

TENMARS

LUX/FC LED Light Meter

TM-201L / TM-209/TM-209N

/TM-209M

User's manual



CE

HB2TM2090002

TENMARS ELECTRONICS CO.,LTD

CONTENTS

1. Description	1
2. Safety Precaution	1
3. Preface	2
4. features	3
5. Specifications	4
6. Operation	6
7. Luminous intensity measurement (TM-209/ 209N/209M)	12
8. Instrument Description of TM-201L	13
9. Instrument Description of (TM-209/209N/209M)	14
10. Attention	156
11. Recommended Levels of Illumination	17
12. Battery Replacement	18
13. End of life	18

1. Description

Measures light from visible luminaries equipped with white light LED, fluorescent, metal halide, high-pressure sodium and incandescent sources.

2. Safety Precaution



CAUTION

Be extremely careful for the following conditions while measuring

- Do not operate the meter under the environment with explosive gas (material), combustible gas (material) steam or filled with dust.
- In order to avoid reading incorrect data, please replace the battery immediately when the symbol "⊕" appears on the LCD.
- In order to avoid the damage caused by contamination or static electricity, do not touch the circuit board before you take any adequate action.
- Operating Environment: Indoors use. This instrument has been designed for being used in an environment of pollution degree 2.
- Operation Altitude: Up to 2000M.
- Operating Temperature & Humidity: 5°C ~ 40°C, 0%~ 80%RH.
- Storage Temperature & Humidity: -10°C ~ 60°C, 0%~ 70%RH.
- EMC: EN61326-1(2006), IEC 61000-4-2(2008), IEC 61000-4-3(2006) + (2007).

3. Preface

The flux of light received in a unit area of a certain side being shown is popularly known as illumination. The measuring unit in both United Kingdom and America is known as footcandles light, but in Europe it is also known as meter candlelight.

One foot-candles light is the illumination of light that falls on one side which is one foot away from a one foot-candlelight and exactly intersecting with the light. Its abbreviated form is written as 1 Fc=1 Lm/ft, similarly, one-meter candlelight is the illumination of light that falls on a side which is one meter away from a one meter candlelight and exactly intersecting the light. It is also called Lux i.e. the flux of light being received in each sq. meter is called the illumination of one lumen.

1 FC=10.764 LUX, 1 LUX=0.09290 FC,
therefore, Nbr. of foot (meter) candlelight =

Nbr. of Lumen

Area(sq. foot or sq. meter)

Nbr. of Lumen=Nbr. of foot (or meter)x area

4. Features

- Overload Indication: LCD screen will show "OL" on the upper left-hand corner.
- Low battery Indication " ".
- Sampling Rate: 2.5 times per second for digital display.
- Spectral response close to CIE luminous spectral efficiency.
- Cosine Angular corrected.
- According to JIS C 1609:1993 and CNS 5119 general A class Specifications.
- Measuring lights source: LED white light and all visible light.
- Measuring intensities of illumination in Lux or footcandles.
- Many applications include: Warehouses, factories, office buildings, restaurants, schools, library, hospitals, photographic, many video, parking garages, museums, art galleries, stadiums, building security.
- Data hold.
- Maximum hold.(TM-201L)
- Maximum/Average/Minimum Hold.(TM-209/209N/209M)
- Zero adjustment.
- Auto power off and disable function. (TM-209/209N/209M)
- Auto ranging. (TM-209/ 209N/209M)

5. Specifications

Display of TM-201L	2000 count, maximum display 1999	
Display of (TM-209/209N/209M)	4000 count, maximum display 3999	
Sensor	Silicon photodiode and filter	
Measuring Range of TM-201L	200,2000, 20000,200000 Lux 20,200,2000,20000 Footcandles	
Measuring Range of (TM-209/209N/209M)	40,400,4000, 40000,400000 Lux 40,400,4000,40000 Footcandles	
Accuracy	±3% (Calibrated to standard incandescent lamp 2856° K and corrected LED day while in white, amber, green, blue, red LED light spectrum) 8% other visible light source(TM-201L) 6% other visible light source(TM-209/209N/209M)	
Angle deviation from cosine characteristics	30 °	±2%
	60 °	±6%
	80 °	±25%
Power Supply	9V NEDA 1604, IEC 6F22, JIS 006P battery x 1pc	
Battery life	About 200 hours	
Dimensions	Meter: 38 (H) x 55(W) x 130(L) mm 1.5(H)x 2.2(W) x 5.1(L) inch	
	Sensor: 25(H) x 55(W) x 80(L) mm 9.8H)x 2.2(W) x 3.1(L) inch	
Weight	250 g (include battery)	

Accessories	User's manual, carrying case, 9V battery
Length of wiring for light sensor: Approx. 1.5M	

6. Operation

- Press the “” button to turn power on or off.
 - Remove sensor cap and place the sensor perpendicular to the light.
 - Select LUX or FC.
 - When “OL” is shown on the LCD screen, press the  button for useable reading. (TM-201L).
 - If you want to keep the reading value on the LCD screen permanently after testing, press the “” button.
 - When done testing, replace the sensor cover to protect the filter and sensor.
- Data Hold**
 Freezes the reading present on the LCD screen at the moment the button is pressed.

- **R(TM-201L)**

Press the manual ranging button for usable reading.

- **ZERO (TM-201L)**

Adjust to 0, ADJ to enable LCD to indicate 000 on the screen.

- **ZERO(TM-209/ 209N/209M)**

Press the "ZERO" button for the zero adjustment if any digits appear on the LCD screen, when the light sensor cap is not attached "CAP" will be shown on the screen. Make sure that it is attached to the light sensor.

- **M-H (TM-201L)**

Press "M-H" button to Lockup data maximal value of measure data.

- **MAX/AVG/MIN(TM-209/ 209N/209M)**

Press "▲" button simultaneously Lockup data maximum and average and minimum value of measure data. Press the "▲" button for more than 1 seconds to disable this feature.

- **LX/FC(TM-201L)**

Illuminance Lux or Foot candle measuring unit button.

- **LX/FC/CD(TM-209/ 209N/209M)**

Illuminance Lux or Foot candle and luminous intensity measuring unit button.

- **L.S. (TM-209)(TM-209N only L9 can be revised)**
(TM-209M only L7~L9 can be revised)

Light source selection 1 ~ 9 features, each light source can set correction parameters, default as 1.000. Calibration parameters can be set to 0.001 to 1.999, when the pressure L.S. button for more than 1 second, LCD L.S. below the LN flashing,

pressure ▲ or ▼ change L1 to L9. Press LS button for less than 1 second, the digits of 1.000 on the lower right-hand corner of the screen will

be flashing, pressure ▲ or ▼, you can change the calibration parameters as to 0.995, the display changes immediately, set $350.0 \times 0.996 = 348.6$,

Setup complete press "HOLD L.S." for more than 1 second.

- **L.S. (light source) factor:(TM-209)**

L1 → LED white day light : 0.99.

L2~L9 → Default Standard light source A: 1.00.

- **L.S. (light source) factor:(TM-209N)**

L0→ Standard light source A : 1.00.

L1→LED white day light : 0.990.

L2→ NEON BLUE light : 1.286.

L3→ NEON GREEN light : 1.167.

L4→ NEON PINK light : 0.760.

L5→ NEON PURPLE light : 0.804.

L6→ NEON RED light : 0.671.

L7→ NEON YELLOW light : 0.840.

L8→ NEON WHITE light : 0.870.

L9→ Standard light source A : 1.00.

- **L.S. (light source) factor:(TM-209M)**

L0→Standard light source A : 1.00.

L1→LED white day light : 0.99.

L2→LED RED light : 0.516.

L3→LED AMBER(YELLOW) light : 0.815.

L4→LED GREEN light : 1.216.

L5→LED BLUE light : 1.475.

L6→LED PURPLE light: 1.148.

L7~L9→ Default Standard light source A: 1.00.

- **Auto-Power Off (TM-209/ 209N/209M)**

Power off automatically after approx. 5 minutes without using the meter.

- **Disable Auto Power Off (TM-209/ 209N/209M)**

When the power is on, press the  button for more than 1 second, to cancel or recovery automatically shutdown. Automatic shutdown feature is enabled if "  " shows on the screen.

- **MEM(MOMORY) (TM-209/ 209N/209M)**

Press  button for one second to store the data, the LCD screen will display M and NO. 01~NO.99.

When the AVG shows on the right hand corner of the screen, press  button at this moment, LCD will display AVG M and NO.01 ~ NO.99, and store the AVG value at present moment.

- **READ (READ MEMORY) (TM-209/ 209N/209M)**

Pressure  button for more than one second to display the stored values, the LCD will display M and NO. 01 ~ NO.99, press  or  keys to review all the stored values, for example, NO. 1 → NO. 2 until NO. 99. If the stored data is AVG value, the screen will display AVG on the lower left-hand corner. Press the  button for more one second to disable this feature.

- Clear memory (TM-209/ 209N/209M)

When power is off, press  and  buttons together, then the screen will display “CLr” which means the memorized data is erased.

7. Luminous Intensity Measurement (TM-209/ 209N/209M)

1. Press the “” button to turn power on or off.
2. Remove sensor cap and place the sensor perpendicular to the light.
3. Press  button for more than 1 second.
4. Press  or  button to select ft(feet) or m(meter).
5. Press  button for less than 1 second.
6. Press  or  to set the distance between the light center of lamp and measurement base level.
7. Press  button for less than 1 second.
8. Read the display.
9. Press the “” button for more 1 second to disable this feature.

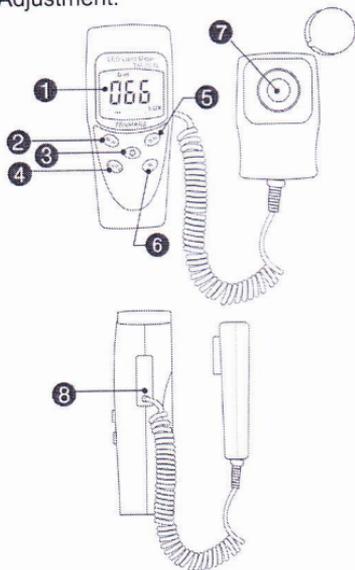
- The luminous intensity is calculated using the following formula:

Luminous intensity(cd)=illumination(Lx)x distance(m²)

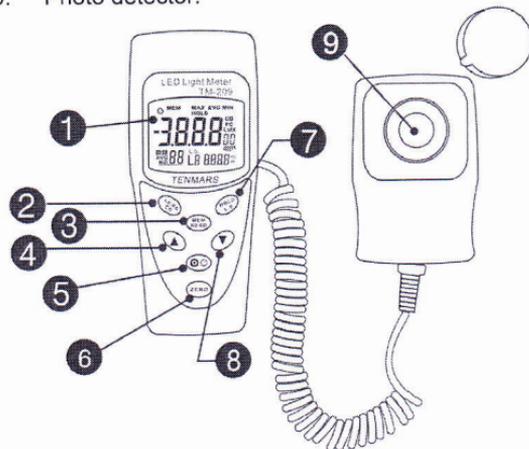
- The preset maximum distance is 0.01 ~ 30.47 m or 0.01 ~ 99.99 ft.
- If a single light source is used and is regarded as a single-point light source, the luminous intensity of the light source can be calculated and displayed, by setting the distance from the light source to the measuring point.

8. Instrument Description of TM-201L

1. Display (LCD).
2. MAX HOLD.
3. Power Button: ON/OFF.
4. Lux/Fc button
5. DATA HOLD button.
6. Range button.
7. Photo detector.
8. Zero Adjustment.

**9. Instrument Description of (TM-209/209N/209M)**

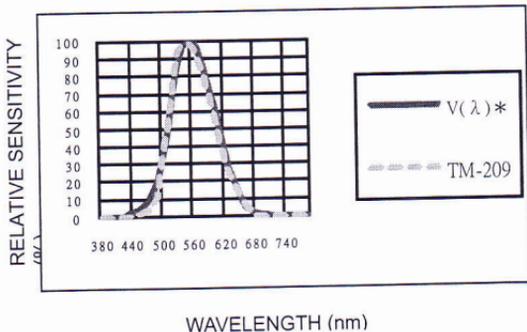
1. Display (LCD).
2. Lux/Fc/CD button
3. MEM/READ.
4. MAX/AVG/MIN and setup upward.
5. Power ON/OFF and disable auto power off.
6. Real time auto zero.
7. DATA HOLD and Light source select (L.S.).
8. Setup downward.
9. Photo detector.



- **Relative Spectral (Sensitivity)**

The deviation from the comparative standards for luminosity is determined by JIS standard C 1609-1993.
Peak sensitivity wavelength: 550 nm

Typ. $T_a = 23^\circ\text{C}$

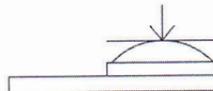


* CIE luminous spectral luminous

10. Attention

- Set for referring the testing of source of light is located at the right top end (0 degree) of the light sensor ball plane.

Light Source 0 degree



- When the meter is not in use, please keep the cap of the light sensor in its place to avoid the photo diode from wearing out.
- When it is not in use for a long time, please take the batteries away. And avoid keeping it in a place of high temperature and humidity.

11. Recommended Levels of Illumination

Suitable levels of illuminance
(According to the JIS standard Z 9110-1979)

Offices

Illuminance (lux)	Place
1500 to 750	Offices, designing, drawing rooms
750 to 300	Offices, conference rooms, computer rooms
300 to 100	Workrooms, corridors, stairways, restrooms
75 to 30	Indoor emergency stairways

Factories

Illuminance (lux)	Place
3000 to 1500	Where such work as assembling, inspecting testing, selecting, extremely precision visual work
1500 to 750	Assembling, inspecting, testing, selecting, precision visual work
750 to 300	Assembling, inspecting, testing, selecting and visual ordinary work
300 to 150	Wrapping and packing
75 to 30	Indoor emergency stairways

Schools

Illuminance(lux)	Place
1500 to 300	Precision drawing or drafting, precision experimenting, library
750 to 200	Classrooms, library reading rooms, staff rooms, gymnasia
300 to 75	Lecture halls, assembly rooms, locker rooms, corridors, stairways and restrooms
75 to 30	Warehouses and emergency stairways
10 to 2	School passages

12. Battery Replacement



WARNING

If the symbol "  " appears on the LCD, please replace the battery immediately

1. Remove the battery cover
2. Replace the battery.
3. Install the battery cover.

13. END OF LIFE



Caution: this symbol indicates that equipment and its accessories shall be subject to a separate collection and correct disposal