

WIDE RANGE SINGLE PIECE DIGITAL LIGHT METER

USER'S MANUAL



Please read this manual carefully and thoroughly before using this product.

TABLE OF CONTENTS

Introduction	2 – 3
Key Features	3 – 4
Safety Instructions	4
What's in the Package	4
Product Overview	4 – 5
Setup Instructions	5
Install Battery	5
Operating Instructions	6 – 9
Choosing the Right Range	6 – 8
Specifications	9 – 10
Operating & Maintenance Tips	10
Warranty Information	11
Return for Repair Policy	12

INTRODUCTION

Thank you for purchasing General Tools & Instruments' DLM204 Wide Range Single Piece Digital Light Meter. Please read this user's manual carefully and thoroughly before using the instrument.

The DLM204 is a general-purpose handheld instrument suitable for measuring the intensity of visible light in commercial, industrial, and consumer settings such as offices, factories, hospitals and schools. Applications include compliance with safe lighting regulations, facilities management, security, photography, videography, engineering, construction and surveillance.

The meter displays measured light intensity in either of two units: lux and foot-candles. The lux is the standard international unit of illuminance, or how much luminous flux is spread over a given area. One can think of luminous flux as a measure of the total amount of visible light present, and illuminance as a measure of the intensity of illumination on a surface. A given amount of light will illuminate a surface more dimly if it is spread over a larger area, so illuminance is inversely proportional to area.

The standard international unit of luminous flux is the lumen, and one lux is equal to one lumen/m². For perspective on lux readings from the natural world, a moonless clear night sky has an illuminance of about 0.002 lux, while direct sunlight has an illuminance of 30,000 to 130,000 lux.

The foot-candle (or lumen per square foot) is a non-standard unit of illuminance. Like the Btu, it is mainly in common use only in the U.S., particularly in construction-related engineering and building codes.

Lux and foot-candles are different units of the same quantity. One foot-candle (ft-cd) = 10.764 lux, and 1 lux = 0.0929 ft-cd.

The DLM204 has a 2 in. diagonal LCD with 1 in. high digits. The meter is powered by a “9V” battery (included in the package).

KEY FEATURES

- Readings displayed in lux or foot-candles
- Choice of four ranges for each unit
- Large 2000 count LCD
- Uses cosine angular correction, silicon photodiode and filter to approximate relative spectral response curve

used by the International Illumination Commission (CIE) and adopted by Japanese Industrial Standard C 1609:1993

- Zero adjustment
- Max memory + data hold
- Low battery and overload indications
- One-handed operation
- CE and RoHS approved
- 1-year limited warranty

SAFETY INSTRUCTIONS

Do not operate the DLM204 in the presence of combustible gases or combustible materials (including dust in high concentration).

WHAT'S IN THE PACKAGE


The DLM204 is packaged in a white box along with a soft pouch, a "9V" battery and this user's manual

PRODUCT OVERVIEW

The figure at right shows all controls, indicators and physical features on the front, back and right side of the DLM204. Familiarize yourself with their positions and functions before moving on to the Setup Instructions.

The DLM204's controls, indicators and physical features



1. LCD
 2.  (power) button
 3. **M-H** button
 4. **Lx/Fc** button
 5. **D-H** button
 6. **R** button
 7. Light sensor with cap
 8. **0 ADJ** hole (on right side)
 9. Tripod mount (on back)
 10. Battery compartment (on back)
-

SETUP INSTRUCTIONS

INSTALL BATTERY

The DLM204's battery compartment is under a cover on the lower back of the unit (Callout 10 of the figure). To open the compartment, turn the meter over and slide the cover down in the direction of the **OPEN** arrow.

Plug the included “9V” battery into the wired socket inside the compartment. The terminals of the battery and the socket mate in only one way, with the smaller male terminal plugging into the larger female terminal.

Position the battery and socket in the compartment so the socket's wires run under the battery, rather than above it.

To close the battery compartment:

- 1) Cradle the meter face-down in your “off” (weaker) hand.
- 2) With your other hand, position the cover above the battery so its flanged top edge is touching the top edge of the compartment.
- 3) Place the tip of your index finger on the cover's ribbed area marked **OPEN** and the tip of your thumb near the cover's curved, bottom edge.
- 4) Push both ends of the cover down and forward until it snaps into place.

OPERATING INSTRUCTIONS

To power the meter on or off, press the green  button.

Before making any measurements, remove the cap covering the light sensor (Callout 7). Do not detach the cap from the lanyard.

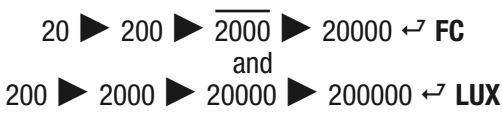
Begin by selecting a measurement unit—lux or foot-candles. Pressing the **Lx/Fc** button (Callout 4) toggles between the two units. When the DLM204 powers on, it automatically resumes using the last unit selected. In other words, whichever measurement unit you select becomes the meter's default unit until you change it.

To make an initial measurement, position the meter so the light sensor is as close to perpendicular to the source of light as possible.

If your reading is **OL.** or **OL**, there is enough light to overload the meter using its current measurement range. **You must switch to a wider measurement range.**

CHOOSING THE RIGHT RANGE

The DLM204 provides four manually selectable ranges for each of the two measurement units: lux and foot-candles (FC). Repeated presses of the **R** button (Callout 6) cycle through the four ranges for each unit. The following two graphics illustrate the sequence.



The measurement unit in use will determine which of the two graphics appears at the bottom of the LCD, below the measured light level. In each graphic, there will be a line above or below one of the four values, indicating that it represents the high end of the measurement range currently in use. In the upper graphic at the bottom of the previous page, the line above **2000 FC** indicates that the currently selected range is 0 to 2000 foot-candles. In the lower graphic, the line below **2000 LUX** indicates that the currently selected range is 0 to 2000 lux.

Press the **R** button and note that doing so moves the overscore or underscore mark one step to the right, above the next-widest range—unless the meter is already using the widest range. In this case, pressing the **R** button causes the mark to “wrap around” to the narrowest range, on the left.

For any light-level value, the “right” measurement range is not just the one that avoids an **OL** or **OL** readout. It is also the range that provides the reading with the *highest resolution*.

To illustrate this concept, measure a dim light—one that produces a reading using the narrowest range of either measurement unit. For example, say that your reading is **12.24 FC** on the **0 to 20 FC** scale (range). Press the **R** button to switch to the wider **0 to 200 FC** range and note that the readout changes to **12.2 FC**. Then press the **R** button again to switch to the even-wider 0 to **2000 FC** range. The readout will change to **12 FC**.

Clearly, the reading of **12.24 FC** produced by using the **0 to 20 FC** range provides the most precise (highest-resolution) measurement among the three ranges used in this example. Each of the eight available ranges has an inherent measurement resolution—the smallest change in a reading

that it can *resolve*. On the DLM204, the **0 to 20 FC** range has the highest resolution because its readings are always integers followed by two decimal places. The two ranges with the next-best resolution are **0 to 200 FC** and **0 to 200 LUX**; each can resolve measurements to one decimal place. The other five available ranges have the worst resolution; none of them can measure light levels with an accuracy of less than 1 lux or 1 foot-candle.

For the sake of accuracy, you should try to maximize the resolution of every measurement that you make—by switching to the next-narrowest range. If doing so produces a reading with an additional decimal place, your effort will be rewarded by a more-accurate reading. If switching to the next-narrowest range produces an overload, simply return to the previous range.

Whichever range you choose will automatically become the default range used by the meter when it is powered up following a shutdown. In other words, the DLM204 “remembers” both the measurement unit and the measurement range in effect when it was last used.

To hold any reading (“freeze” the display), press the **D-H** button (Callout 5). **D-H** will appear on the top line of the LCD. This feature is useful for making measurements above your head, below your knees, or around a corner. Held readings can be viewed at eye level later.

To release the display and resume making real-time readings, press the **D-H** button again.

The DLM204 can also keep track of the maximum light levels measured during a measurement session—the period of time that begins when the meter is powered on and ends when it is powered off.

To display the maximum light level recorded during the current measurement session, press the **M-H** button. Doing so will cause the term **MAX** to appear on the top line of the LCD, above the highest (maximum) value recorded.

To return to displaying real-time light-level readings, press the **M-H** button again.

SPECIFICATIONS

Overall Measurement Range: 0 to 20,000 foot-candles (ft-cd)/0 to 200,000 lux

Individual Ranges/Resolutions: 0 to 20 ft-cd/0.01 ft-cd; 0 to 200 ft-cd/0.1 ft-cd; 0 to 2,000 ft-cd/1 ft-cd; 0 to 20,000 ft-cd/10 ft-cd; 0 to 200 lux/0.1 lux; 0 to 2,000 lux/1 lux; 0 to 20,000 lux/10 lux; 0 to 200,000 lux/100 lux

Measurement Accuracy: $\pm 3\%$ of reading for standard incandescent lamp operating at 2856°K; ± 6 to 8% for other visible light sources (incandescent, fluorescent, high-pressure sodium and metal-halide lamps)

Angular Deviations from Cosine Characteristics:
 $\pm 2\% @ 30^\circ$, $\pm 6\% @ 60^\circ$, $\pm 25\% @ 80^\circ$

Ranging Type: Manual only

Display Type & Size: 2 in. (50mm) diagonal LCD with 1 in. (25mm) high digits

Display Resolution/Refresh Rate:
2000 counts/2.5 times/second

Light Sensor Type: Silicon photodiode

Environmental Classification: Pollution Degree 2
(offices, laboratories and test stations)

Operating Temperature:
 14° to 122°F (-10° to 50°C)@ $<80\%\text{RH}$

Operating Altitude: Up to 2000m (6561 ft.)

Storage Temperature: 14° to 122°F (-10° to 50°C)@<70%RH


Dimensions: 6.7 x 2.2 x 1.5 in. (172 x 55 x 38mm)

Weight (including battery): 8.8 oz. (250g)

Power Source: (1) “9V” battery
(NEDA 1604/IEC 6F22/JIS 006P)

OPERATING & MAINTENANCE TIPS

Keep the light sensor clean and covered by the protective cap when the meter is not in use.

When the  icon appears on the LCD, it's time to replace the “9V” battery that powers the meter (although measurements will remain valid for several hours after the low-battery indicator first appears). To replace the battery, follow the instructions on page 5.

To avoid draining the battery prematurely, remember to power off the meter after each measurement session. The DLM204 has no Auto Power Off (APO) function.

Remove the battery before storing the meter for an extended period of time (months rather than weeks), to minimize the risk of having the battery leak and damage or ruin the meter.

Every so often, perform a rough calibration of the meter by: 1) Selecting the **0 to 20 FC** range; and 2) placing the protective cap over the light sensor with the meter on. If this does not produce a reading of **0.00 FC**, use the end of a paper clip to press the **0 ADJ** button on the right side of the meter.

Try not to drop the meter. And never disassemble it or immerse it in water; doing so would void the limited warranty.

WARRANTY INFORMATION

General Tools & Instruments' (General's) DLM204 Wide Range Single Piece Digital Light Meter is warranted to the original purchaser to be free from defects in material and workmanship for a period of one year. Subject to certain restrictions, General will repair or replace this instrument if, after examination, the company determines it to be defective in material or workmanship. The warranty period begins on the date of purchase. You are encouraged to register your product online. General will extend your warranty an additional 60 days if you register at www.generaltools.com/ProductRegistry.

This limited warranty does not apply to damages that General determines to be from an attempted repair by non-authorized personnel or misuse, alterations, normal wear and tear, or accidental damage. The defective unit must be returned to General Tools & Instruments or to a General-authorized service center, freight prepaid and insured.

Acceptance of the exclusive repair and replacement remedies described herein is a condition of the contract for purchase of this product. In no event shall General be liable for any incidental, special, consequential or punitive damages, or for any cost, attorneys' fees, expenses, or losses alleged to be a consequence of any damage due to failure of, or defect in any product including, but not limited to, any claims for loss of profits.

Register now at www.generaltools.com/ProductRegistry to receive a 60-day extension to your warranty.

RETURN FOR REPAIR POLICY

Every effort has been made to provide you with a reliable product of superior quality. However, in the event your instrument requires repair, please contact our Customer Service to obtain an RGA (Return Goods Authorization) number before forwarding the unit via prepaid freight to the attention of our Service Center at this address:

General Tools & Instruments

80 White Street New York, NY 10013 212-431-6100

Remember to include a copy of your proof of purchase, your return address, and your phone number and/or e-mail address.
