3423

LUX HiTESTER

INSTRUCTION MANUAL

Contents

Introduction

Thank you for purchasing this HIOKI "3423 LUX HiTESTER". To get the maximum performance from the tester, please read this manual first, and keep this at hand.

Inspection

When the unit is delivered, check and make sure that it has not been damaged in transit. In particular, check the accessories, panel switches, and connectors.
If the tester is damaged, or fails to operate according to the specifications, contact your dealer or HIOKI representative.

Safety Notes

⚠ WARNING

This product is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the product. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from product defects.

This Instruction Manual provides information and warnings essential for operating this equipment in a safe manner and for maintaining it in safe operating condition. Before using this equipment, be sure to carefully read the following safety notes.

Safety symbols

	This symbol is affixed to locations on the equipment where the operator should consult corresponding topics in this manual (which are also marked with this symbol) before using relevant functions of the equipment. In the manual, this mark indicates explanations which it is particularly important that the user read before using the equipment.
	Indicates DC (Direct Current).
	Indicates the ON side of the power switch.
	Indicates the OFF side of the power switch.

The following symbols are used in this Instruction Manual to indicate the relative importance of cautions and warnings.

 **WARNING**	Indicates that incorrect operation presents significant danger of accident resulting in death or serious injury to the user.
CAUTION	Indicates that incorrect operation presents possibility of injury to the user or damage to the equipment.
NOTE	Denotes items of advice related to performance of the equipment or to its correct operation.

Accuracy

The specifications in this manual include figures for "measurement accuracy" when referring to digital measuring instruments, and for "measurement tolerance" when referring to analog instruments.

f.s.	(maximum display or scale value, or length of scale) Signifies the maximum display (scale) value or the length of the scale (in cases where the scale consists of unequal increments or where the maximum value cannot be defined). In general, this is the range value (the value written on the range selector or equivalent) currently in use.
rdg.	(displayed or indicated value) This signifies the value actually being measured, i.e., the value that is currently indicated or displayed by the measuring instrument.
dgt.	(resolution) Signifies the smallest display unit on a digital measuring instrument, i.e., the value displayed when the last digit on the digital display is "1".

Notes on Use

⚠ CAUTION

- The detector and display of this unit can be separated. In order to prevent damage to this unit, always power off before separating or putting together.
- To avoid damage to the unit, do not short the ANALOG OUT terminal and do not input voltage to the ANALOG OUT terminal.
- This product is not designed to be entirely water- or dust-proof. To avoid damage, do not use it in a wet or dusty environment.
- Do not store or use the product where it could be exposed to high temperature or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- Do not use the product where it may be exposed to corrosive or combustible gases. The product may be damaged.
- To avoid damage to the product, protect it from vibration or shock during transport and handling, and be especially careful to avoid dropping.

NOTE

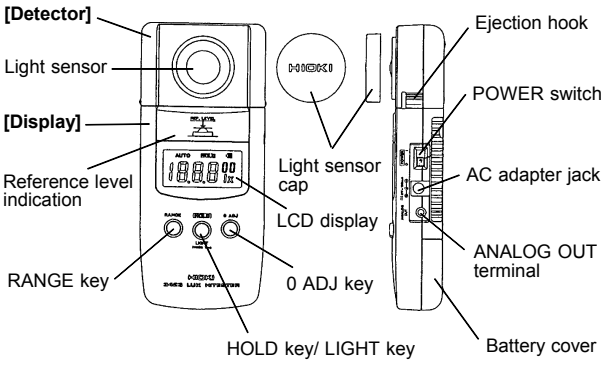
- When taking measurements from ordinary lighting fixtures, the display will sometimes "roll", and be hard to read. This is generally due to fluctuations in the line voltage to the fixture or shadows caused by people in the area etc. Please note this in measuring.
- This instrument is equipped with a backlight in the display for measuring under the low illuminance. The brightness is set lowest, for the low consumption of the batteries. It also goes out automatically in approx. eight seconds, after it is turned on, in order to prevent the effect of backlight on the illuminance.
- The reference level as marked on the faceplate is the tip of the light sensor.
- The indicator appears when battery voltage becomes low. Replace the batteries as soon as possible.
- Do not take this instrument apart or subject it to any shock or impact.

Chapter 1 Overview

1.1 Product Overview

The 3423 is suited for a wide range of applications involving illumination equipment, lighting work and facility management.
The instrument has five measurement ranges, 20 lx to 200,000 lx, so it can measure the wide range of illuminance.
It can measure, with the detector separated from the display and has a large LCD easy to read in the display, for user's convenience. Moreover, the backlight allows to take readings easily under the low illuminance. (The display is held when the backlight turns on and the backlighting has no effect on the measurement.)
By using the silicon diode and optical filter in the detector, the visual perception is corrected so that the perception of colors is close to human perception. The instrument has a microcomputer and can perform the auto range, one-touch zero adjustment of analog output. An AC adapter is also available, as well as batteries, and useful for long-time measurement.

1.2 Names and Functions of Parts



The 3423 consists of detector part and display part. They can be separated using the optional accessory 9436 CONNECTION CABLE.

[Detector]		
Light sensor	The sensor part for the 3423 Measures the illuminance on the light sensor.	
[Display]		
Reference level indication	Indicates that the reference level is the tip of the light sensor.	
LCD display	**AUTO**	Lights during Auto Range operation.
	HOLD	Lights when holding the indication or lighting the backlight.

LCD display	B	Lights when battery power is running low.
	0	Lights when measuring in the 20,000 lx range.
	00	Lights when measuring in the 200,000 lx range.
	lx	Indicates the unit of illuminance (lux).
	.	Indicates the decimal point.
RANGE key	Selects the range.	
HOLD key, LIGHT key	Holds the indication or lights the backlight.	
0 ADJ key	Performs zero adjustment.	
Light sensor cap	Attached to the detector, when performing zero adjustment.	
Ejection hook	Used to separate and put together the detector and display.	
POWER switch	Powers on and off.	
AC adapter jack	Input jack for an AC adapter.	
ANALOG OUT terminal	Performs analog output of illuminance. (The optional accessory, 9094 OUTPUT CORD is used.)	
Battery cover	Removed when changing batteries.	

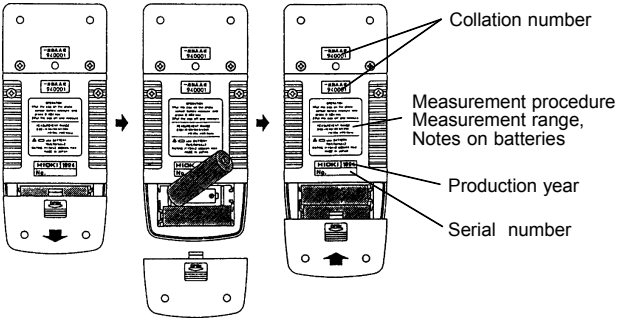
Chapter 2 Preparing for measurement

2.1 Installing or Replacing the Batteries

WARNING

- **To avoid electrocution, turn off the power switch and disconnect the AC adapter cord before removing the lithium battery. After replacing the batteries, replace the cover and screws before using the product.**
- **Do not mix old and new batteries, or different types of batteries. Also, be careful to observe battery polarity during installation. Otherwise, poor performance or damage from battery leakage could result.**
- **To avoid the possibility of explosion, do not short circuit, disassemble or incinerate batteries.**
- **Handle and dispose of batteries in accordance with local regulations.**

1. Remove the battery cover.
2. Installing or replace with all two new batteries.
3. Fit cover properly



2.2 Using An Adapter

⚠ WARNING

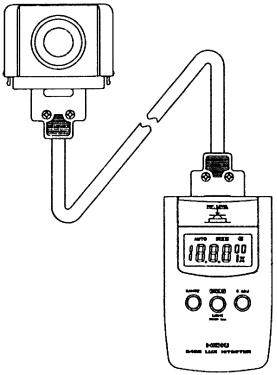
Use an AC adapter that conforms to IEC 950 standards in respect to safety is rated for 6 V - 300 mA (with ±10% stability), has 5 mm-dia. - terminals and has a center pin with negative polarity. To avoid electrical hazards and damage to the product, do not apply voltage outside of this range.

An AC adapter can be used.

Chapter 3
Measurement Procedure

1. Attach the supplied light sensor cap to the detector and set the POWER switch to **|** (ON).
2. Press the 0 ADJ key if any digits appear in the LCD display. Then "**ADJ**" is indicated and the zero adjustment for all ranges is performed at the same time.
3. When "**ADJ**" disappears, remove the light sensor cap and put the detector where the measurement is taken.
4. When powering on, "**AUTO**" is indicated in the LCD display, and the Auto Range mode is selected.
   When fixing the range, press the RANGE key to select the optimum range. ("**AUTO**" disappears and the selected range is fixed. Then the wider measurement range is selected by pressing the RANGE key. The 20 lx range is selected after 200,000 lx range.) Press the RANGE key for more than one second to change the Manual Range to the Auto Range.
5. "**OF**" is indicated, when the measured value exceeds the measurement range.
6. Take the reading, When it is stable.

7. Press the HOLD key to hold the reading. Press it again to release holding. (The analog output is not held. The range switching and zero adjustment is impossible, when holding.)
8. Press the LIGHT key for more than one second to turn on the backlight. The reading is held automatically, when it lights. The backlight lights for approx. eight seconds, and then goes out automatically. (Holding is not released after the backlight goes out. If you press the LIGHT key again within eight seconds, the backlight goes out and holding is released.)
9. When using the analog output, connect the ANALOG OUT terminal and the recorder etc. with the 9094 OUTPUT CORD (option). The analog output value varies by 0.1 mV as the display value varies by 1 digit. When the illuminance varies, if the Auto Range is selected, the range may change and the full scale value may vary. In this case, use in the Manual Range.
10. When battery power is running low, the B indication lights. Please change the batteries.
11. When measuring with the detector separated form the display, pull the detector slowly, holding the display and pressing both ejection hooks, after making sure that the POWER switch is ○ (OFF). Use the 9436 CONNECTION CABLE (with case) (option) to connect the detector and the display.
12. After finishing measurement, attach the light sensor cap and set the POWER switch to ○ (OFF).



NOTE
- When the light sensor cap is not attached (more than approx. 1 lx is indicated), "**CAP**" is indicated. Make sure that it is attached.
- If performing the zero adjustment soon after powering on, several digits may not disappear. In this case, perform the zero adjustment again.
- Do not connect or disconnect the AC adapter, and the detector and the display, with the POWER switch on.
- Setting the POWER switch to | (ON) soon after setting to ○ (OFF) may cause malfunction. In this case, power on in several seconds after setting to ○ (OFF).
- Use the backlight under low illiminance. It may be difficult to find it under ordinary illuminance. as the brightness is set lowest for the low consumption of batteries.

Chapter 4
General Specifications

Class	Conforms to JIS C 1609-1993 general AA class
Type	Weights and Measure Act, type approval E-11
Display	LCD 3 1/2 Maximum "1999" However, in the 20,000 lx range, the maximum is "19,990" and in the "200,000 lx range, the maximum is "199,900" Auto (**AUTO**) display indicator HOLD (HOLD) display indicator Battery consumption (B) display indicator Unit symbol (lx) display indicator EL backlight function
Display operation	20, 200, 2,000 lx range: 1-count step 20,000 lx range: 10-count steps 200,000 lx range: 100-count steps
Measuring ranges	20/200/2,000/20,000/200,000 lx Auto/manual switching
Overflow indication	"**OF**" is displayed
Accuracy	±4%rdg. ±1 dgt. (23±5℃/73±41°F)
Angled incident light characteristics	Angle Deviation from cosine characteristics 10° ±1% 30° ±2% 50° ±6% 60° ±7% 80° ±25%

Response time	Auto range: 5 seconds or less Manual range: 2 seconds or less
Temperature characteristics	Deviation from value measured at 23 ℃ (73˚F) between -10℃ (50˚F) and 40℃ (104˚F): ±3% Humidity characteristics: Deviation from value measured in an environment with a temperature and humidity of 23℃ (73˚F) and 45% to 75% rh when the unit is left in an 85% to 95% rh environment for three hours and then is returned to the original environment : ±3%
Relative spectral response characteristics in the visible spectrum	Deviation from spectral luminous efficiency: 8% or less
Response characteristics in ultraviolet and infrared spectrums	Response to ultraviolet and infrared radiation: less than 1%
Fatique characteristics	Change in value one minute and ten minutes after light strikes sensor : ±1%
Characteristics regarding intermittent light	Deviation in value when subjected to intermittent light for 1/2 cycle at a frequency of 100 Hz or 120 Hz: ±2%
Receptor element	Silicon photodiode
Operating temperature and humidity range	-10 to 40℃ (50 to 104˚F), 80% RH or less (no condensation)
Storage temperature and humidity range	-10℃ to 50℃ (50 to 122˚F), 80% RH or less (no condensation)

Operating temperature and humidity for guaranteed accuracy Guaranteed accuracy period	23℃±5℃ (73°F±9°F), 80%RH or less For 2 years
Analog output	200 mVDC f.s. ±2.5% f.s. (versus the display value)
Power supply	Rated supply voltage 1.5 VDC×2 two R6P manganese batteries or two LR6 alkaline batteries
Maximum rated power	600 mVA
Continuous operating time	Approx. 25 hours
Effect of radiated radio-frequency electromagnetic field	±120 dgt. at 3 V/m
Dimensions and mass	Approx. 74W×170H×30D mm (2.91"W×6.69"H×1.19"D) (excluding protruding parts) Approx. 310 g (10.9 oz.) (including batteries)
Accessories	Light sensor cap, two R6P manganese batteries 9376 CARRYING CASE Instruction Manual
Options	9436 CONNECTION CABLE (2 m/7.87", with case) 9376 CARRYING CASE, 9094 OUTPUT CORD (1.5 m/5.91")
Standards Applying	Safety EN61010-1:2001 Pollution Degree 2, (anticipated transient overvoltage 330 V) EMC EN61326:1997+A1:1998+A2:2001 +A3:2003

Chapter 5
Using this unit for legal purpose

This unit is approved under Weights and Measures legislation by the Japanese Ministry of Economy, Trade and Industry. An official approval from the Japan Electric Meters Inspection Corporation is necessary for this unit to be used as an illuminance meter for legal purposes. After the approval, the unit can be used for trade and evidential purposes. The approval can be issued by HIOKI. After the approval, a seal is affixed, and the unit can be used as a legally certified illuminance meter for two years. When the approval expires, recalibration and a new official approval are required.

Chapter 6 Reference

6.1 Recommended Levels of Illumination

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

Offices

Level of illuminance (lx)	Place
1500 to 750	Offices, designing, and drawing rooms
750 to 300	Offices, conference rooms, and computer rooms
300 to 100	Workrooms, corridors, stairways, and restrooms
75 to 30	Indoor emergency stairways

Factories

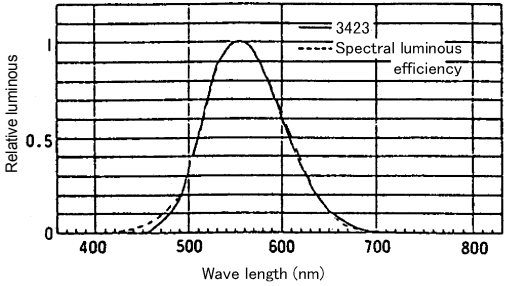
Level of illuminance (lx)	Place
3000 to 1500	Where such work as assembling, inspecting, testing, selecting and extremely precision visual work
1500 to 750	Assembling, inspecting, testing, selecting and precision visual work
750 to 300	Assembling, inspecting, testing, selecting and visual ordinary work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

Schools

Level of illuminance (lx)	Place
1500 to 300	Precision drawing or drafting, precision experimenting, library reading rooms and precision handicraft
750 to 200	Classrooms, library reading rooms, experiment demonstration rooms, staff rooms and 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 (for night)

6.2 Relative Spectral Response Characteristics in the Visible Spectrum

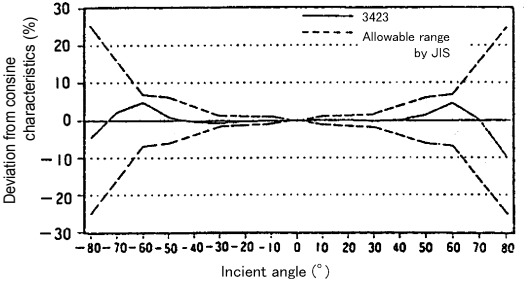
Human perception of brightness ranges from 360 nm to 830 nm in the wavelength and is the maximum at 555 nm.
The International Commission on Illumination (CIE) has established comparative standards for luminosity, setting the maximum perception for 1 and indicating the amount of perception of each wavelength by the relative value, and calculating the average of many people. In the 3423, the relative spectral response characteristics are close to the comparative standards for luminosity.
The deviation from the comparative standards for luminosity is determined by the fs value of JIS standard C 1609-1993.



Relative Spectral Responsivity

6.3 Angled Incident Light Characteristics

It is known that the luminance is proportional to the cosine of the incident angle of light (the cosine law).
In the 3423, the shape of the light sensor, hook etc. is so made that it can follow the cosine law closely.



Angled Incident Light Characteristics

Chapter 7
Maintenance and Service

7.1 Message

OF Indicates the measured value exceeds the measurement range.

ADJ Indicates the zero adjustment is being performed.

CAP Indicates that the light sensor cap must be attached to the detector, during the zero adjustment.

7.2 Cleaning

To clean the product, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
Wipe dirt from the detector with a dry cloth etc., when it is dirty.

7.3 Calibration and Repair

- The calibration interval for the 3423 is two years. It is recommended to calibrate it every two years, for accurate measurement. Contact your nearest service representative.
- If the unit is not functioning properly, check the batteries. If a problem is found, contact your dealer or HIOKI representative.
- Pack the unit carefully so that it will not be damaged during transport, and write a detailed description of the problem. HIOKI cannot bear any responsibility for damage that occurs during shipment.

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name:	HIOKI E.E. CORPORATION
Manufacturer's Address:	81 Koizumi, Ueda, Nagano 386-1192, Japan
Product Name:	LUX HiTESTER
Model Number:	3423
Option:	9436 CONNECTION CABLE 9094 OUTPUT CORD

The above mentioned products conform to the following product specifications:

Safety:	EN61010-1:2001
EMC:	EN61326:1997+A1:1998+A2:2001+A3:2003 Class B equipment Portable test and measurement equipment

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC, but is not applicable to the Low Voltage Directive 73/23/EEC.

HIOKI E.E. CORPORATION

15 September 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

3423B999-04

HIOKI 3423 LUX HiTESTER

Instruction Manual

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