



uSpectrum PC Software

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HATO ONE - MANUAL-EN_full_version - 2.0



Original / Authorized Agent Stamp

* To ensure your warranty validation, please place your agent's stamp in the box and fill in the purchase date. If the agent stamp and purchase date cannot be supplied, the warranty period will be based on the manufacturing date of the product. See product datasheet for warranty period.

Product Serial Number :

Purchase Date :

HATO est. 1974
agricultural lighting

HATO Agricultural Lighting

T. +31 (0)46 4585050
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HATO ONE

spectro-gallilux meter

User Manual



Contents

- 1** Introduction..... 04
 - 1.1 Packing Contents 05
 - 1.2 Appearance Introduction 06
 - 1.3 Annual Product Calibration 07
 - 1.4 Product Notes and Precautions 07

- 2** Preparations before Use 08
 - 2.1 Preparing Before Use 09
 - 2.2 Basic Measurement 13
 - 2.3 System Reset 14

- 3** System Overview..... 18
 - 3.1 Main Page 19
 - 3.2 Measurement Modes Introduction..... 21
 - 3.3 Measurement Introduction..... 22
 - 3.4 Measurement Setting Introduction 23
 - 3.5 Continuous Measurement Introduction 26
 - 3.6 Customizing BASIC Mode List 27
 - 3.7 Instruction of Spectrum Mode 28
 - 3.8 FLICKER Mode Introduction 29
 - 3.9 FREQUENCY Mode Introduction 30
 - 3.10 ANALYSE Mode Introduction 31
 - 3.11 CRI Mode Introduction 32
 - 3.12 Switch Between CIE1931 & CIE1976 34
 - 3.13 Compare Mode Introduction 35
 - 3.14 BROWSER Mode Introduction 36
 - 3.15 Transferring Data with PC Connection 37
 - 3.16 Connecting with Mobile APP 38
 - 3.17 Connecting with uSpectrum 39

- 4** Specification 42
 - 4.1 Product Specification 43
 - 4.2 Product Appearance and Dimension 45

- 5** Appendices 48
 - 5.1 Product Warranty Terms 49
 - 5.2 Measurement Indexes 53
 - 5.3 Q&A 59



To get more information related to operation, firmware upgrade and warranty terms; online application for correction and Repair service, please contact one@hato.lighting

1

Introduction

- 1.1 Packing Contents
- 1.2 Appearance Introduction
- 1.3 Annual Product Calibration
- 1.4 Product Notes and Precautions



1.1 Packing Contents

Please check HATO ONE spectro- gallilux meter packing before use, contact your agent if there are missing items.



HATO ONE
spectro- gallilux meter



Protection Bag



Battery



Case



Strap



Neck Strap



Stand Bracket



SD card



USB Cable
(It is used to connect with PC software.)



Power Adaptor

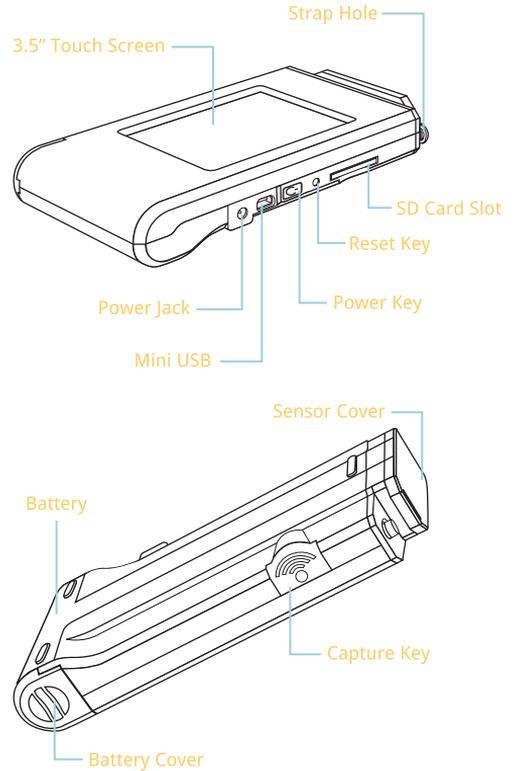


User manual



WiFi Wing
wireless remote control card
(It is used to connect with APP.)

1.2 Appearance Introduction



If the system crashes, please press the power key for 3 seconds to turn off the system.
If the problem still can't be fixed, please use a pin to press the reset key to turn off the system.



1.3 Annual Product Calibration

As the product is a high-precision instrument, please use it cautiously. To ensure the accuracy of measurements, annual calibration is recommended. Please consult the customer service department for the calibration service: one@hato.lighting



1.4 Product Notes and Precautions

1. HATO ONE spectro- gallilux meter is a high-precision instrument. Please unpack with care. Any vibration or collision may cause instrument damage. If the product doesn't work normally or needs repair, please don't attempt any repairs. All repairs must be performed by the authorized customer service agent.
2. Most LCD screens have a very small and inconsequential defective pixel rate (usually less than 0.1%). This results in occasional pinpoints of white or other colors but will not affect the accuracy of measurements.



Precautions / Warnings

Please read the following precautions to avoid fire, excessive heat, chemical leakage and explosion :

- Do not disassemble or modify the battery.
- Do not expose the battery to heat (fire) or water/moisture.
- When disposing used/old batteries, wrap with insulation tape to shield the battery from electrical contact with metallic objects, which might ignite a fire or explosion.
- If the unit is plugged into the power adapter and the battery seems to be overheating, or if there is smoke or peculiar odors emanating from the unit, unplug immediately to avoid the possibility of fire.
- However, do not touch the cables if there is heat emanating from near the cables as melted or deformed cables could expose wiring and result in burns or electric shock.
- Do not use cloth or anything to wrap or cover the equipment while charging – this could cause the unit to overheat, melting the casing or causing fire.
- If the unit is accidentally immersed in water, or if moisture has seeped inside, or metal objects have dropped into the casing, immediately remove the battery to avoid fire or electric shock.
- Do not operate or store the battery in high-temperature environments-it will cause battery leakage and/or shorten the life of the battery .
- Do not use paint thinner, benzene or other organic solvents to clean the equipment – this may damage the exterior finish or touch screen, and may even ignite fire.

Preparations before Use



- 2.1 Preparing Before Use
- 2.2 Basic Measurement
- 2.3 System Reset



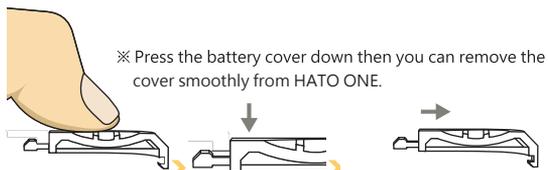
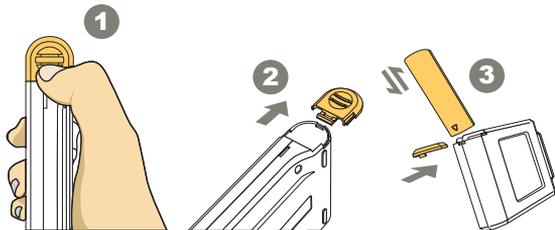
2.1 Preparing Before Use

Battery installation :

Step1. Hold HATO ONE, then press the battery cover.

Step2. Press the battery cover down to remove it.

Step3. Install the battery after removing battery cover.



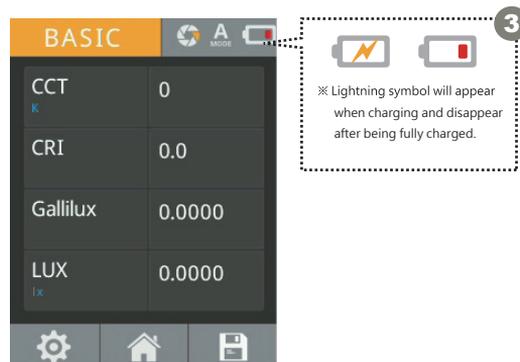
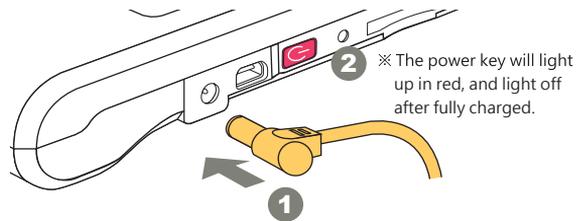
1. Please charge the battery for 6 hours at first time usage.
2. To avoid any interruption while measuring, please check battery status before use.
3. Please purchase a new battery if it gets low easily after being fully charged, which means battery life comes to an end.
4. Usage time will depends on battery life, HATO ONE battery can operate 5 hours after being fully charged.



2.1 Preparing Before Use

Battery charging :

1. Plug power charging cable into power jack to start charging.
2. Power Off Status: Users can check power key, it will light in red while charging and light off after being fully charged.
3. Power On Status: Users can check HATO ONE screen, it will appear a lightning symbol to indicate charging, and lightning symbol will disappear after being fully charged.

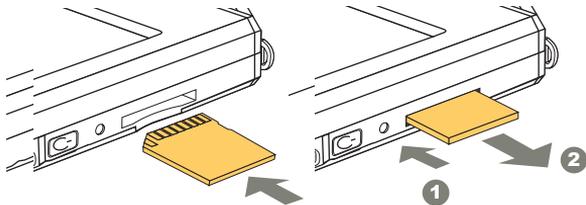




2.1 Preparing Before Use

Installing the SD Card :

Remove the SD Card :



※ Insert the memory card according to the direction.

※ Press to remove the SD card

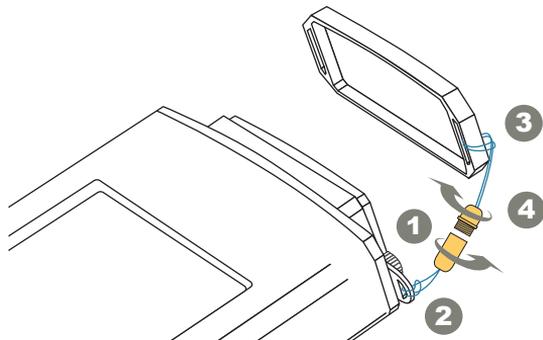
Strap installation :

Step1. Unscrew the strap.

Step2. Tie the strap to the strap hole of HATO ONE.

Step3. Tie the strap to the sensor cover.

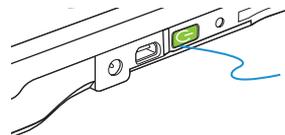
Step4. Screw the strap.



2.1 Preparing Before Use

Power on

Press the Power button for 1 second and then release it.

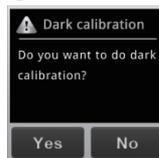


※ When the power is on, the Power button will turn on the green indicator. When the power is off, the green indicator will be off.

Dark calibration

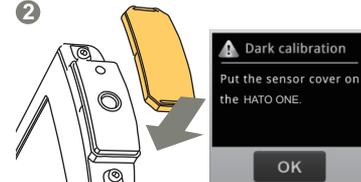
When the system is powered on and the power key is in green, the screen will show the Dark Calibration.

1



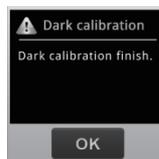
"Do you want to do dark calibration?" Please select "Yes".

2



After the sensor cover is put on, please select "OK".

3



When the screen shows "Dark calibration completed", please press "OK" to enter the main page.



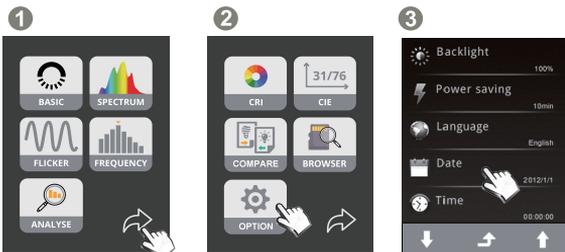
It is recommended performing dark calibration every time when it is powered on.



2.1 Preparing Before Use

Set date and time

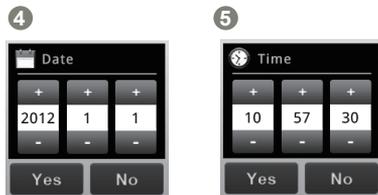
After the dark calibration is completed, please set date and time before measurement.



Go to the next page.

Select "Option".

Select "Date" and "Time".



After the setting is finished, please press "Yes".

After the setting is finished, please press "Yes".



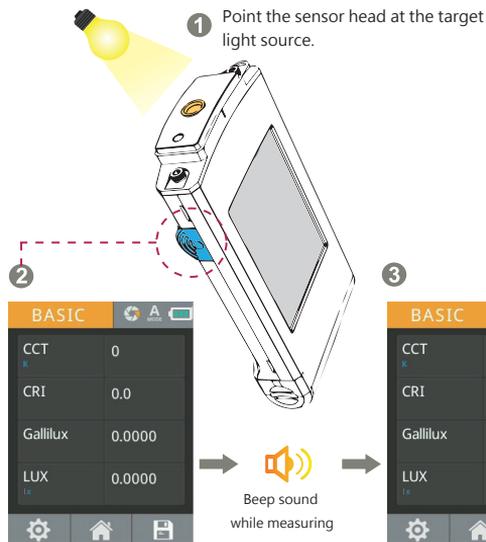
Please press the power key for 3 seconds to turn off the system.

2.2 Basic Measurement



Measure

Select "Basic" to enter measurement page.



Press Capture key at appropriate distance.

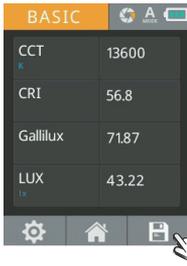
The measurement data will be shown on the screen after beep sound.



2.2 Basic Measurement

Save measurement data

1

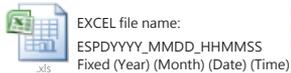
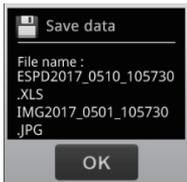


2

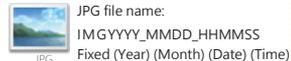


Press Save key on the lower right of the screen, and select "Yes" key.

3



▲ Can save the original data completely.

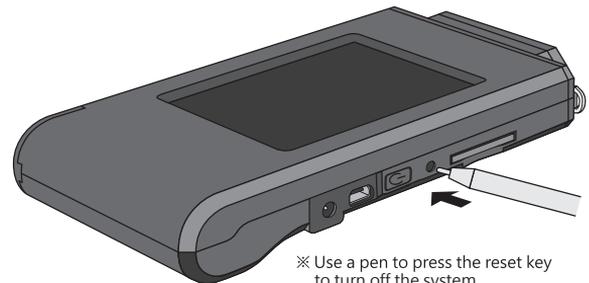
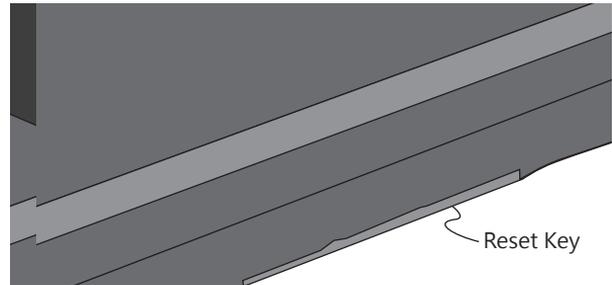


The measurement data are saved in the memory card successfully. Please record the file name if necessary.

2.3 System Reset



Users can press the reset key to turn off the system if system crashes.



※ Use a pen to press the reset key to turn off the system.

3

System Overview

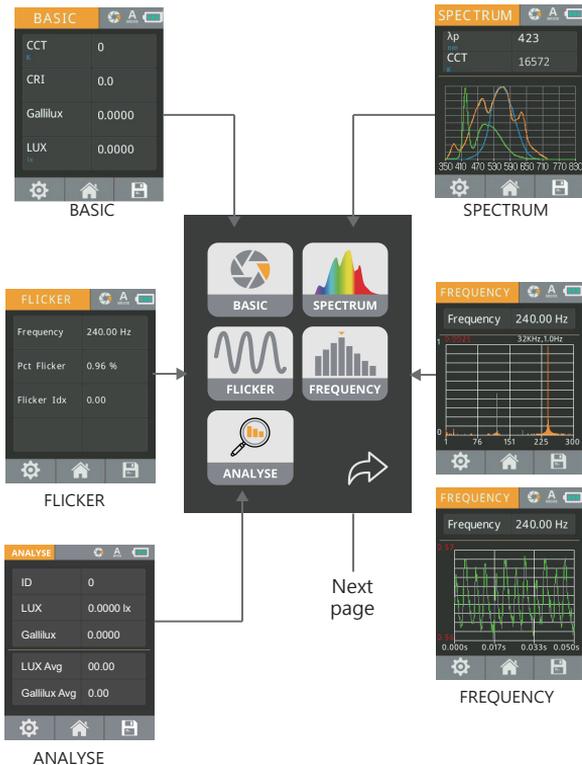
- 3.1 Main Page
- 3.2 Measurement Modes Introduction
- 3.3 Measurement Introduction
- 3.4 Measurement Setting Introduction
- 3.5 Continuous Measurement Introduction
- 3.6 Customizing BASIC Mode List
- 3.7 Instruction of Spectrum Mode
- 3.8 FLICKER Mode Introduction
- 3.9 FREQUENCY Mode Introduction
- 3.10 ANALYSE Modes Introduction
- 3.11 CRI Mode Introduction
- 3.12 Switch Between CIE1931 & CIE1976
- 3.13 Compare Mode Introduction
- 3.14 BROWSER Mode Introduction
- 3.15 Transferring Data with PC Connection
- 3.16 Connecting with Mobile APP
- 3.17 Connecting with uSpectrum



3.1 Main Page

The interface of the product is touch screen operation. By touching the screen with your figure, you may select the target menu or option.

The sub menus of each measurement mode are as shown below.



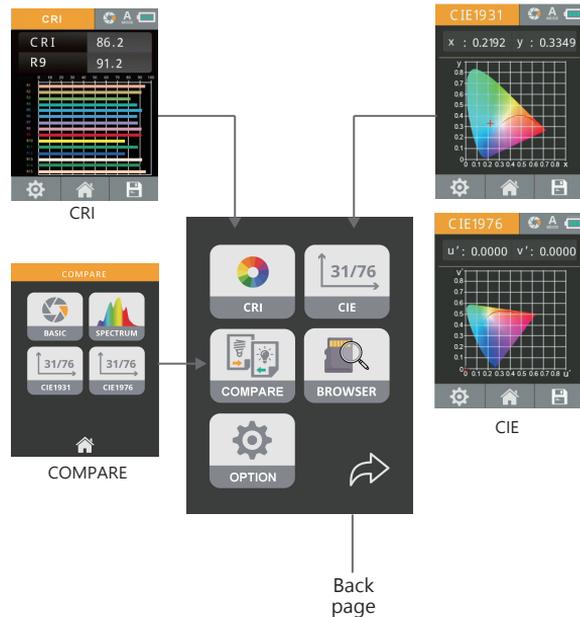
The analyse button allows you to analyse the data of a defined number of measurements.



3.1 Main Page

The interface of the product is touch screen operation. By touching the screen with your figure, you may select the target menu or option.

The sub menus of each measurement mode are as shown below.





3.2 Measurement Modes Introduction

Interface introduction :

 Means button

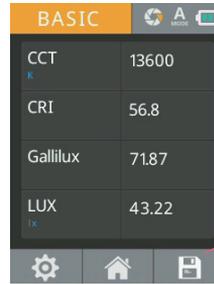


1. Measuring Mode - Basic
2. Measuring Function -Single operation  /continuous operation  . For continuous measurement, please refer to 3.5.
3. Exposure Mode -Automatic  /Manual 
4. Battery Power
5. Measurement Setting - please refer to 3.4.
6. Back to Main Page
7. Store the measured data- please refer to 3.3.
8. Show measured data – It shows different data based on the measuring mode. You may make selections by yourself.



3.3 Measurement Introduction

Save measured data :



Press save button to save file



Confirm

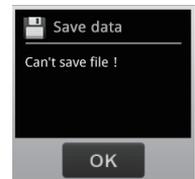
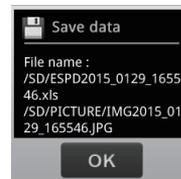
Success

Failed

Failed

Please insert SD card

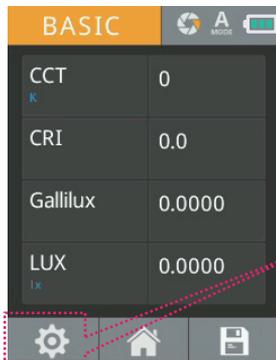
Please change SD card





3.4 Measurement Setting Introduction

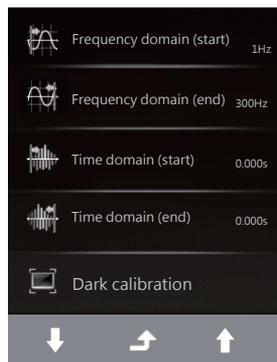
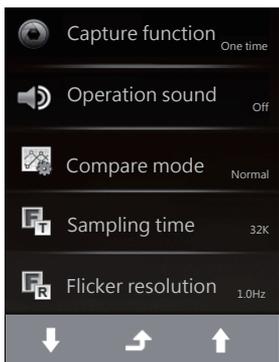
Please go to measurement page to do measurement settings.



Measurement page



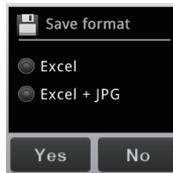
Previous measurement page Next page



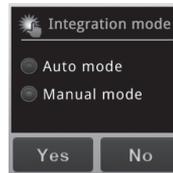
3.4 Measurement Setting Introduction



Save Format Setting :



Integration Mode Setting :



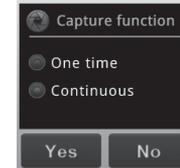
Integration Time Setting :



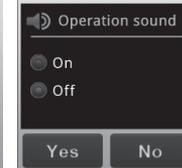
Long time exposure Setting :



Capture Function Setting :



Operation Sound Setting :



Sampling time Setting :



Flicker resolution Setting :



+ / - : Adjust key
Yes / No : End of the setting



3.4 Measurement Setting Introduction

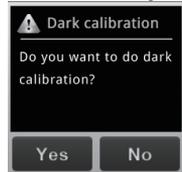
Frequency domain(start) :



Frequency domain(end) :



Dark calibration Setting :



Keyboard Setting :



Keypad ON: The keypad interface will show up when saving file, which allows you to rename the file.

Keypad OFF: It will skip the keypad interface when saving files, and name the file automatically.

Keyboard Instruction :



Key in the number or English letter.

Select it to show the input value on the upper side.

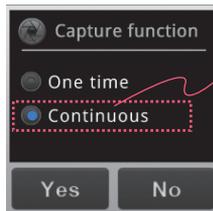
Delete the input English letter or number.

Confirm the input value and save it, then return to the interface.



3.5 Continuous Measurement Introduction

1

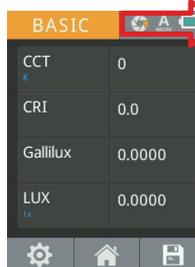


Select Continuous

2



3



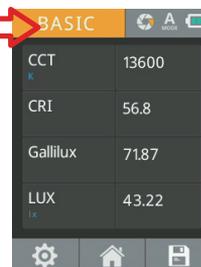
Basic mode (start measurement) press capture key



※ The capture symbol is rotating when HATO ONE is processing continuous measurement.

HATO ONE will process measurement with interval of 3 seconds.

4



Basic mode (after measurement) Press the capture key again to see the measurement results.

Step1. Select the continuous capture

Step2. Press the capture key

Step3. Processing the continuous measurement

Step4. Press capture key again to stop continuous measurement



1. Continuous measurement has no beep sound after press capture key.
2. Users cannot save the measurement data while processing continuous measurement.
3. Adjust the integration time is only allowed in the manual mode.



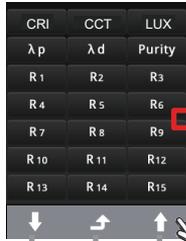
3.6 Customizing BASIC Mode List

The 4 items on the Basic list can be customized with different units of measure (e.g. Gallilux fc, R9, LUX).

1

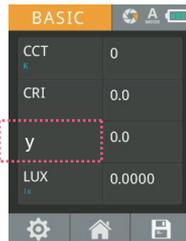


2



Previous page Back to BASIC mode Next page

3



- Step1. Tap the box of measuring unit
- Step2. Select an item from the list
- Step3. The new data item will be displayed



For more information about Measurement Index, please refer to 5.2.

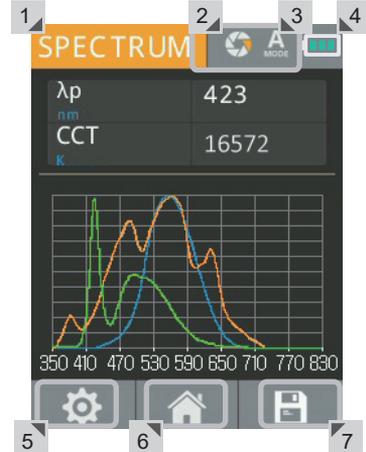
3.7 Instruction of Spectrum Mode



Interface introduction :



Means button



1. Measuring Mode - SPECTRUM
2. Measuring Function - Single operation /continuous operation .For continuous measurement, please refer to 3.5.
3. Exposure Mode -Automatic /Manual
4. Battery Power
5. Measurement Setting - please refer to 3.4.
6. Back to Main Page
7. Store the measured data- please refer to 3.3.



3.8 FLICKER Mode Introduction

Interface introduction :

 Means button



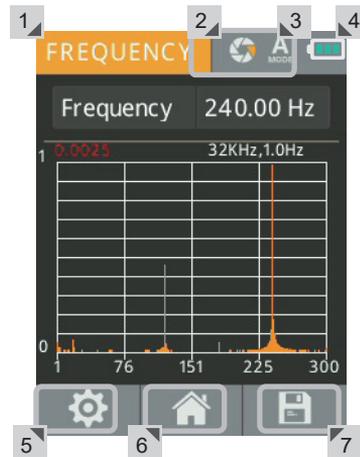
1. Measuring Mode - FLICKER
2. Measuring Function –Single operation  /continuous operation  . For continuous measurement, please refer to 3.5.
3. Exposure Mode -Automatic  /Manual 
4. Battery Power
5. Measurement Setting - please refer to 3.4.
6. Back to Main Page
7. Store the measured data- please refer to 3.3.



3.9 FREQUENCY Mode Introduction

Interface introduction :

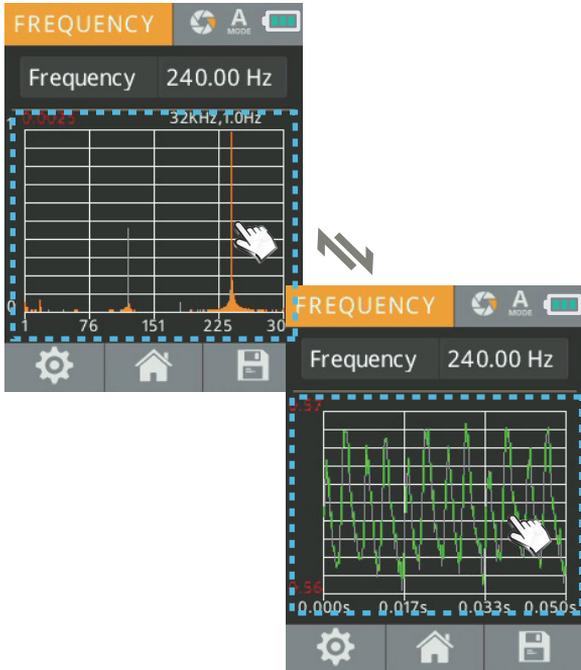
 Means button



1. Measuring Mode - FREQUENCY
2. Measuring Function –Single operation  /continuous operation  . For continuous measurement, please refer to 3.5.
3. Exposure Mode -Automatic  /Manual 
4. Battery Power
5. Measurement Setting - please refer to 3.4.
6. Back to Main Page
7. Store the measured data- please refer to 3.3.

3.9 FREQUENCY Mode Introduction

Touch the graph to switch the table between Frequency.



3.10 ANALYSE Mode Introduction

The analyse button allows you to measure and analyse data of your whole barn trough multiple measurements.

Press ID to select the number of measurements.

Press ID to change to another measuring point.

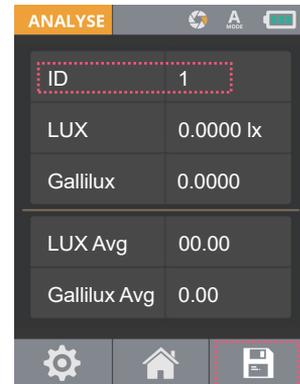
Press Save icon to save the measurements,

When opening measured data on PC a report opens in which the average, minimum and maximum values on:

LUX, Gallilux, Pct Flicker, Flicker index, Fc, CCT, CRI, CRI - R9

Additionally you will get Uniformity: Emin/Eav and Diversity:

Emin/Emax of lux, gallilux and Fc.



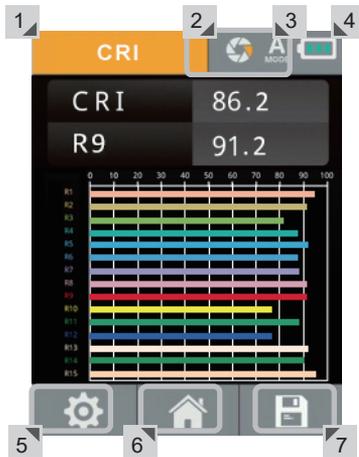


3.11 CRI Mode Introduction

After entering the CRI Mode, user may see the measured data such as CRI R1~R15 and Ra.

Interface introduction :

 Means button

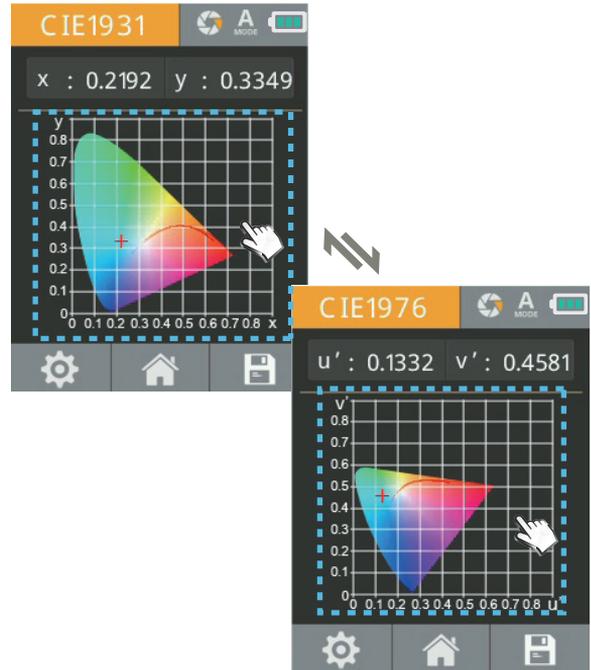


1. Measuring Mode - FREQUENCY
2. Measuring Function - Single operation  /continuous operation  . For continuous measurement, please refer to 3.5.
3. Exposure Mode - Automatic  /Manual 
4. Battery Power
5. Measurement Setting - please refer to 3.4.
6. Back to Main Page
7. Store the measured data- please refer to 3.3.

3.12 Switch Between CIE1931 & CIE1976



Touch the graph to switch the table between CIE1931 and CIE1976.



3.13 Compare Mode Introduction

Users can use the real-time measurement or select the historical measurement data to show the measured light source data with parallel display. We offer four modes that allow you to compare the measurement of the source data: BASIC, SPECTRUM, CIE 1931 and CIE 1976.



Select the "light source" mode you need.

After the measurement is completed, the measured light source data are compared by parallel display.

3.14 BROWSER Mode Introduction

The Browser (on Home Screen) allows you to review historical data that was previously saved to the SD card.



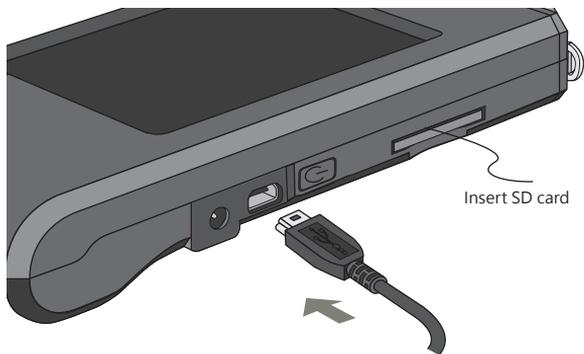
- Step1. Press the "BROWSER" icon
- Step2. A file browser will show the files on the SD card.
If you select an excel file, a review menu will be displayed.
- Step3. Press any of the icons to review the data.
- Step4. Displaying the data of excel file .



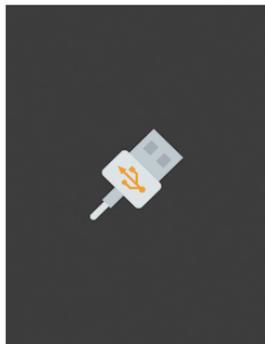
3.15 Transferring Data with PC Connection

Storage the measurement data :

Inside the package has a USB cable, connect the mini USB to HATO ONE and plug the USB to your PC then you can read the data saved in SD card.



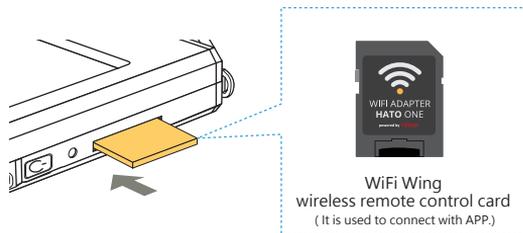
After connected USB cable, HATO ONE will display as below.



3.16 Connecting with Mobile APP

WiFi Wing wireless remote control card

Insert WiFi Wing card to the system. At IOS or Android platform, download HATO ONE APP and install it on your mobile. Then you can connect it with system for the measurement of wireless control.



※For more operation, please refer to Wing user manual.
Please visit UPRtek official site, <http://www.uprtek.com>

Install APP

Download and install the HATO ONE APP on your Mobile.



2 Select WiFi HATO ONE



Measure





3.17 Connecting with uSpectrum

Install uSpectrum PC software

Please visit UPRtek official site, <http://www.uprtek.com>, Download and install uSpectrum software on the PC. Then you can connect it with the system for USB control of measurement.



uSpectrum
Install file



Set USB PC connection mode

1



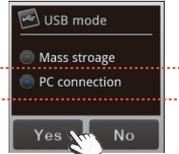
Select "Option".

2



Select "USB mode".

3



Select "PC connection"
and press Yes.

Measure



USB connection



uSpectrum PC software

4

Specification

4.1 Product Specification

4.2 Product Appearance and Dimension

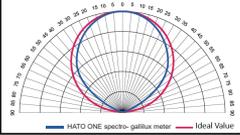


4.1 Product Specification

Spectrum	
Sensor	CMOS Linear Image Sensor
Wavelength Range	350 to 780 nm
Wavelength Data Increment	1 nm
Spectral Bandwidth	Approximately 12 nm (Half Bandwidth)
Wavelength Reproducibility	$\pm 1 \text{ nm}^{-1}$
Measurement Range	5 to 100,000 lx
Illuminance Accuracy	$\pm 2.5\%$
Illuminance Repeatability (2σ)	0.2% (100 ~ 100,000 lx) 0.5% (5 ~ 100 lx)
Color Accuracy	± 0.002 in CIE 1931 x,y (100 to 100,000 lx) ± 0.0025 in CIE 1931 x,y (5 to 100 lx)
Color Repeatability (2σ)	0.0002 in CIE 1931 x,y (500 to 100,000 lx) 0.0004 in CIE 1931 x,y (30 to 500 lx) 0.001 in CIE 1931 x,y (5 to 30 lx)
CCT Accuracy	$\pm 2\%$
Stray Light	-25 dB max.^{-3}
Integration Time Range	100 us to 1,000 ms
Digital Resolution	16 bits
Flicker	
Measurement Range	5 to 100,000 lx
Sampling Rate	100k sample/sec
Frequency Range	5 to 50k Hz
Frequency Resolution	2, 4, 8, 16, 32 Hz
Flicker Accuracy	$\pm 5\%$
Feature	
Capture Function	One time/Continuous
Operation Mode	Standalone Mode/WiFi Mode ⁴ /USB Mode (MSC Mode ⁵ + PC connection)
Integration Mode	Auto/Manual
Measuring Modes	1. Basic Mode
	2. Spectrum Mode
	3. CIE 1931/1976 Chromaticity Mode
	4. Flicker Mode
	5. Frequency Mode
	6. Browser Mode
	7. Option Mode
	8. Compare Mode
	9. Analyze Mode
Measuring Capabilities	1. Illuminance (LUX)/Foot Candle (fc)
	2. Gallilux
	3. Correlated Color Temperature (CCT)
	4. CIE Chromaticity Coordinates (1) CIE 1931 XYZ Value
	5. Dominant Wavelength (λ_d)
	6. Color Rendering Index (CRI, Ra)/R1 to R15
	7. Flicker Frequency
	8. Percent Flicker
	9. Flicker Index

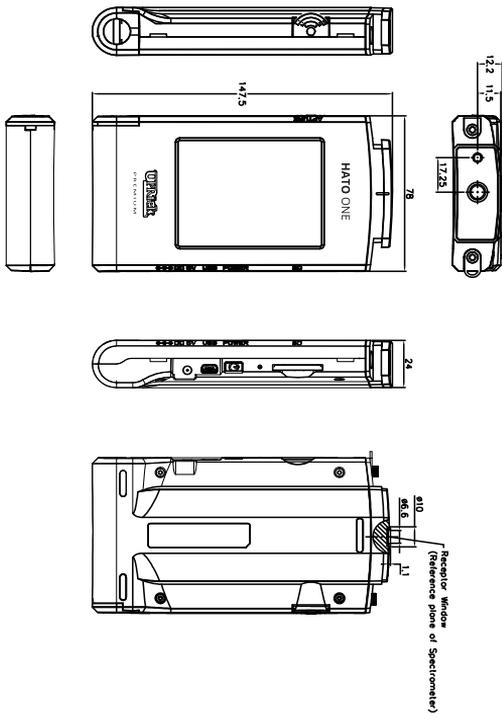


4.1 Product Specification

Measuring Capabilities	10. Peak Wavelength (λ_p)
	11. Peak Wavelength Value (λ_{pV})
	12. Scotopic and Photopic Ratio (S/P)
System Configurations	
Display	3.5" 320X240 Resistive Touch LCD
Max. Files	\approx 68,000 Files @ 8GB SD Card (Excel + JPG)
Battery Operation Time	\leq 5 hours / Fully Charged
Power	Adapter; 2500 mAh (3.7V Rechargeable Li-ion Battery)
Data Output Interface	SD Card (SD2.0,SDHC/up to 32G)/Mini USB Port (USB 2.0)/WiFi SD Card compatible with iOS and Android
Data Format	Compatible Excel/JPG
Dimensions	147.5 x 78 x 24 mm (H x W x D)
Weight (with Battery)	225 g \pm 10 g
Operating	0 to 35 °C, relative humidity 70% or less without condensation
Storage Temperature/Humidity	-10 to 40 °C, relative humidity 70% or less without condensation
Display languages	English/Traditional Chinese/Simplified Chinese/Japanese/Spanish/German/French/Italian/Russian
Cosine Correction	
	<p>*1 : Input source must be a stable light source.</p> <p>*2 : Temperature $23 \pm 2^\circ\text{C}$ and relative humidity 50% or less.</p> <p>*3 : Input the 550nm monochromatic light and measure the stray light ratio at 550nm \pm 40nm.</p> <p>*4 : It can be connected to mobile phones and tablets.</p> <p>*5 : MSC Mode - Mass Storage Class.</p> <p>The company reserves the right to change product specifications at any time without prior notice.</p>



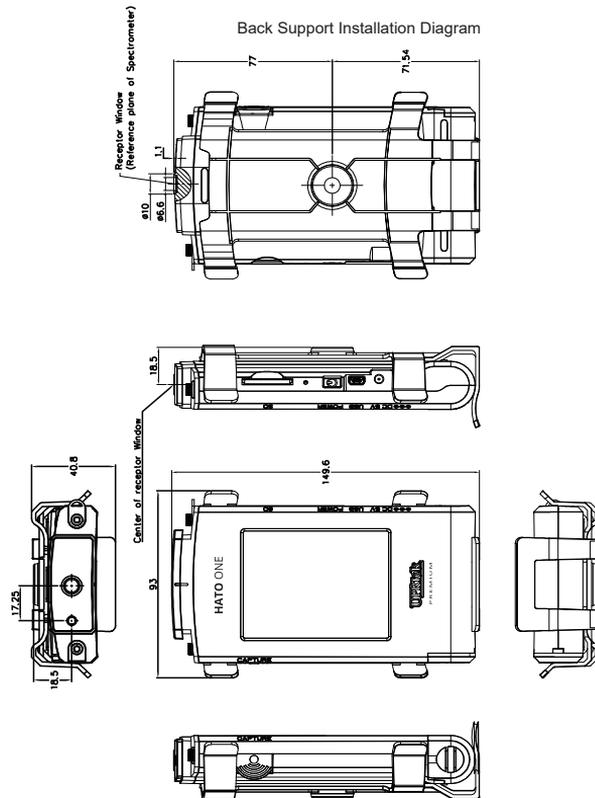
4.2 Product Appearance and Dimension



Unit: mm



4.2 Product Appearance and Dimension



Unit: mm

5

Appendices

- 5.1 Product Warranty Terms
- 5.2 Measurement Indexes
- 5.3 Q&A



Warranty Principles

UPRTEK provides the service of repairing or changing equivalent products for the customer in case of the material or functional defect and fault during the product warranty period.

1. Changing new product:

- If the consumer finds any functional defect or fault or finds any part missing within 7 days after purchasing the product, it should consult the original seller and report to the vendor immediately. Moreover, it should leave the contact information, so the customer service personnel of the original vendor will check it out and generate the number of changing new product for the customer. In this case, the original vendor provides the service of "changing new product" within 7 days.
- The customer should return the product to the original vendor within 30 days after getting the repair number. As for the international customer, it permits the flexibility of logistical time and expands the time for returning the product to the original vendor.

Remarks: It requires complete package when returning the product to the original vendor. There should be no part missing or scratch on the surface unless the part is found missing when the product is delivered. Under this circumstance, the original vendor reserves the ultimate right to determine whether to change new product.

2. Repair service:

- If it exceeds the period for changing new product (seven days), the functional non-compliance or defect found on the product should go through RMA workflow. When any product needs to be returned to the original vendor for repair, it should consult the business service personnel via Email, fax or phone call to apply for repair number before returning the product to the original vendor for repair service.



- After the original vendor receives the returned product, the internal engineer of the Company will check it initially and confirms the causes for product defect. If it is within the warranty period and it is the functional fault of the product, it should follow the general repair workflow. However, if the engineer checks it is human damage rather than functional fault, it is inapplicable to the warranty term.

Remarks: To avoid damage during the product transportation, we strongly recommend choosing international express service and protecting the product carefully.

Limited Warranty

The warranty term is inapplicable to the damage caused by unnatural or external factors, such as the following circumstances:

1. When the fault is caused by the natural disaster and improper human operation rather than the product itself;
2. When the product is repaired or disassembled by others rather than the technician authorized by the company;
3. When the warranty volume label or disassembly-proof volume label is modified, damaged or gone;
4. When the product serial number is wrong, damaged or unclear.

Exemption from Liabilities

- UPRTEK is not liable to the product defect or damage caused by any factor during the transportation of sending HATO ONE series product for repair. It is recommended taking out the storage device, packing and transporting the product properly on your own before sending the product for repair.
- UPRTEK is not liable to the compensation for the operation loss, expected cost loss, data loss caused by or related to the usage of the product of the Company, as well as any other indirect, accident or derivative loss or damage provided it is permitted by the laws.



Applicable Subjects for Warranty Terms

UPRTEK's warranty service terms are only applicable to the consumers who purchase the company products through formal or legal sales channels.

Warranty Period

1.Host of HATO ONE series product:

UPRTEK provides two years of warranty service for all HATO ONE series products, with free calibration service for one time.

2.Product supplies and related accessories:

The product suppliers and the related accessories such as battery, tripod and neck strap, are excluded from the warranty service.

Services Provided by Authorized Agent or Distributor

- The qualifies agent or distributor may receive or deliver the host of HATO ONE series product for basic inspection, so as to confirm whether the device needs to be returned to the original vendor for further calibration service.
- URL of qualified agents or distributors: www.uprtek.com.
- The basic inspection service provided for the consumer is charged based on the announcement made by UPRTEK.

Other Notes

UPRTEK doesn't produce or manufacture all materials and parts of the product. If the target material and part is discontinued within the warranty period, UPRTEK is entitled to replace it with equivalent alternative to finish repair.

Sending for Repair

Consumer may send the product back to the original vendor RMA repair service through either of the following two methods:

- The consumer sends the product to UPRTEK's agent or distributor which will return it to the original vendor for repair.
- The consumer sends the product to UPRTEK for repair directly.



Service after Warranty Period

If any damage or fault occurs to HATO ONE series product after two years of warranty period, the consumer may still return the product to UPRTEK for repair. However, the repair service should be charged based on the product fault or damage condition. If the engineer finds the following situations, it is suggested purchasing new product:

- The HATO ONE series product or part is not available anymore;
- The functions of the device can't be recovered due to the damage caused by water, strong collision, serious contamination or corrosion.
- The product is deformed due to falling or strong collision, and the functions can't be recovered even if the main parts are replaced.
- The product is aging or used in adverse environment, so many parts don't work normally. In this case, it has to be changed.
- The part is not available even if it is it the warranty period.



5.2 Measurement Indexes

Abbreviation	Full Name	Unit	Description
CCT	Corelated Color Temperature	K (kelvin)	The color temperature is the color radiated by a black-body radiator under different temperatures. CCT has the color that is the closest to the ideal black-body radiator.
CRI (Ra)	Color Rendering Index	---	As defined by CIE, R1~R8 represent the value of eight standard colors, while CRI(Ra) is the average value of R1~R8. The value 100 indicates the best quality of light source, while the value 0 indicates the worst quality of light source.
R1、R2R15	Rendering Index	---	It represents the quality of light source, with the indexes corresponding to 15 standard colors, including: R1: light grey-red; R2: dark grey-yellow; R3: saturated yellow-green; R4: middle yellow-green; R5: light

next page



5.2 Measurement Indexes

			yellow-green; R6: light blue; R7: light purple-blue; R8: light red-purple; R9: saturated red; R10: saturated yellow; R11: saturated yellow; R12: saturated yellow; R13: white skin color; R14: Leaf green; and R15: yellow skin color.
LUX	Illuminance	lx	The measure of light intensity. The corresponding unit for lux in English and American units is the foot-candle. One foot-candle is approximately 10.764 lux.
Gallilux	---	---	The measure of light intensity as perceived by poultry.
λ_p (LambdaP)	Peak wavelength	nm	It is the wavelength with the highest power in the measured spectrum.
λ_{pV} (LambdaPV)	Peak wavelength value	mW/m ²	It is the highest power in the measured spectrum, in the unit: mW/m ² .



5.2 Measurement Indexes

Abbreviation	Full Name	Unit	Description
λ_d (LambdaD)	Dominant wavelength	nm	The dominant wavelength is used to express the color of the measured light. It could be hybridized by the spectrum color of the wavelength and the standard illuminant E(x,y = 0.333, 0.333).
I-Time	Integration time	ms	The integration time measured by the spectrometer.
x y X Y Z	CIE1931 color coordinate	---	The color coordinate was built by CIE in 1931.
u' v'	CIE1976 color coordinate	---	The color coordinate was built by CIE in 1976.
Duv (Δ_{uv})	CIE1960 uv color coordinate difference	---	It is the uv distance between CIE1960 coordinate and the Planck's blackbody radiation with the same color temperature. The value close to 0 indicates the color temperature and color are

next page



5.2 Measurement Indexes

			closer to that of the blackbody radiation. The positive value indicates it is above the blackbody radiation, while the negative value indicates it is below the blackbody radiation.
Δx (deltax) (dx)	CIE1931 x color coordinate difference	---	It is the x difference between CIE1931 coordinate and the Planck's blackbody radiation with the same color temperature.
Δy (deltay) (dy)	CIE1931 y color coordinate difference	---	It is the y difference between CIE1931 coordinate and the Planck's blackbody radiation with the same color temperature.
$\Delta u'$ (deltau) (du)	CIE1976 u' color coordinate difference	---	It is the u' difference between CIE1976 coordinate and the Planck's blackbody radiation with the same color temperature.
$\Delta v'$ (deltav) (dv)	CIE1976 v' color coordinate difference	---	It is the v' difference between CIE1976 coordinate and the Planck's blackbody radiation with the same color temperature.



5.2 Measurement Indexes

fc	Footcandle	fc	It is based on the unit of lm/ft^2 .
S/P (SP-ratio)	Scotopic vision/ photopic vision ratio	---	The sensitivity of human eyes varies with the light of different wavelength. It can get the data such as illuminance based on the brightness function. However, the brightness function is different for human eyes under high brightness and low brightness. Therefore, it defines the ratio of photopic vision under high brightness and scotopic vision under low brightness, which is called S/P ratio.
W/m^2	Irradiance	W/m^2	It is the irradiance within the range of the wavelength specified in the specification.
Findex (Flicker Idx)	Flicker index	---	Flicker index= Area above the mean value /area below the mean value. Higher value represents obvious flicker.



5.2 Measurement Indexes

Fpercent (Flicker Pct)	Flicker percent	%	Flicker percent=(Maximum value - minimum value)/ (Maximum value + minimum value). Higher value represents obvious flicker.
Freq (Frequency)	Flicker Frequency	Hz	It is the flicker rate of the measured light, or the frequency shown per second.



5.3 Q&A

The following situations are not fault. Please double check it before requesting for repair. If it doesn't work normally after the inspection, it could be caused by fault of the device. In this case, please take out the battery and contact the seller or the vendor for repair.

State	Inspection item	Solution
Power-on failure (No display)	Check whether the battery is installed correctly.	Please don't install the battery inversely, or push it in violently, which may destroy the battery spring.
	Check whether the battery runs out of power.	Please charge the battery for 6 hours for the first use. (Please refer to 2.1)
	Check whether the battery connector is dirty.	Please wipe it with dry cloth.

Item	Solution
Why I feel the card is stuck when inserting and unplugging it?	It is the anti-shedding function designed specially. It prevents SD card shedding in case of collision under external force, which may cause write-in error.
What is the function of dark calibration? Do I need to perform dark calibration at every startup.	The dark calibration is also known as zero calibration. As the temperature change of the environment affects the measurement results, the user is suggested performing dark calibration before measurement, so as to improve the measurement accuracy. (As for the calibration instruction, please refer to 2.6).
Why my SD card can't be used on HATO ONE?	The SD card should be formatted into FAT before being inserted into HATO ONE. Moreover, the memory of SD card is required to be 1G or higher.



To get more information related to operation, firmware upgrade and warranty terms; online application for correction and Repair service, please contact one@hato.lighting