button, the range (and the input range annunciator) incremants, and a new value is displayed.

HOLD (DATA-HOLD) Button

Press "HOLD" button to toggle in and out of the DATA-HOLD mode. In the DATA-HOLD mode, the "H" annunciator is displayed and the last reading is held on the display.

OPERATION

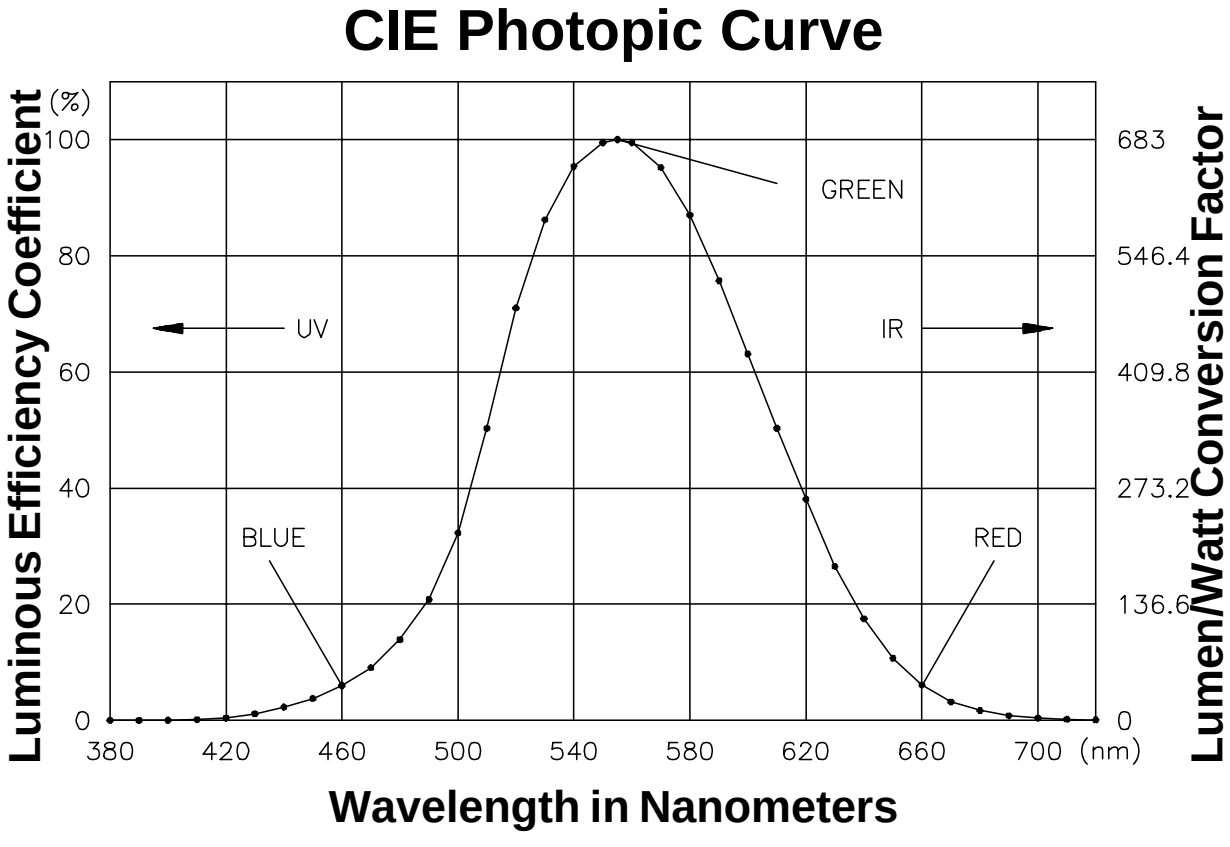
1. Set the power switch to the desired range (use range button select 20lux, 200lux, 2000lux, 20000lux) or only 200000lux range.
2. Remove the sensor head cover.
3. Hold the sensor head steady and make certain that the light source completely fills the cosine correction dome.
4. Move away from the sensor head to avoid shadowing it. The sensor head has a 1.5 meter cable to allow separation between the observer and the measurement location.
5. Read the illuminance value from the display. If magnitude of lux (or fc) is not known, press RANGE button to the highest range and reduce until a satisfactory reading is obtained.
6. Cover sensor head to extend sensor life.

SPECIAL CONSIDERATIONS

- Keep the plastic domed cosine corrector clean and free of scratches. It may be cleaned with a soft cloth and isopropyl alcohol.
- When light is received from many directions simultaneously, take special care to avoid reflections or shadowing the sensor with your body.
- For best accuracy, repeat the measurement several times to ensure that the light source has remained stable.
- Avoid flexing the cable excessively at either end of the cable.
- **The Inverse-square Law**
  The law stating that 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 law that the illuminance on any surface varies as the cosine of the angle of incidence. The angle of incidence *q* is the angle between the normal to the surface and the direction of the incident light. The inverse-square low and the cosine law can be combined as $E=(I \cos q)/d^2$.

Cleaning

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



Wavelength (nm)	V_l CIE Photopic Luminous Effciency Coefficient	Photopic Lumen/Watt Conversion Factor
380	0.0000	0.05
390	0.0001	0.13
400	0.0004	0.27
410	0.0012	0.82
420	0.0040	2.73
430	0.0116	7.91
440	0.0230	15.7
450	0.0380	25.9
460	0.0600	40.9
470	0.0910	62.1
480	0.1390	94.8
490	0.2080	142.0
500	0.3230	220.0
510	0.5030	343.0
520	0.7100	484.0
530	0.8620	588.0
540	0.9540	650.0
550	0.9950	679.0
555	1.0000	683.0
560	0.9950	679.0
570	0.9520	649.0
580	0.8700	593.0
590	0.7570	516.0
600	0.6310	430.0
610	0.5030	343.0
620	0.3810	260.0
630	0.2650	181.0
640	0.1750	119.0
650	0.1070	73.0
660	0.0610	41.4
670	0.0320	21.8
680	0.0170	11.6
690	0.0082	5.59
700	0.0041	2.78
710	0.0021	1.43
720	0.0010	0.716
730	0.0005	0.355
740	0.0003	0.170
750	0.0001	0.820
760	0.0001	0.041

WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 13 **months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear or which are damaged by misuse are not warranted. This includes contact points, fuses, and triacs.

OMEGA is glad to offer suggestions on the of use of its various products. Nevertheless, OMEGA only warrants that the parts manufactured by it will be as specified and free of defects

OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

Every precaution for accuracy has been taken in the preparation of this manual; however, OMEGA ENGINEERING, INC. neither assumes responsibility for any omissions or errors that may appear nor assumes liability for any damages that result from the use of the products in accordance with the information contained in the manual.

SPECIAL CONDITION: Should this equipment be used in or with any nuclear installation or activity, purchaser will indemnity OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the equipment in such a manner.

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected application.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED.
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair.
2. Model and serial number of product , and
3. Repair instructions and/or specific problems relative to the product.

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