

Color Meter MK350S



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Introduction

1

1.1 Features

1.2 Package Contents

1.3 Product Description

1.4 Annual Product Calibration

1.5 Product Notes and Precautions

1.1 Features

The MK350S is a lightweight, portable, easy-to-operate LED meter with WiFi remote control operations and SD card data storage. This product has basic features for fast, easy LED readings, as well as advanced light analytics, and efficient work-flow features for LED production environments.

Features

- Enhanced screen resolution improvements from predecessor models
- More than 30 light unit-of-measures to choose from
- Standalone LED meter – No other equipment necessary (e.g. PC, Smartphone etc.)
- Illumination distribution charts provide assistance in fixture design
- “BIN” ranking features allow for fast CIE 1931 inspection and confirmation of LED quality
- Visual aim ‘n click display (on-screen viewport) - No more blind measurements
- Automatic continuous measurements with data-save to an SD card
- Easy, on-the-spot data comparison features – Comparing 2 LEDs, or comparing against historical data
- Maximum and minimum acceptable ranges for evaluating LED quality.
- Built-in file browser allows for quick access to previously saved data

1.2 Package Contents



Case



MK350S LED Meter



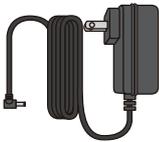
Protection Bag



Battery



USB Cable



Power Adaptor



Screen Wipe



Strap



Neck Strap



User Manual and Warranty



Tripod / Stand Bracket

1.3 Product Description



1.4 Annual Product Calibration

This product is a high-precision measurement device with sensitive components – handle with care. To ensure the accuracy of measurements, it is recommended to have the unit calibrated once a year. Please contact your agent or our customer service department for calibration service.

1.5 Product Notes and Precautions

1. The MK350S LED Meter contains sensitive components. Please unpack with care, as any trauma to the unit may damage the equipment. Contact your agent if the unit appears not to be operating normally. Do not attempt any repairs – all repairs must be performed by qualified service agents.
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.



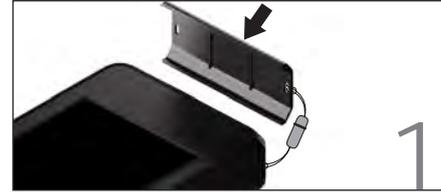
Precautions / Warnings

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

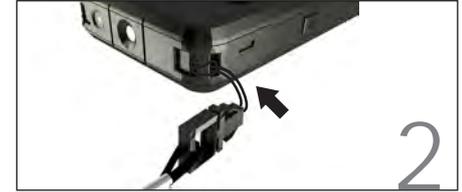
- Do not disassemble or modify the battery.
- Do not expose the battery to heat (fire) or water/moisture.
- When disposing used/old batteries, wrap with insulation tape to shield the battery from electrical contact with metallic objects, which might ignite a fire or explosion.
- If the unit is plugged 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 accidently 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.

Product Setup

2



Attach the “Sensor Cover” using the cover strap (attachment wire) and the strap holes.



You can attach a lanyard (neck strap) onto one of the two strap holes on top of the corners of the MK350S unit.



Remove the back cover from underneath the MK350S by inserting your fingernail into the notch, located below the end of the cover, and sliding your nail along the underside of the edge to unhinge one side - do the same for the other side.



Install the battery as shown with the correct orientation. The battery will install in only one direction – do not force the battery in.



Replace the back cover.



Use the Power Adapter cable supplied in the packaging to connect it to the MK350S and charge the battery – the battery recharge light will flash if recharging and will stop flashing when fully charged.
(Charge for 6 hours on this first time use)



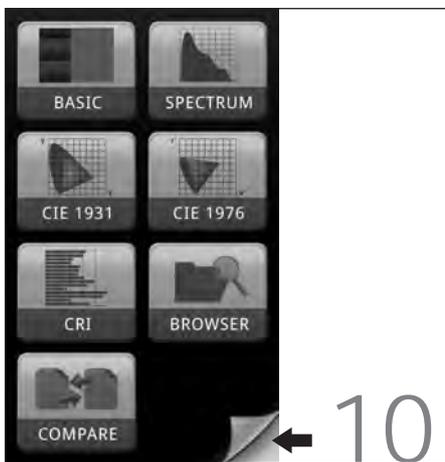
7
While the unit is charging, set the Date and Time by turning on the MK350S by pressing the On/Off button on the right side of the unit. A green light, on the same side as the On/Off button, will illuminate.



8
The MK350S will initialize and then an MK350S splash screen will display.

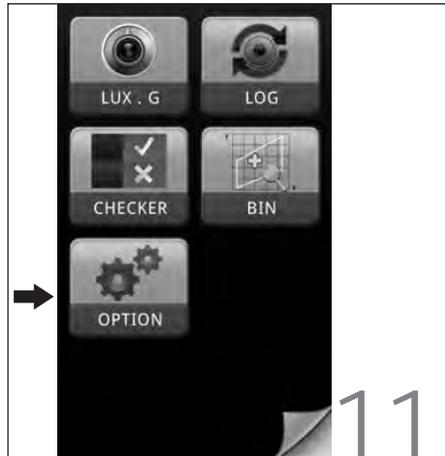


9
The unit will ask you if you want to perform a "Dark calibration". Tap "No" on the screen.



10
The Home Screen will appear on the screen.

Tap the "Flip Page" corner to access the second page of menu items.



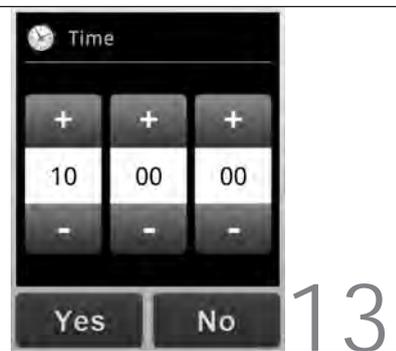
11
Tap the "OPTION" icon.



12
Set the Date or the Time by tapping the items shown above.



13
Set current Date.



Set current Time.

You have completed the product setup.



To turn off the MK350S, press the On/Off button for 5 seconds.

Getting Started

3

3.1 Taking a Measurement

3.2 Extended Warranty

3.1 Taking a Measurement

This section describes how to get started by taking a quick measurement. Note that some of the references to buttons and lights are described in the Product Description section.



Turn on the MK350S by pressing the On/Off button. A green light on the same side as the On/Off button will illuminate.



The unit will ask you if you want to perform a "Dark Calibration". Tap "Yes".

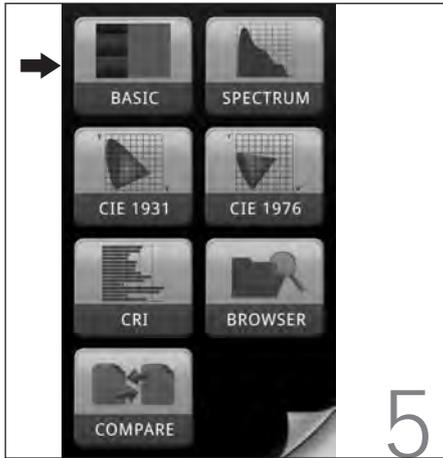


The unit will then ask you to place the "Sensor Cover" over the sensor. Place the cover over the sensor and tap "OK".

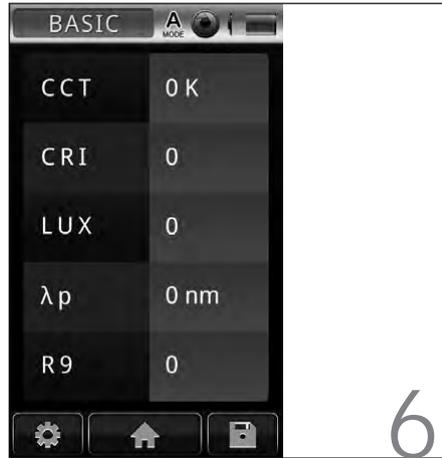


When Dark Calibration is finished, tap "OK" again.

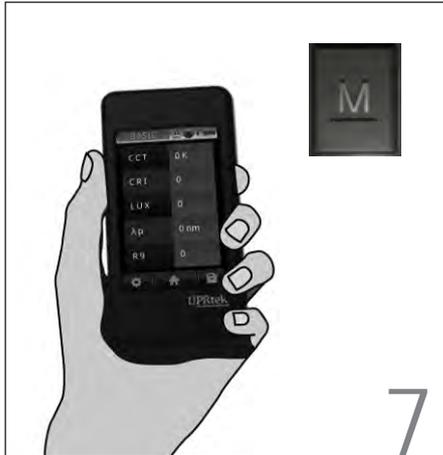
3.1 Taking a Measurement



The Home Screen will appear on the screen, tap the "BASIC" item.



The Basic screen will appear.

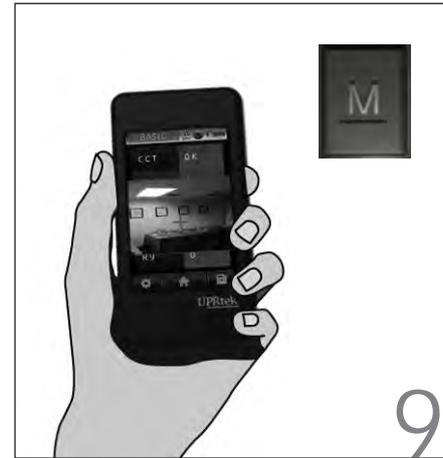


Press the "Measure" button on the left side (marked with an M).



A viewport will display on the screen with a "cross hair" mark in the middle.

3.1 Taking a Measurement



Aim the "cross hair" by pointing the camera lens on top of the unit in the direction of a light. Press the "Measure" button again.



The results will be instantly displayed on the screen.

Congratulations! You've taken your first recording.

4

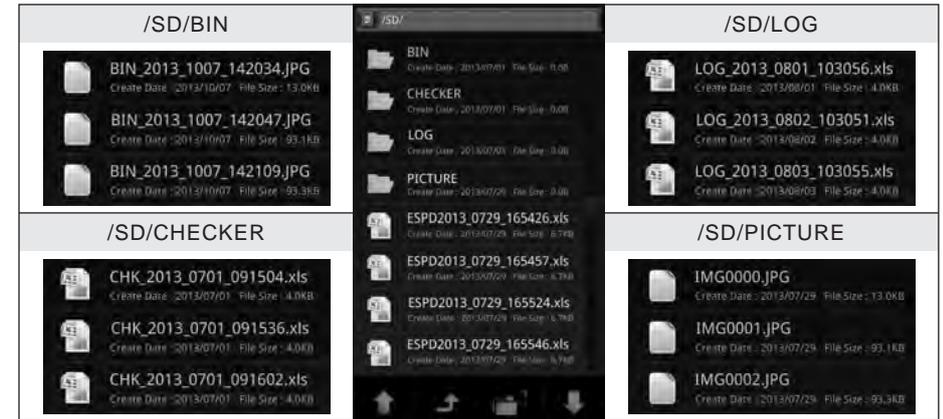
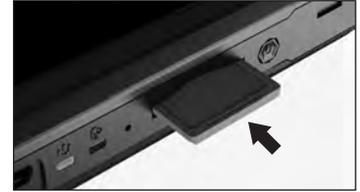
Additional Setup and Notes

4.1 SD Card

4.2 Other Notable Setup Items in OPTION

4.1 SD Card

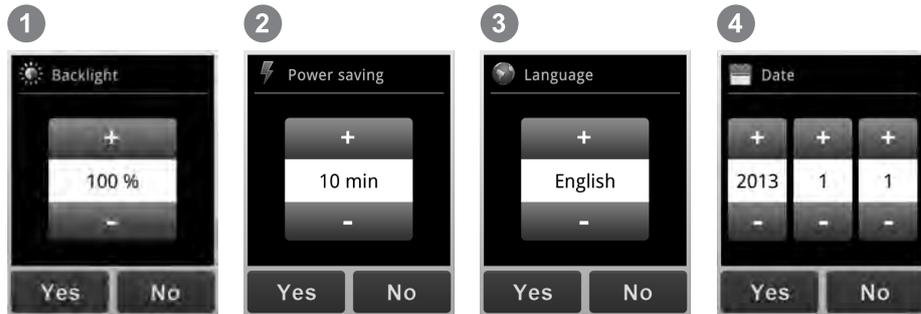
This unit can write measurement data onto an SD Card (only support for above 1GB). Simply insert the card into the card reader slot. Data is written as excel files (.xls) or jpg image files (for light spectrums and color gamuts).



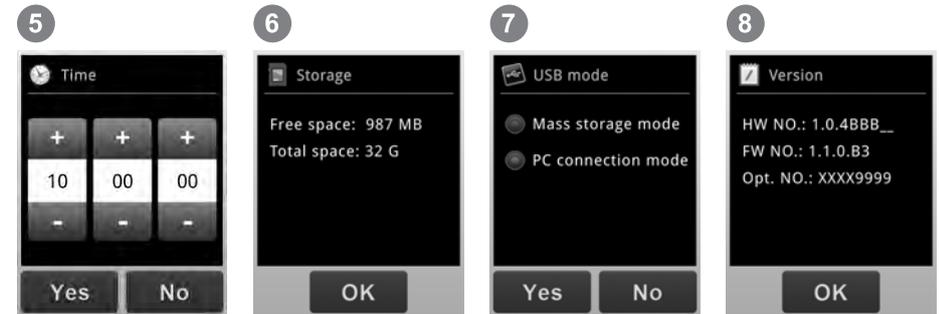
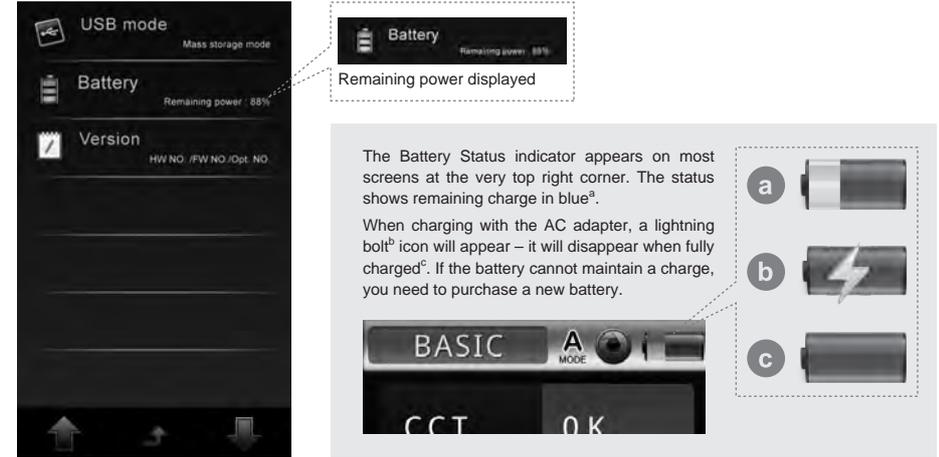
Mode	Excel File	JPG File	Naming Rule
BASIC	✓	✓	Excel File :
SPECTRUM	✓	✓	ESPDYYYY MMDD HHMMSS
CIE1931	✓	✓	JPG File :
CIE1976	✓	✓	IMGYYYY MMDD HHMMSS
CRI	✓	✓	Normal View : IMGYYYY MMDD HHMMSS LUX0
LUX · G		✓	LUX View : IMGYYYY MMDD HHMMSS LUX1
LOG	✓		LOGYYYY MMDD HHMMSS
CHECKER	✓		CHKYYYY MMDD MMSS
BIN		✓	BINYYYY MMDD HHMMSS

4.2 Other Notable Setup Items in OPTION

Other setup items to note in the System Options Menu.



4.2 Other Notable Setup Items in OPTION

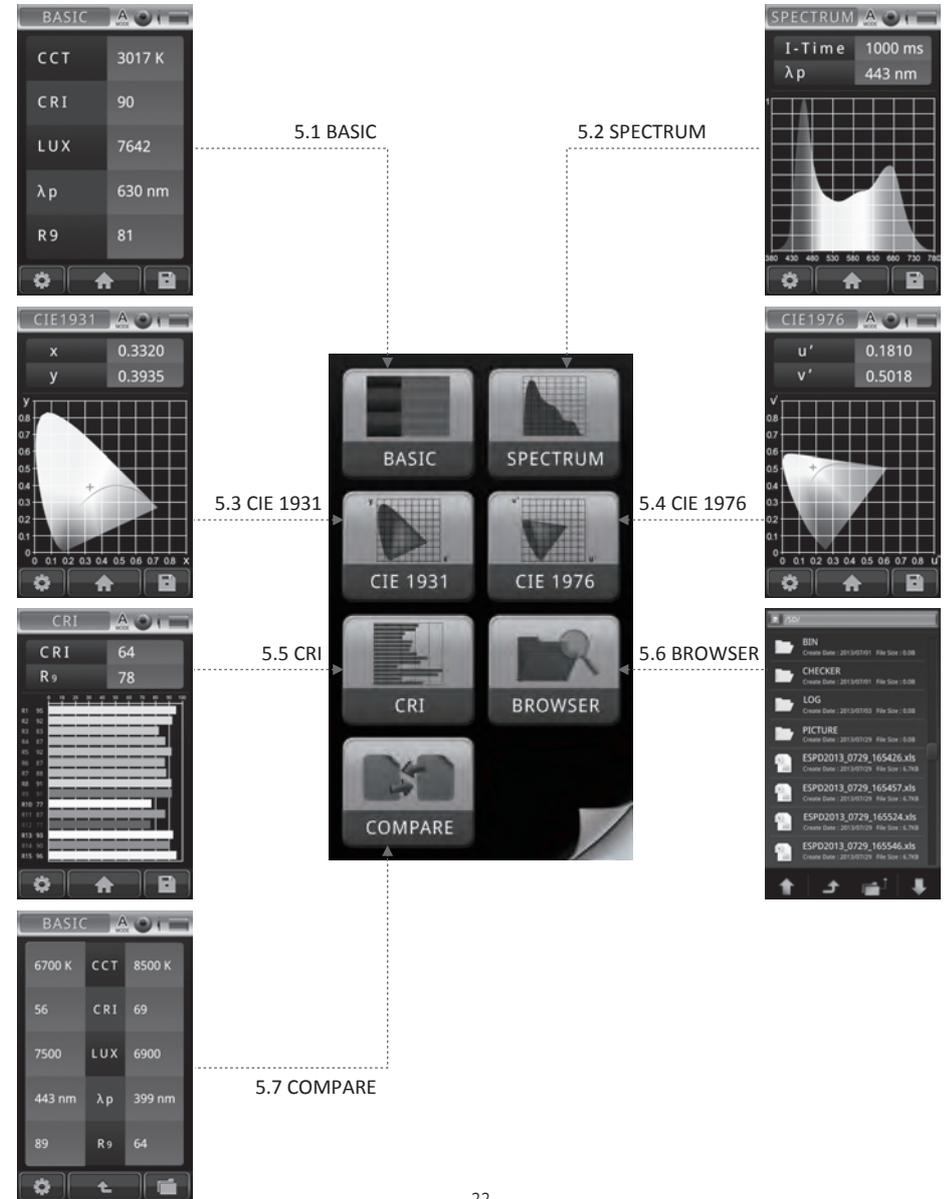


Please refer 5.1 BASIC (P24) for Basic list setup. Other setup options are covered in other sections.

Home Screen (Page 1)

5

- 5.1 BASIC
- 5.2 SPECTRUM
- 5.3 CIE 1931
- 5.4 CIE 1976
- 5.5 CRI
- 5.6 BROWSER
- 5.7 COMPARE



5.1 BASIC

This screen shows a list of light measurements recorded after pressing the “Measure” button as demonstrated in the “Getting Started” section.



BASIC A MODE

CCT	3017 K
CRI	90
LUX	7642
λp	630 nm
R9	81

Settings icons: Gear, Home, Save

Saving Data



You can save your data by tapping the save icon in the lower right corner. All of the data that is present in the Basic list is saved to the SD card and can be recalled through the “Browser” function.

5.1 BASIC

Customizing the Basic List

The 5 items on the Basic list can be customized with different units of measure (e.g. PPF, fc, R9, λp) through the Systems Options, accessed from the Home Screen.

1. Home screen with BASIC button.

2. System Options menu with OPTION button.

3. Settings menu with Basic list option.

4. Confirmation dialog for selecting an item.

5. List of items to choose from:

CCT	CRI	LUX
λp	λd	Purity
R1	R2	R3
R4	R5	R6
R7	R8	R9
R10	R11	R12
R13	R12	R15
x	y	u'
v'	Duv	Δx
Δy	$\Delta u'$	$\Delta u'$

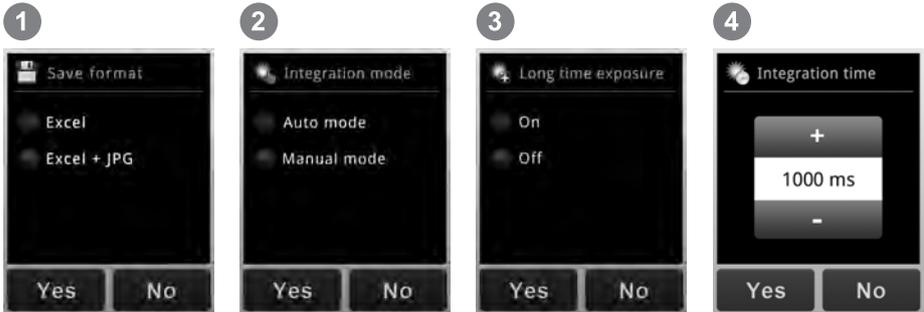
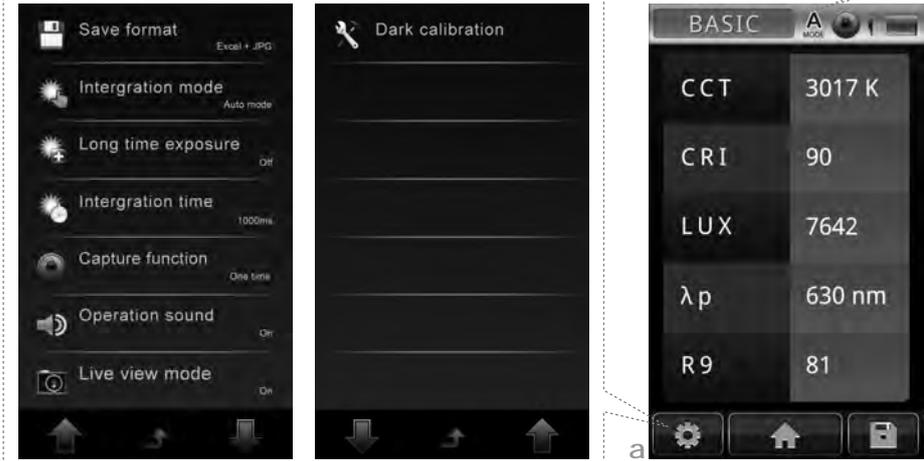
6. Confirmation dialog for updating the list.

Tap on one of the gray boxes⁴ and select an item from the list⁵ and then return to the Basic Mode List – tap “Yes”⁶ to update. The next time you bring up the Basic List, your new data item will display.

5.1 BASIC

Tool Options (Measurement)

This is found on screens like the BASIC screen (also CRI, CIE1931 & CIE1976) where there is a "Tools" icon in the lower left corner^a. Note that this icon is the Measurement Tools Icon as opposed to the System Tools icon on the Home Screen.



When saving data (e.g. from the BASIC screen), you can choose to save to an Excel file, or Excel & JPG files (screen shots)

Integration time can be automatically set by the MK350S (Auto Mode) or Manually (Manual Mode). If Manual Mode is chosen, you must set "Integration time"

This option is turned on in low light conditions (LUX ≤ 50). It allows you to set the Integration time (exposure time) higher.

The length of time, in msec, that the MK350S captures light data in one measurement (like exposure time).

5.1 BASIC

I-Time Setup	A MODE	AL MODE	M MODE	ML MODE
a	Auto	Auto	Manual	Manual
b	Off	On	Off	On
c	6ms 1000ms	1001ms 5000ms	6ms 1000ms	1001ms 5000ms

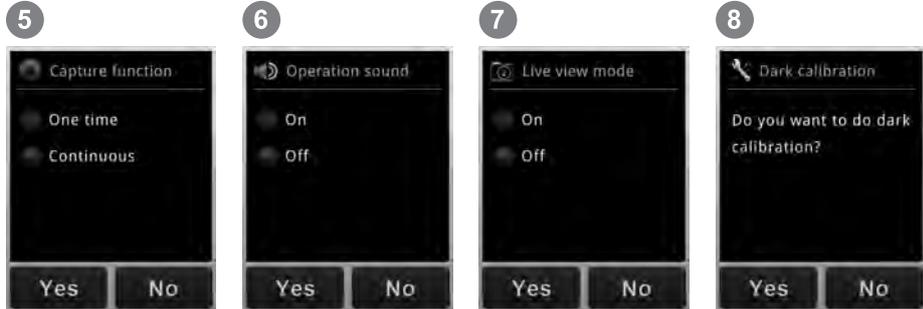
A -Automatic AL -Automatic+Long Time Exposure
M -Manual ML -Manual+Long Time Exposure

a Intergration mode Auto mode

b Long time exposure Off

c Intergration time 1000ms

The system will prompt you to do Dark calibration after you turn on/off "Long exposure time". This procedure will take you around 1min and 15 secs. We strongly recommend that you to execute Dark Calibration every time you on/off "Long time exposure" setup.



You can set the MK350S to take snapshots continuously (Continuous capture). As soon as you press the "Measure" button, the unit will begin to capture at 3 second intervals. Press "Measure" again to stop capturing.

This turns on and off the audible beep that occurs when you take a measurement - it takes up to 3 seconds take a measurement - the unit beeps when it is done.

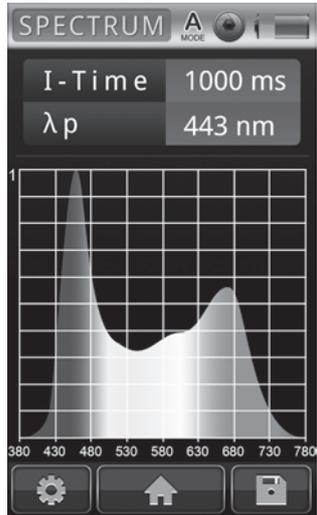
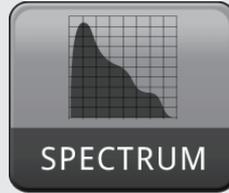
This item gives you the option of reviewing the viewport before you take a measurement with the "Measure" button.

You are always prompted to do a Dark calibration when you turn on the unit. However, you can perform a dark calibration anytime with this option.

1. Continuous capture function allows users to take consecutive measurements and review results quickly without bothering with buttons - however, it does NOT allow you to save data to the SD Card. (see the LOG function for continuous captures with data-save to an SD Card).
2. Live view mode only for BASIC, SPECTRUM, CIE1931, CIE1976, CRI measurements

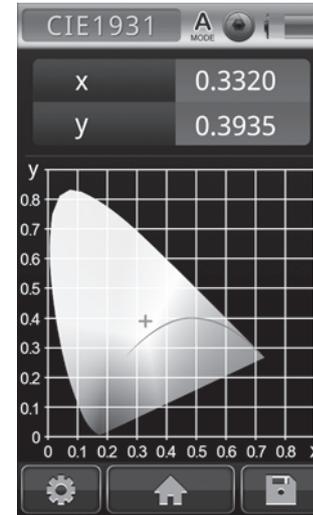
5.2 SPECTRUM

Light Spectrum of the latest measurement taken.



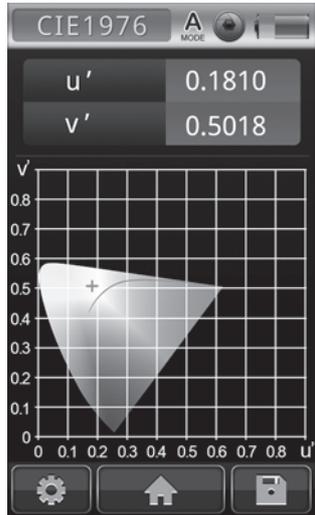
5.3 CIE 1931

The CIE1931 chromaticity x, y values of the latest measurement taken.



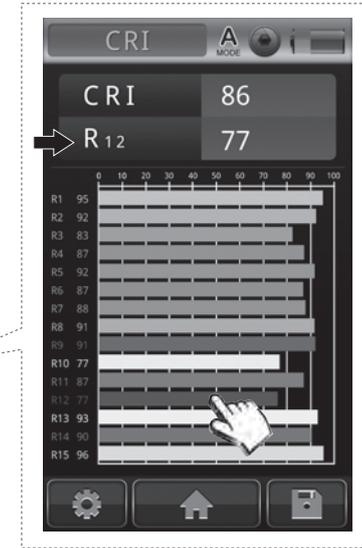
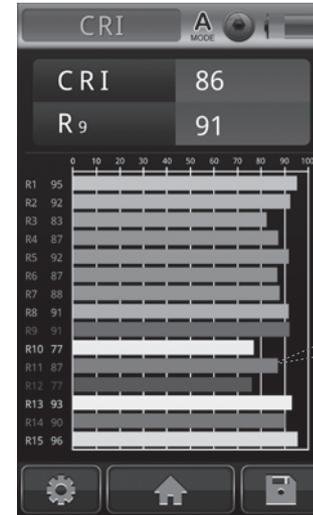
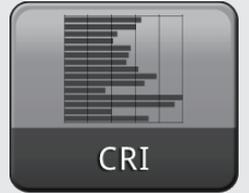
5.4 CIE 1976

The CIE1976 chromaticity u' , v' values of the latest measurement taken.



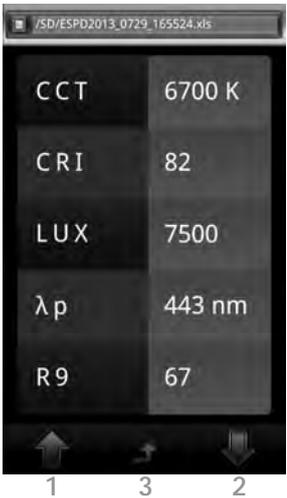
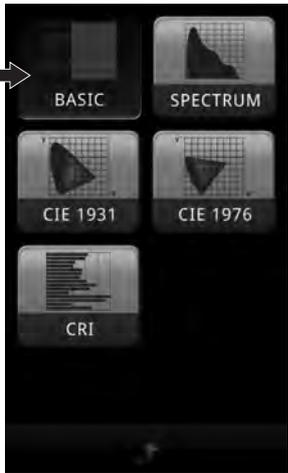
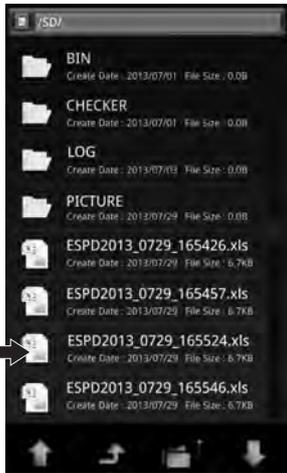
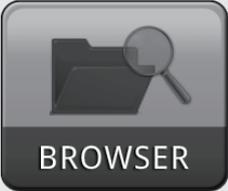
5.5 CRI

The CRI R1-R15 values of the latest measurement taken.



5.6 BROWSER

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



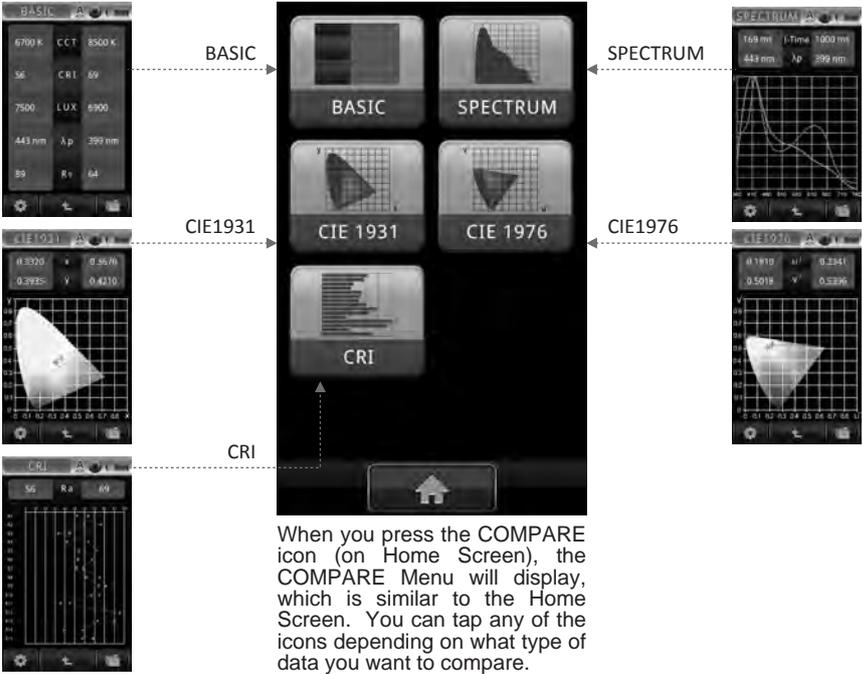
When you press the "Browser" icon, a file browser will display showing the files on the SD card.

If you select an excel file, a review menu will display, similar to the Home Screen. You will have access to all the data and charts that were available when the measurement was taken. Press any of the icons to review the data.

All of the data screens will have 3 navigation icons at the bottom of the screen. The BLUE up¹ and down² arrows will scroll through the other Excel files on the SD card in order, displaying the same data items. The RED³ up arrow will return you to the previous screen.

5.7 COMPARE

The Compare item allows you to compare two measurements side by side. You can compare two consecutive measurements or compare a measurement against historical data (SD card).



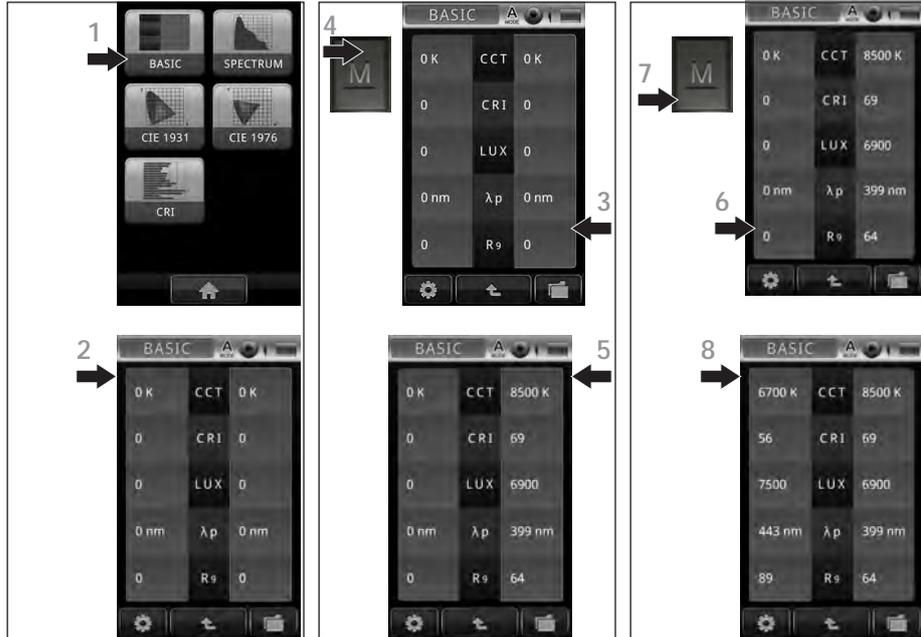
When you press the COMPARE icon (on Home Screen), the COMPARE Menu will display, which is similar to the Home Screen. You can tap any of the icons depending on what type of data you want to compare.



The examples in the following pages only describe how to compare data in the BASIC and SPECTRUM screens, - comparing CRI, CIE 1976, CIE 1931 data are similar.

5.7 COMPARE

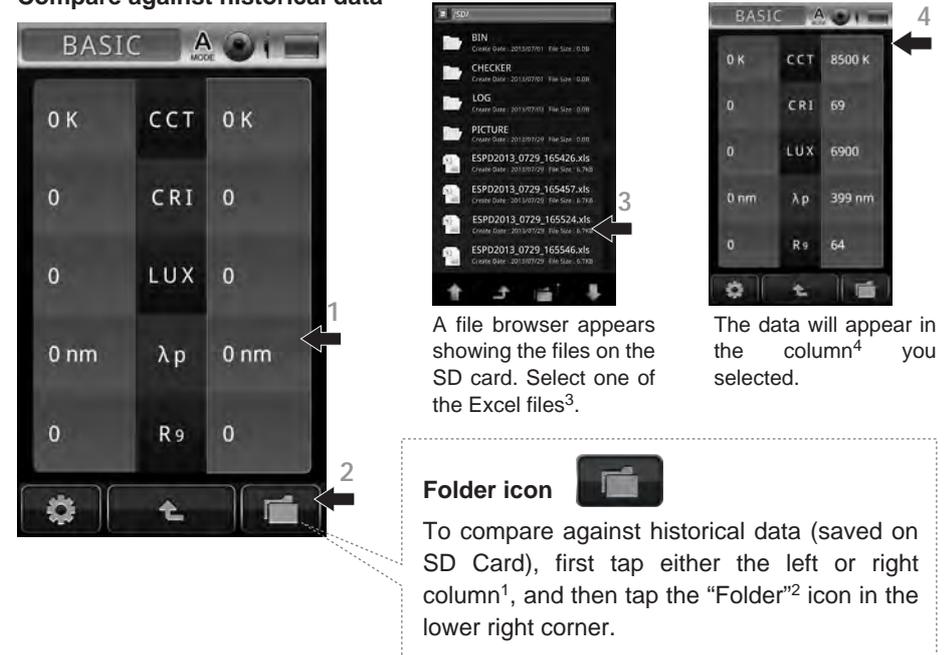
Compare two consecutive measurements



1. Select the BASIC icon
2. The left column and right column will represent the data you are comparing.
3. First, tap the right column. A green border will appear around the right column.
4. Point the MK350S to a light source and take a measurement.
5. The measurement data will fill the right column.
6. Next, tap the left column. A red border will appear.
7. Take another measurement.
8. The new data will fill the left column. You can now compare the two measurements.

5.7 COMPARE

Compare against historical data



A file browser appears showing the files on the SD card. Select one of the Excel files³.

The data will appear in the column⁴ you selected.

Folder icon



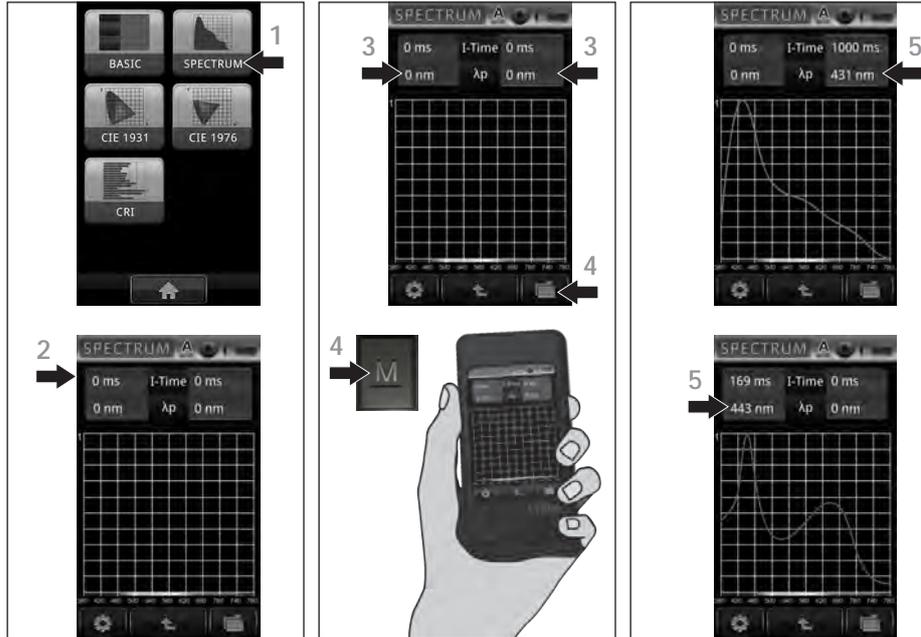
To compare against historical data (saved on SD Card), first tap either the left or right column¹, and then tap the "Folder"² icon in the lower right corner.



The list items in the COMPARE screen (e.g. CCT, CRI, LUX etc.) is the same list configured for the BASIC Screen. If you change the list items on the BASIC screen, it will also change on the COMPARE screen..

5.7 COMPARE

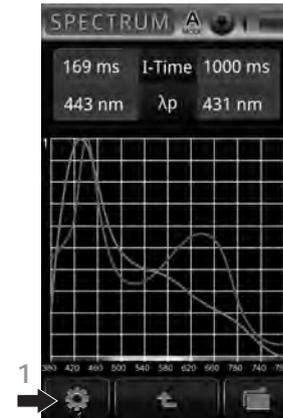
Spectrum data comparison



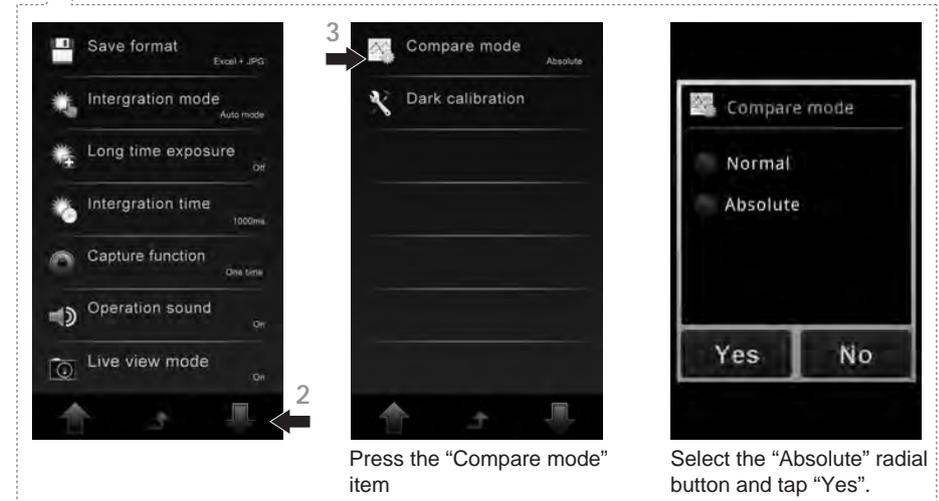
1. Select the SPECTRUM icon.
2. You will get a screen with a similar left/right column format, similar to the Basic List comparison.
3. You can tap one of the columns.
4. Take a measurements or access historical data. (do the same for the other column)
5. The spectrum data will fill the chart with the data in the form of a red graph line and a green graph line, representing the left and right columns respectively.

5.7 COMPARE

It is also possible to see the relative difference between the spectrum data between the first measurement and the second measurement.



Press the Tools icon on the bottom left bottom corner.

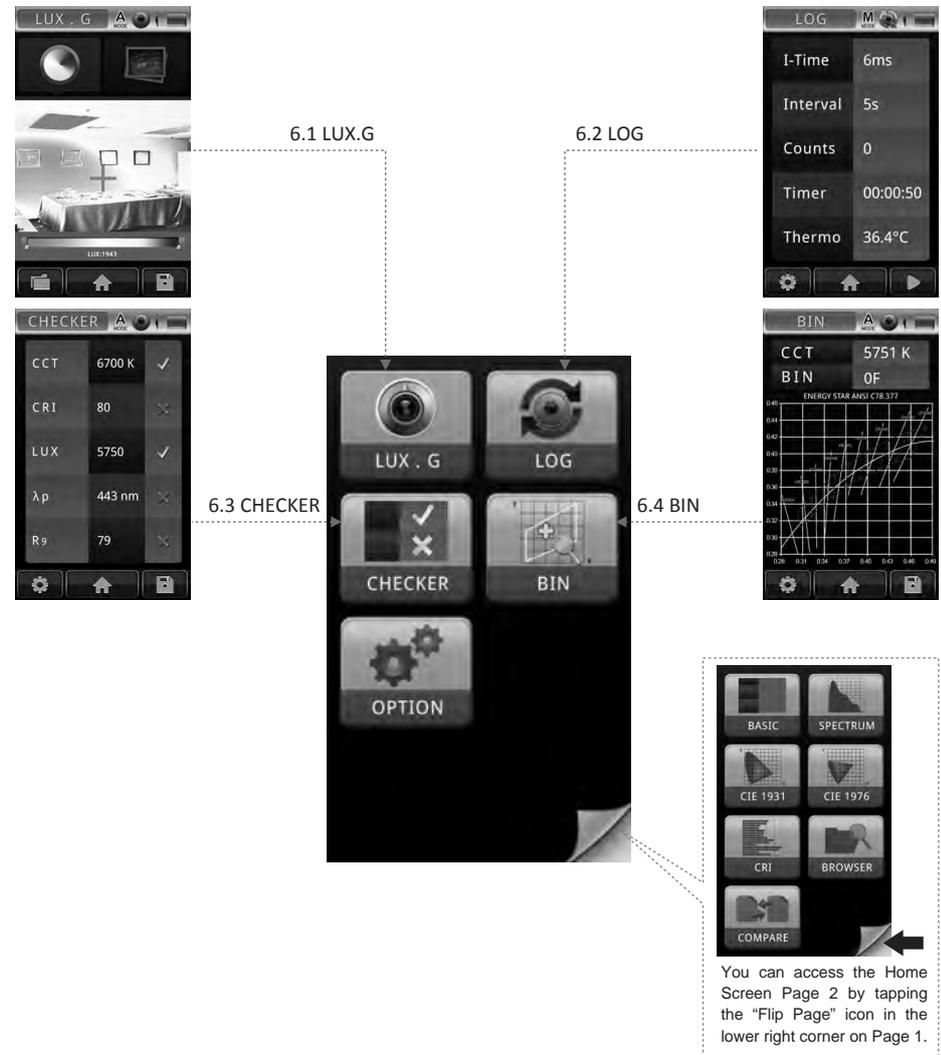


Press the "Compare mode" item

Select the "Absolute" radial button and tap "Yes".

Home Screen (Page 2) 6

- 6.1 LUX. G
- 6.2 LOG
- 6.3 CHECKER
- 6.4 BIN



6.1 LUX. G

The LUX. G item is a unique feature important for interior designers and lighting professionals. It gives a visual representation of light distribution in a scene, giving you a reference for environment light design (homes, libraries, offices, museums etc.).



LUX button
Tap this button in the upper left to view the light distribution.



The LUX. G screen initially displays the viewport in normal view mode.

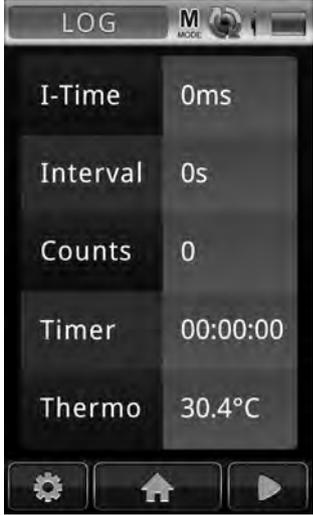
After tapping the LUX button, the light distribution appears in the viewport. The brightest and darkest areas are indicated in the color bar below the viewport (red = brightest, blue = darkest).

Normal View button
Tap this button to return to normal view.



6.2 LOG

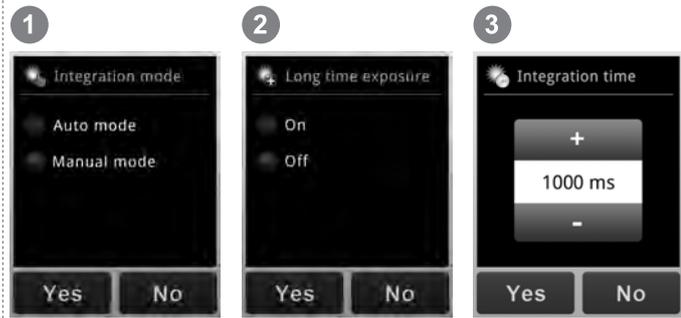
The LOG function is used to continuously capture several measurements in sequence. It is similar to the "Capture" function in the Measurement Tools. However, with Logging, the data will capture AND save to the SD Card.



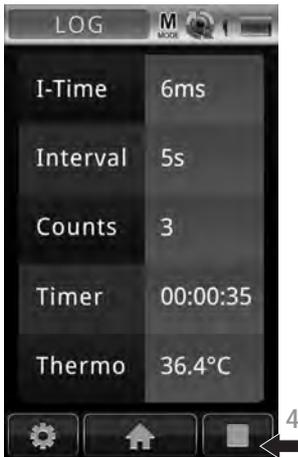
6.2 LOG



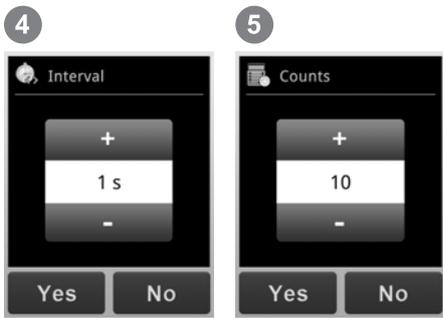
1. Configure the settings by pressing the "Tool" button at the lower left corner.
2. Setup the logging parameters.
3. You can begin a Log session by tapping the play icon in the lower right corner.



6.2 LOG



4. You can stop the logging by tapping the stop icon.



- 1 2 3 Refer P26 for I-Time Setup chart.
- 4 The range of Interval is 1-60 seconds.
- 5 The number of captures or snapshots for each I-Time.

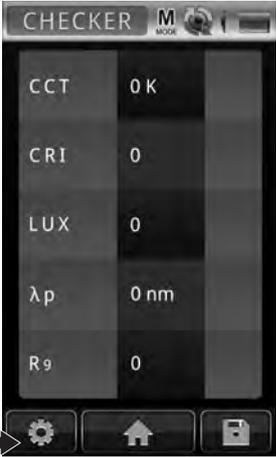
1. I-Time is the "Integration Time" or the amount of time that the MK350S captures light information (similar to exposure time). The Log function allows you to setup Integration Time criteria during the Logging session.
 2. It's recommended to execute Dark Calibration after you turn on/off the "Long time exposure" item.

6.3 CHECKER

The Checker function allows you to see if the values of an LED measurement fall within an acceptable range of values.




Setting the Ranges



1. To set the ranges, tap the "Tool" icon in the lower left corner.



2. Set the maximum and minimum ranges for each of the items in the CHECKER screen.

The list in the Checker screen (e.g. CCT, CRI, LUX etc.) is the same list configured for the BASIC Screen (see P24 Customizing the Basic List). If you change the list on the BASIC screen, it will also change in the Checker screen.

6.3 CHECKER



3. Use keyboard to set the values. Press OK to save the setting.
 ± : plus and minus
 BS : backspace
 OK : save the setting



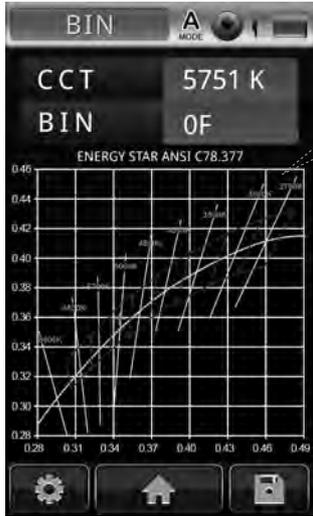
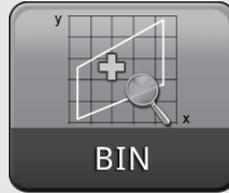
4. You can take a reading by pressing the Measure button.



5. The measurement values will display and the numbers will be compared against preset ranges and display an "✓" (ok) or an "X" (out of range), indicating if the ranges fall within acceptable ranges.

6.4 BIN

The BIN function serves to assist LED manufacturers and buyers in measuring and then classifying LEDs for “Bins” as defined by classifications according to USA Energy Star ANSI C78.377.



When you take a measurement for an LED from this screen, a bin number displays next to the “BIN” label indicating which BIN that LED belongs to based on USA Energy Star ANSI C78.377 standards.

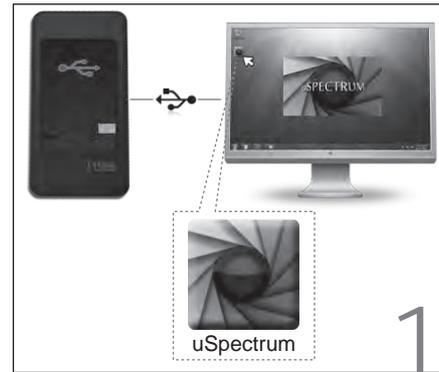
BIN ranking can also be customized by loading a modified BIN chart, using a PC and the uSpectrum software (see Note below).



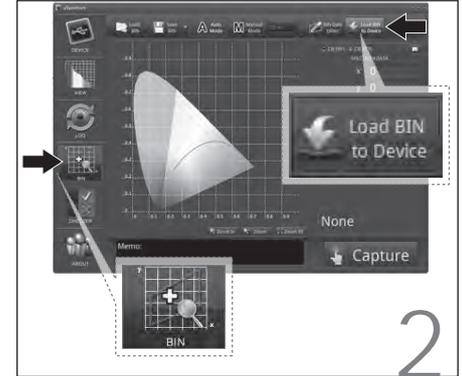
Please make sure you go to the UPRtek website to register licence and download the PC software, uSPECTRUM.

6.4 BIN

To use a modified BIN chart, you must download the new BIN chart, which you create using the uSpectrum PC software.



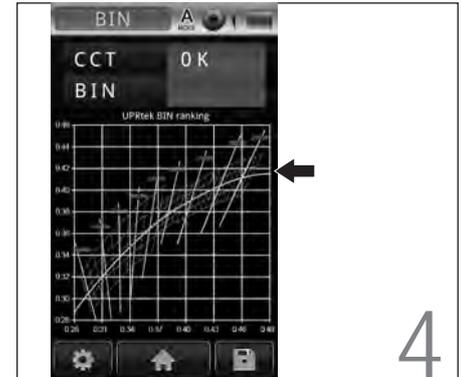
Use a USB cable to connect the MK350S to a PC. Click the uSpectrum icon on the PC.



Tap the BIN icon on the left side and then tap "Load BIN to Device" at the top of the screen.



Browse to your modified BIN Chart and press OK to load the new BIN chart. (Note: Modifying the BIN chart is covered in the uSpectrum PC Software section)



Your modified BIN chart is now uploaded and ready to use.

Miscellaneous

7

7.1 Bracket

7.2 PC Connection

7.3 System Reset

7.1 Bracket

You can attach an optional accessory bracket to the MK350S that will allow you to use a stand or tripod for hands-free LED measurements.



7.2 PC Connection

You can attach a Windows based PC directly to the MK350S using the enclosed USB cable. This allows your PC to use Windows Explorer to view data or transfer data that was saved onto the MK350S SD Card (Excel files or JPG files).



After connection, the MK350S screen will display as shown.

7.3 System Reset

If for any reason you want to perform a system reset, you can use a pointer to press into the pinhole as shown below.



Specification



Sensor	CMOS Linear Image Sensor
Spectral Bandwidth	Approximately 12 nm (half bandwidth)
Receptor Size	Ø 6.6 ± 0.1 mm
Cosine Correction	Refer Figure 1.
Measurement Range	20 ~ 70000 Lux
Wavelength Range	380 ~ 780 nm
Integration Time Range	6 ~ 5000 ms
Capture Function	One time / Continuous
Integration Mode	Auto / Manual
Measuring Modes	<ol style="list-style-type: none"> 1. Basic Value Mode 2. Spectrum Graph Mode 3. CIE 1931 Chromaticity Diagram Mode 4. CIE 1976 U.C.S Chromaticity Diagram Mode 5. Color Rendering Index Mode 6. Lux Image Distribution Mode 7. Measurement Log Mode 8. CCT BIN Chart Mode 9. Quality Control Checker Mode 10. Measurement Comparison Mode 11. Data Browser Mode
Measuring Capabilities	<ol style="list-style-type: none"> 1. CCT 2. Lux / Foot Candle 3. CRI Ra / R1~R15 4. Spectral Irradiance 5. C.I.E Chromaticity Coordinates <ol style="list-style-type: none"> (1) CIE 1931 x,y Coordinates (2) CIE 1976 U.C.S u',v' Coordinates 6. Peak Wavelength / Dominant Wavelength 7. Δx , Δy , $\Delta u'$, $\Delta v'$ 8. Duv , Purity 9. PPF (400nm~700nm) PPF-R (600nm~699nm)

	PPF-G (500nm~599nm) PPF-B (400nm~499nm) PPF-UV (380nm~399nm) PPF-NIR (700nm~780nm) 10. BIN / SDCM	
Digital Resolution	16 bits	
Dark Calibration	Yes	
Stray Light	-25 dB max.* ¹	
Wavelength Data Increment	1 nm	
Wavelength Reproducibility	± 1 nm * ²	
Illuminance Accuracy		± 5%
Color Accuracy	Illuminant A @ 2856K at 20000 Lux	± 0.0025 in CIE 1931 x,y
Color Repeatability		± 0.0005 in CIE 1931 x,y
CCT Accuracy		± 2%
CRI Accuracy @ Ra		± 1.5%
Display	4.3" LCD 800X480 Touch Panel	
Camera Resolution	2M pixels	
Max. Files	≈ 2000 Files @ 2GB SD Card	
Battery Operation Time	≤ 4 hours / Fully Charged	
Battery	2500 mAh / Rechargeable Li-ion Battery	
Data Output Interface	SD Card / USB 2.0	
Data Format	Compatible with MicroSoft Office Excel / JPG Data Format	
Dimensions	163 x 81 x 25.8 mm (H x W x D)	
Weight (with Battery)	250 g ± 20 g	
Operating Temperature Range	0 ~ 35 °C	
Storage Temperature Range	-10 ~ 40 °C	
Language Modes	English / Traditional Chinese / Simplified Chinese / Japanese	
<p>*1 : Input the 550nm monochromatic light and measure the stray light ratio at 550nm ±40nm. *2 : Input source must be a stable light source. The company reserves the right to change product specifications without prior notice.</p>		

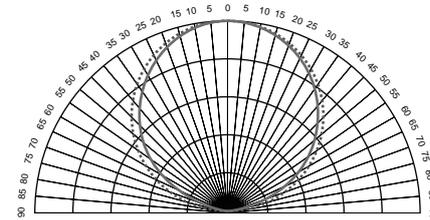


Figure 1 : Cosine Correction — MK350S Ideal Value

Warranty

10

Warranty Policy

UPRtek provides replacement or repair services to our customers for defective products within the applicable warranty period.

1. DOA (Dead on Arrival) Returns :

- In the event that you receive a product that is not working properly or is defective, you should notify our service staff upon receipt of the products. If defects in the product are discovered within 7 days after receiving the product (except those due to willful damage or customer misuse), you should notify us by email, facsimile, or phone immediately upon noticing the defect, so we can process the return as a DOA product. You will be issued a DOA number accordingly.
- DOA products must be returned within 30 days of purchase and in original condition. For products considered as “Dead on Arrival”, we will replace it with a new product (in whole package) at no charge and pay return and re-delivery shipping costs. International customers should allow for additional transit time due to international customs clearance.

2. RMA (Return Merchandise Authorization) :

- For merchandise sent for repair or replacement with or without warranty, you must first obtain an RMA number by contacting our service staff by mail. The following information is required in order to complete your RMA request: company name, contact person, phone number and e-mail, customer ship-to address, product model number, serial number, and a brief description of the problem you are experiencing with the product you wish to return.
- All returned products will be tested by our professional technicians to verify the complaint / defect in question. However, if the defect in question cannot be found by our technicians, you are responsible for paying a testing fee plus shipping fee for NDF (No-Defect Found) products.
- Claims for loss or damage during shipment must be made to the courier by the customer. For your protection, we strongly recommend that you fully insure your return shipment for damages. Please use a courier that is able to provide you with proof of delivery.

Delivery Methods

Consumers can choose either of the two methods indicated below to return the product to the factory for RMA Service :

- Customers can send the products through UPRtek global distribution channels that will send and return the products to and from the factory for repair and warranty service.
- Customers can return the product directly to the UPRtek factory for servicing.

Rules on Product Repairs After The Warranty Period

UPRtek provides product services after warranty expiration at reasonable charges. In case of product defects, the customers are still able to send products back to the UPRtek factory for service. The repair charges will be based on the type of defect, and in some cases, maintenance fees will be charged.

However, purchasing a new product is advised under these conditions:

- If the MK350 series or its accessories are no longer available.
- If the product functionality is almost certain to be impossible to recover from (e.g. total immersion in water, undergoing extreme electrical shock, severe contamination or corrosion damage).
- If the product was dropped or sustained such a traumatic impact causing major structural damage, or if our technicians determine that normal functionality cannot be recovered even after major component replacement.
- If multiple parts simultaneously fail due to normal wear and tear, or poor handling.
- Even if the product is within the service period of the warranty, yet parts are no longer available.