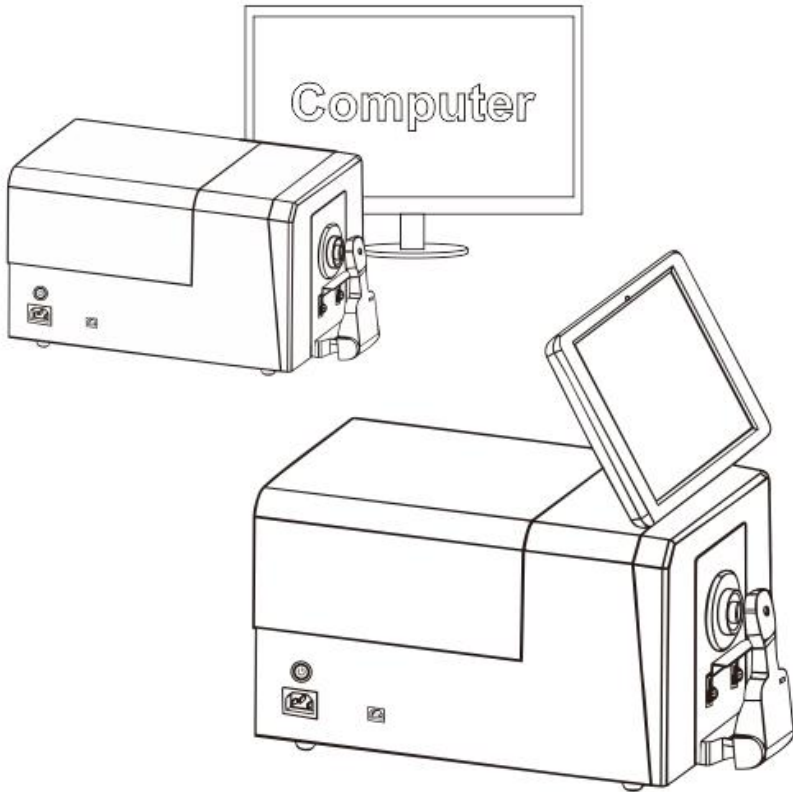




# Benchtop spectrophotometer Operation Manual



V3.0

## Safety Symbol

In order to avoid accidents caused by improper operation, the following symbols are used in this manual or on the instrument label.



This symbol instructs relative safety warnings or precautions.  
Read these instructions carefully to use this instrument safely and correctly.



This symbol is a description of electrical hazards associated with electric shock.  
Read these instructions carefully to use this instrument safely and correctly.



This symbol is a description of fire hazards.  
Read these instructions carefully to use this instrument safely and correctly.



Represents a prohibiting execution. This is absolutely not executable



Represents an instruction.  
The instruction must be strictly performed.



Represents a prohibiting execution.  
Do not disassemble this instrument.



Represents an instruction.  
Make sure that the AC adapter is pulled out from the AC socket.

## Cautions

- No copy or copy of all or part of this manual is strictly prohibited without authorization from the company.
- The contents of this manual are subject to change without prior notice.
- When preparing this manual, we have done our best to ensure the accuracy of its contents. If you have any questions or find any errors, please contact your retailer or our authorized maintenance agency.
- The company has no liability for all consequences arising from the improper operation of this instrument.

**Please keep this manual carefully for your reference at any time.**

## 安全说明

## Safety Measures

To ensure proper use of this instrument, please read carefully and strictly observe the following points.



Warning: Failure to comply with the following points may pose a danger to personal safety.

	<ol style="list-style-type: none"> <li>1. Do not use this instrument in a place where there are combustible or flammable gases (gasoline, etc.), otherwise it may cause fire.</li> <li>2. Do not allow liquid or metal objects to enter the instrument, otherwise it may cause fire or electric shock. If a liquid or metal object enters the instrument, turn off the power immediately, unplug the AC adapter plug, and contact the nearest authorized maintenance institution.</li> <li>3. Do not force, twist or pull the power cord of the AC adapter. Do not scrape or modify the power cord, or place heavy objects on the power cord, otherwise it may damage the power cord, and cause fire or electric shock.</li> <li>4. Do not use wet hand to plug AC adapter plug, otherwise it may cause electric shock.</li> <li>5. If the instrument or AC adapter is damaged, or smokes, do not continue to use this instrument, otherwise it may cause fire. In this case, power should be switched off immediately, AC adapter plug removed from the AC socket, and contact the nearest authorized maintenance institution.</li> <li>6. Do not measure the face directly on the sample measuring aperture, otherwise it may damage the eyes.</li> <li>7. Do not place the instrument on an unstable or inclined surface, or it may cause the instrument to slide or overturn, causing injury to personnel.</li> </ol>
	<ol style="list-style-type: none"> <li>1. Be sure to always use a standard AC adapter or an optional AC adapter and connect it to an AC socket with rated voltage and frequency. If you use a not specified AC adapter, it may damage the instrument or cause a fire or electric shock.</li> <li>2. Be careful not to put your hand in the notch of the instrument, or you may get stuck in your finger and cause injury.</li> </ol>
	<ol style="list-style-type: none"> <li>1. Do not disassemble or refit the instrument or AC adapter, otherwise it will cause fire or electric shock.</li> </ol>
	<ol style="list-style-type: none"> <li>1. If the instrument is not used for a long time, please pull the AC adapter plug from the AC socket. Because the dust or water stains on the AC adaptor pins may cause a fire, they should be pulled out immediately.</li> <li>2. When pulling the AC adapter plug out of the AC socket, be</li> </ol>

sure to always hold the plug itself to avoid pulling the power cord, which may damage the power cord and cause fire or electric shock.
--

## 技术说明

The benchtop spectrophotometer is designed for the measurement of color and color difference in all fields. It can measure the color for reflection and transmission with high accuracy.

### Operating Environment

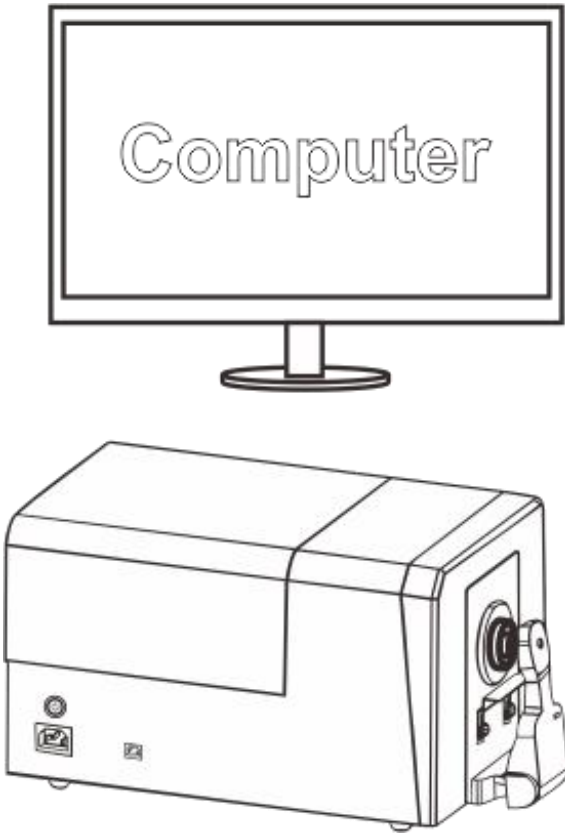
- Please use this instrument at ambient temperatures ranging from 0°C to 40°C without condensation. Do not use this instrument in areas where temperature varies dramatically.
- Do not place this instrument near direct sunlight or heat sources such as furnaces. In this case, the internal temperature of the instrument may be higher than the ambient temperature.
- Do not use this instrument in the presence of dust, cigarettes or chemical gases, or it may cause performance degradation or even system collapse.
- Do not use this instrument near devices such as loudspeakers that generate strong magnetic fields.
- The bench-top spectrophotometer and its standard AC adapter are designed for indoor use only. Because rain or other factors may damage the instrument, so do not use it outside.

### White Calibration Plate

- Do not scrape or dirty the white correction board, for example, do not leave fingerprints.
- When white calibration plate is not used, be sure to place them properly to prevent white calibration plate from being exposed to light.
- To achieve accurate measurement, we advise that the white calibration plate should also be calibrated periodically.

### Power

- Ensure that the power switch is switched to "O" when the benchtop spectrophotometer is not used.
- Make sure you always use a standard AC adapter and connect it to an AC socket with rated voltage and frequenc



This manual already includes a tablet instrument as an explanation. If you have purchased an instrument without a tablet, please connect it to a computer and follow this manual to operate

CATALOGUE

SAFETY SYMBOL .....	错误! 未定义书签。
SAFETY CAUTIONS.....	错误! 未定义书签。
SAFETY MEASURES.....	错误! 未定义书签。
OPERATIONAL ENVIRONMENT.....	III
WHITE CALIBRATION PLATE.....	错误! 未定义书签。
POWER.....	错误! 未定义书签。
INSTRUCTION.....	错误! 未定义书签。
PRECAUTIONS.....	错误! 未定义书签。
1、INTERFACE DESCRIPTION.....	错误! 未定义书签。
2、OPERATING INSTRUCTION.....	错误! 未定义书签。
2.1 ABOUT INSTRUMENT.....	4
2.2 POWER ON & OFF.....	5
2.3 CALIBRATION.....	5
2.3.1 Reflection Measurement Mode Calibration.....	错误! 未定义书签。
2.3.2 Transmission Measurement Mode Calibration.....	10
2.3.3 Haze Measurement Mode Calibration.....	12
2.4 ILLUMINANT SETTINGS.....	13
2.4.1 Observer Angle.....	14
2.4.2 Illuminant.....	14
2.4.3 UV Mode.....	14
2.5 MEASUREMENT MODE.....	15
2.6 INSTRUMENT MEASUREMENT.....	19
2.6.1 Instrument measurment page.....	19
2.7 STANDARD MEASUREMENT.....	35
2.7.1 Measurement Instruction.....	35
2.7.2 Reflection Measurement.....	35
2.7.3 Transmission Measurement.....	错误! 未定义书签。
2.7.4 Haze Measurement.....	37
2.8 COLOR OPTIONS.....	39
2.8.1 Color Space.....	39
2.8.2 Color Formula.....	40
2.8.3 Reflectance Colorindex.....	41
2.8.4 Transmission Colorindex.....	41
2.8.5 Default Tolerance.....	42

2.9	PARAMETER SETTINGS.....	42
2.9.1	Color Diff.Formula Factors.....	43
2.9.2	MI Settings.....	44
2.9.3	YI MI Settings.....	45
2.9.4	555 Shade Sorting.....	45
2.9.5	Strength Settings.....	46
2.10	DISPLAY SETTINGS.....	46
2.10.1	Color Offset.....	46
2.10.2	Test Results.....	47
2.11	DATA MANAGEMENT.....	47
2.11.1	Delete Record.....	48
2.11.2	Search Record.....	49
2.11.3	Check Record.....	49
2.11.4	Rename.....	50
2.12	SYSTEM SETTING.....	50
2.12.1	Language Setting.....	51
2.12.2	Appearance Setting.....	52
2.12.3	Bluetooth.....	52
2.12.4	Calibration Period.....	52
2.12.5	Key Response Mode.....	53
2.12.6	Factory Reset.....	54
2.12.7	About.....	54
2.12.8	Exit.....	55
三、	DAILY MAINTENANCE.....	错误! 未定义书签。
四、	TECHNICAL PARAMETERS.....	错误! 未定义书签。
4.1	PRODUCTS FEATURE.....	56
4.2	TECHNICAL SPECIFICATIONS.....	58

## Instruction

This benchtop grating spectrophotometer are independently developed by 3nh company, who has complete intellectual property rights. A 10.5 -inch touch PAD is used as a display interactive interface. According to CIE, the geometric optical structure  $D/8^\circ$  (reflection) and  $D/0^\circ$  (transmitted), the instrument can measure Reflection/Transmission and colorimetric data of various samples. The instrument with  $\Phi 25.4\text{mm}$ ,  $\Phi 15\text{mm}$ ,  $\Phi 8\text{mm}$ ,  $\Phi 4\text{mm}$  various reflective aperture to meet various test occasions. The instrument is equipped with 360 ~ 780nm full spectral light sources, 400nm cut-off, 420nm cut-off light source, 460nm cut-off light source, Xenon light source (Note: some models are equipped with differences), switch through on-off, and achieve color index measurement on various samples/fluorescent samples. This instrument with accuracy and stability measurement, large storage capacity, equipped with USB and Bluetooth dual communication modes, and PC -site color management software achieve more extension functions, which can be used for precision analysis and transmission of color. It is suitable for precise color transmission, quality control, chromatography, and chromatography etc. It is also widely used in the fields of scientific research institutions and laboratory drug analysis.

## Precautions

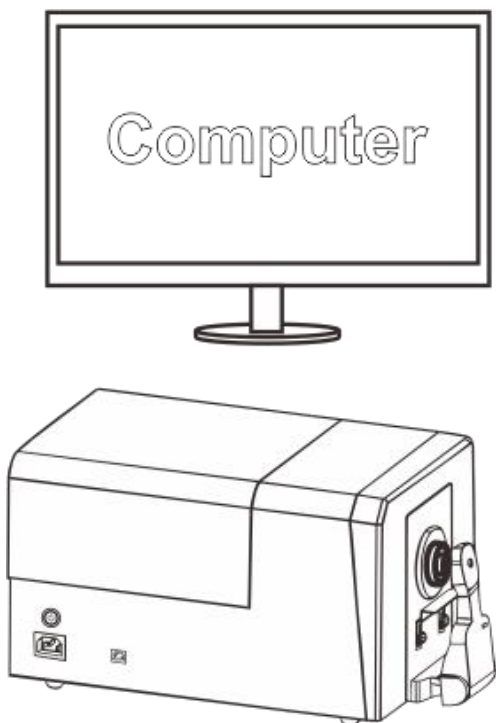
- The spectrophotometer is a precise measuring instrument. Please avoid drastic changes of external environment when measuring. These changes, including the flicker of surrounding light and the rapid change of temperature, will affect measurement accuracy.
- Keep the instrument balanceable, make sure the measuring aperture touch the surface of the test sample placidly, and no shaking or shifting when measuring. Please prevent the colorimeter from fierce collision or crash.
- The instrument is not waterproof. Do not use it in high humidity environment or in water.
- Keep the instrument clean. Avoid dust, powder or solid particles entering the measuring aperture and the instrument.
- Replace the white calibration cavity and put the spectrophotometer into



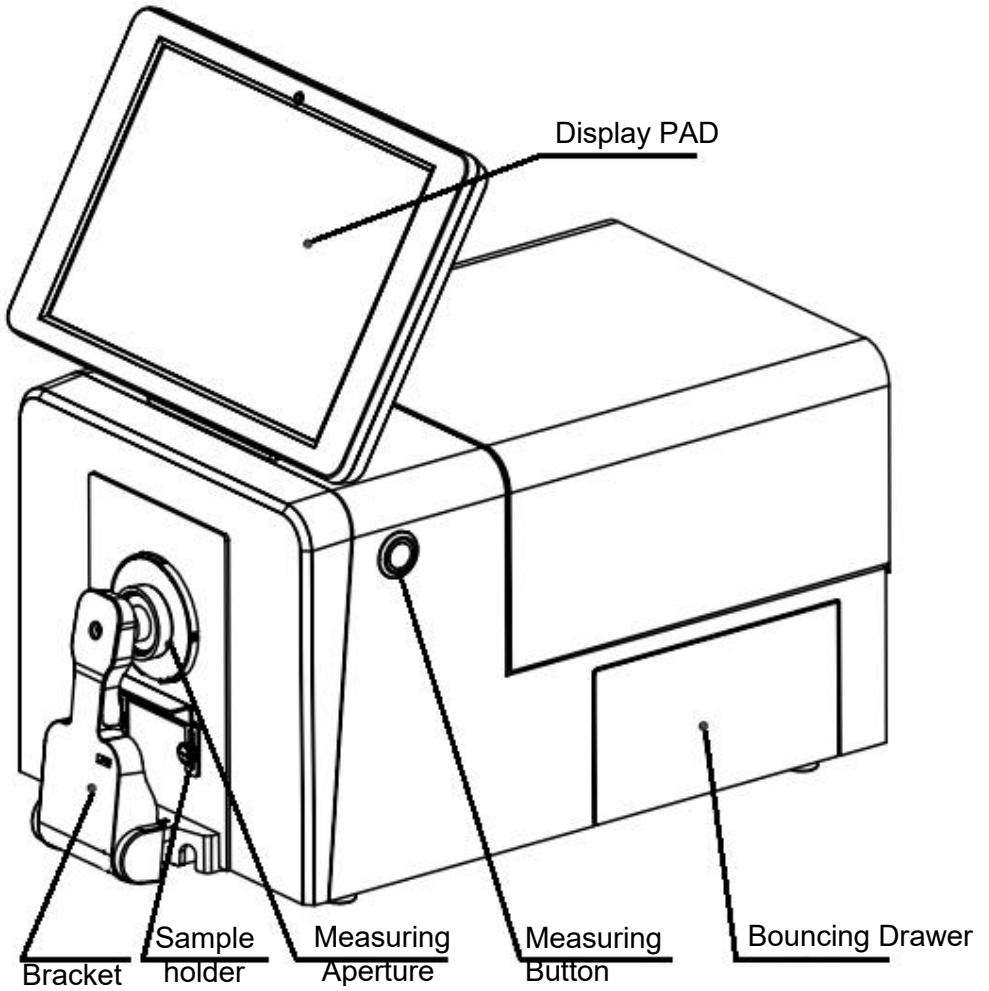
instrument case when not in use.

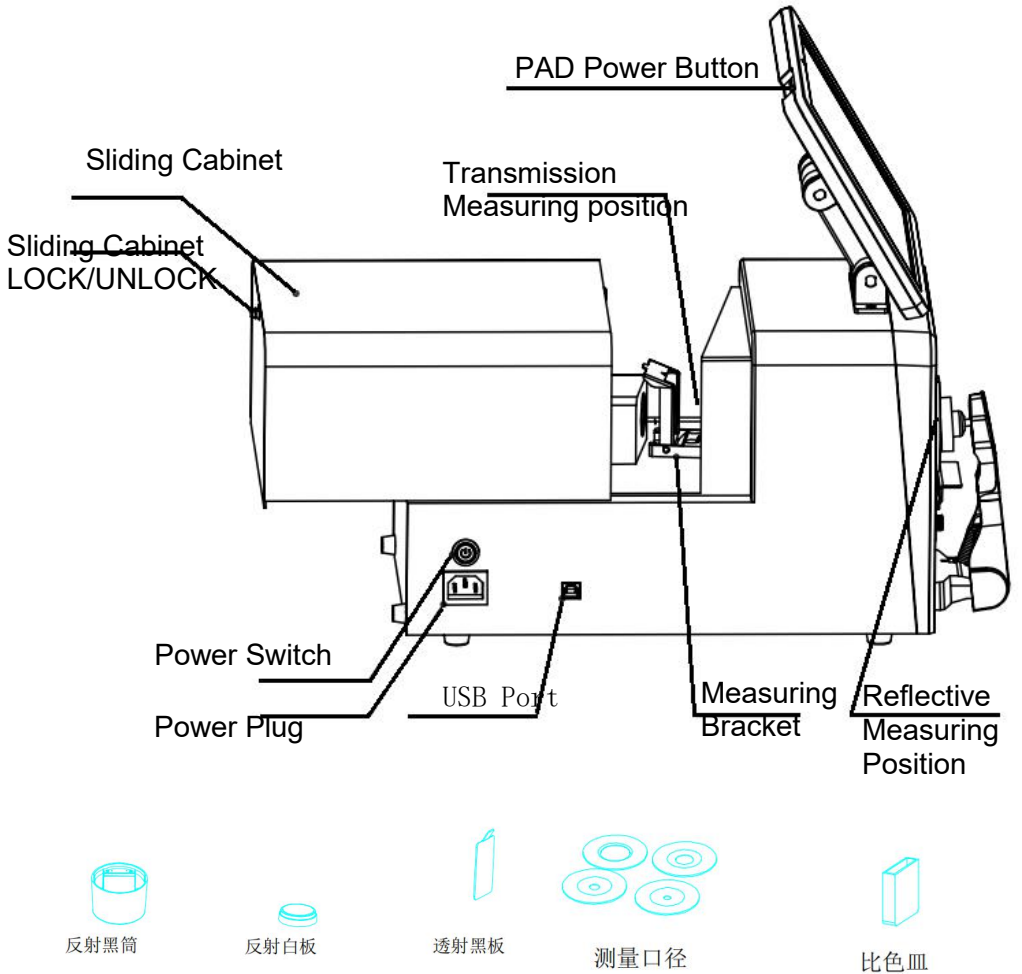
- Please turn off power to prevent the instrument from damage, place instrument, calibration plate, other accessories in the original package, and Store in a dry and cool environment if you don't use it for a long time.
- Any unauthorized changes to the instrument are not permitted, or it will affect the measuring accuracy, even cause irreversible damage.

## 1. INTERFACE DESCRIPTION



This manual already includes a tablet instrument as an explanation. If you have purchased an instrument without a tablet, please connect it to a computer and follow this manual to operate





- Reflective Black Calibration Cavity
- Reflective White Calibration plate
- Transmission Black Calibration Plate
- Measuring Aperture
- Cuvette

Figure 1 Instrument Structure Diagram

**PAD:** 10.5 -inch independent rotated Pad, 128G storage capacity; used to display measurement data and instrument operation navigation, and the flat PAD power switch controls the punch and shutdown of the tablet PAD separately.

**Bracket:** Under reflective measurement mode, to fix samples in correct position, also there is holder to help support if sample is heavy.

**Measuring Aperture:** Reflective measuring apertures:  $\Phi 25.4\text{mm}$ /  $\Phi 15\text{mm}$  / $\Phi 8\text{mm}$ / $\Phi 4\text{mm}$ ; customer selects the appropriate measuring aperture according to the tested sample dimension. The bigger aperture customers choose, the more accurate the measurement data will be.

Transmissive measuring apertures: $\Phi 25.4\text{mm}$ , and white plate must stay in reflective measuring position

**Wake-up/Measuring button :**

\*Pressing the button shortly is to wake up the system and start measuring.

\*Pressing the button during measurement will cause operation invalid.

**Bouncing Drawer:** Store small sample or accessory

**Reflective Measuring Position:** During Reflective measuring mode, the sample should cling to the measuring aperture tightly fixed by sample holder.

Meanwhile, the transmission measurement aperture remains unshielded and the cover above the port should be closed.

**Transmissive Measuring Aperture:**

During Transmissive measuring mode, the sample should cling to the measuring aperture tightly fixed by clamp component. The cover above the port should be closed, meanwhile the Reflective white calibration plate should be placed to the reflective measuring port.

**Reflective Black Calibration Cavity:**

During Reflective measuring mode, black calibration is used as the 0 benchmark.

For specific operation please refer to the section of black and white calibration.

**Reflective White Calibration Plate:**

During Reflective measurement mode, white calibration is used as the highest reflectance test benchmark of the instrument. For specific operation please refer to the section of black and white calibration.

**Transmissive Black Calibration Plate:**

During Transmissive mode, black calibration is used as the 0 benchmark. For

specific operation please refer to the section of black and white calibration.

**Sliding Cabinet:** Open/Close transmission house, Keep transmissive measurement stable environment, avoid outside effective.

**Sliding Cabinet Lock/Unlock:** Lock or unlock sliding cabinet

**USB Port:**

USB port is used to connect with PC computerized high-end color management software to achieve more extension functions.

**DC Power Port:** The power adapter connects Alternating Current (AC110V-240V) to power the instrument. The specification of external power adapter is DC 24V/3A.

**Power Switch:** Setting power switch to "I", it turns the power ON, and setting to "O", it turns the power OFF. We set power ON or OFF by toggling the switch.

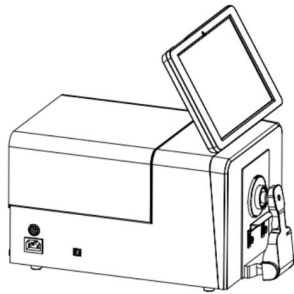
**PAD Power:** Control Pad screen independently, When you do not use the instrument for a long time, you need to turn off the PAD power switch.

**Note:** The entire machine instrument includes measuring instrument modules and PAD modules, and the two modules are independent of each other. The measuring instrument module can connect to PAD module or the PC . At the same time, the measuring instrument module can only connect one of the modules (PAD modules or PC). The booting and shutdown of the PAD is controlled by its own PAD power switch

## 2. OPERATIONING INSTRUCTION

### 2.1 About Instrument

Click "instrument", we can check instrument model, serial number, whiteboard number, software version, hardware version; click unconnected to change connection method. (Figure 2)



Instrument Model : xxxxxx  
Serial Number : xxxxxx  
Whiteboard Number : xxxxxx  
Software Version : xxxxxx  
Hardware Version : xxxxxx

Figure 2 Instrument Information

## 2.2 Power On & Off

Press the power switch to "I", to power up the instrument.

When the indicator light turns green, the instrument is on in normal. Press the power switch to "O", the instrument is turned off, and the indicator light goes out.

If no any operation done for a long time when the instrument on, it will automatically enter into standby mode. At this time, press the measuring button to wake-up the instrument to keep working.

Press pad power button, turn on pad screen, open Color Control

Center, click "Instrument" to check if connection successful, press power button again, Pad into standby mode, long press power button, sliding screen, pad turn off, or turn off in Windows system.



Please cuff off the power if not to use the instrument for a long time.

## 2.3 Calibration

Black and white calibration is required under the following circumstances.

- 1、 Before the first time of measuring after power is on.
- 2、 Before the first time of measuring after switching measuring aperture.
- 3、 Before the first time of measuring after switching reflective and transmissive mode.
- 4、 Before the first time of measuring after switching UV mode.
- 5、 When the environmental condition change relatively large (such as temperature changes exceeding 5 degrees Celsius).
- 6、 Use the instrument for a continuous long time (over 8 hours).
- 7、 When the user finds that the measuring data is inaccurate.

### 2.3.1 Reflection Measurement Mode Calibration



First of all, ensure that the instrument is in Reflective Measurement Mode

#### Calibration Steps:

1. Click “Start Calibration” and enter calibration page(Figure 3)in menu page. It will display if calibration still valid and rest valid time.



目前校正尚有效  
07:59:43

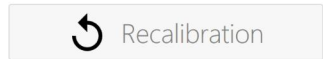
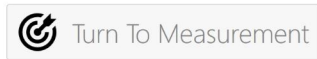


Figure 3 Calibration Page



Calibration expired

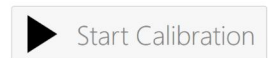


Figure 4 Calibration Expired

2. Click "Start Calibration" to enter Reflective Black Calibration interface as shown



in Figure 5. Place well black cavity according to the warning, then press the measuring button to start black calibration, or click “←” to cancel and quit the calibration

**Steps for placing black cavity:**

- Pull out and open the bracket
- Follow instruction, Place the black cavity to joint with groove of instrument, then close the sample clamp to fasten the black cavity, clear the transmission house

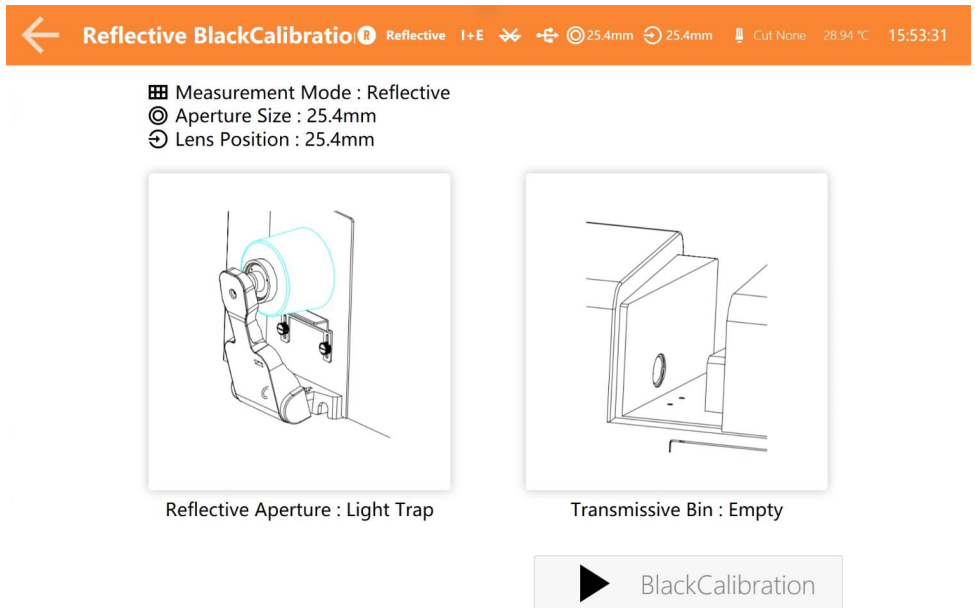


Figure 5 Black Calibration

3. It will automatically enter White Calibration after Black Calibration is finished as shown in Figure 6. Place well white plate (the same step as how to place black cavity), then press measuring button to start white calibration, or click “←” to

cancel and quit the white calibration.

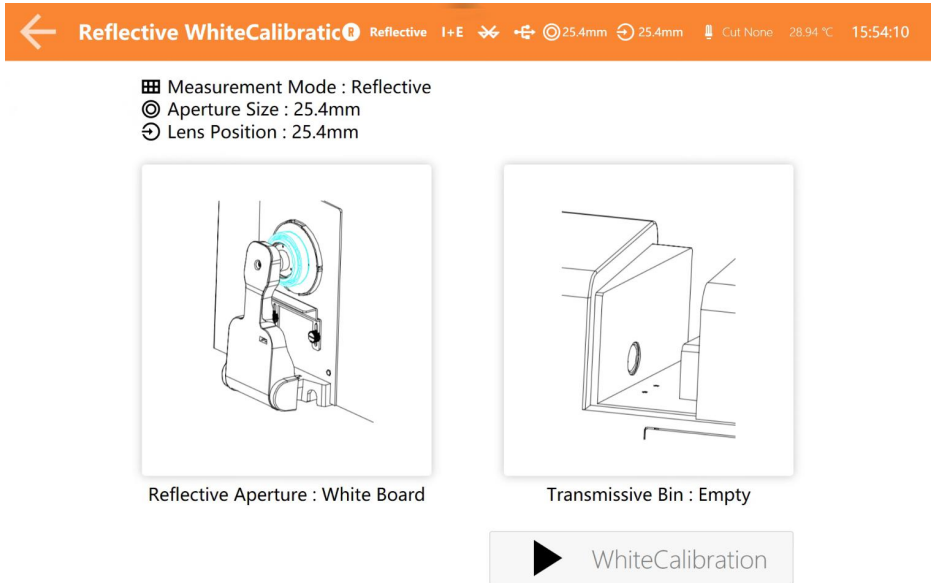


Figure 6 White Calibration

4. After black and white calibration are finished rightly, the instrument system will reset remaining time according to valid time after last calibration (As shown in Figure 7).



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07:59:23

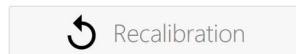
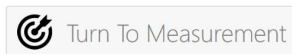


Figure 7 Calibration successful Page

### 2.3.2 Transmission Measurement Mode Calibration

First of all, ensure instrument is in Transmission Measuring Mode (For specific setting please refer to section 2.5)

**Cautions:** During transmission measuring mode, no matter if it's during calibration or measurement mode, please ensure transmission measuring aperture is  $\Phi 25.4\text{mm}$ , and fasten the reflection plate to the reflective measuring aperture.

#### Calibration Steps:

1. Enter into main menu as shown in Figure 8, click "Calibration" to enter transmissive black calibration. Place the transmission black plate into transmission sample bin and stick it to the side of integrating sphere tightly, put white board in reflective aperture and click the "Black Calibration" to start calibration.

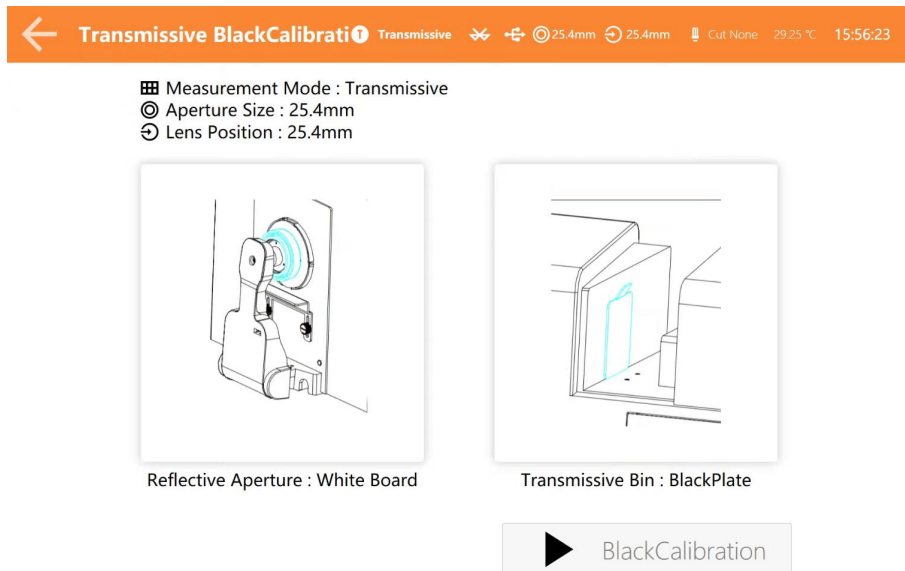


Figure 8 Transmissive Black Calibration

2. After finishing transmission black calibration, enter transmissive white calibration page(Figure 9), take out the black plate, place the white calibration reference according to instruction, ensure it stick to the side of integrating sphere tightly, close the bin cover, and click “White Calibration” to start calibration.

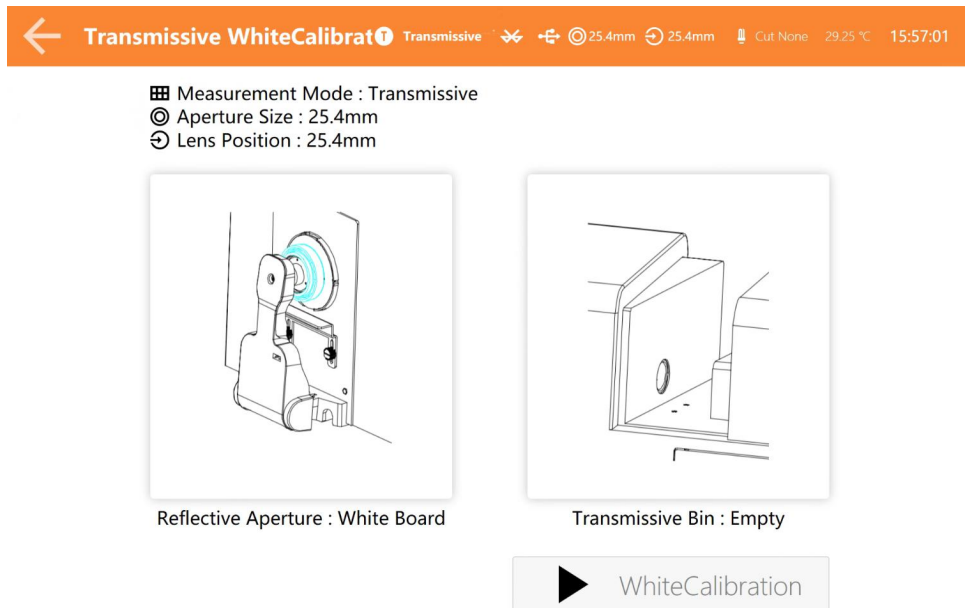


Figure 9 Transmissive White Calibration

### Cautions :

The users should choose relative white calibration reference according to different type of transmissive tested sample. For example, if tested sample is plastic or glass etc, air can be chosen as white calibration reference. If tested sample is liquid, then a cuvette filled with deionized water or distilled water can be used as a reference for white calibration. If the tested sample is powder packed in a cuvette, then an empty cuvette can be selected as a reference for white calibration. Of course, users can also choose the standard solution that has been calibrated (e.g. Potassium Permanganate solution with calibrated transmissivity) as a reference. Calibration channels should be chosen relatively for different calibration reference.

After finishing calibration rightly, the instrument system will reset remaining time

according to valid time after last calibration

### 2.3.3 Haze Measurement Mode Calibration

First of all, ensure instrument is in Transmission Measuring Mode

#### Calibration Steps:

1. Enter into main menu, click “Calibration” to haze transmission black calibration. Place the transmission black plate into transmission sample bin and stick it to the side of integrating sphere tightly, close the cover, and click the test key to start calibration.
2. Click “Measure” in main menu, enter haze measurement page, in the upper left corner, click haze calibration to start haze black calibration page (Figure 10), follow the instruction, put black cavity on reflective aperture, clear transmission house, click “calibration” to start.

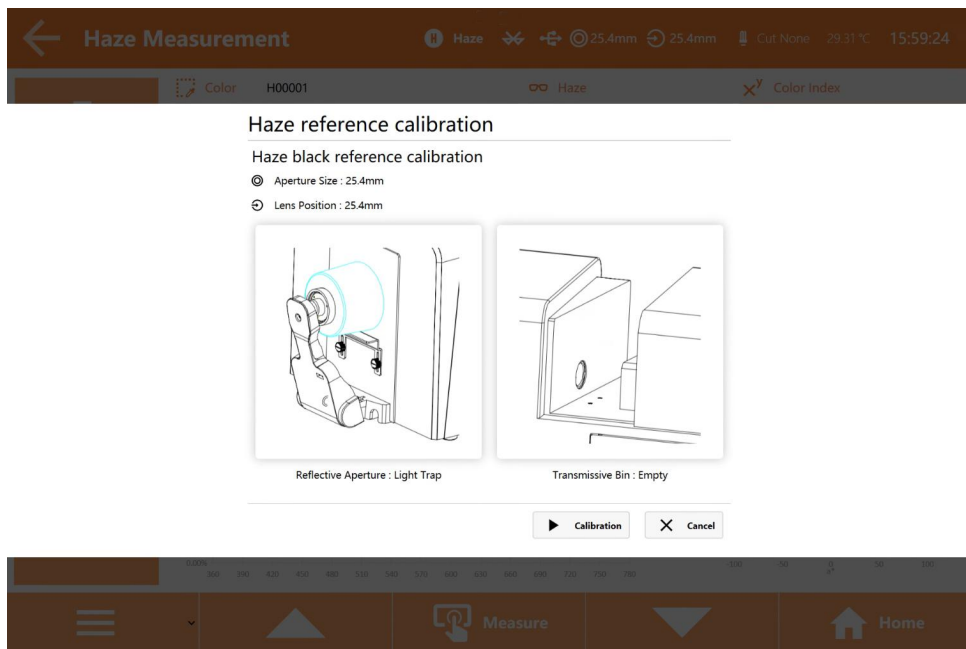


Figure 10 Haze Black Calibration

3. After finishing haze black calibration, enter haze white calibration page (Figure 11), place the white calibration plate in reflective aperture. Keep transmissive bin empty. Click “Calibration” to start calibration.

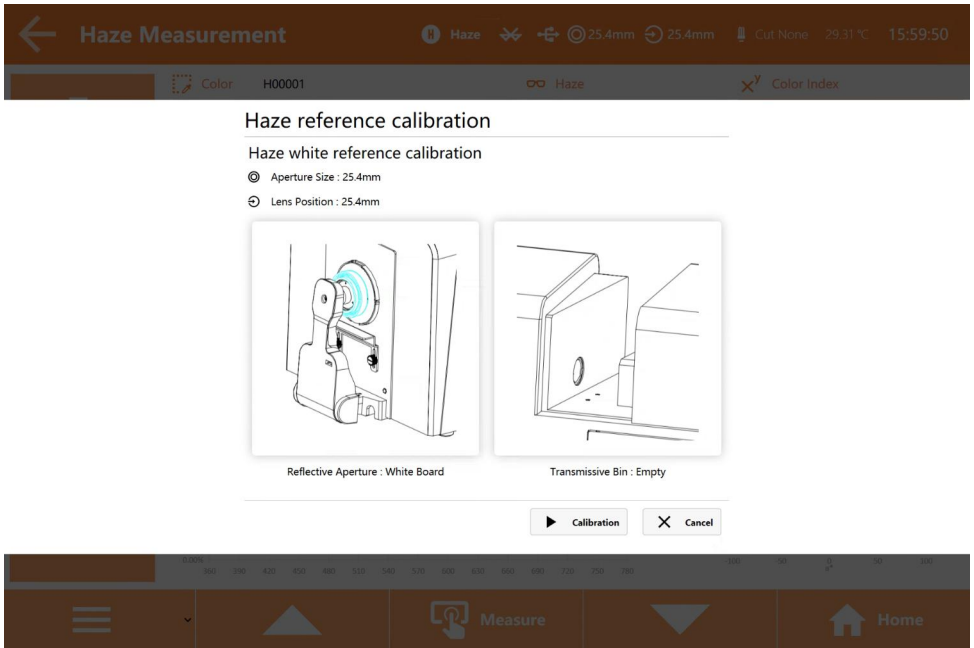


Figure 11 Haze White Calibration

## 2.4 Illuminant Settings

Click “Illuminant Settings”, can choose the illuminant type according to user’s requirement(Figure 12). In this page, user can do settings on observer angle and UV mode.

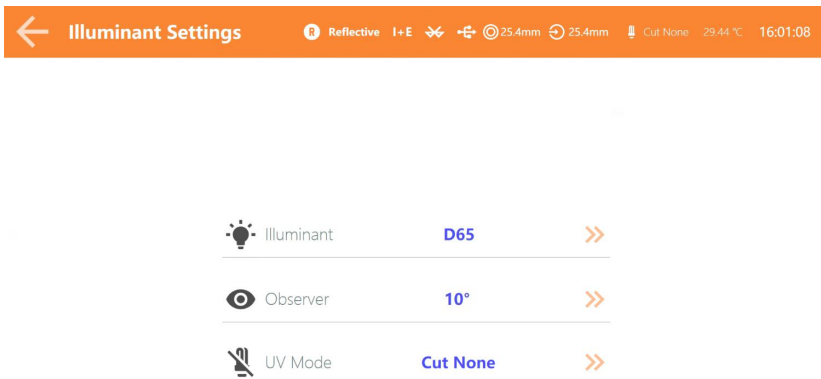


Figure 12 Illuminant Settings

## 2.4.1 Observer Angle

Click “Observer”, angel switch between 10° and 2°, 10° is with CIE1964 standard, 2° is CIE1931.

## 2.4.2 Illuminant Settings

Click “Illuminant”, enter light source option page (Figure 13), here we can select D65, A, C, D50, D55, F1 ~ F12 and other light sources in the light source selection window.

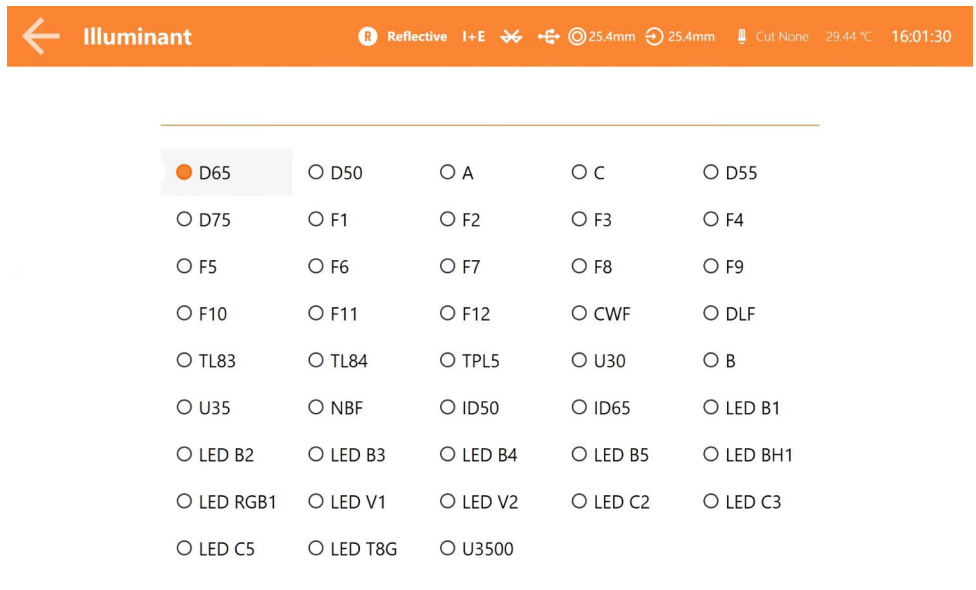


Figure 13 Light Source Modes

## 2.4.3 UV Light Source Setting

Click “UV Mode”, switch UV models (Figure 14)  
 “Cut 400nm” means that light source is filtered out of 360 ~ 400nm spectrum, “Cut 420nm” means that light source is filtered out of 360 ~ 420nm, “Cut 460nm” means that light source is filtered out of 360 ~

460nm,"Cut None" means no light source is filtered out, stay full 360~780nm full spectrum. (Noted: There are differences in some models)

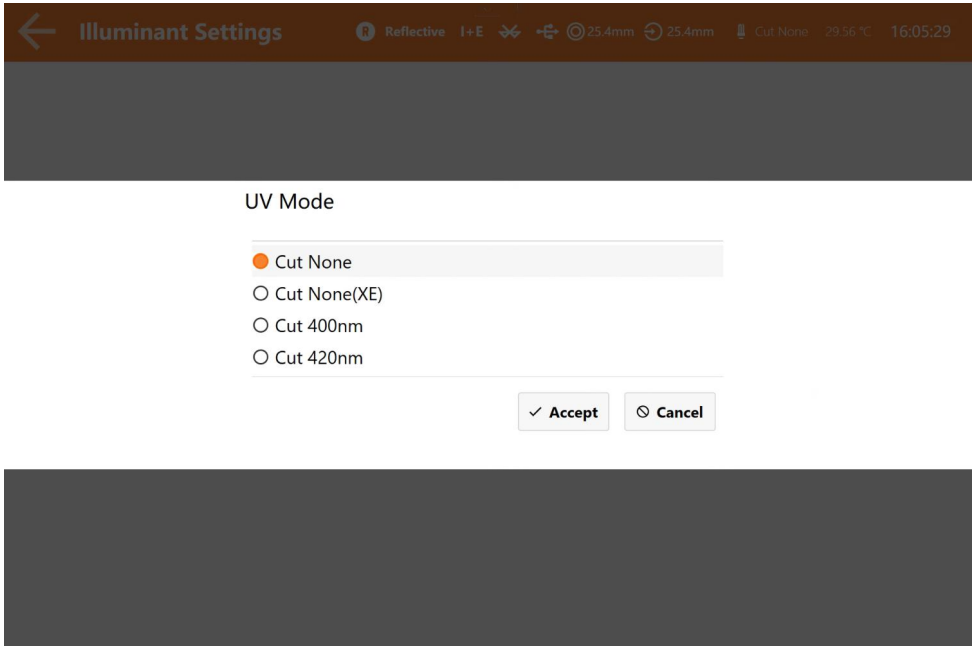


Figure14 UV Mode

## 2.5 Measurement Mode

Click "Measurement Mode" and enter setting page(Figure 15), setting item include: Sample type, Aperture size/ Lens position,Measurement way,Standard measurement times, SCI/SCE switch.



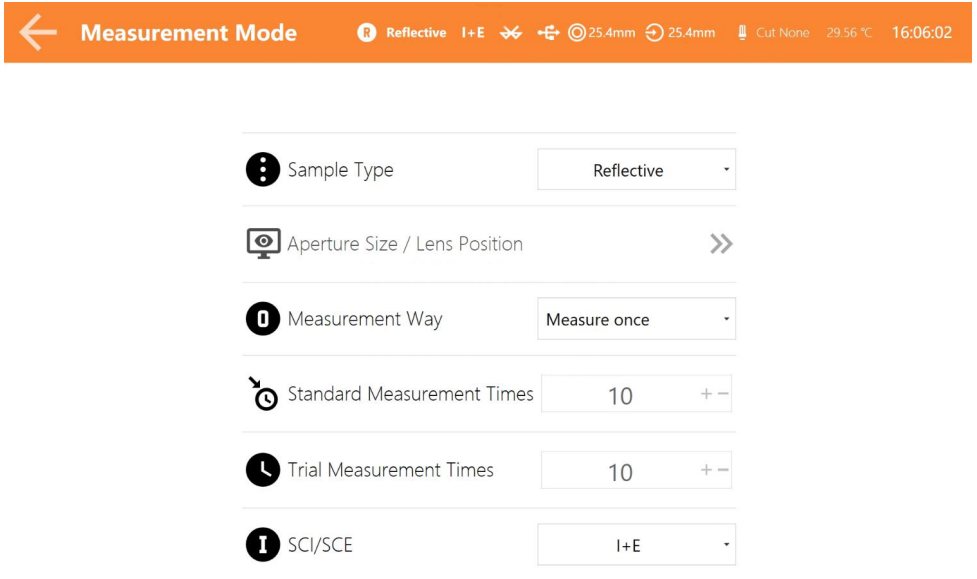


Figure15 Measurement Mode

Click "Sample Type" (Figure15), three options: Reflective, Transmissive, Haze, once you choose transmissive, transmissive status will displayed in main measurement page, shows now it is under transmissive measurement mode.

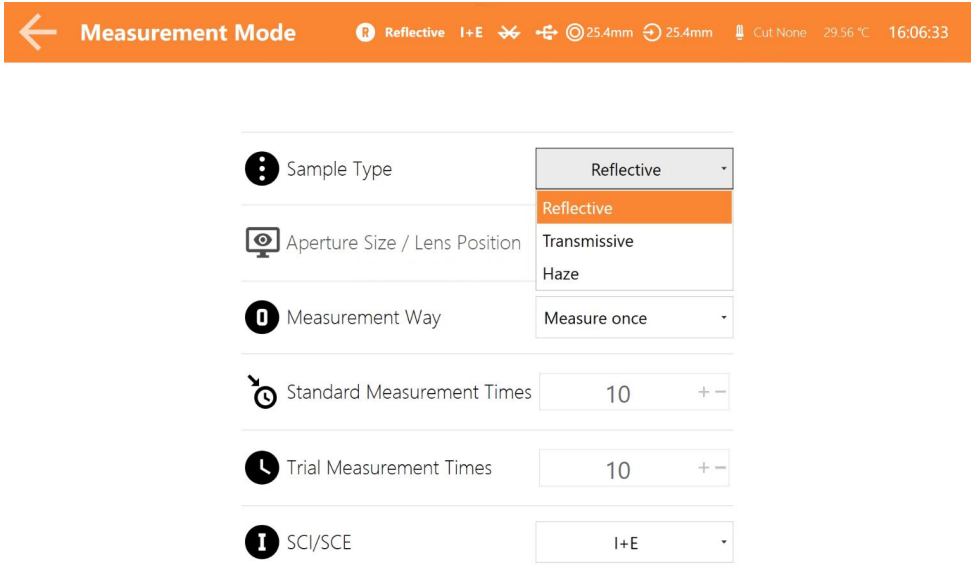


Figure16 Sample Type

**Cautions: Black and white calibration is required to do again if measurement mode switching between reflective, transmissive, and haze.**

Aperture Size/Lens Position(Figure17), You can configure automatic identification and manual mode. Under Auto Mode instruments will identify the aperture size according to the image of camera when aperture replaced, and then adjust the lens position; the manual mode user can set the aperture size and adjust the lens position.

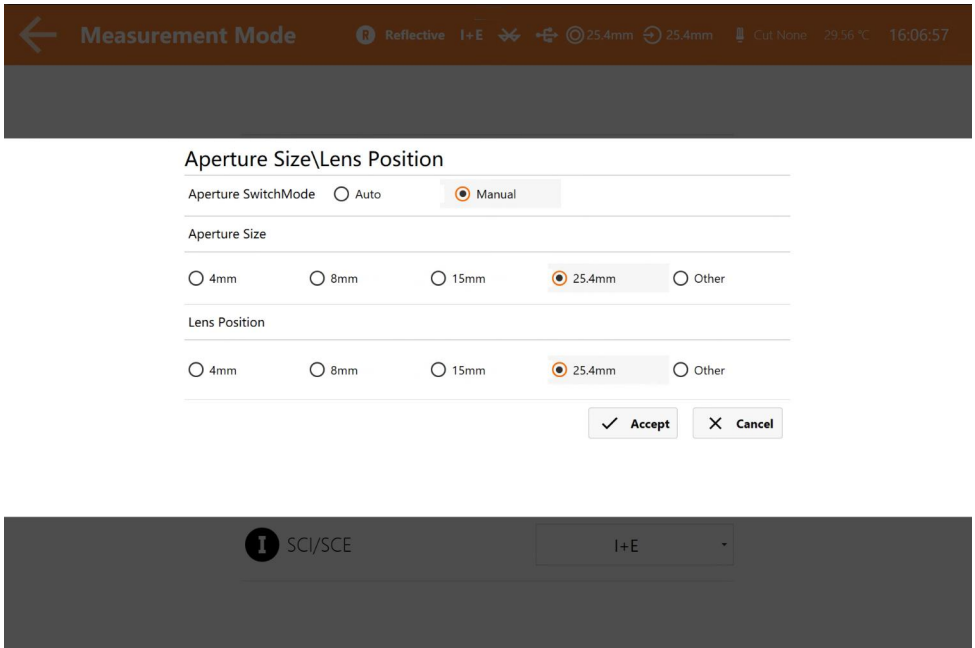


Figure17 Aperture Size/Lens Position Setting

**Cautions:** Under transmission measurement mode, only manual mode supported, and reflective aperture 25.4mm certainly, transmissive aperture size can be adjusted only by manual according to the actually transmissive aperture using.

Measurement mode including: measure once, continuous measurement, average measurement (Figure 18).

- **Measure Once:** Standard/Sample measurement times only once, under other modes, measurement times can be set as customer required.
- **Continuous Measurement:** If measurement conditions are certain, and need to measure continuous, or in some work flow process, we can choose this mode to saving operation steps and measurement time. Both standard and sample measurement times can be ordered and each measurement result will be stored. User can click “cancel” to stop continuous measurement.
- **Average measurement:** When the measured product are relatively large, or chroma is relatively uneven, the multi -point average reflect rates is obtained by measuring multiple test points, and then the calculated chroma data can

represent the real color of the sample data.

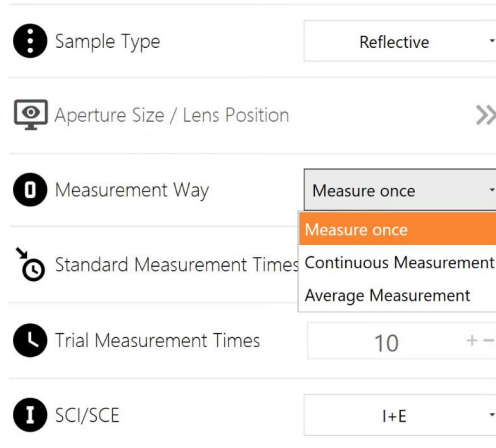


Figure18 Measurement Mode

SCI/SCE setting: The current measurement mode can be switched between SCI, SCE, I+E.

## 2.6 Instrument Measurement

“Click Measurement” in main menu, enter measurement page.

### 2.6.1 Instrument Measurement Page

**Reflective measurement page(Figure 19 ) instruction:**



Figure 19 Reflective Measurement Page

1. Items displayed from left to right:

- (1) Current page name, product type current measurement mode (reflective,transmission,haze)
- (2) Measurement mode, SCI, SCE, I+E (SCI+SCE) 3 modes is optional, so need to identify. Click SCI/SCE in left line, achieve fast switch.If in setting only SCI or SCE is chosen,fast switch not working.
- (3) Bluetooth working status
- (4) Aperture size
- (5) Lens position
- (6) UV light source cut
- (7) Instrument temperature
- (8) Current system time

2. Items displayed from up to down:

- (1) Observer,click and fast setting
- (2) Current illuminant, click and do fast setting
- (3) Current measurement mode,click and do fast setting
- (4) Current color space,click and do fast setting
- (5) Current color formula,click and do fast setting
- (6) Current color index,click and do fast setting
- (7) Default tolerance

3. Items in bottom displayed from left to right:

- (1) Standard/sample switch
- (2) Click "☰"(Figure20) sub-menu, here can rename,delete current data record,input/output record,make notes according to light spectrum(Figure21) and color space(Figure22).

**Cautions: Sample input is effected by product type and current measurement page, eg: current product is reflective type, and current page in sample measurement, then the input only can be reflective sample record.**

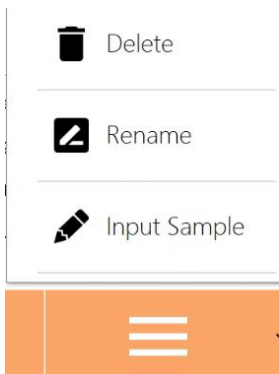


Figure20 sub-menu

Input Sample(Standard)

Name :  Reflective/Transmissive : Transmissive

Data Type :

Trans

	00	10	20	30	40	50	60	70	80	90
300							0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure21 make notes according to light spectrum

## Input Sample(Standard)

---

Name :  Reflective/Transmissive : Transmissive

Data Type :  Color Space :

Illuminant  Observer

Trans




X

Y

Z

---

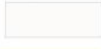
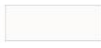
Figure22 make notes according to color space

- (3) Click " "turn to last record
- (4) Press measuring button,start to measure product color
- (5) Click " "turn to next record
- (6) Camera location:click " ", check reflective product placement location via camera.
- (7) Back main menu
- (8) Print

#### 4. Items in middle area

- (1) Color: display name of standard and trial(sample), measurement time, pseudo color, color space data, tolerance

 Color

Sample	Name	DateTime	Pseudo Color	L*	a*	b*
Standard	T00002	2023-06-16 16:33:21		98.75	0.12	0.68
				98.75	0.11	0.68
Trial	S00001	2023-06-16 16:33:30		$\Delta L^*$	$\Delta a^*$	$\Delta b^*$
				-0.00	-0.01	0.00

Name	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$
Tolerance	-1,1	-1,1	-1,1	1
$\Delta$	-0.00	-0.01	0.00	0.01



Figure 23 Reflective product information

(2) Color Index: display standard and trial color index data and difference

 Color Index

Whiteness	Standard	Trial	$\Delta WI$
WI(ASTM E313)	93.81	93.79	-0.02
WI(CIE ISO)	93.81	93.79	-0.02
WI(Hunter 1942)	98.24	98.24	-0.00

Figure 24 Color Index

(3) Spectrum Chart: Double -click to enter spectra chart,click “” or “” to switch displayed wavelength, current standard spectra wavelength,standard reflectance,trial reflectance,and the difference between standard and trail.they can be switched between each 10nm wavelength,drop down this page to get more data.



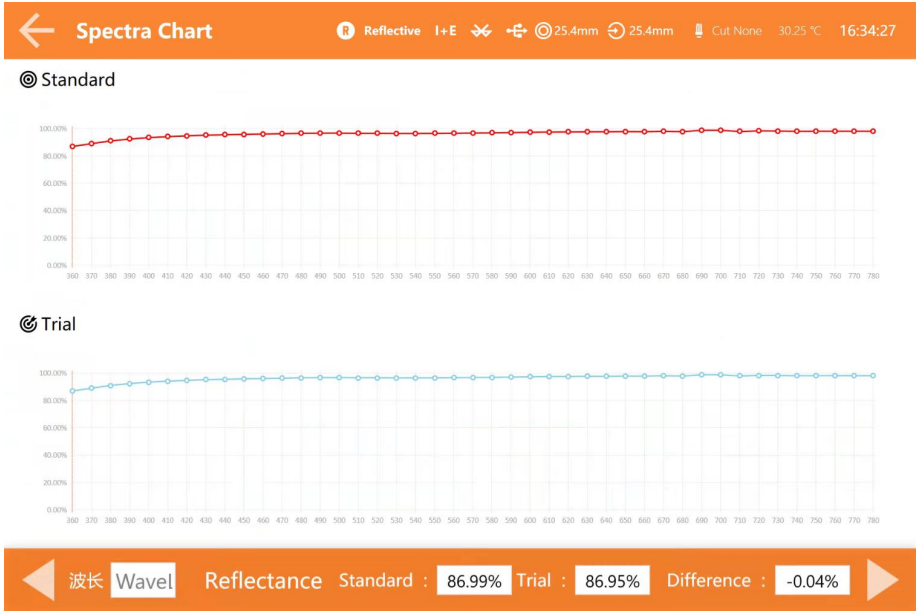


Figure 25 Reflectance Spectra Chart

(4) Color Chart: Double -click to enter

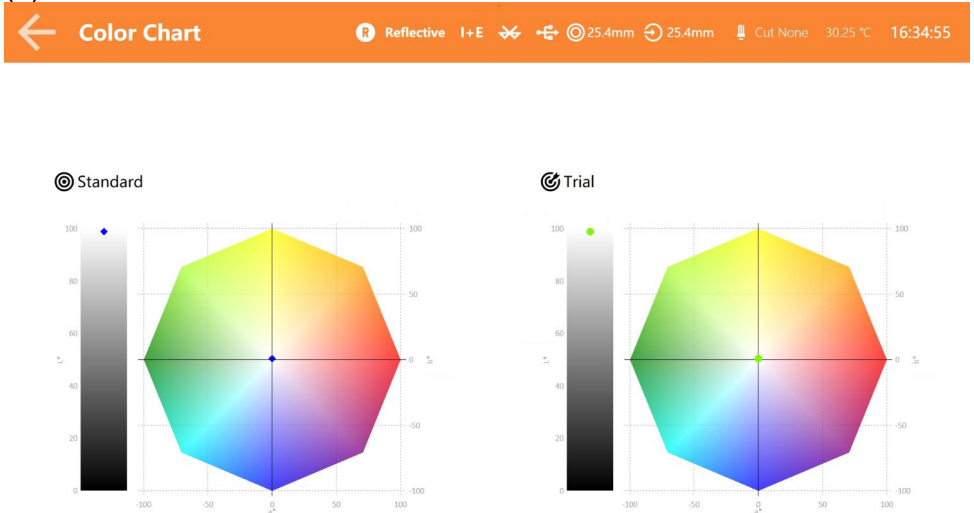


Figure 26 Reflective Color Chart

(5) Color Difference Chart: Double -click to enter

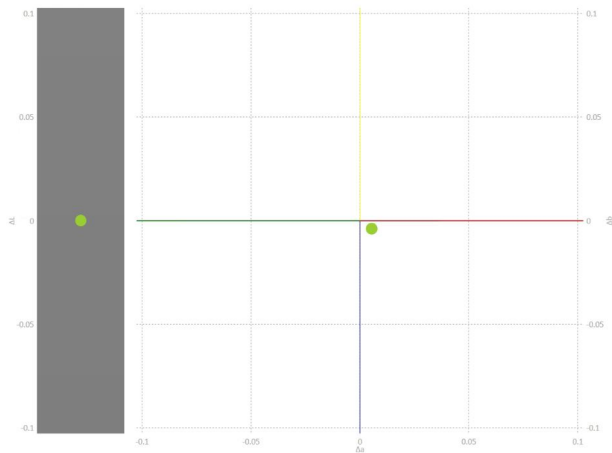


Figure 27 Reflective Color Difference Chart

Transmissive measurement page (Figure 28 ) instruction:

- 10°
- D65
- CIE Lab
- $\Delta E^*ab$
- Whiteness
- Tolerance

Sample	Name	DateTime	Pseudo Col	L*	a*	b*
Standard	T00003	2023-06-16 16:36:38		100.02	-0.07	-0.02
Trial	S00001	2023-06-16 16:36:49		100.05	-0.13	-0.04
				$\Delta L^*$	$\Delta a^*$	$\Delta b^*$
				0.02	-0.06	-0.02

Name	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$
Tolerance	-1,1	-1,1	-1,1	1
$\Delta$	0.02	-0.06	-0.02	0.07

Color Index				
Whiteness	Standard	Trial	$\Delta WI$	
WI(ASTM E313)	100.15	100.28	0.12	
WI(CIE ISO)	100.15	100.28	0.12	
WI(Hunter 1942)	99.92	99.85	-0.07	

Spectrum Chart  Transmittance  Absorbance

Color Chart

Color Difference Chart

Figure 28 Transmissive measurement page


1. Items displayed from left to right:

- (1) Current page name
- (2) Product type
- (3) Bluetooth working status
- (4) Aperture size
- (5) Lens position
- (6) UV light source cut
- (7) Instrument temperature
- (8) Current system time



2. Items displayed from up to down:

- (1) Observer,click and fast setting
- (2) Current illuminant, click and do fast setting
- (3) Current color space,click and do fast setting
- (4) Current color formula,click and do fast setting
- (5) Current color index,click and do fast setting
- (6) Default tolerance

3. Items in bottom displayed from left to right:

- (1) Standard/sample switch
- (2) Click""(Figure29) sub-menu, here can rename,delete current data record,input/output record,make notes according to light spectrum(Figure30) and color space(Figure31).

**Cautions: Sample input is effected by product type and current measurement page, eg: current product is transmissive type, and current page in sample measurement, then the input only can be transmissive sample record.**

- (3) Click""turn to last record
- (4) Press measuring button,start to measure product color
- (5) Click""turn to next record
- (6) Back main menu

 Delete

 Rename

 Input Sample



Figure29 sub-menu

### Input Sample(Standard)

Name :  Reflective/Transmissive : Transmissive  
 Data Type : Spectrum

Trans	00	10	20	30	40	50	60	70	80	90
300							0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure30 Input record

#### 4. Items in middle area

- (1) Color: display name of standard and trial, measurement time, pseudo color, color space data, tolerance

 Color

Sample	Name	DateTime	Pseudo Color	L*	a*	b*
Standard	T00003	2023-06-16 16:36:38	<input type="text"/>	100.02	-0.07	-0.02
Trial	S00001	2023-06-16 16:36:49	<input type="text"/>	100.05	-0.13	-0.04
				$\Delta L^*$	$\Delta a^*$	$\Delta b^*$
				0.02	-0.06	-0.02
Name	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$		
Tolerance	-1,1	-1,1	-1,1	1		
$\Delta$	0.02	-0.06	-0.02	0.07		

Figure31 Product color information

(2) Color Index: display standard and trial color index data and difference

**Color Index**

Whiteness	Standard	Trial	$\Delta WI$
WI(ASTM E313)	100.15	100.28	0.12
WI(CIE ISO)	100.15	100.28	0.12
WI(Hunter 1942)	99.92	99.85	-0.07

Figure32 Transmissive Product color information

(3) Spectrum Chart: Double -click to enter spectra chart,click “◀” or “▶” to switch displayed wavelength, current standard spectra wavelength, transmittance, can be switched between each 10nm wavelength

**Spectrum Chart**  Transmittance  Absorbance



Figure33 Spectrum Chart -Transmittance

 Spectrum Chart     Transmittance     Absorbance

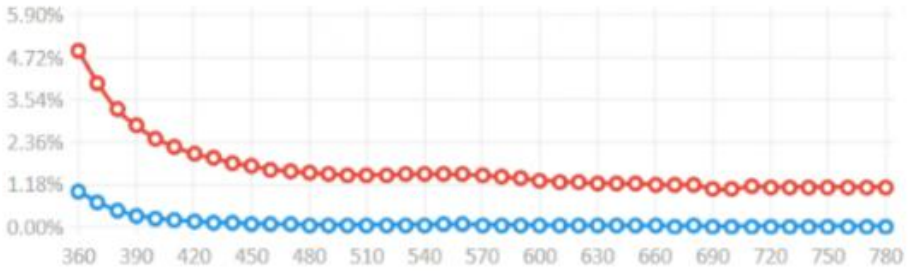
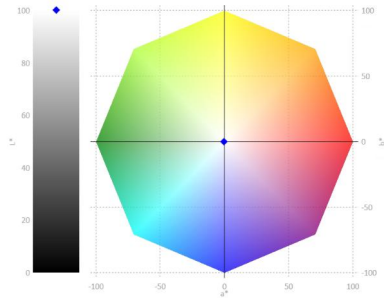


Figure34 Spectrum Chart-Transmittance - Absorbance

(4) Color Chart: Double -click to enter

 **Color Chart**     Transmissive      25.4mm     25.4mm     Cut None    30.44 °C    16:42:17

 Standard



 Trial

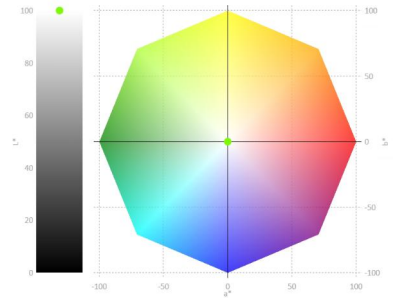


Figure 35 Transmissive Color Chart

(5) Color Difference Chart: Double -click to enter

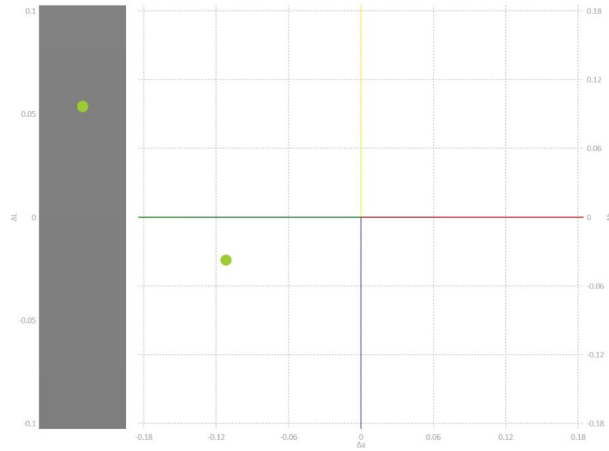


Figure 36 Transmissive Color Difference Chart

Haze measurement page (Figure 37 ) instruction:

← Haze Measurement H Haze ✂ + - ⊙ 25.4mm ↻ 25.4mm 📏 Cut: None 30.50 °C 16:43:06

**Haze Calibration**

- 10°
- D65
- CIE Lab
- Whiteness

Sample	DateTime	Pseudo Color	L*	a*	b*	H (C/10°)	T (C/10°)
Black. Data						H (A/10°)	T (A/10°)
White. Data						H (D65/10°)	T (D65/10°)

**Color Index**

Whiteness Black. Data White. Data

- WI(ASTM E313)
- WI(CIE ISO)
- WI(Hunter 1942)
- WI(Hunter 1960)
- WI(R457)
- WI(Taobh)
- WI(Taube)

**Spectrum Chart**

**Color Chart**

☰
▲
📏 Measure
▼
🏠 Home

Figure 37 Haze measurement page

1. Items displayed from left to right:

- (1) Current page name
- (2) Product type
- (3) Bluetooth working status
- (4) Aperture size
- (5) Lens position
- (6) UV light source cut
- (7) Instrument temperature
- (8) Current system time

2. Items displayed from up to down:

- (1) Haze calibration,click and enter haze calibration page
- (2) Current observer angle,click and fast setting
- (3) Current illuminant, click and do fast setting
- (4) Current color space,click and do fast setting
- (5) Current color index,click and do fast setting

3. Items in bottom displayed from left to right:

- (1) Click "☰" sub-menu, here can rename,delete current data record, input /output record.

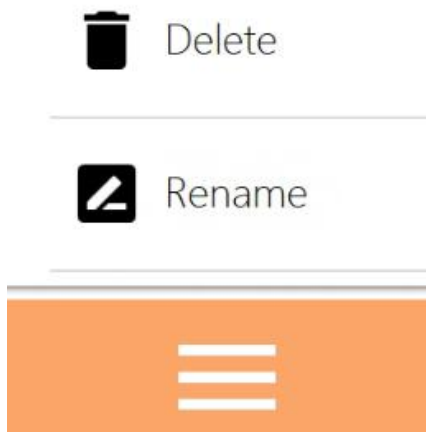


Figure38 Haze Sub-menu



- (2) Click "▶" turn to last record
- (3) Press measuring button, start to measure product color
- (4) Click "▶" turn to next record
- (5) Back main menu

4. Items in middle area

- (1) Color: display product name, black and white background data including measurement time, pseudo color, color space data

 **Color**      H00001



Sample	DateTime	Pseudo Color	L*	a*	b*
<b>Black. Data</b>	2023-06-16 16:44:07		93.92	-1.39	-0.27
<b>White. Data</b>	2023-06-16 16:44:13		7.70	-0.42	3.62

Figure39 Haze color information

- (2) Haze: data under different measure conditions

 Haze

<b>H</b> (C/ 10°)	<b>115.38</b>	<b>T</b> (C/ 10°)	<b>0.85</b>
<b>H</b> (A/ 10°)	<b>115.38</b>	<b>T</b> (A/ 10°)	<b>0.87</b>
<b>H</b> (D65/ 10°)	<b>115.38</b>	<b>T</b> (D65/ 10°)	<b>0.85</b>

Figure40 Haze

(3) Color Index: display color index data

 Color Index

Whiteness	Black. Data	White. Data
WI(ASTM E313)	86.28	-86.78
WI(CIE ISO)	86.28	-86.78
WI(Hunter 1942)	92.12	9.22
WI(Hunter 1960)	93.03	4.20
WI(R457)	85.53	0.61
WI(Tabpl)	85.43	0.62
WI(Taube)	86.45	-0.08

Figure41 Haze Color Index

(4) Spectrum Chart

 Spectrum Chart

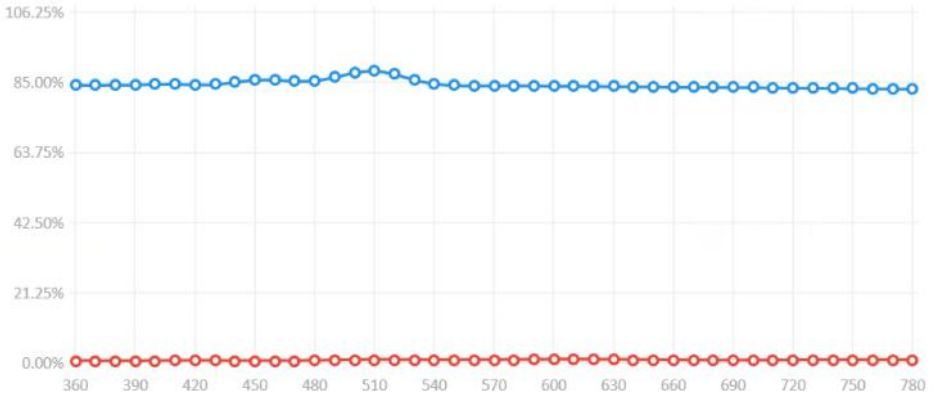


Figure42 Haze Spectrum Chart

(5) Color Chart

 Color Chart

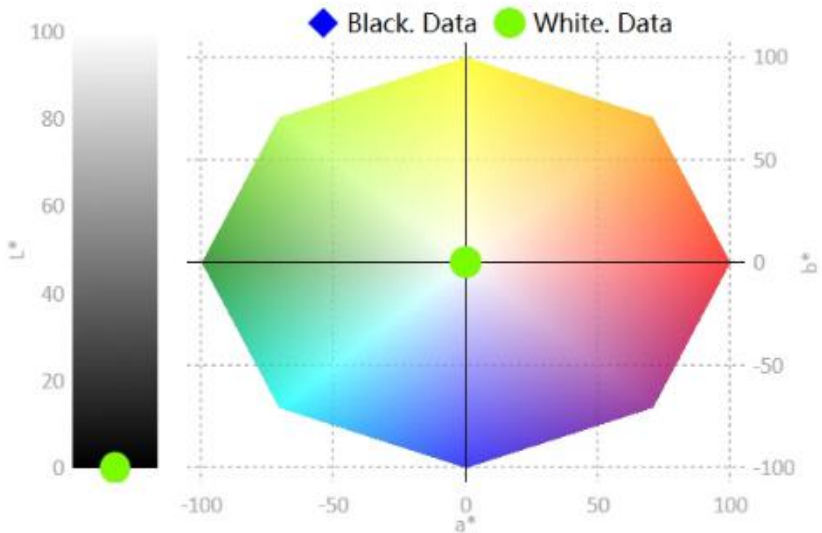


Figure43 Color Chart

## 2.7 Product measurement

### 2.7.1 Measurement Process

#### 1. Reflective measurement:

Set the sample type to reflection> Set aperture size> Set illuminant> Set UV> Black and White calibration> Place the sample> Press the measuring button/click to measure.

#### 2. Transmissive measurement:

Set the sample type to transmissive> Set aperture size> Set illuminant> Set UV> Black and White calibration> Place the sample> Press the measuring button/click to measure.

#### 3. Haze measurement

Set the sample type to haze> Set aperture size> Set illuminant> Set UV> Haze black reference calibration> Haze white reference calibration > Place the sample> Press the measuring button/click to measure > Haze black background data > Haze white background data

### 2.7.2 Reflective measurement

Reflective product in standard measurement steps:

1. Set the current sample type to reflective (refer to 2.5 measurement steps)

2. Set according aperture size

Main menu → Measurement Mode → Aperture size/Lens position, enter and choose according size and position

### Aperture Size\Lens Position

Aperture SwitchMode  Auto  Manual

---

Aperture Size

4mm  8mm  15mm  25.4mm  Other

---

Lens Position

4mm  8mm  15mm  25.4mm  Other

---

**Accept**  **Cancel**

Figure44 Aperture Size\Lens Position

### 3. Set Illuminant:

Measurement page → Illuminant setting(Figure45),click and choose according illuminant as required,click"Cancel"and back measurement page

#### Select a illuminant

<input checked="" type="radio"/> D65	<input type="radio"/> D50	<input type="radio"/> A	<input type="radio"/> C
<input type="radio"/> D55	<input type="radio"/> D75	<input type="radio"/> F1	<input type="radio"/> F2
<input type="radio"/> F3	<input type="radio"/> F4	<input type="radio"/> F5	<input type="radio"/> F6
<input type="radio"/> F7	<input type="radio"/> F8	<input type="radio"/> F9	<input type="radio"/> F10
<input type="radio"/> F11	<input type="radio"/> F12	<input type="radio"/> CWF	<input type="radio"/> DLF
<input type="radio"/> TL83	<input type="radio"/> TL84	<input type="radio"/> TPL5	<input type="radio"/> U30
<input type="radio"/> B	<input type="radio"/> U35	<input type="radio"/> NBF	<input type="radio"/> ID50
<input type="radio"/> ID65	<input type="radio"/> LED B1	<input type="radio"/> LED B2	<input type="radio"/> LED B3
<input type="radio"/> LED B4	<input type="radio"/> LED B5	<input type="radio"/> LED BH1	<input type="radio"/> LED RGB1
<input type="radio"/> LED V1	<input type="radio"/> LED V2	<input type="radio"/> LED C2	<input type="radio"/> LED C3
<input type="radio"/> LED C5	<input type="radio"/> LED T8G	<input type="radio"/> U3500	


---

**Accept**  **Cancel**

Figure45 Illuminant Setting

4. If any change on UV light source, please do calibration again.

5. Product measure in standard measurement page:

After above steps finish, enter standard measurement page, put product on reflective measuring aperture position, click "measure" or quick click measuring button start to measure, LED indicator lights flickering, when flicker stops, measurement is done.

Reflective trial measurement is similar to standard measurement

### **2.7.3 Transmissive measurement**

Transmissive product in standard measurement steps:

1. Set the current sample type to transmissive
2. Set according aperture size

Under transmission measurement mode, aperture size / Lens position only manual mode supported, transmissive aperture size can be adjusted only by manual according to the actually transmissive aperture using, and make sure reflective aperture stay 25.4mm certainly

3. Set Illuminant
4. Calibration again
5. Product measure in standard measurement page:

Back to transmissive standard measurement page, place the sample in the transmissive house, cling to the transmissive aperture, and close transmissive cabinet. Short press the measurement button to start the measurement.

Transmissive measurement data will also display in color index page.

Transmissive trial measurement is similar to standard measurement

### **2.7.4 Haze measurement**

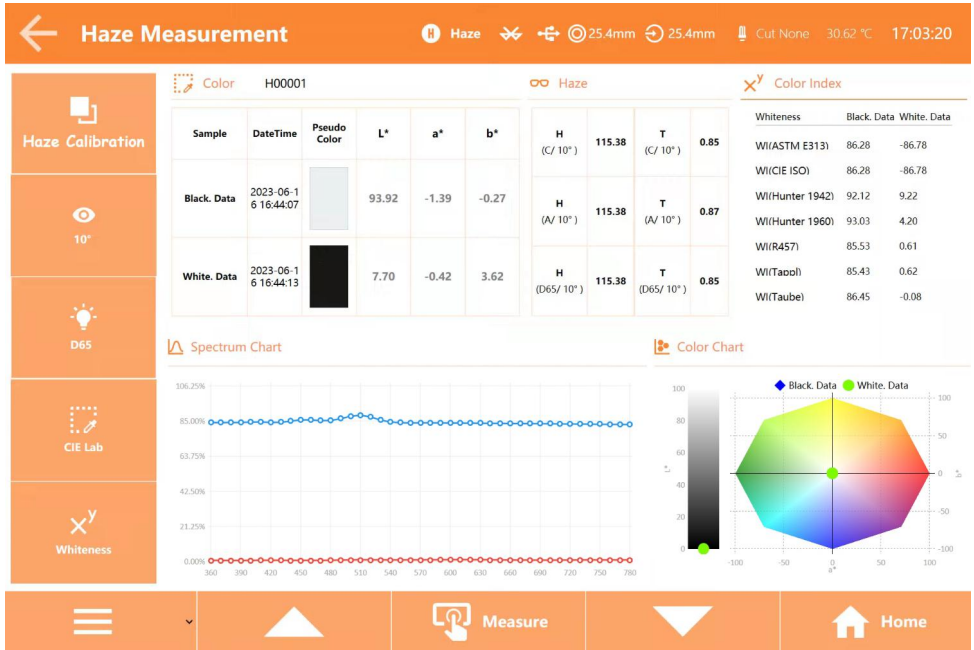


Figure46 Haze Measurement Page

Haze is one color indexes of transmissive measurement, it is based on international standards that objectively measure the full transmission rate and transmission haze. It is suitable for the measurement of full transparent, transparent samples (plastic plates, sheets, plastic film, flat glass), and has a wide range of applications in national defense scientific research and industrial and agricultural production.

When white board place on reflective measuring aperture position, transmissive measurement geometric condition will be D/0; When reflective black cavity placed on reflective aperture position, transmissive measurement geometric will be D/0. Haze measurement need below two conditions:

1. Set current sample type to haze
2. Set according aperture size

Under transmission measurement mode, aperture size / Lens position only manual mode supported, and make sure reflective aperture stay 25.4mm certainly

3. Follow the instruction in screen, finish all steps and done haze

measurement.

## 2.8 Color Options

Click "Color Options" in main menu, enter color options page

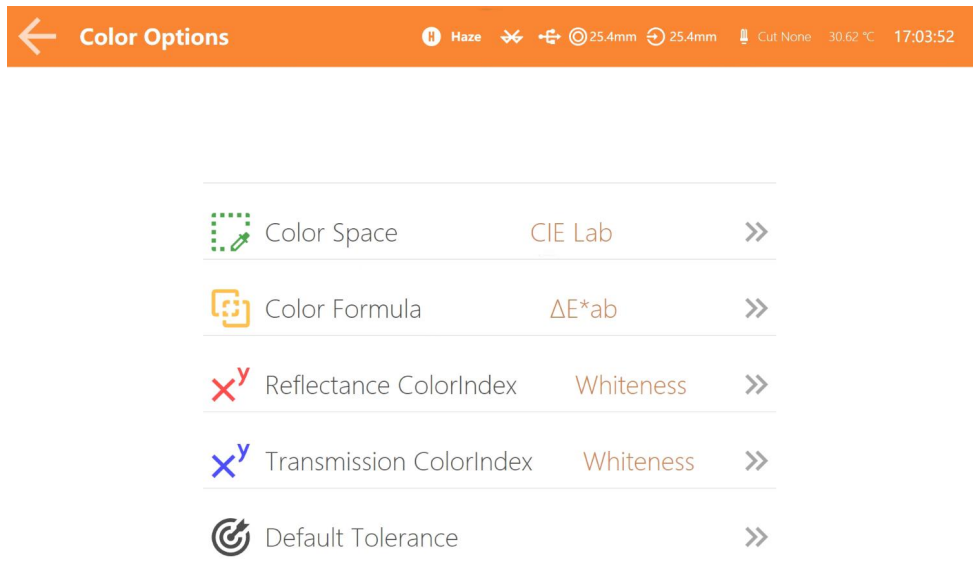


Figure47 Color Options Page

### 2.8.1 Color Space

Click "Color Space" enter page(Figure48), choose according color space type, click "Accept" and finish color space setting.



## Select a colorspace

- CIE XYZ
- CIE Lab
- CIE Luv
- sRGB
- Munsell
- CIE Yxy
- CIE LCh
- Hunter Lab
- DIN99 Lab
- $\beta$ xy

✓ Accept

⊗ Cancel

Figure48 Color Space

## 2.8.2 Color Formula

Click “Color Formula” enter page(Figure 49), choose according color formula type, click “Accept” and finish color formula setting.

## Color Formula

- $\Delta E^*ab$
- $\Delta E^*94$
- $\Delta E^*00$
- $\Delta E^*cmc(1:1)$
- $\Delta E^*cmc(2:1)$
- $\Delta E^*cmc(l:c)$
- $\Delta E^*uv$
- $\Delta E(Hunter)$
- $\Delta E99$

✓ Accept

⊗ Cancel

Figure 49 Color Formula

### 2.8.3 Reflective Color Index

Click “Color Index” enter reflective color index page (Figure 50), choose according color index type, click “Accept” and finish color index setting.

#### Select a colorindex

<input type="radio"/> Yellowness	<input checked="" type="radio"/> Whiteness
<input type="radio"/> Strength	<input type="radio"/> MI
<input type="radio"/> Shade555	<input type="radio"/> StainingFastness
<input type="radio"/> ColorFastness	<input type="radio"/> Gloss8
<input type="radio"/> Carbon	<input type="radio"/> ITA°

Figure 50 Reflective Color Index

### 2.8.4 Transmissive Color Index

Click “Color Index” enter transmissive color index page (Figure 51), choose according color index type, click “Accept” and finish color index setting.

#### Select a colorindex

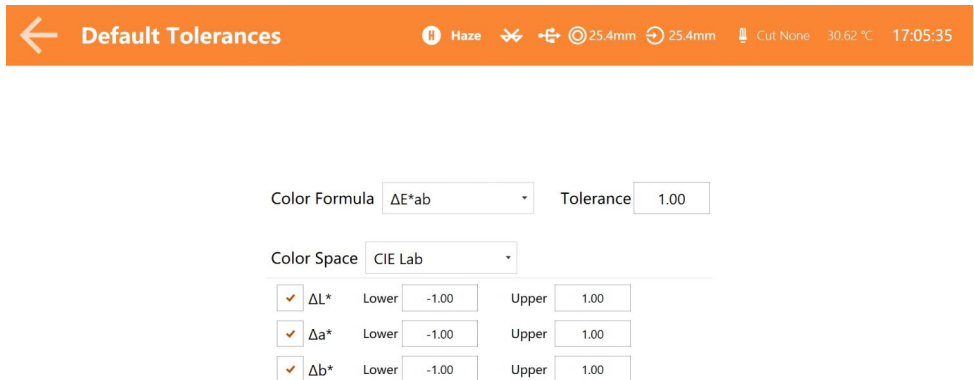
<input type="radio"/> Yellowness	<input checked="" type="radio"/> Whiteness
<input type="radio"/> Strength	<input type="radio"/> MI
<input type="radio"/> Shade555	<input type="radio"/> GardnerIndex
<input type="radio"/> PtColIndex	<input type="radio"/> Klett
<input type="radio"/> Saybolt	<input type="radio"/> ASTM D1500
<input type="radio"/> Chinese Pharmacopeia	<input type="radio"/> Total Transmittance

Figure 51 transmissive color index

## 2.8.5 Default Tolerances

Enter “Default Tolerance” page(Figure 52), click edit box to revise tolerance item value, the lower limit must be less than upper limit. Click color formula drop -down box to change different formula type, revise according tolerance value; Also click color space drop -down box to change different space type, revise according tolerance value. Tolerance items will effect measure result judgment only when it is ticked, not ticked items will be ignored.

When standard use default tolerance, trial will compare with standard, within tolerance range, trial will be prompted pass, or it will prompted fail. (Measure result prompt function should be open).



Color Formula  Tolerance

Color Space

<input checked="" type="checkbox"/>	ΔL*	Lower	<input type="text" value="-1.00"/>	Upper	<input type="text" value="1.00"/>
<input checked="" type="checkbox"/>	Δa*	Lower	<input type="text" value="-1.00"/>	Upper	<input type="text" value="1.00"/>
<input checked="" type="checkbox"/>	Δb*	Lower	<input type="text" value="-1.00"/>	Upper	<input type="text" value="1.00"/>

Figure 52 Default Tolerance Setting

## 2.9 Parameter Settings

Click “Parameter Settings” and enter(Figure 53), here can do color diff. Formula factors, MI, YI MI, 555 Shade Sorting, Strength Setting



Figure 53 Parameter Settings Page

### 2.9.1 Color diff. Formula factors

Click "Color diff. Formula factors", enter setting page (Figure 54), can do factors sets on  $\Delta E^*94$ 、 $\Delta E^*00$ 、 $\Delta E^*cmc(1:c)$ .

**ΔE\*94**

KL94  KC94  KH94

**ΔE\*00**

KL00  KC00  KH00

**CMC**

KLcmc  KCcmc

Figure 54 Color diff. Formula factors Setting

### 2.9.2 MI Settings

Click "MI Settings", enter setting page(Figure 55), can do reference 1 and reference 2 setting on illuminant and observer angle.

**Reference 1**

Illuminant

Observer

**Reference 2**

Illuminant

Observer

Figure 55 MI Settings

### 2.9.3 YI MI Settings

Click "MI Settings", enter setting page(Figure 56), choose the YI or WI standard

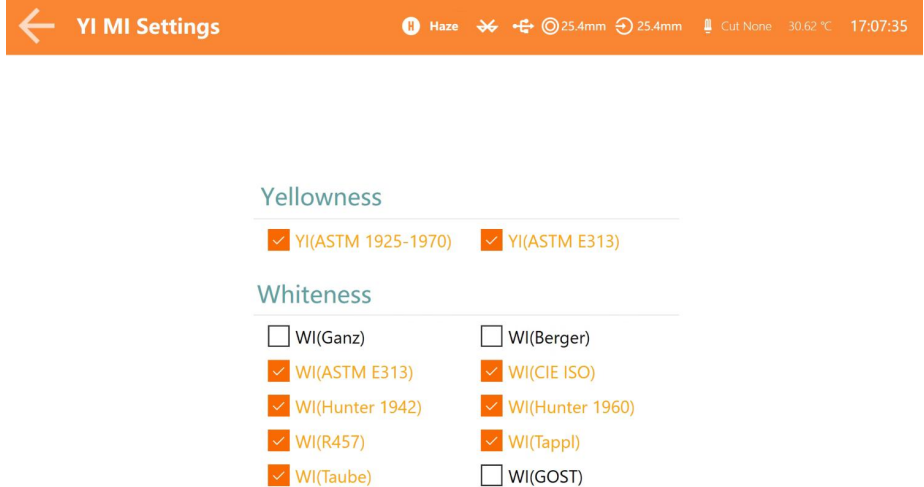


Figure 56 YI MI Settings

### 2.9.4 555 Shade Sorting

Click "555 Shade Sorting", enter setting page(Figure 57), choose the sorting standard and shade tolerance

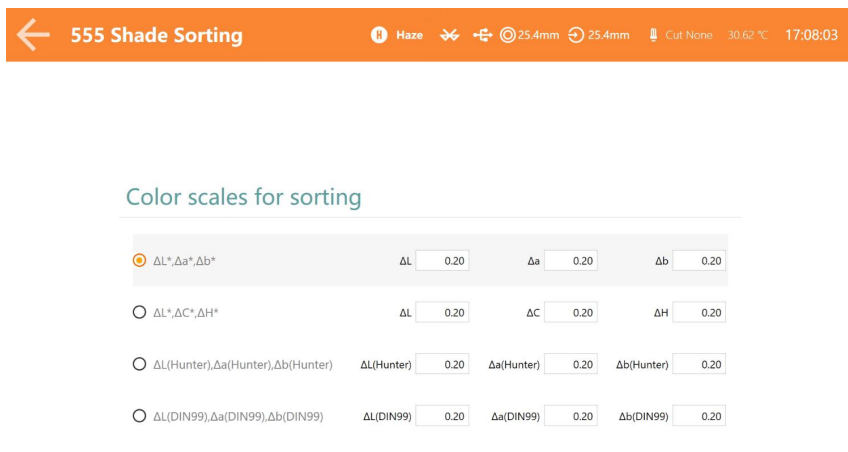


Figure 57 555 Shade Sorting

## 2.9.5 Strength Settings

Click "Strength Settings", enter setting page(Figure 58), tick strength type need to display and specified wavelength position

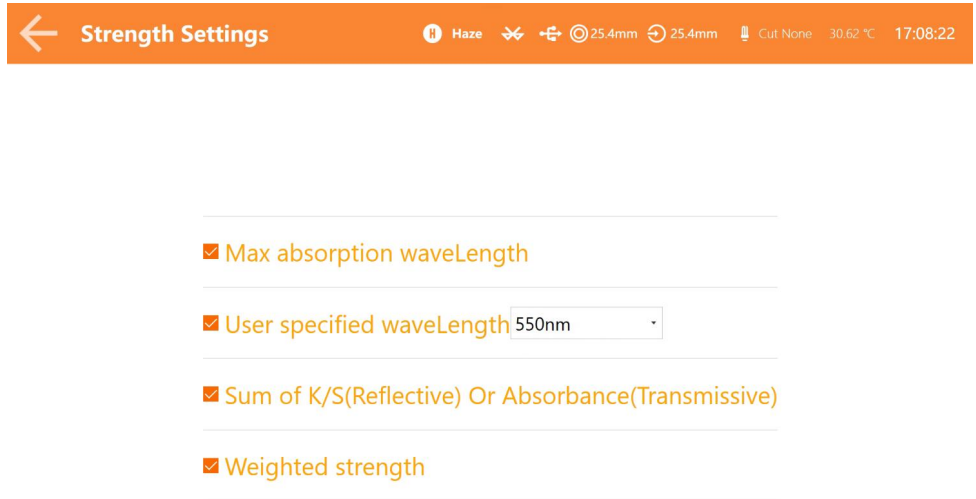


Figure 58 Strength Settings

## 2.10 Display Setting

Click "Display Settings" on the main menu to enter the display setting page"Figure 59"

### 2.10.1 Color Offset

When open the function of the color offset, it will display the color deviation between trial and the standard when trial is measured. When it is closed, there is no corresponding prompt.

## 2.10.2 Test Result

When open the test result prompt, if the test result exceeds the tolerance range set for the standard during the sample measurement, the red font “Fail” will be prompted. If it is within tolerance range, the green "Pass" is displayed.

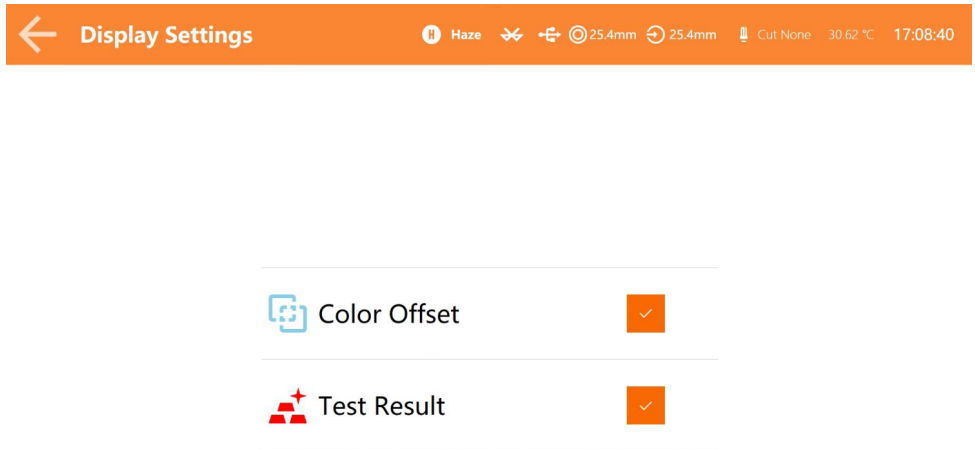


Figure 59 Display Setting

## 2.11 Data Management

Click “Data Management” on the main menu to enter the data management page(Figure 60). Data management can achieve functions such as “Check Record”, “Delete All”, “Delete Trial Record”, “Search Record” and fast setting on illuminant, observer, color space, etc. In the bottom, can check last and next record, and total record quantity



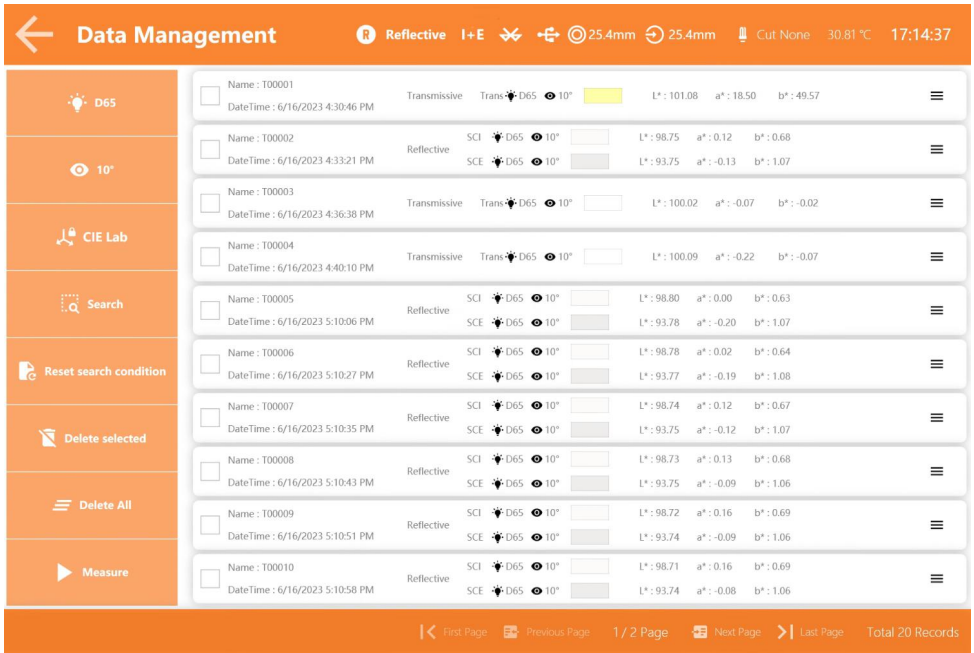


Figure 60 Data Management

## 2.11.1 Delete Record

In the left line of data management page, “Delete selected”, “Delete All”, and click “☰” the right sub-menu of each record to delete records.

Delete selected: tick the left block of record, more records can be ticked, the click”Delete selected” to delete these records.

Delete All: click and confirm, all record will be deleted, click “Cancel” to cancel this operation

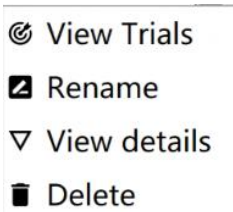


Figure 61 Sub-menu of Standard

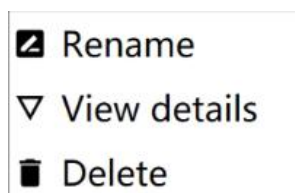


Figure 62 Sub-menu of Trial

## 2.11.2 Search Record

Click “Search”, input recording name, record type, and record storage time to find record. Click to reset the search condition to reset the search condition and display all the records.

### Search condition



<input type="checkbox"/> Name	<input type="text"/>
<input type="checkbox"/> Reflective / Transmissive	<input checked="" type="radio"/> Reflective <input type="radio"/> Transmissive
<input type="checkbox"/> Start Time	6/16/2023 12:00:00 AM 
<input type="checkbox"/> End Time	6/16/2023 5:16:06 PM 

Figure 63 Standard Record Search

### Search condition



<input type="checkbox"/> Name	<input type="text"/>
<input type="checkbox"/> Start Time	6/16/2023 12:00:00 AM 
<input type="checkbox"/> End Time	6/16/2023 5:16:31 PM 

Figure 64 Trial Record Search

## 2.11.3 Check Record

Click “☰” enter sub-menu, then “View Trials”, enter trials list(Figure 66); “View details” to check detail standard/trial information.

Trial Records		Reflective	I+E	25.4mm	25.4mm	Cut None	30.81 °C	17:16:53	
<ul style="list-style-type: none"> <li>D65</li> <li>10°</li> <li>CIE Lab</li> <li>Search</li> <li>Reset search condition</li> <li>Delete selected</li> <li>Delete All</li> <li>Measure</li> </ul>	<input checked="" type="checkbox"/>	Name : T00020 DateTime : 6/16/2023 5:12:16 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.74 a* : 0.08 b* : 0.68			
			SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.75 a* : -0.13 b* : 1.07				
	<input type="checkbox"/>	Name : S00001 DateTime : 6/16/2023 5:12:35 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.80 a* : -0.07 b* : 0.64			
			SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.78 a* : -0.22 b* : 1.08				
	<input type="checkbox"/>	Name : S00002 DateTime : 6/16/2023 5:12:43 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.77 a* : -0.01 b* : 0.66			
			SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.77 a* : -0.19 b* : 1.07				
	<input type="checkbox"/>	Name : S00003 DateTime : 6/16/2023 5:12:50 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.76 a* : 0.01 b* : 0.66			
			SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.76 a* : -0.17 b* : 1.08				
	<input type="checkbox"/>	Name : S00004 DateTime : 6/16/2023 5:12:58 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.76 a* : 0.01 b* : 0.67			
			SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.76 a* : -0.17 b* : 1.08				
	<input type="checkbox"/>	Name : S00005 DateTime : 6/16/2023 5:13:06 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.76 a* : 0.01 b* : 0.67			
			SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.76 a* : -0.17 b* : 1.07				
	<input type="checkbox"/>	Name : S00006 DateTime : 6/16/2023 5:13:14 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.76 a* : -0.00 b* : 0.67			
			SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.76 a* : -0.17 b* : 1.07				
	<input type="checkbox"/>	Name : S00007 DateTime : 6/16/2023 5:13:22 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.77 a* : -0.01 b* : 0.66			
		SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.76 a* : -0.17 b* : 1.07					
<input type="checkbox"/>	Name : S00008 DateTime : 6/16/2023 5:13:29 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.76 a* : -0.02 b* : 0.66				
		SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.77 a* : -0.18 b* : 1.08					
<input type="checkbox"/>	Name : S00009 DateTime : 6/16/2023 5:13:37 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.77 a* : -0.03 b* : 0.67				
		SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.77 a* : -0.18 b* : 1.08					
<input type="checkbox"/>	Name : S00010 DateTime : 6/16/2023 5:13:45 PM	Reflective	SCI <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 98.77 a* : -0.03 b* : 0.66				
		SCE <input checked="" type="checkbox"/> D65 <input checked="" type="checkbox"/> 10°	<input type="checkbox"/>	L* : 93.77 a* : -0.19 b* : 1.08					

Figure 65 Trial Records List

## 2.11.4 Rename

Click “☰” enter sub-menu, then “Rename”, Input new name(Figure 66), click “OK” to save, “Cancel” to cancel name edit operation

### Rename

Input a new name

OK

Cancel

Figure 66 Rename

## 2.12 System Setting

Click “System Settings” in the main menu to enter the system setting page(Figure 67)

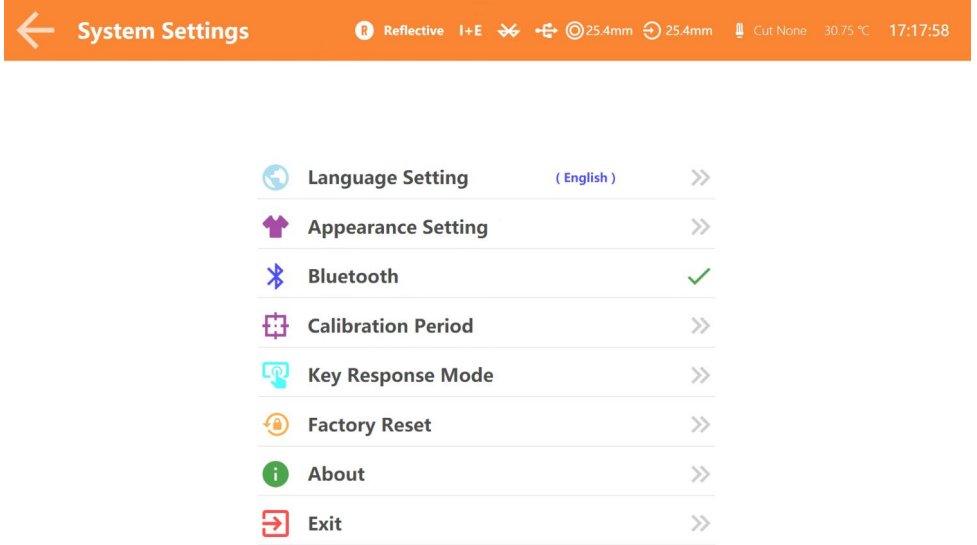


Figure 67 System Setting

### 2.12.1 Language Settings

Click "Language Settings" to select the appropriate language(Figure 68)



#### Language Setting

- English
- 中文简体
- 中文繁體

## Figure 68 Language Settings

### 2.12.2 Appearance Setting

Appearance setting for setting the color of the instrument interface. In this page, click “Appearance Setting”, tick the color(Figure 69)

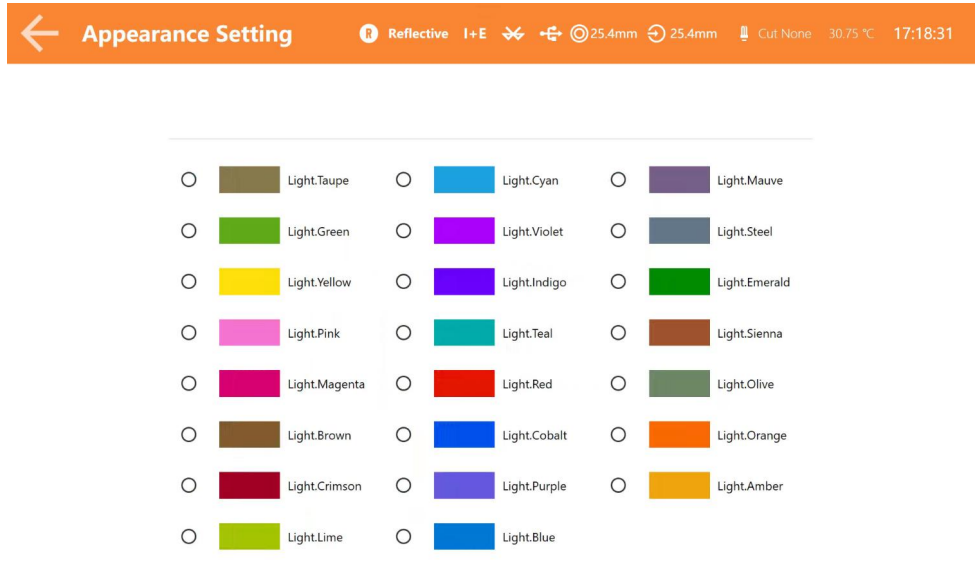


Figure 69 Appearance setting

### 2.12.3 Bluetooth

For instruments equipped with Bluetooth, click the menu item to switch the Bluetooth

### 2.12.4 Calibration Period

Click “Calibration Period” on system setting interface to enter. Set the effective time of the black and white plate calibration. If the effective time is exceeded, the instrument will prompt to perform the black and white plate calibration again. The optional valid time is when startup, four hours, eight hours, twenty hours and one

week(Figure 70)

## Calibration Period

- When Startup
- Eight Hours
- One Week
- Four Hours
- Twenty Four Hours

✓ **Accept**

⊘ **Cancel**

Figure 70 Calibration Period Setting

### 2.12.5 Key Response

Click the "Key response mode" in the system settings page to enter, there are three modes: measurement and upload results, upload key message, and do nothing

Measurement and upload results: When measuring button pressed, it will automatically jump to the measurement interface and do measurement

Upload key message: When measuring button pressed, it will not jump automatically to the measurement interface and do measurement. Only in measurement page, pressing measuring button will do measurement

Do Nothing: Measuring button have no any function

## Key Response Mode

Measure and upload the results

Upload key message

Do Nothing

✓ **Accept**

⊘ **Cancel**

Figure 71 Key Response

### 2.12.6 Restore Factory Settings

Click “Restore Factory Settings” on the system setting page to enter this interface, as shown in Figure 72. Click “OK ” to clear all measurement records and parameter settings and restore to the factory state; click “Cancel” to cancel this operation.

## System Settings

Are you sure you want to restore factory Settings ?

OK

Cancel

Figure 72 Restore Factory Settings

### 2.12.7 About

Click "About" in the system settings page and enter(Figure 73). In this interface, you can view the software publishing company, software version

number and other information.

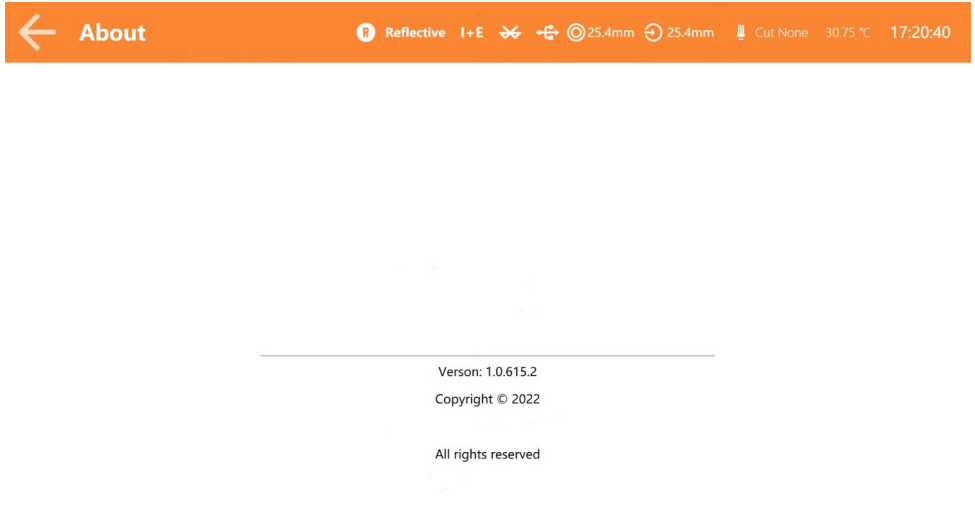


Figure 73 About

### 2.12.8 Exit

Click "Exit" in the system settings interface to exit the software and return to the desktop (Figure 74)

## Exit

Are you sure to exits the application



Figure 74 Exit



### **3 DAILY MAINTENANCE**

- (1) This instrument is a precision optical instrument. Please keep and use the instrument properly. Avoid using and storing the instrument under humid, strong electromagnetic interference, strong light and dust. It is recommended to use and store the instrument in a standard laboratory environment.
- (2) The white plate is a precision optical component. It should be kept and used properly. Avoid rubbing the work surface with sharp objects, avoid soiling the work surface with dirt, and avoid exposing the white plate under strong light. Regularly clean the white plate working surface with a cloth and alcohol. Before calibration, clean the dust on the white plate surface in time.
- (3) In order to ensure the validity of the test data, it is recommended to inspect the instrument and the white plate to the manufacturer or a qualified metrology institute for every year from the date of purchase.
- (4) This instrument get power from the external supply power charger. Pad part with built-in Li battery, power supply should be used in a standard manner to avoid frequent plugging and unplugging, to protect the power supply performance and to extend the service life.
- (5) Please do not disassemble the instrument privately. Please contact the relevant after-sales staff If there is any problem. Label removing will affect the after-sales maintenance service of the instrument.

### **4. TECHNICAL PARAMETERS**

#### **4.1 Product Feature**

- (1) High hardware configuration: Industrial -grade high -performance MCU control module, 10.5 -inch independent rotating PAD, 128G storage capacity; USB/Bluetooth 5.0 dual communication mode
- (2) 154mm integral sphere, use high life span full spectrum LED and full spectrum Xenon lamps as lighting sources (Note: Some models are

- equipped with differences), and high -precision concave grating is used; double array 256 image CMOS detectors, dual light road design
- (3) Measuring reflective and transmissive spectrum of sample, accurate Lab data, can be used for color matching and accurate color transfer.
  - (4) Side measurement, upward measurement, and downward measurement (using accessories) and other gestures are placed and measured, adapting to more samples.
  - (5) Automatic identification of aperture size,  $\Phi$  25.4/15/8/4mm four apertures can be switched; open -type transmitted warehouses, with 25.4mm aperture(other size can be customized), taking into account the special needs of customers.
  - (6) Automatic temperature and humidity compensation function, make the measurement data more accurate
  - (7) Wavelength range 360nm–780nm,combined LED Light. Including UV,4 00 / 420 / 460nm cut-off light source, more professional on UV product measurement
  - (8) Independent light source detector, always monitor changes in light sources to ensure that the light source is reliable
  - (9) Multiple measure modes: quality mode, sample mode, to meet more customer needs
  - (10) A variety of accessories: holding tool of reflective sample, transmission holder, for more conditions
  - (11) 128G Large-capacity storage space, which can store more than 100,000 test record
  - (12) Built-in Camera locating
  - (13) PC color management software has powerful extensions.

## 4.2 Technical Specifications

Optical Geometry	<p>Reflect: D/8(diffused illumination, 8-degree viewing angle) ;                  SC/SCE ; Include UV / excluded UV light source;                  Transmittance: D/0 (diffuse illumination: 0° viewing)                  SC/SCE ; Include UV / excluded UV light source;                  HAZE (ASTM D1003);                  Standards meet: CIE No.15, GB/T 3978,GB 2893,GB/T 18833,ISO7724/1,ASTM E1164,DIN5033 Teil7,JIS Z8722 under condition C</p>
Characteristic	<ol style="list-style-type: none"> <li>1. It is used for accurate analysis and transmission of laboratory color. Apply in paints, inks, textiles, garments, printing and dyeing, printing etc industries</li> <li>2. 10.5 inch rotatable display pad, 128G storage, camera real-time positioning</li> <li>3. Instrument can be measured on the side, upward measurement, and the downward measurement (use accessories) and other gestures.</li> <li>4. Open transmission warehouse, available thickness of 54mm transmitted samples.</li> <li>5. Automatic temperature and humidity compensation function</li> <li>6. Built -in full spectral high life LED light source and Xenon lighting sources, testing fluorescent samples have better recognition</li> </ol>
Integrating Sphere Size	<p>Φ154mm</p>
Light Source Device	<p>360nm–780nm Wavelength range ,combined LED Light. Including UV, 400nm / 420nm /460nm cut-off light source, 360~780nm Xenon Lamp.</p>
Spectrophotometric Mode	<p>Concave Grating</p>

## Benchtop Spectrophotometer

Sensor	256 Image Element Double Array CMOS Image Sensor
Wavelength Range	360~780nm
Wavelength Interval	10nm
Semiband Width	5nm
Measured Reflectance Range	0~200%
Measuring Aperture	<p>Reflective:</p> <p>XLAV <math>\Phi</math>25.4mm/<math>\Phi</math>30mm</p> <p>LAV<math>\Phi</math>15mm/<math>\Phi</math>18mm</p> <p>MAV<math>\Phi</math>8mm/<math>\Phi</math>10mm</p> <p>SAV<math>\Phi</math>4mm/<math>\Phi</math>6mm</p> <p>Transmissive:</p> <p><math>\Phi</math>25.4mm(No limit on sample height and width, but thickness<math>\leq</math>54mm)</p> <p>Remark:</p> <ol style="list-style-type: none"> <li>1. Automatic identification of aperture switch</li> <li>2. Customized Configuration caliber and lens position</li> </ol>
Specular Component	Reflectance: SCI&SCE / Transmittance: SCI&SCE
Color Space	CIE LAB,XYZ,Yxy,LCh,CIE LUV,Musell,s- RGB,HunterLab, $\beta$ xy,DIN Lab99
Color Difference Formula	$\Delta E^*ab$ , $\Delta E^*uv$ , $\Delta E^*94$ , $\Delta E^*cmc(2:1)$ , $\Delta E^*cmc(1:1)$ , $\Delta E^*00$ , DIN $\Delta E99$ , $\Delta E$ (Hunter) , $\Delta E^*CH555$ color shade sorting

Benchtop Spectrophotometer

<p>Other Colorimetric Index</p>	<p>WI(ASTM E313, CIE/ISO,AATCC,Hunter, Taube,Berger Stensby)                  YI(ASTM D1925, ASTM 313),ISO brightness,R457                  MI (Metamerism Index),                  Staining Fastness, Color Fastness, Color Strength, Opacity,                  APHA/Hazen/Pt-Co Index, Gardner Index                  8° Gloss,555 Index, Haze,Transmission(ASTM D1003), Saybolt index, ASTM D1500 Color code, carbon (My,dM) ,Color density                  CMYK(A,T,E,M),Tint, Color density (part function achieved via software in PC)</p>
<p>Observer Angle</p>	<p>2°/10°</p>
<p>Illuminant</p>	<p>D65,A,C,D50,D55,D75,F1,F2,F3,F4, F5, F6,F7,F8,F9, F10,F11,F12,CWF,DLF,TL83,TL84,TPL5,U30, B,U35,NBF                  ID50,ID65,LED-B1,LED-B2,LED-B3,LED-B4,LED-B5,LED-BH1,LED-RGB1,LED-V1,LED-V2,LED-C2,LED-C3,LED-C5,                  customized light source(41 light sources in total,part achieved via software in PC)</p>
<p>Displayed Data</p>	<p>Spectrogram/Values, Samples Chromaticity Values, Color Difference Values/Graph, PASS/FAIL Result, Color Offset, Color assessment, haze, liquid chromaticity</p>
<p>Measuring Time</p>	<p>2.0s (Measure SCI &amp; SCE meantime about 4s)</p>
<p>Repeatability</p>	<p>Reflectance chromaticity value:Φ25.4mm/SCI, Standard deviation within <math>\Delta E^*_{ab}</math> 0.018 ( When a white calibration plate is measured 30 times at 5 second intervals after white calibration);                  Reflectance chromaticity value:Φ25.4mm/SCI, Standard deviation within <math>\Delta E^*_{ab}</math> 0.01 ( When a white calibration plate is measured 30 times at 5 second intervals after white calibration);                  spectrum reflectance /transmission: ≤0.1%</p>

## Benchtop Spectrophotometer

Inter-instrument Error	Φ25.4mm/SCI, Within $\Delta E^*ab$ 0.1 (Average for 12 BCRA Series II color tiles)
Dimension	L*W*H=440x248x283mm
Weight	Approx. 13.5kg
Power	AC 24V, 3A Power adapter power supply
Illuminant Life Span	5 years, more than 3 million times measurements
Display	10.5-inch rotatable display pad
Data Port	USB & Bluetooth
Data Storage	128G storage, above 100,000pcs
Language	Simplified Chinese, Traditional Chinese, English,(Optional Customized German,Russian, French ,Spanish ,Japanese, Thai, Korean, Polish, Portuguese)
Operating Environment	0~40°C (32~104°F)
Storage Environment	-20~50°C (-4~122°F)
Optional Accessory	Micro Aperture(4mm) transmission test clamp component, Instrument inversion components,culture dish,Film fixture
Standard Accessory	Power Adapter, User Guide, CD Disk(PC Software), USB cable, Standard Calibration Board, Black Calibration Cavity, Transmission black baffle, Sample holder, 25.4 caliber, 15 caliber, 8 caliber, 4 caliber,Transmissive Test Component, cuvette
Notes	The specifications are subject to change without notice.