GENERAL OFFICE	
ENVIRONMENT	UNIT(LUX)
design room, general office	2000~1500
lobby, store, typing	1500~750
meeting room, telephone switchboard room, printer room, entertainment, restaurant	750~300
dancing house, security room, hall, rest-room	300~150
tea room, warehouse	150~75
outdoor stair	75~30

FACTORY	
ENVIRONMENT	UNIT(LUX)
precision working, design	3000~1500
research & development department	1500~750
packing, measurement, hall, rest-room	750~300
dye, passway, hall, rest-room	150~75
warehouse	75~30

HOSPITAL	
ENVIRONMENT	UNIT(LUX)
Vision examination	10000~5000
operating room	1500~750
clinic room, drug room, nursing room	750~300
waiting room	300~150
x-ray room	150~75
elevator	75~30

SCHOOL	
ENVIRONMENT	UNIT(LUX)
computer room	1500~300
classroom, laboratory, workshop, office, library, meeting room, indoor stadium	750~200
hall, stair, rest-room, outdoor stadium	300~150
warehouse, garage, safety door	75~30

HOUSE	
ENVIRONMENT	UNIT(LUX)
sawing	2000~750
writing	1000~500
study desk, make-up desk, island, phone station	750~300
laundry room, entertainment, living room, entrance	300~150
closet, bedroom, stair, hall	150~70
balcony, porch	70~30

HOTEL	
ENVIRONMENT	UNIT(LUX)
check-in, check-out desk	1500~750
lobby, office, parking, kitchen	750~300
restaurant, rest-room	300~150
hall, escalator, stair, shower, garden	150~75
elevator	75~30

omega.com®
OMEGA®

OMEGAnet® On-Line Service www.omega.com	Internet e-mail info@omega.com

Servicing North America:

USA: One Omega Drive, Box 4047
ISO 9001 Stamford, CT 06907-0047
Certified Tel: (203) 359-1660 FAX: (203)359-7700
e-mail: info@omega.com

Canada: 976 Bergar
Laval (Quebec) H7L5A1, Canada
Tel: (514) 856-6928 FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico: En Español: (001) 203 359-7803
e-mail: espanol@omega.com
Fax: (001) 203 359-7807 info@omega.com.mx

Servicing Europe:

Benelux: Postbus 8034, 1180 LA Amstelveen, The Netherlands
Tel: +31 (0)20 6418405 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: sales@omegaeng.nl

Czech Republic: Frystatska 184, 733 01 Karviná, Czech Republic
Tel: +420 (0)59 6311899 FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342 e-mail: info@omegashop.cz

France: 11, rue Jacques Cartier, 78280 Guyancourt, France
Tel: +33 (0)1 61 37 2900 FAX: +33 (0)1 30 57 5427
Toll Free Feance: 0800 466 342
e-mail: sales@omegaeng.fr

Germany/ Austria: Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: +49 (0)7056 9398-0 FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
e-mail: info@omega.de

United Kingdom: One Omega Drive River Bend Technology Centre
Northbank, Irlam, Manchester,
M44 5BD United Kingdom
ISO 9002 Certified Tel: +44 (0)161 777 6611 FAX: +44 (0)161 777 6622
e-mail: sales@omega.co.uk

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, human applications.

WARRANTY / DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's 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 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. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been 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 are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only 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, EXPRESS 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.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control?
OMEGA...Of Course!
Shop online at www.omega.com

TEMPERATURE
- ☑ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

PRESSURE/STRAIN AND FORCE
- ☑ Transducers & Strain Gauges
- ☑ Load Cells & Pressure Gauges
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

FLOW/LEVEL
- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

pH/CONDUCTIVITY
- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION
- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Datalogging Systems
- ☑ Recorders, Printers & Plotters

HEATERS
- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL
- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

M3916/0803

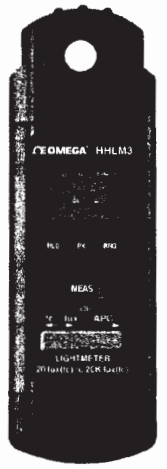
1 YEAR WARRANTY

CE UK CA

User's Guide

Shop online at
omega.com®
OMEGA®
www.omega.com
e-mail: info@omega.com

ISO 9001 CERTIFIED STAMFORD, CT
ISO 9002 CERTIFIED MANCHESTER, UK



HHLM3
Digital Lightmeter

INTRODUCTION

This HHLM3 is a portable easy use 3½ digit, compact-sized digital lightmeter designed for simple one hand operation. It provides measure ments in lux and fc units.

The HHLM3 features PEAK-HOLD (50ms pulse light) and DATA-HOLD function. There is a pocket hook and magnetic holder on the back of the unit.

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.

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, normal.

Operating Environment:
0°C to 50°C at < 75% R.H.

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, <75% R.H.

Auto power off:
15 seconds.

Battery:
3 pcs 1.5V (AAA size) included.

Battery Life:
90 hours (continuous) typical.

Dimensions:
152mm(H) x 48mm(W) x 26mm(D).

Weight:
Approx. 2.9 oz. (81.2g) including battery.

ELECTRICAL

Photometric Formulas:
10.764·footcandles=lux (lumens/meter^2)
0.0929·lux=footcandles(lumens/foot^2)

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

Resolution:
0.01lux, 0.01fc

Spectral response:
CIE photopic

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

Acceptance angle:
f'_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

MEAS (MEASURE) Button

Press "MEAS" button to turn on the meter for measuring illumination. Press"MEAS" button again to turn off the meter.

Range Select Button

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

DATA HOLD Mode

Press the "HLD" key to enter the Data Hold mode,the " H " annunciator is displayed. When DATA HOLD mode is selected, the lightmeter holds the present readings and stops all further measurements.

Press the "HLD" key again cancels DATA HOLD mode, causing lightmeter to resume taking measurements.

PEAK HOLD Mode

Press "PK" button to toggle in and out of PEAK Hold mode. In the PEAK Hold mode, the " PH " annunciator is displayed.

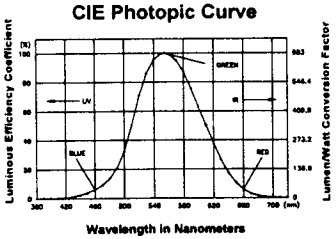
OPERATION

1. Set the power switch to the desired range (use range button) select 20lux(fc), 200lux(fc), 2000lux(fc), 20000lux(fc) range.
2. Remove the cover of sensor head.
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.
5. Read the illuminance value from the display. If magnitude of lux (or fc) is not known, press "RNG" button to the highest range and reduce the range until a satisfactory reading is obtained.
6. Cover the sensor head to extend the sensor life.

APO (Auto power off) Function

Remove rubber cover on front case and slide the switch to right to enable "APO" function, the " P " annunciator is displayed. It will turn off automaticaly after approximately 15 minutes to lengthen battery life. Slide the switch to left to disable "APO" function.

CIE Photopic Curve



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.

- **The Inverse-square Law**
The law states 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 θ 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 $E=(I \cos \theta)/d^2$.

PROCEDURE OF CALIBRATION

Note:
The following calibration procedure should perform only by a qualified for technician who have access to the items as following.

Equipment:
A gas-filled tungsten-filament lamp operating at a correlated color temperature of 2856K.

Zero Calibration
Set the function/range to the 2000lux, then cover sensor head adjust VR21 until display reading 00.0±2dgts.

Basic Calibration
Set the function/range to the 2000lux, then apply 1800lux adjust VR10 until the reading 1800.±1dgt.

fc Calibration
Set the function/range to the 200fc, then apply 180fc adjust VR22 until display reading 180.0±2dgts.

MAINTENANCE

Battery Replacement

1. Power is supplied by three 1.5V (AAA size) batteries.
2. The " ⊟+ " appears on the LCD display when replacement is needed. To replace the batteries, remove the screw from the back of the meter and lift off the battery cover.
3. Remove the batteries from battery contacts and replace.
4. When not in use for long period of time, remove the batteries.
5. Don't store in a location with high Temp. or high humidity.

Cleaning

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

Wavelength (nm)	Vλ CIE Photopic Luminous Efficiency 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