

User's Guide

EXTECH
INSTRUMENTS

Datalogging Light Meter with PC Interface

Model 401036



Warranty

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website at www.extech.com (click on 'Contact Extech' and go to 'Service Department' to request an RA number). A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

Introduction

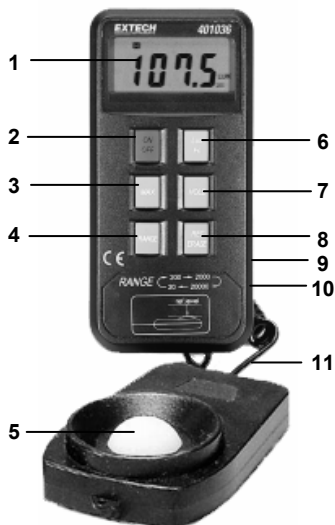
Congratulations on your purchase of the Extech 401036 Datalogging Light Meter. This device measures light intensity to 20,000 Foot-candles (Fc) or Lux. 16,000 measurement readings can be logged by the meter and later transferred to PC using the RS-232 interface. Real-time meter/PC logging is also supported. Careful use of this meter will provide years of reliable service.

Specifications

Display	3 ½ digit (2000 count) multifunction LCD display
Sensor	Silicon Photo-diode meets C.I.E. photopic curve V (λ)
Ranges / Resolution	19.99, 199.9, 1999, and 1999 x 10 Fc and Lux
Accuracy	± (3% reading + 5 digits)
Repeatability	± 2%
Datalogger memory	16,000 readings max.
PC Interface	RS-232C Serial Communications at 9600 bps
Range status indication	'OL' is displayed for measurement exceeding published limits
Sampling time	2.5 readings per second
Power Supply	9V battery (display includes low battery indicator); 50 hour typical battery life
Operating temperature	32 to 104°F (0 to 40°C)
Operating Humidity	< 80% RH
Weight	9.6 oz. (300g)
Dimensions	Meter: 5.7 x 2.8 x 1.5" (146 x 70 x 39mm); Probe: 3.4 x 2.4 x 1.1" (87.5 x 60 x 29mm)
Accessories	Carrying case, Windows™ software, PC communications connecting cable, 9- to 25-pin adapter & 9V battery

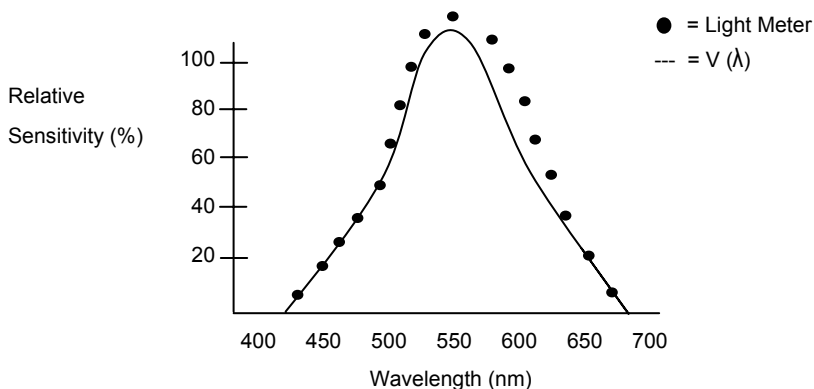
Meter Description

1. 2000 Count LCD includes LUX, Fc, low battery, MAX, H (hold), & x10 indicators
2. ON/OFF key Turns the meter on or off
3. Max. Hold key When pressed, the LCD displays only the maximum reading
4. Lux/Fc key Press to toggle the displayed unit of measure. The LCD shows the unit
5. Light Sensor (Lens cover not shown)
Point toward source of light to take measurements. Note that a tripod mount is located on the rear of the sensor
6. Range key Press repeatedly to select desired range: 20, 200, 2,000, 20,000
7. Data Hold key Press to freeze the displayed measurement
8. Record/Erase key Press momentarily to store one reading; Press and hold for 3 seconds to activate the continuous recording mode. Press again to end recording
9. RS-232 jack Stereo jack for PC to Meter connection cable
10. Zero adjust Cover the sensor with supplied lens cap and adjust the zero pot for a 0.0 Fc/LUX display
11. Sensor Cable Connects sensor to meter



Note that the battery compartment, tilt stand, and hanging mount are located on the rear of the meter

Spectral Sensitivity Curve



Operation

1. Turn the meter ON or OFF with the ON/OFF key.
2. Press the Lux/Fc key to select the unit of measure for light intensity.
3. With the lens cap completely covering the light sensor, zero the meter by adjusting the screw on the right side of the meter for an LCD reading of 0.0.
4. Remove the lens cap and face the light sensor toward the source of light.
5. Read the light intensity reading on the LCD.
6. For over-range conditions, the 'OL' icon will display. Select a higher range by pressing the Range key until a valid reading replaces the OL display.
7. For the 20,000 range, multiply the displayed reading by 10.

Data Hold

Press the HOLD key to freeze the displayed reading. Press again to return to normal operation.

Maximum (MAX) reading

Press the MAX key to display only the highest reading. As higher measurements are made the display updates accordingly. The 'MAX' icon appears on the LCD in this mode of operation. To return to normal operation, press the MAX key again and the MAX indicator will extinguish.

Range selection

Press the RANGE key to select the appropriate measurement range. Start with the lowest range (20) and work up to higher ranges as needed. If 'OL' (overload) is displayed, press the range key until a valid reading is displayed.

Datalogger

REC/ERASE Key

The REC/ERASE key is used to record and erase data. Press the REC/ERASE key once to log one reading (REC icon flashes once on the LCD). To automatically datalog readings at programmable intervals (continuous recording mode), press and hold the REC/ERASE key for 3 seconds (REC icon begins flashing repeatedly).

Press the REC/ERASE key any time while recording to exit the record mode. When the memory is full (16,000 readings or 255 sets), the LCD will display 'FULL' and recording ends. To download and view the stored data, connect the meter to a PC and perform the steps provided in the 'PC Interface' section of this manual.

To erase stored data, perform these steps:

1. With the meter turned off, press and *hold* the REC/ERASE key.
2. Turn the meter on by pressing the ON/OFF key and then immediately release the ON/OFF key.
3. Continue to hold the REC/ERASE key until 'del' flashes 3 times on the LCD. The meter automatically returns to normal operation after the data are erased.

SAMPLING RATE

The sampling rate is the interval of time between logged readings. Note that there are *two* sampling rate selections for two separate datalogging scenarios described below:

PC Sampling Rate

The PC sampling rate is the rate at which measurements are recorded by the PC *while the meter is connected to the PC*. This is known as real-time recording since the readings are being taken by the meter and recorded by the PC at the same time. Set the rate in the supplied software program as described in the PC SAMPLING paragraph on page 6.

Datalogger Sampling Rate

This is the meter's internal sampling rate used when the meter is logging readings remotely in continuous recording mode (disconnected from the PC). The default rate is 1 second. Change the rate in software by following the steps on page 6 for SAMPLING TIME with the meter connected to the PC.

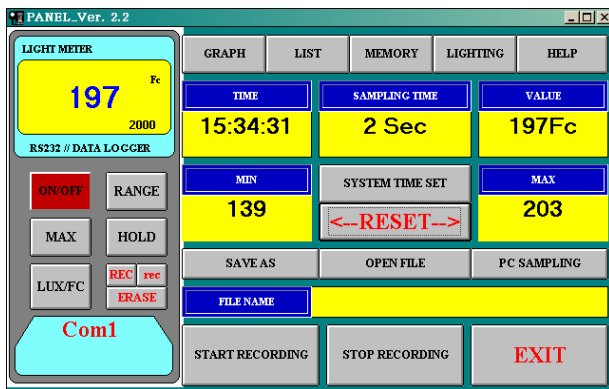
PC Interface

Connect the supplied interface cable to the phono jack on the right side of the light meter and to the PC 9-pin COM port. If you must connect to a 25-pin PC COM port, use the supplied 9- to 25-pin adapter. The phono plug which connects to the meter is configured as follows: Tip (Transmit), Ring (Receive), Sleeve (Ground).

Windows™ Software

Installation

Install the software by following the instructions on the supplied CD-ROM's label. The label also includes the program version number. Launch the program and follow the onscreen instructions. When finished, restart Windows™, and run the software program.



The software screen shown above will appear whether PC-meter communication has been established or not. If the meter and PC are properly connected the software will display COM1 or COM2 (depending on the PC port used) in the bottom left-hand field. 'NO COM' will appear on the screen if communication has not been established. When communications is established the meter can then be remotely controlled by the keys on the left side of the screen which closely match the meter's front panel. The user can also log readings in real-time or download readings from the meter that have been previously recorded.

Recorded Data Sets

Every recording session yields one 'set' of data. For example, if you record continuous data for 1 hour everyday for 5 days. Each day's group of readings will be a numbered set (1 through 5, in this case). Sets can then be selected and the data viewed as described in the 'PC Interface' section. Furthermore, manually recorded single readings are also considered sets even though each set will have only one reading. A maximum of 255 sets and 16,000 readings may be recorded. Keep in mind that battery life is typically 50 hours.

Main Software Window Description

(Refer to diagram on the previous page)

SAVE AS	Click here to create a new file to store data
OPEN FILE	Click here to open an existing data file
FILENAME	When a file is opened or a new one is named, the name of the file appears here
PC SAMPLING	Click here to select the PC sampling rate (1 to 65 seconds) used when the PC and meter are connected and logging simultaneously in real-time
SAMPLING TIME	Set the meter's internal sampling time (rate) as follows: 1. Connect the meter to the PC and run the software. 2. Click on MEMORY (this will open the Logger window) 3. In the SAMPLING field, change the sampling rate (1 to 32,767 seconds max.) but do not press the ENTER key 4. Click on SAMPLING to store the new sampling rate. Confirm the change by closing and re-opening the LOGGER window.
START RECORDING	After opening a file, click here to start datalogging
STOP RECORDING	Click here to end datalogging
EXIT	Closes the software program
GRAPH	An X-Y graph is displayed plotting record number and measurements
LIST	The recorded data is displayed in list form. Available selections in the list display are: PAUSE Pause the scrolling list CONTINUE Continue automatically listing the data SAVE Save list to the opened file PRINT Print list to the default, connected printer EXIT Exit the list window
MEMORY	Click the Memory button to view the number of readings/sets recorded
LIGHTING	Press to calculate Luminous Intensity (cd). Refer to the section on Luminous Intensity..
HELP	Click to call up a copy of the main software display. At this display, when an item is selected with the mouse, an explanation appears on the screen for the selected item
VALUE	The current measurement
MIN	The lowest reading encountered since a PC datalogging session began
MAX	The highest reading encountered since a PC datalogging session began
RESET	Clears the minimum and maximum display values
TIME	Current PC real-time clock setting
SYSTEM TIME SET	Press to synchronize the first light meter reading to the current PC time and date

Downloading Pre-Recorded Data from the Meter to a PC

1. Connect the meter to the PC as previously described and refer to the diagram below.
2. Click the 'Number of sets' button. The number of Sets will appear. For more information on Data Sets, refer to the section entitled Recorded Data Sets on page 5.
3. Click the 'Time of Recording' button and the cursor will move to the 'Choose No. of Set' area.
4. Type a particular set number and a data list will appear.
5. For more information on the recorded data, click on the "Show Data" button.
6. Save data to a file or print data using the 'show data' menu selections.
7. Data files (text files) can be opened in spreadsheet and database programs for further data manipulation.

LOGGER

MEMORY 16.0 K **REMAINING** 15.9 K **4 SETS COMPLETED**

TIME OF METER 99-03-23 11:41:47 **ID CODE** 200 **SAMPLING** 2 sec

NUMBERS OF SETS 4

SET	DATE-----TIME
1	99-03-22----11:50:53
2	99-03-22----11:51:40
3	99-03-22----11:51:53
4	99-03-22----11:52:01

CHOOSE NO OF SET

NUMBERS OF REC

SHOW DATA

Luminous Intensity (cd) Calculation

Luminous Intensity (cd) is calculated using the equation shown in the screen diagram at right. Follow these steps:

1. Connect the meter to the PC, run the supplied software, and establish communications as previously described.
2. Take a light intensity reading with the meter.
3. Select the measurement system by clicking 'Metric System' (meters) or 'Imperial System' (feet).
4. Enter the distance to the light source from the meter sensor in meters (Metric) or feet (Imperial).
5. The software will then display the Luminous Intensity value.

LIGHTING

$cd = \text{Meters (sq)} \times \text{Lux} = \text{Feet (sq)} \times Fc$

METRIC SYSTEM **IMPERIAL SYSTEM**

ENTER DISTANCE FROM LIGHT ON COUNT WITH METERS

580Lux **METERS (sq)**

Battery Replacement

The meter uses a 9V battery for its operational power and it has a 50 hour typical life span. Replace the battery when the low battery icon appears on the meter's LCD display.

1. Remove the three (3) phillips screws on the rear of the meter.
2. Open the meter housing and replace the battery
3. Close the meter housing and secure the rear screws

Calibration and Repair Services

Extech offers complete repair and calibration services for all of the products we sell. For periodic calibration, NIST certification on most products or repair of any Extech product, call customer service for details on services available. Extech recommends that calibration be performed on an annual basis to ensure calibration integrity.



Support Hotline (781) 890-7440

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