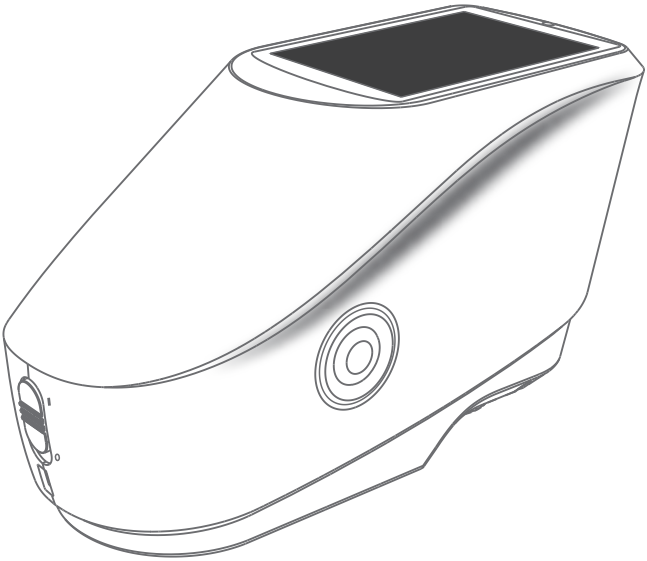
D/8°

SPECTROPHOTOMETER

OPERATION MANUAL



V6.0

CATALOGUE

Instruction.....1
Cautions.....1
1. Interface Description.....2
2. Operating Instruction.....3
2.1 Power On&Off.....3
2.2 Calibration.....5
2.3 Measurement.....6
2.3.1 Measurement Instruction.....6
2.3.2 Standard Measurement.....8
2.3.3 Sample Measurement 10
2.3.4 Average Measurement.....12
2.4 Connecting to PC.....13
2.4.1 USB Connection.....13
2.4.2 Bluetooth Connection.....13
2.5 Print.....14
3. Main Menu.....15
3.1 Data Management.....15
3.1.1 Check Record.....16
3.1.2 Delete Recod.....19
3.1.3 Search Record.....20
3.1.4 Standard Input.....23
3.2 Calibration.....24
3.3 Average 25
3.4 Light Source.....26
3.5 Color Space.....27
3.6 Color Index.....27
3.6.1 Set Color Index.....28
3.6.2 Parameter Factors Settings.....29
3.7 Display Setting.....32
3.8 System Setting.....32
3.8.1 Auto Save.....34
3.8.2 Measurement Aperture.....34
3.8.3 Bluetooth.....35
3.8.4 Buzzer Switch.....35
3.8.5 Sample Measurement Mode.....35
3.8.6 Calibration Validity.....36
3.8.7 Control Mode.....37
3.8.8 Language Setting.....38
3.8.9 Time Setting.....38
3.8.10 Backlight Time.....39
3.8.11 System Tolerance.....40
3.8.12 Screen Brightness.....40

3.8.13 Restore Factory Settings.....40
3.8.14 Working Mode.....41
4.Daily Maintenance.....41
5.Technical Parameters.....42
5.1 Products Feature.....42
5.2 Technical Specifications.....43

Instruction

Grating spectrophotometer are independently developed by company, who has complete intellectual property rights. The instrument has the character of stable working, accurate color measurement, powerful functions, and take the leading position in the color industry. They are widely used in plastic, electronics, paints, textile, printing, automobile, medical, cosmetic and food industries or science research institutes and laboratories.

With the D/8 geometric optical illumination recommended by CIE, the instruments can measure SCI / SCE reflectance data of sample or fluorescent sample, and can measure and indicate all color difference formulas and color indexes in various of color spaces accurately. By using the instruments, it is easy to achieve the accurate color transmission, the instruments also can be accurate measuring equipment for color matching system and widely used in color quality control area. The instruments are equipped with high-end color management software which can be connected to PC to achieve more extension functions.

Cautions

● 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 take out the battery to prevent the instrument from damage if you don't use it for a long time.

● Please keep the instrument in a cool dry place.

● Any unauthorized changes to the instrument are not permitted, or it will affect the measuring accuracy, even cause irreversible damage.

1. Interface Description

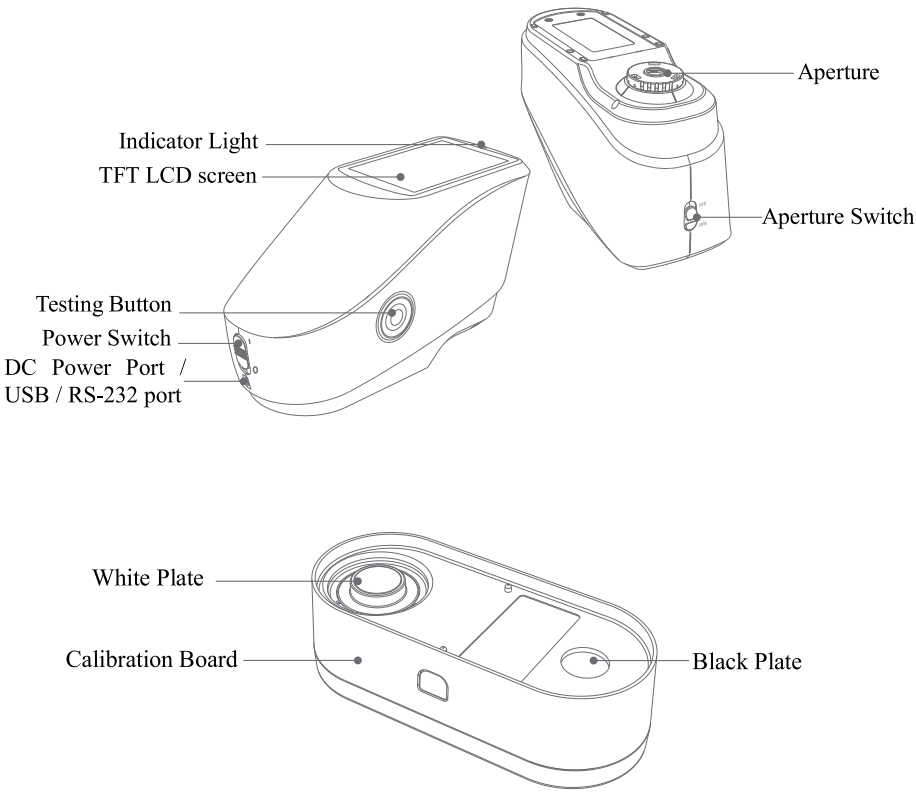


Figure 1 Instrument Structure Diagram

Port Description

1. Power Switch 1/0: Push the switch to “1” to turn on the instrument. Push the switch to “0” to turn it off.
2. Switch / Testing button: Long press for 3 seconds to turn ON/OFF power, short press for measurement.
3. Indicator light: LED light includes green, yellow and red.

* Turn to red when battery in charge and turn to green when battery is full.
* Without doing black/white calibration or out of validation, LED light turns to red when switching on the instrument and measurement could not be performed.
* LED light turns to yellow during measuring and turns to green when finished. If during measurement the instrument shocked or measuring data abnormal, it turns to red when finished and the measuring date needs to be checked.
* LED light turns to yellow when doing the black/white calibration, and turns to green for calibration succeeded, to red for calibration failed.

4. DC Power Port / USB / RS-232 port: A common interface. The instrument will judge the connection status automatically. DC Power Port to connect with AC adapter for charging. The adapter specification is 5V, 2A. USB port is used to transfer data to PC. RS-232 port is used to connect to the printer.
5. Aperture switch: used for changing the measuring aperture, setting this switch to “MAV”, turn toΦ8mm aperture, while setting this switch to “SAV”, turn to Φ4mm aperture.

2. Operating Instruction

2.1 Power On& Off

The instrument supports both hard power on & off and soft power on &

off. As per Figure 1, Setting power switch to “0” turns the power OFF, and setting it to “1” turns the power ON. The instrument will enter into soft turn off after long time no operation (Please look into chart 3.8.10 for backlight time), press “Power/Test” button for 3 seconds to turn on. Press “Power/Test” button for 3 seconds to soft turn off the instrument.

After the instrument turns on, it will enter into the display as show in Figure 2 if the black/white calibration is out of validation or the turn-on calibration is set. Or it will enter into the display as show in Figure 3 to measurement interface.

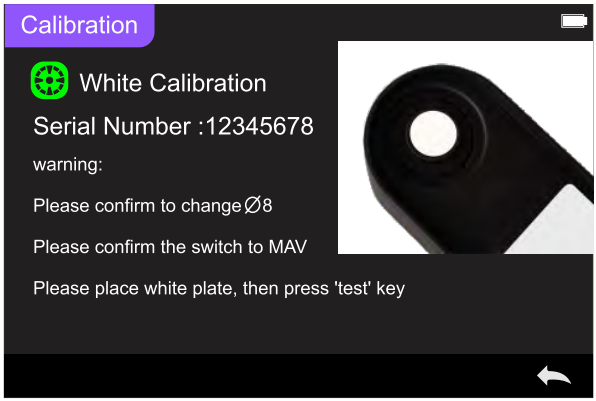


Figure 2 White and Black Calibration

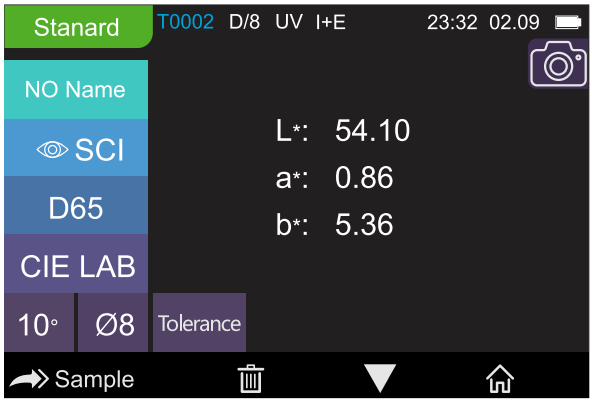


Figure 3 Standard Measurement

2.2 Calibration

In the measurement interface, click " ⌂ " to enter main menu, others please click " ✓ " or " ↩ " to enter main menu, as shown in Figure 4.

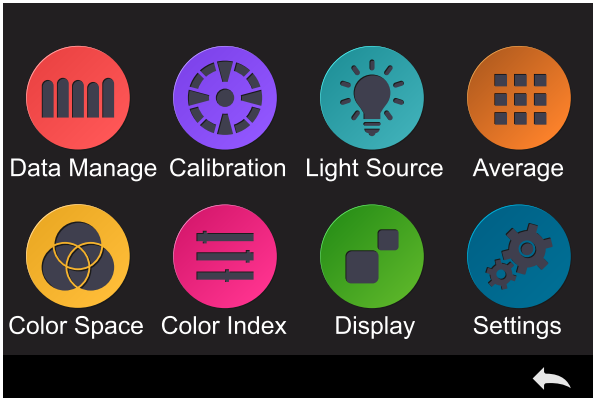


Figure 4 Main Menu

Select “Calibration” to enter white and black calibration interface as shown in Figure 5.

It will show if the calibration is valid or not, and the remaining time if it is valid.

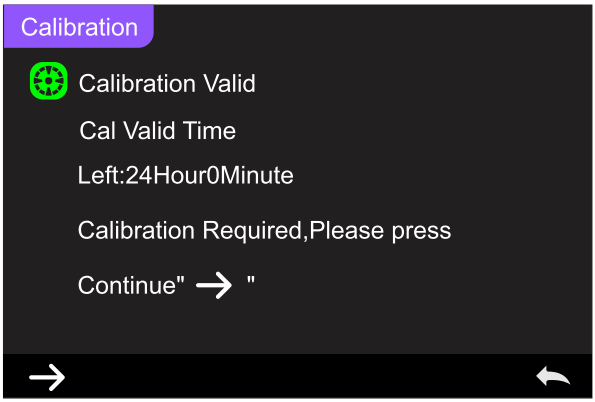


Figure 5 White and Black Calibration

Click "→" to continue and enter “White Calibration” as shown in Figure 2. According to warning, confirm the serial number of white calibration plate correspond to the instrument and correct aperture setting, then put the measuring aperture on white board and press “Testing” button for white calibration, or click "↩" to cancel and quit the calibration.

After white calibration, it will prompt you to black calibration as shown in Figure 6. According to warning, put the measuring aperture on black board and press “Testing” button for black calibration, or click "↩" to cancel and quit the calibration.

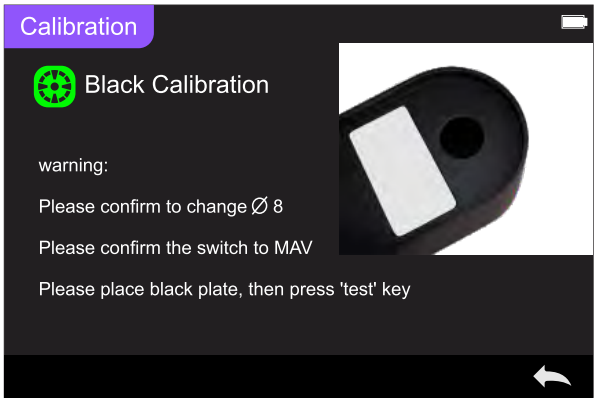


Figure 6 Black Calibration

After black calibration finished, it will automatically enter the main menu, follow the menu to do correspond operations, and click "↩" back to “Standard Measurement”.

2.3 Measurement

2.3.1 Measurement Instruction

As shown in Figure 7, 8, 9, it is working condition area at the top of measurement interface, displaying the status of measurement mode (SCI/SCE), Bluetooth and UV conditions. At the left side, it is shortcut

display, it could switch different modes by pressing different icons. At the middle, it displays different chromatic data according to different setting of color formula. It is operation buttons area at the bottom, which could operate the data by pressing the different buttons.

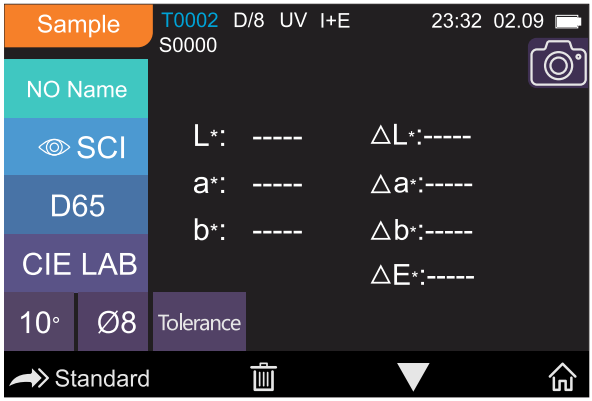


Figure 7 Sample Measurement

Figure 8 is spectral reflectance interface and Figure 9 is color index interface. Click " ▼ " to do quick switchable.

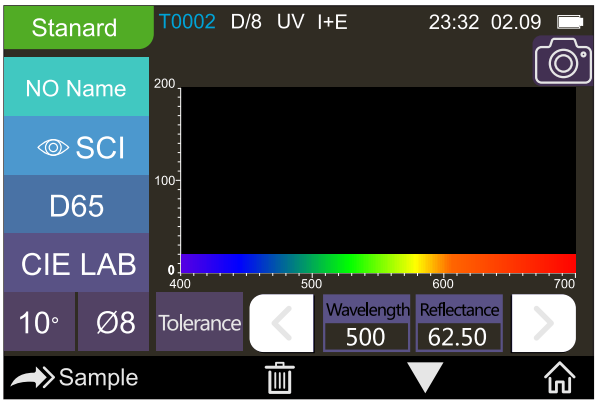


Figure 8 Spectral Reflectance

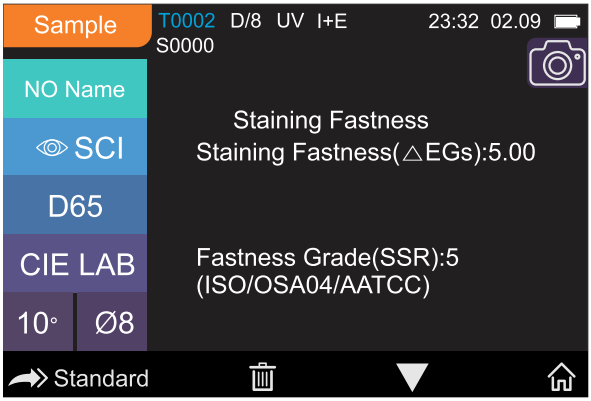


Figure 9 Color Index

2.3.2 Standard Measurement

Please enter “Standard Measurement” interface to perform measurements as shown in Figure 10.

Put the measuring aperture close on the standard sample, press “Testing” key. There is a “Beep” voice, and the LED indication light will turn to green from yellow, then it shows measurement finished as shown in Figure 10 and in Figure 11.

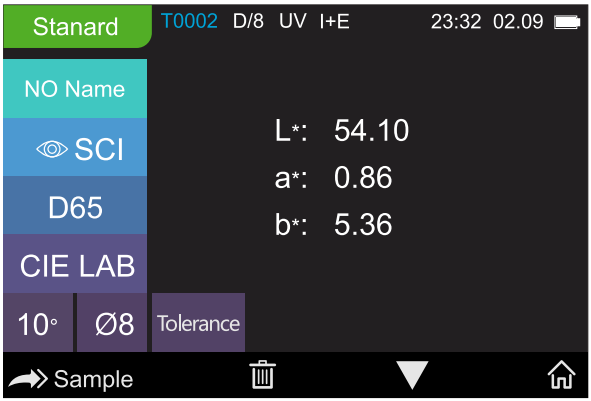


Figure 10 Standard Measurement

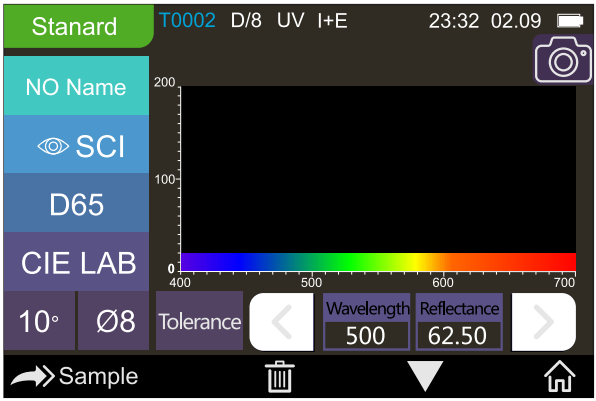


Figure 11 Reflectance of Standard Measurement

Detail instructions of standard measurement are as following:

1) Interface Title: Indicating it is under interface of standard measurement.

2) Condition area: display system setting such as the current serial number, lighting source, UV (on/off), Bluetooth (on/off), measurement mode (I+E mode could not be used under standard measurement), and the current time, date and power etc. Only when turn on Bluetooth or UV function, they will be highlighted.

3) Camera Locating: Click to use the camera to position the measurement, then press "Testing" button to complete measurement.

4) Serial number of standard: It is generated by the system automatically, and started from T0001 to T1000.

5) Standard Name: Display the current measurement standard name, and click it to quickly modify, or the default is No name.

6) Display mode: Click "SCI" to switch "SCE" or click "SCE" to switch "SCI"

Note: The switchable of SCI or SCE model is only to display the current data, and the sample measurement mode "SCI/SCE/I+E" is required to switch in the system setting (Chart 3.8.5). Standard measurement model is fixed with I+E.

7) Light Source: Click the shortcut key to switch different light among the D 6 5、A、C、F 1 ~ F 1 2 etc.
8) Color space: Click the shortcut key to switch different color spaces among CIE lab、CIE XYZ、Hunter lab etc.
9) Observer angle: Click to switch the observer angle 10 and 2.
10) Switch to sample measurement: Click Standard to sample measurement.
11) Measurement aperture: Indicate the current measurement aperture on use.
12) Tolerance setting: Click to set the tolerance of the current sample.
13) Delete/Save: If the auto-save function opens, click to delete the current data. If the auto-save function closes, it will display save button, and click " " to save the current data.
14) Page Turing: Click to quickly switch the current data among data display area, spectrum display area and color index display area (Please see the setting of color index as shown in Figure 36).
15) Wavelength switch button: As shown in Figure 11, click or the wave length and reflectance of the current sample will switch as range of 10nm interval.

Note: If turn off the auto-save function, delete button will be save button " " and click " " to save the current data.

2.3.3 Sample Measurement

After testing the standard, click Standard to enter Sample Measurement interface. Put the measuring aperture close on the measured sample, press “Testing” key. There is a “Beep” voice, and the LED indication light will turn to green from yellow, then it shows measurement finished as shown in Figure 12 and in Figure 13. Sample measurement is similar with standard measurement but it will display the color difference between the current standard and measured sample.

Detail instructions of sample measurement are as following:

1) Interface Title: Indicating it is under interface of sample measurement.
2) Standard Serial No: the current serial number of standard, starts with T, followed by numbers, and all sample chromatic data is based on the current standard.
3) Sample Serial No: the current serial number of sample, starts with S, followed by numbers, generated by the system automatically, uniquely identify current sample.
4) Standard Name: Display the current measurement standard name, and click it to quickly modify, or the default is No name.
5) Display mode: Click "SCI" to switch "SCE" or click "SCE" to switch "SCI"

Note: The switchable of SCI or SCE model is only to display the current data, and the sample measurement mode “SCI/SCE/I+E” is required to switch in the system setting (Chart 3.8.5). Standard measurement model is fixed with I+E. If the current sample measurement mode is SCI (Working Condition Area displays SCI), the instrument only measures SCI data; if set the mode to SCE, there will be “-----” because no measurement for SCE data, as well as no reflectance and color index data under SCE mode.

6) Sample Chromatic Data: Display the current chromatic data.
7) Delta E (Color Difference): The color difference between standard and sample.
8) Measurement Result: Display the test result under the color formula and tolerance. If the result is larger than the tolerance value, it will show red “Failure”, or show green “Pass”. This function only exists when you turn on the function of “Display Measurement Result” in the system setting.
9) Color Offset: only display color offset when you turn on the function in the system setting.
10) Wavelength switch button: As shown in Figure 13, click < or > , the

wave length and reflectance of the current sample will switch as range of 10nm interval.

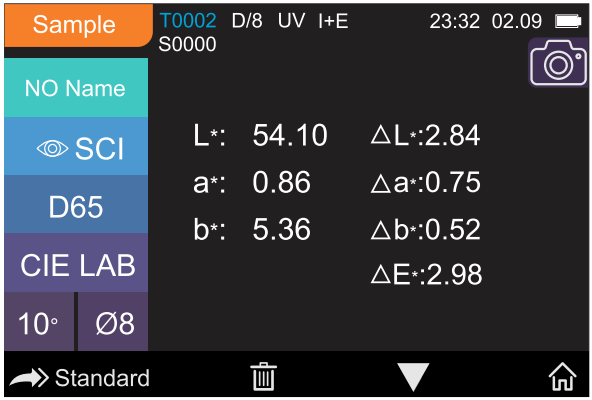


Figure 12 Sample Measurement

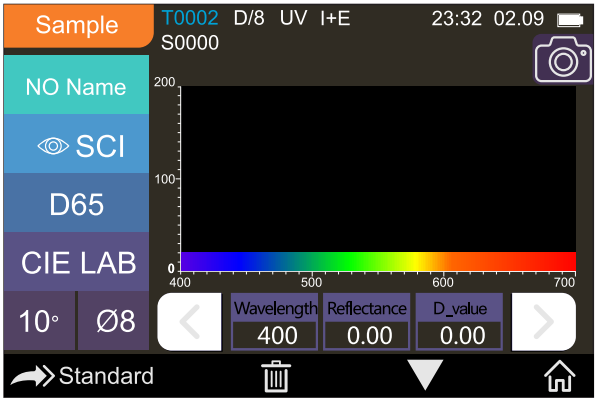


Figure 13 Reflectance of Sample Measurement

2.3.4 Average Measurement

When the measured sample is very large or relatively not very uniform, it needs to measure several points to get an average reflectance to show the sample true chromatic value. This instrument can realize 2-99 times average measurement.

In the main menu, click “Average Measurement” as shown in Figure 14,

input average times and click ✓ to confirm.

If input 1 time, it measures as usual; if more than 1, it will generate measurement results after average times under standard and sample measurement.

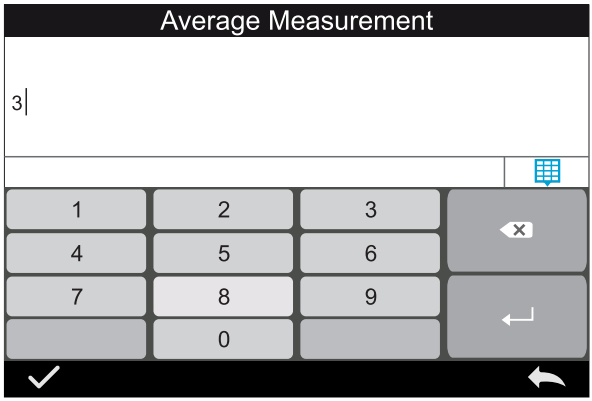


Figure 14 Average Measurement

2.4 Connecting to PC

The instrument has a PC software with powerful extended function, and it could realize more chromatic data analysis. It can connect to PC through USB cable or Bluetooth (Only for the model with Bluetooth function)

2.4.1 USB Connection

First install the software on the computer, then use USB cable to connect PC and the instrument. The software will aromatically connect to the instrument. If it successes to connect, it will display the icon of USB connection, then measure the sample and standard or analyze the data on the computer. But if not, it won't display any.

2.4.2 Bluetooth Connection

For these models with Bluetooth function, it can connect to PC software through Bluetooth.

After installing the PC software, open Bluetooth function in the system setting, and set Bluetooth matching in the PC software setting. If Bluetooth matching successes, it could measure the sample and standard or analyze the data on the computer. About Bluetooth, Bluetooth adapter, and PC software, please follow the steps of software user manual in the chart of Bluetooth.

2.5 Print

Micro Printer is an optional accessory and is required to be purchased separately.

Users should measure the sample first, and save all records. Then connect to micro printer by USB cable. Find the printed data from the sample or standard records as shown in Figure 15, click “Operate” Operate to pop up menu as shown in Figure 16, and select “Print Data” to print the current data.

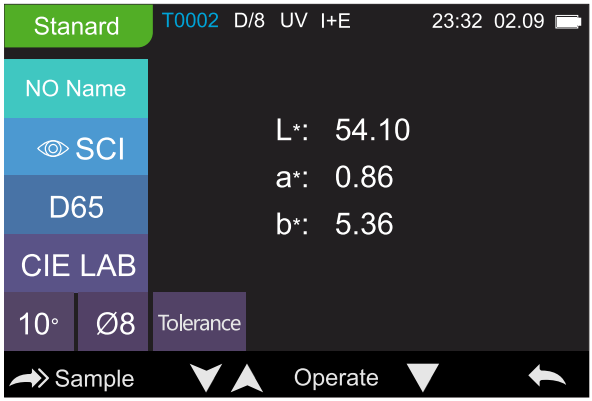


Figure 15 Print Operation

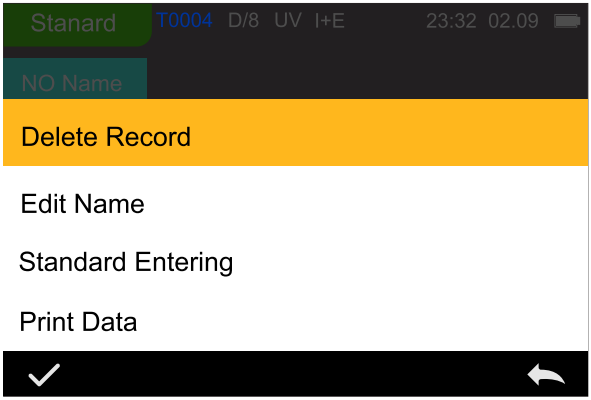


Figure 16 Print Data

3. Main Menu

Click in the measurement interface or in other interfaces to enter the main menu and set all system functions from each submenu.

3.1 Data Management

Click “Data Manage” in main menu to enter data management interface as shown in Figure 17. Data management is mainly for checking, operating the measured records and inputting standard data manually.

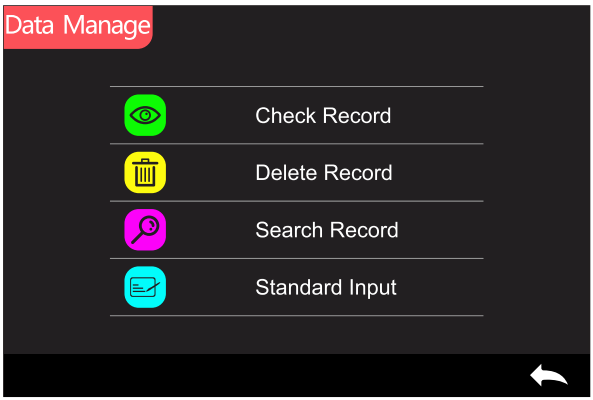


Figure 17Data Management

3.1.1 Check Record

1 Check Standard Record

Select “Check Record” to enter “Standard Record” interface as shown in Figure 18. The measurement condition shows the standard light mode, UV status and the measurement mode, measurement time date.

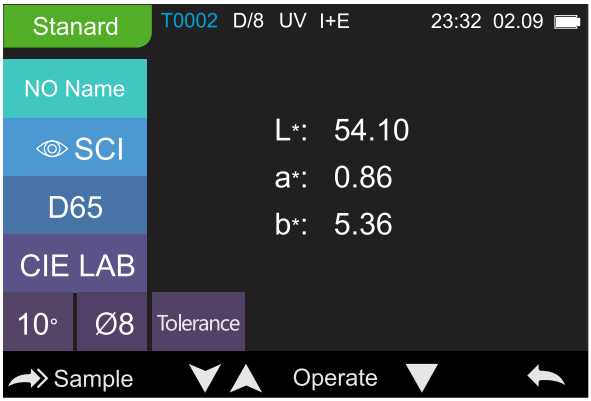


Figure 18 Standard Record

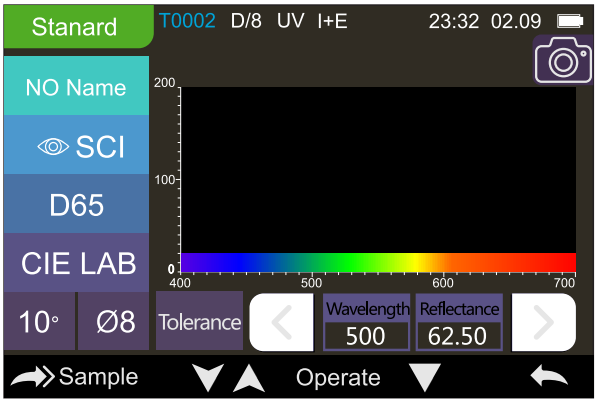


Figure 19 Reflectance of Standard Record

Click ▼ or ▲ to check previous or next record.

Click ▼ to switch among chromatic data, reflectance, color index as shown in Figure 18 and in Figure 19.

Click "Operate" to delete record, edit name, standard entering or print data as shown in Figure 16.

Delete record: Click "Delete Record" to delete data as shown in Figure 20, and click ✓ to confirm or ↩ to cancel delete back to operate menu.

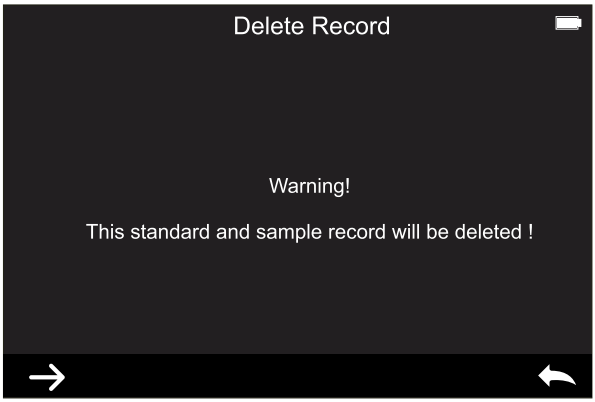


Figure 20 Delete Record

Edit Name: Click "edit name" to the interface as shown in Figure 21, input new name (not over 8 characters), click ✓ to confirm or ↩ to cancel.

Figure 21 Edit Name

Standard entering: Click “Standard entering” to set the standard record to the current standard as shown in Figure 22, and click “Sample” to make sample measurement.

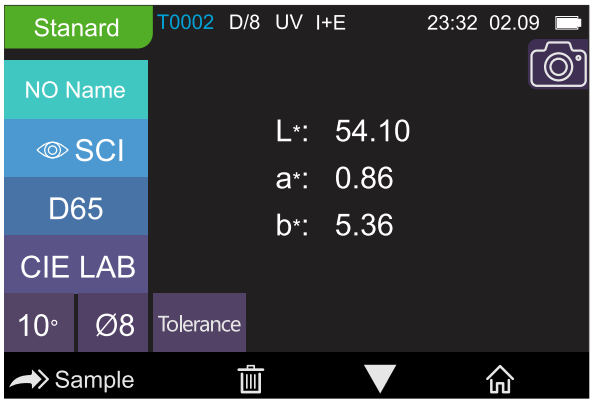


Figure 22 Standard Entering

Print Data: Click “Print data” to print the current record data through micro printer.

2 Check Sample Record

Click “Sample” in standard record interface to check the sample record as shown in Figure 23.

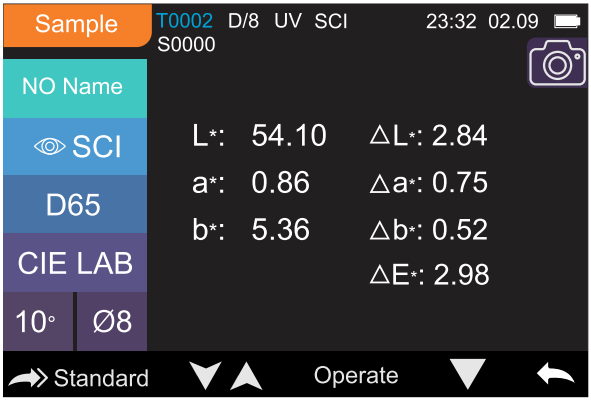


Figure 23 Sample Record

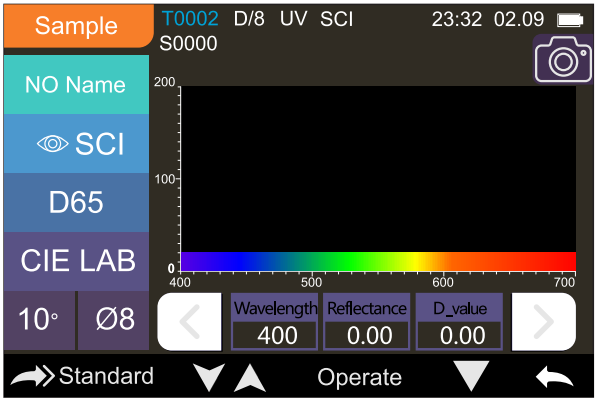


Figure 24 Reflectance of Sample Record

Click ▼ or ▲ to check previous or next record.
Click ▼ to switch among chromatic data, reflectance, color index as shown in Figure 23 and in Figure 24.

Click “Operate” to delete record, edit name, standard entering or print data. It is the same with standard record operation.

3.1.2 Delete Record

In the data management interface, click "Delete Record" to enter the

delete record interface, as shown in Figure 25. Delete records include "Delete All Samples" and "Delete All Records".

Click the corresponding option, it will pop up a warning interface, click ✓ will delete all corresponding records; click ↩ will cancel the operation, as shown in Figure 26.

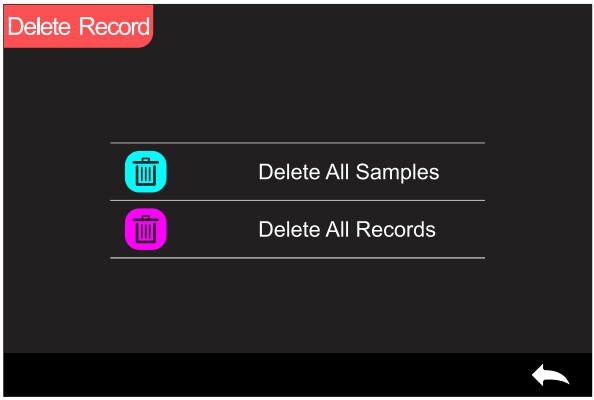


Figure 25 Delete Record

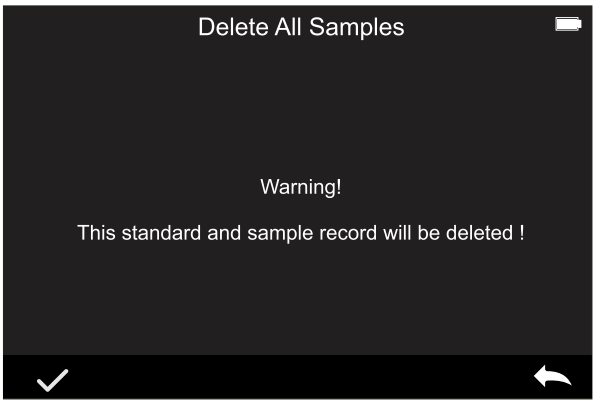


Figure 26 Delete All Samples

3.1.3 Search Record

In the data management interface, click "Search Record" to enter the search menu, as shown in Figure 27. It could choose "Search Standard

Name", "Search Standard Index" and "Search Sample Name".

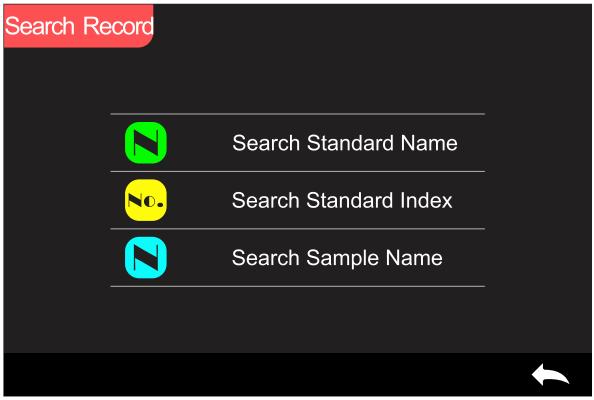


Figure 27 Search Record

1) Search Standard Name

Click “Search Standard Name” to pop up to input search name interface as shown in Figure 28. Input searched name or contained character, then click ✓ to confirm, the instrument will search all standard records automatically and list all matching records, as shown in Figure 29, click ▼ & ▲ to check all matching records.

If there is no matching record, it will prompt "This record is empty" and return to the search record menu.

Figure 28 Input Search Name

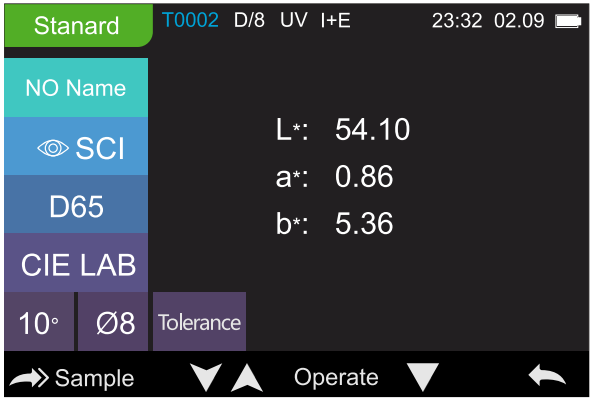


Figure 29 Search Record

2) Search Standard Index

Click “Search Standard Index” to pop up to input search index serial number interface as shown in Figure 28, then click ✓ to execute the search. The instrument will search all standard records automatically and list all matching records.

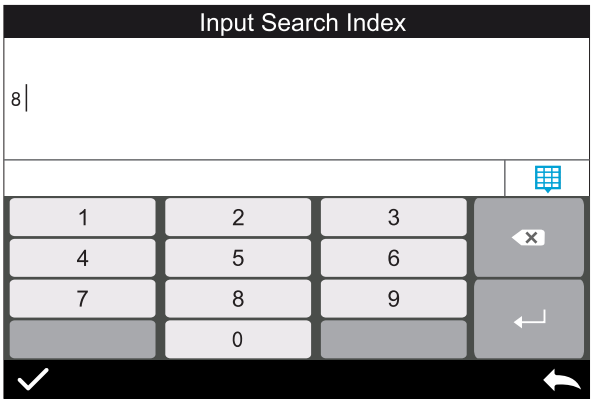


Figure 30 Input Search Index

3) Search Sample Name

Click “Search Sample Name”, as shown in Figure 28. Input searched sample name or contained character, then click ✓ to confirm, the instrument will search all standard records automatically and list all matching records.

3.1.4 Standard Input

In the data management interface, click "standard input" to enter the standard input interface, as shown in Figure 31.

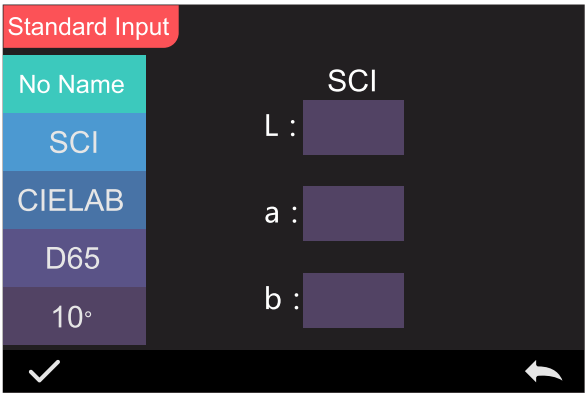


Figure 31 Standard Input

Click "Name" to input the standard name.

Click "Measurement Mode" to set the standard measurement mode, including SCI, SCE, SCI+SCE.

Click "Standard Light Source" to set the standard light source.

Click "Color Space" to select color space. At present, it only supports CIE LAB, CIE Lch, CIE XYZ, CIE Yxy, CIE LUV.

Click "Observer Angle" to set the standard observer angle (2 or 10

degree).

Click "Chroma Coordinates" to enter the corresponding chromatic value, click "L" to input L value as shown in Figure 32, input the corresponding L value and confirm. Input all standard values and click ✓ to confirm, the input standard will be stored in the standard record list, and the standard index will be cumulative.

Note: In the instrument, users can't manually input the reflectance and the input standard data is only valid in the current observe angle, measurement mode and light source. In the check standard record interface, if the observer angle, measurement mode and the light source changed, the corresponding chromatic data will be displayed as "- - - - -".

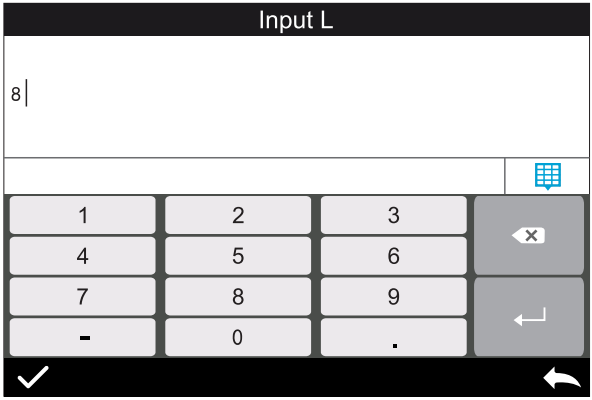


Figure 32 Input L Value

3.2Calibration

White and black calibration as a standard for chromatic data, is required to be done correctly, otherwise it will affect the validity of the data.

When the calibration environment is very different from the test environment of the current sample (for example temperature fluctuate violently), the instrument is required to be re-calibrated timely. It is also

recommended to re-calibrate if the calibration time is more than 24 hours from last successful calibration.

Black and white board is required to be cleaned regularly, and kept in dark, dustproof, and dry conditions.

For black and white calibration operation, please refer to Section 2.2.

3.3Average

When the measured sample is very large or relatively not very uniform, users need to measure several points to get an average reflectance to show the sample true chromatic value. This instrument can achieve 2-99 times average measurement.

In the main menu, click “Average” as shown in Figure 14, input average times and click ✓ to confirm.

If input 1 time, it measures as usual; if more than 1, it will generate measurement results after average times under standard and sample measurement.

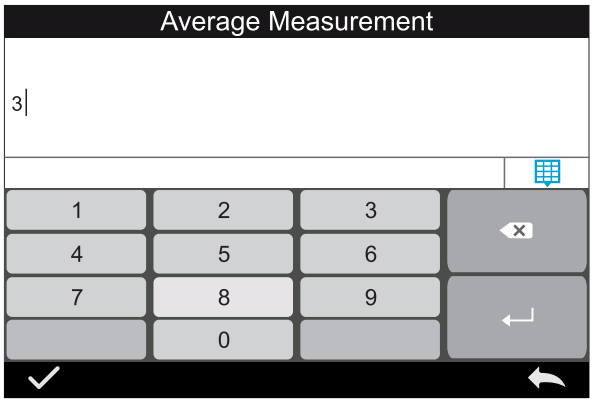


Figure 14 Average Measurement

3.4Light Source

Users could set corresponding light source according to the actual test conditions. In the light source setting interface, it can set the standard observer angle, standard light source and UV light source (different model has different configuration).

In the main menu interface, click "light source setting" to enter the light source setting interface, as shown in Figure 33.

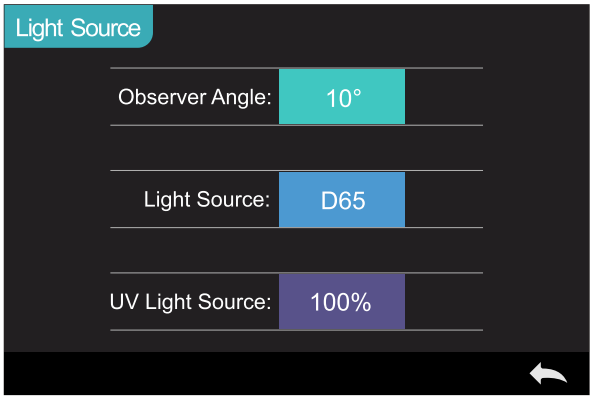


Figure 33 Light Source

Click "Observer Angle" to switch 10 degree or 2 degree. 10 degree is CIE1964 standard, while 2 degree is CIE1931 standard.

Click "Light Source", as shown in Figure 34, users could selectD65, A, C, D50, D55, D75, F1, F2(CWF), F3, F4, F5, F6, F7(DLF), F8, F9, F10(TPL5), F11(TL84), F12(TL83/U30).

Click "UV Light Source" to select the UV light source switch.100% means UV light on while 0% means off. It is recommended to turn on the UV light source when measuring fluorescent sample, and turn off when measuring general sample.

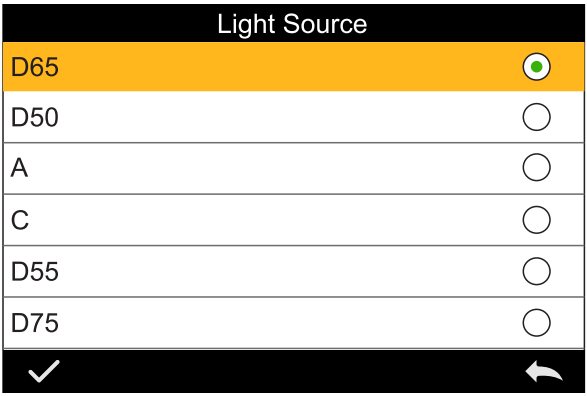


Figure 34 Light Source

3.5 Color Space

In the main menu, click “Color Space” to open the color space interface as shown in Figure 35. Select the corresponding color space and click ✓ to complete the setting.

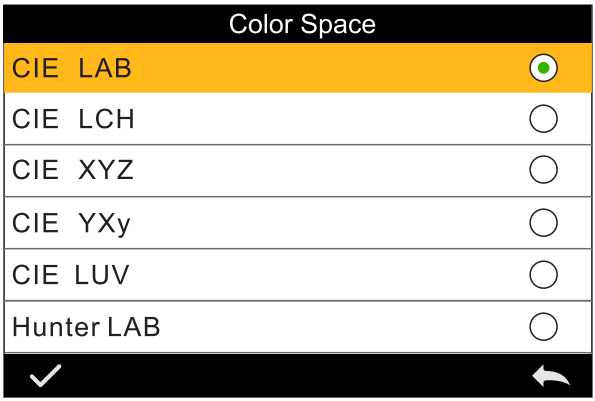


Figure 35 Color Space

3.6 Color Index

Color Index interface could select the current color formula and color

index, as well as set the parameter of color formula and metameric index, as shown in Figure 36.

3.6.1 Set Color Index

In the main menu, click “Color Index” as shown in Figure 36. On the left, it is a radio list of color formula; on the upper right, it is radio list of color index; on the lower right, it is parameter factors settings.

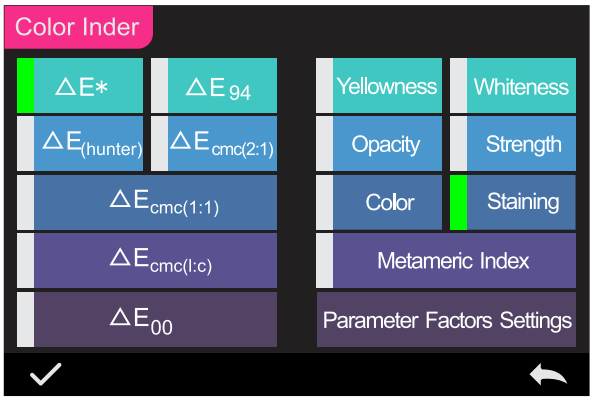


Figure 36 Color Index

Click any color formula or color index to choose the corresponding color formula or color index. Color index is optional, if you want to cancel it, click the selected color index again. After selecting, click ✓ to confirm. The selected color formula will calculate the sample color difference when measuring sample. Color formula Delta E 00 as shown in Figure 37.

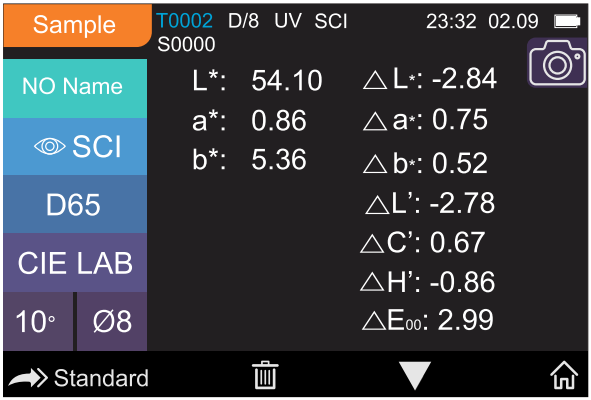


Figure 37 Color Formula

The selected color index will display the color index on standard measurement or sample measurement (some only display on measurement according to different color index). In the measurement interface or check record interface, click ▼ to the color index interface. Yellowness index as shown in Figure 38.

Figure 38 Yellowness Index

3.6.2 Parameter Factors Settings

In the color index interface, click “Parameter factors settings” as shown in Figure 39.

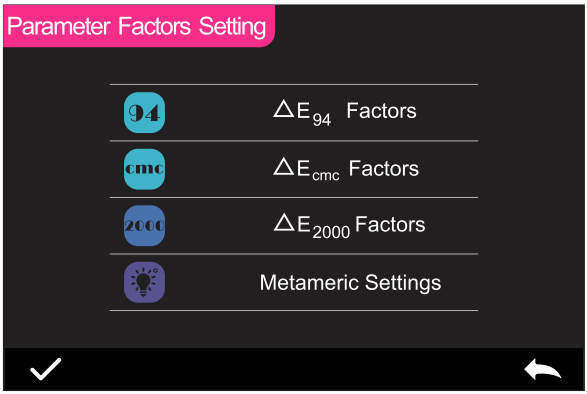


Figure 39 Parameter Factors Setting

1) Setting Factors

For C I E D E 2000 (Δ E00), C I E D E 1994 (Δ E 94), C M C (Δ E C M C (l: C), users could set L, C, H value (CMC only sets L and C).
Take Δ E 94 for example as following: Click ΔE94Factors as shown in Figure 40.

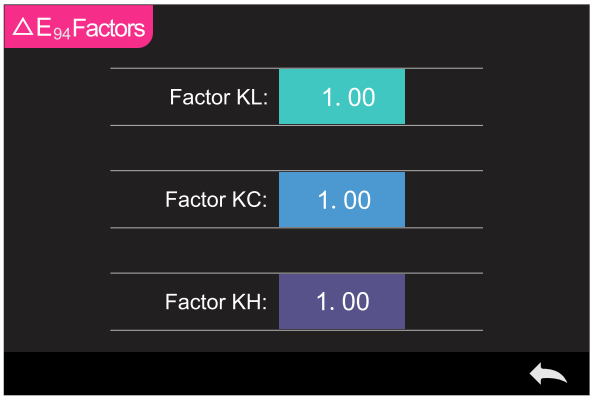


Figure 40 Δ E 94 Factors

Click KL, KC, KH to enter edit interface as shown in Figure 41, input a value to click ✓ to confirm or ↩ to cancel.

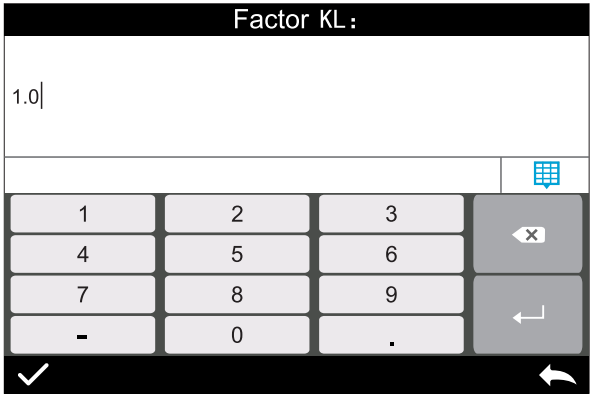


Figure 41 Factor KL

2) Metameric Index

In the Parameter factors settings interface, click “Metameric Index” as shown in Figure 42, separately set light 1 and light 2, and click ✓ to confirm or ↩ to cancel.

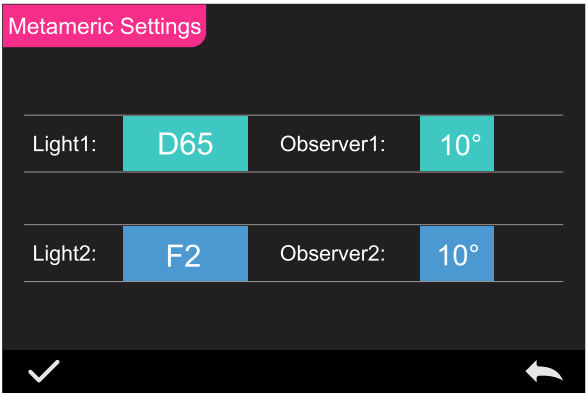


Figure 42 Metameric Settings

3.7 Display Setting

In the main menu, click “Display” as shown in Figure 43. It could set color offset, test result, and operate habit.

If turn on the function of color offset, it will display the color offset on the sample measurement as shown in Figure 12, if turn off, it won’t display color offset.

If turn on the function of test result tip, when the measurement result is larger than the tolerance value, it will display red and prompt failure, if smaller, it will display green and prompt pass.

Default operation is shown according to right hand habit, if users like using left hand, you can set the operate habit to left hand.

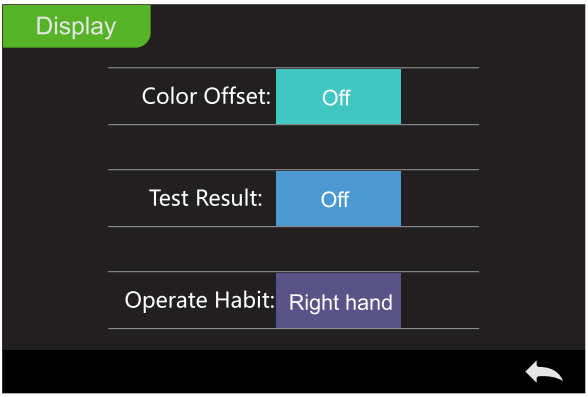


Figure 43 Display

3.8 System Setting

In the main menu, click “System Setting” as shown in Figure 44, Figure 45 and Figure 46.

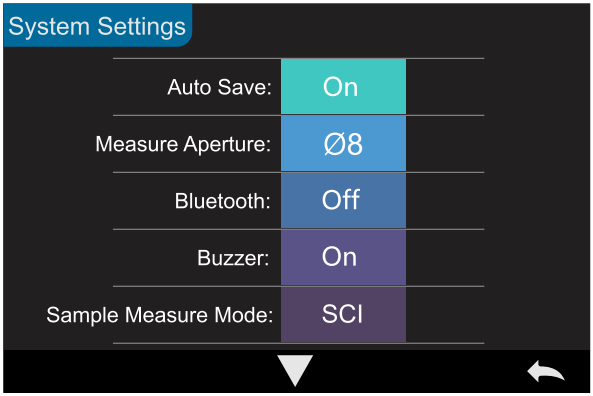


Figure 44 System Settings

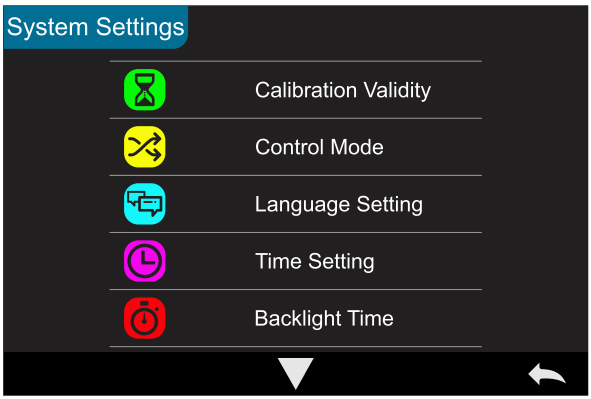


Figure 45 System Settings

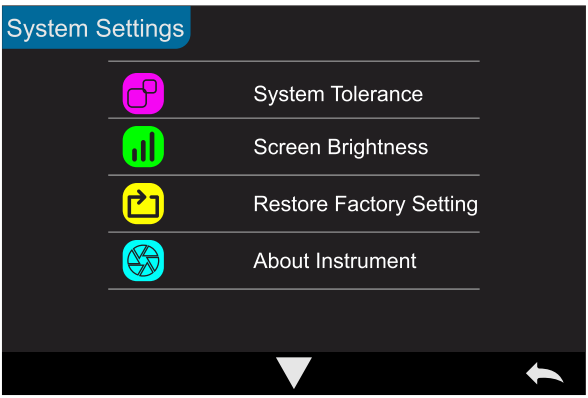


Figure 46 System Settings

3.8.1 Auto Save

When turn on the function of auto-save, it will automatically save data when measured, or it is required to manual click " 💾 "to save as shown in Figure 38.

3.8.2 Measurement Aperture

YS series spectrophotometer features with 8mm, 4mm, 1*3 mm aperture. Different model has different aperture. When the area of measured sample is large and uniformity, it is recommended to use 8mm aperture, while it is small, recommenced 4mm aperture.

Switch aperture is required to follow the three steps.

Step 1: As shown in Figure 47, counterclockwise rotates the measurement aperture, and take off it, then install the new aperture clockwise. When hearing a voice, it shows ok.

Step 2: As shown in Figure 1, if it is Φ4mm aperture, it is required to switch to SAV; if it is Φ8mm aperture, switch to MAV.

Step 3: Switch the default system measurement aperture to correspond with the actual measurement aperture. As shown in Figure 44, the current measurement aperture is Φ8mm. After switching the measurement aperture, you have to re-calibrate the instrument according to part 2.2.

Note: Please confirm the system measurement aperture should be the same with the actual aperture. If it is Φ4mm aperture, switch to SAV; if Φ8mm aperture, switch to MAV, or it could cause wrong test result.

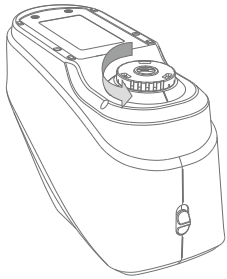


Figure 47 Measurement Aperture

3.8.3 Bluetooth

The Bluetooth® of YS series is 4.0 Dual Mode (compatible with 2.1), which can connect PC with software.

When Bluetooth® is on, the icon ᛒ will be displayed on the screen.

After installing PC software in the computer, turn on the Bluetooth ®, set up the Bluetooth®. matching. If Bluetooth matching successes, it could measure the sample and standard or analyze the data on the computer. About Bluetooth, Bluetooth adapter, and PC software, please follow the steps of software user manual in the chart of Bluetooth.

3.8.4 Buzzer Switch

Click “Buzzer Switch” in “Settings”. When click “On”, there is a voice when measuring while click “Off” there is no voice.

3.8.5 Sample Measurement Mode

SCI Specular Component Include
SCE Specular Component Exclude

The instrument is set through traditional mechanical optical trap way to achieve SCE mode. When the plectrum blocks the mechanical optical trap,

it is SCI mode or it is SCE mode.

On standard measurement, the instrument default complete SCI and SCE measuring mode and test time is about 3.2 second.

On Sample measurement, the instrument is measured according to users' setting. It could be set for: SCI, SCE, or I+E. I+E is SCI & SCE modes. Single SCI or SCE mode test time is about 1.5 seconds.

3.8.6 Calibration Validity

White and black calibration as a standard for chromatic data, is required to be done correctly, otherwise it will affect the validity of the data.

When the calibration environment is very different from the test environment of the current sample(for example temperature fluctuate violently),the instrument is required to be re-calibrated timely. It is also recommended to re-calibrate if the calibration time is more than 24 hours from last successful calibration.

In the system menu, click "Calibration Validity" to select as shown in Figure 48.

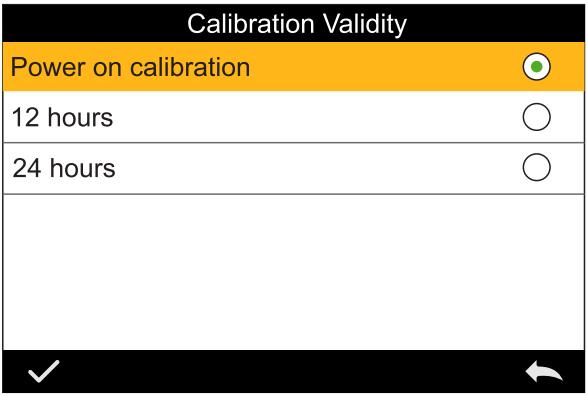


Figure 48 Calibration Validity

If power on calibration is selected, it could do white and black calibration every time when you turn on the instrument. If not, it would be only able to check records abut not complete the test.

If 12 Hours validity is selected, the validity of Calibration will expire in 12 hours. If Expired, it would be only able to check records abut not complete the test. Until re-calibrate it, the calibration is valid.

If 24 Hours validity is selected, the validity of Calibration will expire in 24 hours. If expired, it would be only able to check records abut not complete the test. Until re-calibrate it, the calibration is valid.

When the validity of Calibration expires, the LED light warns red. After calibrating, the LED light will turn green.

3.8.7 Control Mode

When the instrument communicates with the PC software, the user can set the specific measurement control mode.

In the system settings interface, click "Control Mode" to choose as shown in Figure 49. There are three options: Key, P software, keys | PC software.

Key: if selecting this mode, the instrument only could use keys to complete the test and upload data to PC software when connected with PC software.

PC software: if selecting this mode, the instrument only could use software to complete the test and upload data to PC software when connected with PC software.

Key | PC software: if selecting this mode, the instrument only could use software or keys to complete the test and upload data to PC software

when connected with PC software. This mode is the default for the instrument.

Note: The control mode is only valid when connected to the PC software. If unconnected, it is only measured by keys.

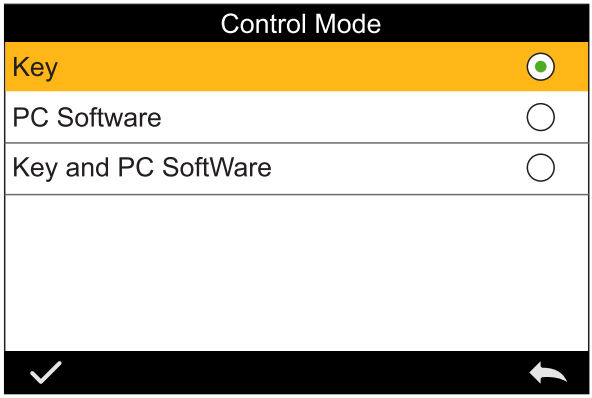


Figure 49 Control Mode

3.8.8 Language Setting

Click “Language Setting” in “Settings” interface to choose English or Chinese.

3.8.9 Time Setting

General the instrument is default set with the local time. In the setting menu to click “Time setting” as shown in Figure 50.

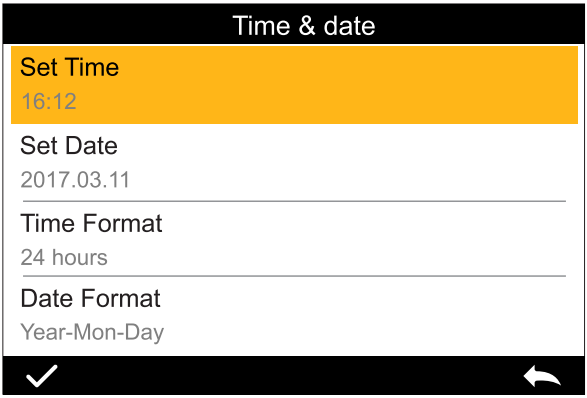


Figure 50 Time & Date

1) Click “Set Time” to set the current time.
2) Click “Set Date” to set the current date.
3) Click “Time Format” to set the required time format.
4) Click “Date Format” to set the required date format. There are three options: “Year Month Day”/ “Month Day Year”/Day Month Year”.

3.8.10 Backlight Time

Click “Backlight Time” in “Settings”. It could set the backlight time according to the requirement.

Backlight time includes: "normally open", "5 minutes", "60 seconds", "30 seconds", "15 seconds". If selecting normally open, it will work until the power is off to automatically shut down.

If selecting "60 seconds", it will work from the last operation. After 3 minutes, it will automatically enter soft power-off into power saving mode. "5 minutes", "30 seconds", "15 Seconds" is the same as above.

5) options: “Year Month Day”/ “Month Day Year”/Day Month Year”.

3.8.11 System Tolerance

Click “System Tolerance” to control all tolerance and default setting is system tolerance.

Set tolerance for current sample according to requirements. △E* is for setting the general tolerance. △L* is for setting the tolerance of the standard brightness. The right side of △L* is the upper limit of tolerance which must be higher than the left side of the △L* which is the lower limit of the tolerance. The same as the △a* and △b*.

3.8.12 Screen Brightness

Click “Screen Brightness” in “Settings”. It could adjust the brightness by “+” and “-”.

3.8.13 Restore Factory Settings

Click “Restore Factory Setting” in “Settings” as shown in Figure 51. Click ✓, the instrument will restore factory settings and all records will be cleared, while click ↩ to cancel this operation.

Note: Restore factory setting will delete all test data and settings. All are irrecoverable so please operate it carefully.

Figure 51 Restore Factory Setting

3.8.14 Working Mode

When measuring liquids, powder or paste, users need to set the instrument into Liquid Measurement mode. In general measurement condition, set the instrument into Portable Measurement mode.

4. Daily Maintenance

1) The instrument is a precision optical instrument. Please keep it and avoid the wet, strong electromagnetic, interference, light and dust. Advice to keep and use in a standard laboratory environment (temperature 20 degrees Celsius, 1 standard atmospheric pressure, humidity 50 ~ 70% RH).

2) The white board is precision optical components, please properly keep it and avoid the sharp objects touching the face, staining the working surface with dirt, exposing to light. Regularly wiping softly with alcohol to clean the white board surface, before calibrating, clean the dust of white board surface.

3) In order to ensure the effectiveness of the test data, advise to send the instrument and white board to the manufacturer or a qualified

measurement institute for calibration after using one year.

4) The instrument has built-in lithium battery. If you do not use the instrument for a long time, please charge it every 2 weeks to protect the performance of lithium batteries for extending the life of lithium batteries.

5) Please do not disassemble the instrument. If there is any question, please contact the relevant after-sales staff. Do not tear the labels, or it will affect its after-sales maintenance service.

5. Technical Parameters

5.1 Products Features

A. Perfect combination of beautiful appearance and the human body mechanics structural design;
B.D/8 geometrical optics, conforms with CIE No.15, GB/T 3978, GB2893, GB/T 18833, ISO7724/1, ASTM E1164, DIN5033 Teil7
C. Use long-life and low power consumption combined LED light source, including UV/excluding UV (only for one model);
D. Switchable 8/4mm aperture, adapt to more samples; support both SCI and SCE at the same time;
E. Measure sample spectra, accurate Lab data, can be used in color matching and accurate color transmission;
F. High electronic hardware configuration: 3.5-inch TFT color LCD, Capacitive Touch Screen, concave grating, 256 Image Element Double Arrays CMOS Image Sensor;
G.USB/Bluetooth (compatible with 2.1), dual mode, widely useful;
H. Super stain-resistant and stable standard white calibration plate;
I. Large capacity storage space, over 20,000 measurement data;
J. Two standard observer angles, a variety of illuminants, a variety of color indexes, conforms with a variety of standard chromatic data, meet a variety of users' demand for color measurement;

K. Camera Locating Function, better position;
L. PC software has a powerful function extension.

5.2 Technical Specifications

Optical Geometry	Reflect: di:8°, de:8°(dif fused illumination, 8-degree viewing angle);SCI&SCE / SPIN&SPEX;Including / excluding UV measurements(some models have); Comply to standard CIE No.15, GB/T 3978, GB 2893, GB/T 18833, ISO7724/1, ASTM E1164, DIN5033 Teil7
Features	high accuracy spectrophotometer for accurate analysis and transmission of laboratory color.Apply in paints, inks, textiles, garments, printing and dyeing, printing etc industries for color transfer and quality control, also for Fluorescence sample color measurement.
Integrating Sphere Size	48mm
Light Source	Combined LED Light, UV Light(some models have)
Spectrophotometric Mode	Concave Grating
Sensor	256 Image Element Double Array CMOS Image Sensor

Wavelength Range	400-700nm
Wavelength Interval	10nm
Semiband Width	10nm
Measured Reflectance Range	0-200%
Measuring Aperture	Dual Aperture: MAV: 10mm/8mm, SAV: 5mm/4mm,1*3mm(some for one aperture)
Specular Component	SCI&SCE
Color Space	CIE LAB,XYZ,Yxy,LCh,CIE LUV,s-RGB, Hunter Lab,βxy,DIN Lab99,Munsell(C/2)
Color Difference Formula	ΔE*ab,ΔE*uv,ΔE*94,ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*00,DINΔE99,ΔE(Hunter)
Other Colorimetric Index	Spectral reflectance, whiteness (ASTM E313-00, ASTM E313-73, CIE/ISO,AATCC,Hunter, Taube, Berger, Stensby), Yellowth (ASTM D1925, ASTM E313-00, ASTM E313-73), Isochromatic Index Mt, Stain Fastness, Color Change Fastness, Strength (dye strength, coloring power), Coverage, 8-degree Glossiness, 555 tone classification, Blackness (My, dM), Color Density CMYK (A, T, E, M), Tint (ASTM E313-00), Color Density, Munsell (some functional functions are implemented through the upper computer)
Observer Angle	2°/ 10°

Illuminant	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 (There are a total of 41 types of light sources, some of which are implemented through PC software)
Displayed Data	Spectrogram/Values, Samples Chromaticity Values, Color Difference Values/Graph, PASS/FAIL Result, Color Offset
Measuring Time	About 1.5s(about 3.2s for SCE&SCI)
Repeatability	Spectral reflectance: MAV,Standard deviation within 0.08% to 0.1% (400 nm to 700 nm: within 0.18%) Chromaticity value:within ΔE*ab 0.03 to 0.05 (When a white calibration plate is measured 30 times at 5 second intervals after white calibration)
Inter-instrument Error	Within ΔE*ab 0.2 (Average for 12 BCRA Series II color tiles)
Measurement Mode	Single Measurement, Average Measurement(2-99)
Locating Method	Camera View Finder Locating
Battery	Li-ion battery. 5000 measurements within 8 hours
Dimension	L*W*H=184*77*105mm

Weight	600g
Illuminant Life Span	5 years, more than 3 million times measurements
Display	3.5-inch TFT color LCD, Capacitive Touch Screen
Data Port	USB, Bluetooth
Data Storage	Standard 2000 Pcs, Sample 20000 Pcs
Software support	Andriod,IOS,Windows, WeChat Mini Program, HarmonyOS
Language	Simplified Chinese, English, Traditional Chinese, Russian, Italian, French, Portuguese, Spanish, German
Operating Environment	0~40℃, 0~85%RH (no condensing), Altitude < 2000m
Storage Environment	-20~50℃, 0~85%RH (no condensing)
Standard Accessory	Power Adapter, Built-In Li-ion Battery, User Guide, PC Software, White and Black Calibration Cavity, Dust Cover
Optional Accessory	Micro Printer, Powder Test Box
*Note: The specifications are subject to change without notice.	

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