



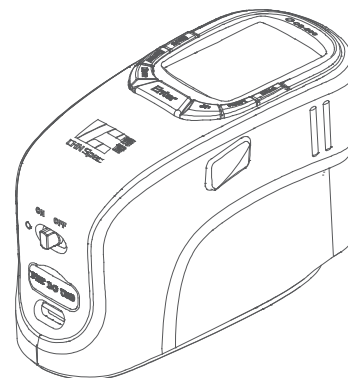
China's leading expert of color  
and gloss analysis



## **SERIES OF SPECTROPHOTOMETER**

OPERATION MANUAL ►

CS-580/600  
CS-610/650/660



Service hotline:+86 571 85888707

Address:No.166,Wenyuan North Road,Jiangan District,Hangzhou City,China



Please do not disassemble the product without the assistance of  
customer support center, If you have any questions, please contact the  
local agency.

[www.hzcaipu.com/en](http://www.hzcaipu.com/en)

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## Terms of use

- 1.Our spectrophotometer is the first model in China that incorporates spectrum splitting technology in the measurement of color. It is mainly used to measure the sample's spectral data, spectral graph, color values, color differences and so on. The structure is compact and handy; measurement is easy to carry out, accurate and precise.
- 2.Our spectrophotometer is widely used in factories, labs and on spot. It can achieve great color measurement in the quality control of almost all fields.
- 3.The warranty period starts on the date you buy the spectrophotometer. If you need warranty service, please go to a local sales division of our company nearby, or visit the website [www.chnspec.com](http://www.chnspec.com) to contact us for repair.
- 4.To avoid damage to instrument accuracy or precision, please do not disassemble the instrument. Damage to the instrument caused by disassembly or improper use is NOT included in the warranty.

## Notes

- 1.Carefully put the instrument on a flat surface.
- 2.This instrument is not moistureproof,Please store the instrument in a dry area.
- 3.Large force, or sharp objects may damage the screen.
- 4.It is recommended to use the original power adapter with the instrument.
- 5.To ensure the machine to work properly, please do not store, or use the instrument in places that are too hot or too cold; please do not put the machine in damp locations, or directly under sunlight. Do not use the instrument in severe environment such as strong shock or quake.
- 6.Check battery before usage.
- 7.Please avoid strong electromagnetic interference in usage.
- 8.Please do not use the instrument to measure surfaces that are not flat.
- 9.Please keep the instrument steady; do not shake the instrument in usage.
- 10.Please put the instrument directly on the spot to be measured, but do not apply strong force.
- 11.If this user manual is further updated, we are not obliged to notify you.
- 12.If you have further questions, please ask on the website.

## Instrument functions

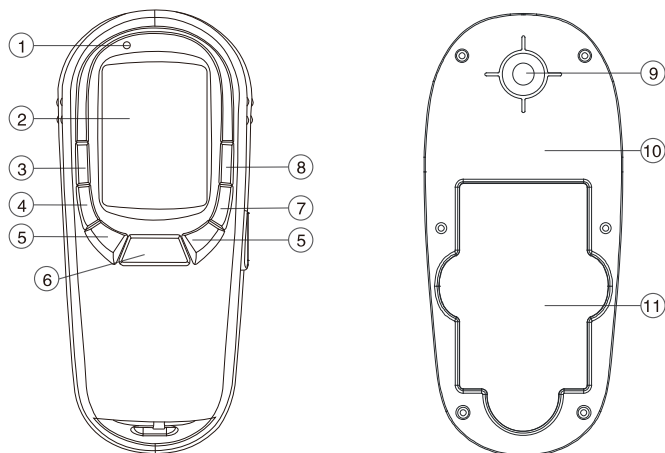
- 1.To test multiple color parameters:  
 $\Delta E^*ab, \Delta E^*ch, \Delta E^*uv, \Delta E^*cmc(2:1), \Delta E^*cmc(1:1), \Delta E^*94, \Delta E^*00, \Delta Eab(\text{Hunter}), 555, \text{color classification}, CIE-L^*a^*b^*, L^*C^*h, L^*u^*v, XYZ, Yxy, \text{Hunter-lab}, \text{Munsell MI}, \text{CMYK}$
- 2.Large data storage space;
- 3.TFT display screen;
- 4.Friendly man-machine interactive interface;
- 5.LED light source, and possess longer service life;
- 6.Low power consumption design, high capacity rechargeable lithium-ion battery configuration;
- 7.Low battery prompt function; full data space prompt function;
- 8.To measure SCI (specular included) and SCE (specular excluded) at the same time;
- 9.USB transmission data, PC software control color data;
- 10.Be able to connect with the mini-printer for printing.

## Technical Parameters

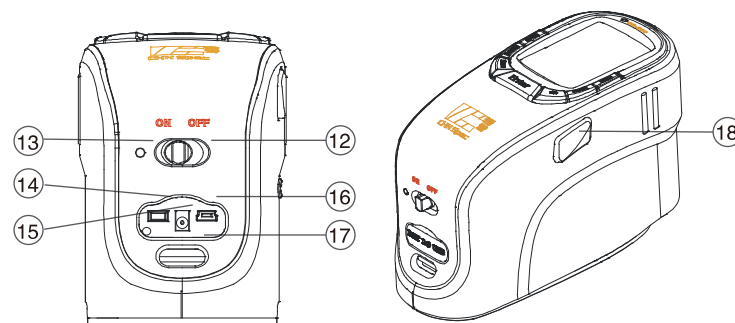
Model	CS-580	CS-600	CS-610	CS-650	CS-660
measurement condition	Observation angle: 2°/10° D/8 (Diffused lighting, 8 degrees observe angle) SCS optical engine (light splitting and integration system), ETC (real time calibration technology), SCI (specular reflection included) /SCE (specular reflection excluded) simultaneous measurement. (conform to CIE No.15, ISO 7724/1, ASTM E1164, DIN 5033 Teil7, JIS Z8722 Condition c standards)				
Size of integrating source	Φ40mm, Alvan diffused reflection surface coating				
Illumination Light source	CLEDs(entire wavelength balanced LED light source)		pulse xenon lamp	CLEDs	
Sensor	dual light path sensor array				
Wavelength range	400~700nm		360~740nm	400~700nm	
Wavelength interval	10nm				
Half spectral width	5nm				
Reflectivity range	0~200%				
Reflectivity resolution	0.01%				
Measurement light source	A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,CWF,U30,DLF,NBF,TL83,TL84				
Data being displayed	SPD distribution/data, sample's color values, color difference values/graph, pass/fail results, color error tendency, color simulation, display measurement area, history data color simulation, manual input standard sample, generate measurement report				
Measurement time interval	2seconds				
Measurement time	2seconds	0.5second	2seconds	0.5second	
Other colorimetric indices	WI(ASTM E313-00,ASTM E313-73, CIE/ISO,AATCC,Hunter,Taube Berger Stensby), YI(ASTM D1925,ASTM E313-00,ASTM E313-73),Tint(ASTM E313,CIE,Ganz), metamerism index M1m, adhesive/changing color fastness				
	ISO luminance,8 gloss, A density, T density				

Color space	CIE-L*a*b,L*C*h,L*u*v,XYZ,Yxy,reflectivity		
	Hunterlab,Munsell MI,CMYK		
Color difference formulas	$\Delta E^*ab, \Delta E^*CH, \Delta E^*uv, \Delta E^*cmc(2:1), \Delta E^*cmc(1:1), \Delta E^*94, \Delta E^*00$		
	$\Delta Eab(Hunter), 555, \text{color classification}$		
Repeatability	light splitting reflectivity: standard deviation within 0.08%		
	color values: $\Delta E^*ab \leq 0.03$	color values: $\Delta E^*ab = 0.03$	color values: $\Delta E^*ab = 0.02$
	(After calibration, standard deviation of 30 measurements on test white board, 5 second intervals)		
	Maximum: 0.05	Maximum: 0.05	Maximum: 0.04
Battery capacity	rechargeable, 10000 continuous tests		rechargeable, 20000 continuous tests
Interface	USB, bluetooth (customizable)		
Data storage	20000 test results		
Light source longevity	1.5 million tests for 5 years	3million tests for 10 years	3million tests for 10 years
Inter-instrument agreement	$\Delta E^*ab$ within 0.2(BCRA color charts II, average of the 12 charts)		
Size	181*73*112mm(L*W*H)		
Weight	550g(does not include battery's weight)		
Work temperature range	0~45 °C, relative humidity 80% or below( at 35°C ),no condensation		
Standard accessories	DC adapter, Lithium battery, manual, color management software, drive software, electronic manual, color management guide, USB cable, black/white calibration tube, protective cover, portable bag, electronic color charts (Optional accessories: powder molding device, microprinter, measurement and test report)		
Color matching system	Does not match	matches	
UV light source	Does not include	included	Does not include

## Appearance and structure



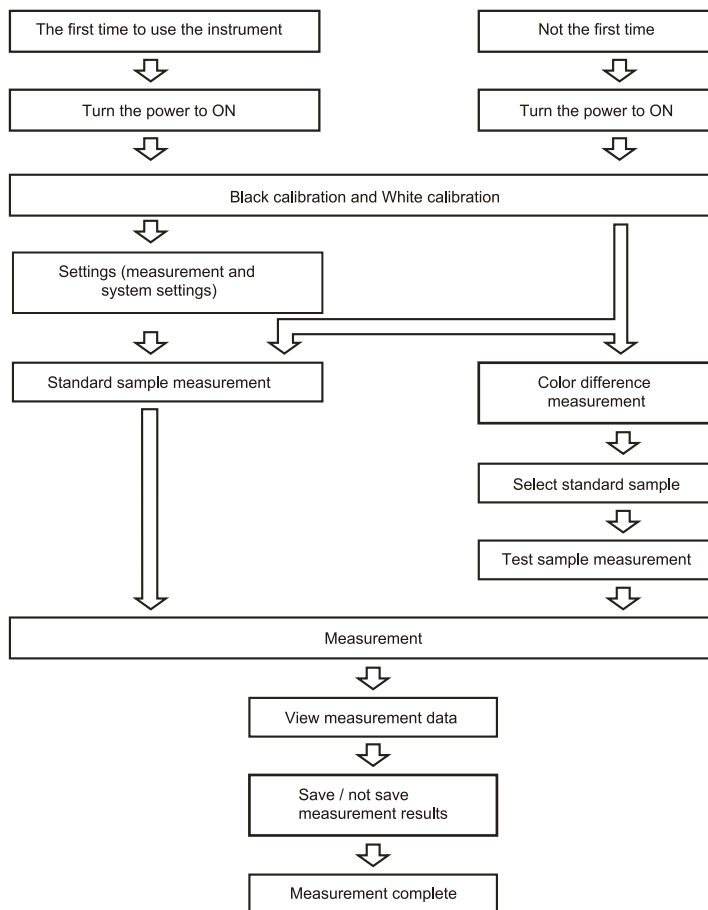
- ① Test indicator light
- ② Display screen
- ③ Save button
- ④ Cancel / Back button
- ⑤ Up / down button
- ⑥ Enter button
- ⑦ Menu button
- ⑧ Printing button/Camera button
- ⑨ Measurement slot
- ⑩ Measurement panel
- ⑪ Battery lid



- ⑫ On & Off
- ⑬ Power indicator
- ⑭ Micro-printer port
- ⑮ DC adapter socket
- ⑯ USB port
- ⑰ Rope groove
- ⑱ Test button



## Measurement flow chart



## Program interface

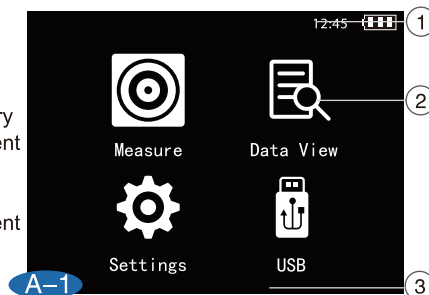
A-1

Main interface

① Title area: display primary functions of the current page

② Working area: display primary functions of sub-pages of current page, or measurement data

③ Condition area: display current conditions of the current page



Basic operations:

Use up and down buttons to select the function you need, then press “Enter” to enter that function’s sub-page; press “Cancel” to return to the mother page, “Save” to save measurement data or system settings; “Menu” to show the menu, “Print” to print measurement data or call out camera view.

Measurement: the user can measure the color values of the sample, color differences, and view saved measurement data;

Data view: in this page the user can view the measurement data under saved standard samples, and can view, delete or edit the name of selected sample; Settings: user can change the measurement and system settings under this page;

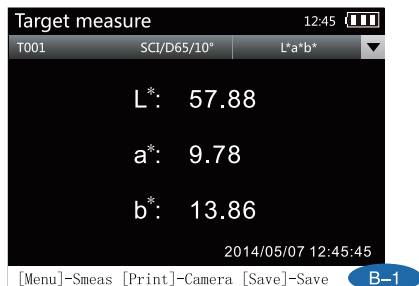
USB connect: user can use the USB cable to connect the instrument to a PC computer.

## Measurement

In the main page, use up and down buttons to select “Measurement”, and press “Enter” to enter the measurement page.

Under this page, user can measure the sample’s color values, spectral reflectivity and so on; and can measure the color difference between two samples and compare their spectral reflectivity curve.

## Target measurement

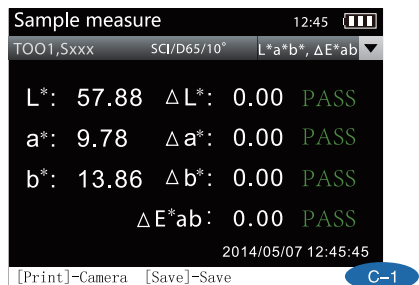


### B-1

Press “print” to view the spot being measured, then press the “Test” button. In the title of the measurement results, first column is target name, after pressing “save” to save, it will show the saved name; before being saved, target’s default name would be “Txxx”.

Second column shows measurement conditions, in the order of measurement condition, light source and spectator, all of which can be changed in the “settings” page. The third column includes data that can be viewed; press “Enter” to view the spectral reflectivity curve of the selected data. When viewing spectral reflectivity, press “Up” and “Down” to see spectral reflectivity at different wavelengths.

## Sample measurement



### C-1

After measuring and saving at least one standard sample, press “Menu” to enter the test sample measurement page under this standard sample. Press “Test” to measure the color difference; like standard sample measurement, after pressing “save” to save, it will show the saved name; before being saved, sample’s default name would be “Sxxx”.

Test sample measurement can also be done under data view page. Press “Up” and “Down” to select a standard sample, and press “Test” to measure the color difference.

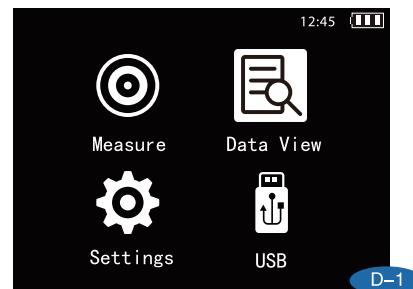
Note: please set the color value tolerance before measurement;

Under test sample measurement, press “Enter”, and then you can select spectral reflectivity with “Up” and “Down”.

## Data View

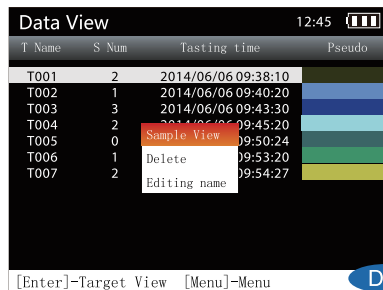
### D-1

In the main page, use “Up” and “Down” to select “Data View”, press enter to enter the data view page, and view saved standard samples.



## D-2

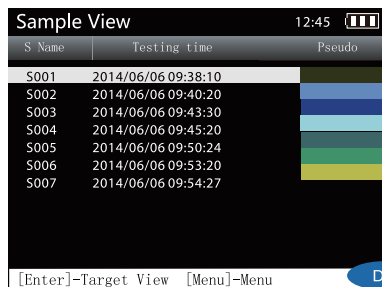
Use “Up” and “Down” to select the standard sample needed, then press “Enter” to view the measurement results of selected standard sample.



D-2

## D-3

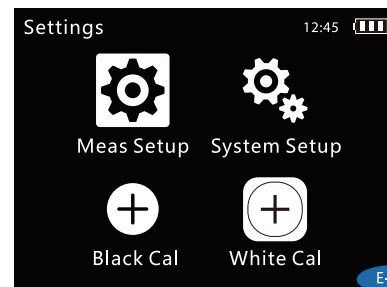
Use “Up” and “Down” to select the standard sample needed, then press “Menu” to open a menu, in which you can view or delete a standard sample, or change its name. Delete will also delete all test samples under the selected standard sample.



D-3

## Settings

In the main page, use up and down buttons to select “Settings”, and press “Enter” to enter the settings page.



E-1/1

**Measurement settings:** the user can change settings of light source, spectator, tolerance, number of measurement times for averaging and SCI/SCE modes, and etc.

**System settings:** user can set language, time and power management; the user can also set all settings back to default, and view the version of the instrument.

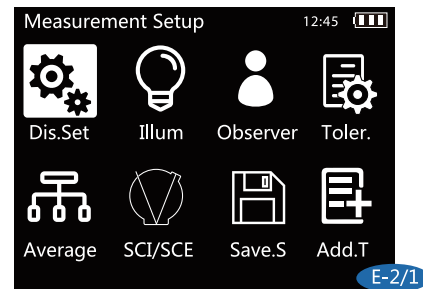
**Black calibration:** the user can black calibrate the instrument.

**White calibration:** the user can white calibrate the instrument.

## Measurement setup

E-2/1

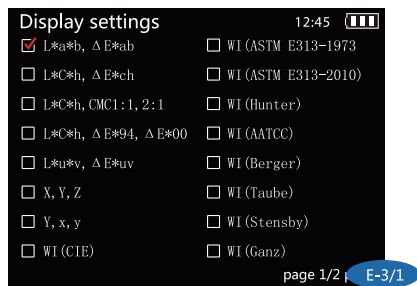
Use “Up” and “Down” to select; press “Enter” to enter measurement setup page.



### E-3/1

Display settings: “Up”/ “Down” to select; “Enter” to enter display settings page. Press “Up” and “Down”, select the color space, color values or indices you need, and confirm with “Enter” button. Then, the measurement page would show the values you need.

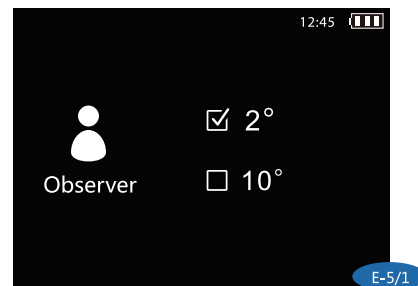
Note: after selection “Metamerism”, you can set the spectator and light source for metamerism comparisons.



### E-5/1

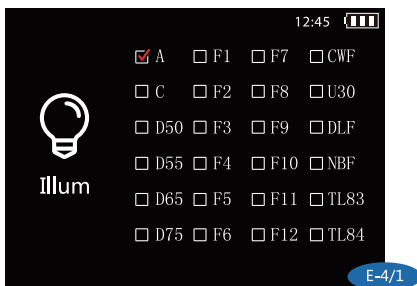
Observer: Use “Up” and “Down” to select; press “Enter” to enter observer settings page.

The instrument offers two standard spectator angles: 2° and 10°. Select with “Up” and “Down”.



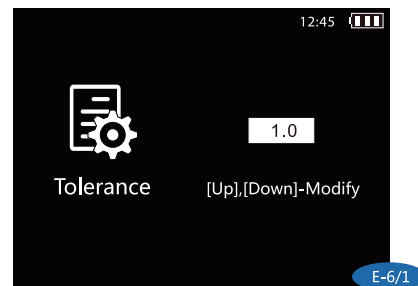
### E-4/1

Light source: Use “Up” and “Down” to select; press “Enter” to enter light source selection page. Under this page, you can toggle any light source that you wish to appear in the testing page, including A, C, D50, D55, D65, D75, F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, CWF, U30, DLF, NBF, TL83 and TL84 light sources, which is a total of 24 light sources. Use “Up”, “Down” and “Enter” to toggle them.



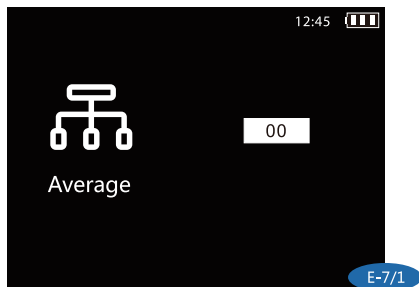
### E-6/1

Tolerance settings: Use “Up” and “Down” to select; press “Enter” to enter tolerance settings page. Use “Up” and “Down” to set the values and press “Enter” to confirm.



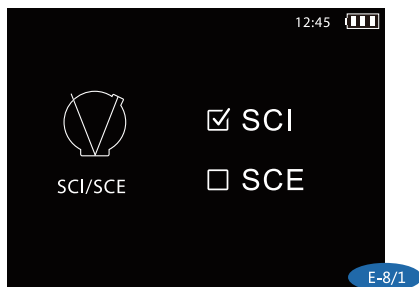
E-7/1

Average settings: Use “Up” and “Down” to select; press “Enter” to enter average settings page. In this page, you set how many measurements does the “average test” makes before averaging to get the result. Use “Up” and “Down” to set the values and press “Enter” to confirm.



E-8/1

SCI/SCE: Use “Up” and “Down” to select; press “Enter” to enter SCI/SCE selection page. This instrument offer both SCI (Specular Component Included) and SCE (Specular Component Excluded) measurement modes; Use “Up” and “Down” to select.

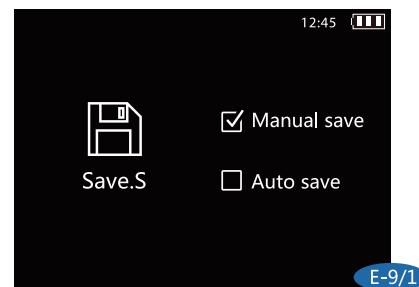


E-9/1

Save setting: Use “Up” and “Down” to select; press “Enter” to enter “Save.S” page. Use “Up” and “Down” to select “Manual saving” or “Auto saving”, press “Enter” to confirm.

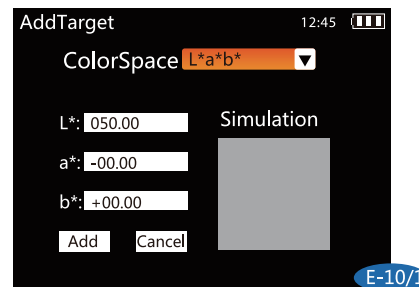
Auto saving: the target and sample measurement will be automatically saved and named every time (T040、S001).

Manual saving: the target and sample measurement will be saved and named by you (such as Txxx、Sxxx) .



E-10/1

Add Target : Use “Up” and “Down” to select; press “Enter” to enter “Add.T”page. Press “Up”、 “Down” and “Enter” , select the color space and enter the vale you need. Use “Up” and “Down” to choose “Add” and press “Enter” to confirm. After saving, simulation area can show the target color you added



## System setup

F-1/1

Use “Up” and “Down” to select; press “Enter” to enter system settings page. In the system settings page, you can enter these sub-pages: settings for language, time, power management, reset all and view version.



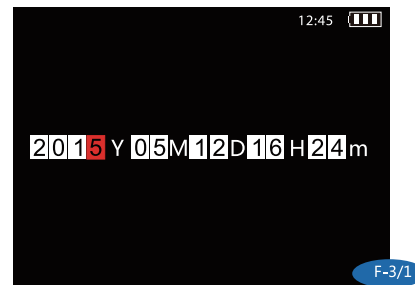
F-2/1

Language selection: Use “Up” and “Down” to select; press “Enter” to enter language selection page. Use “Up” and “Down” to choose from the two languages this instrument supports: Chinese and English.



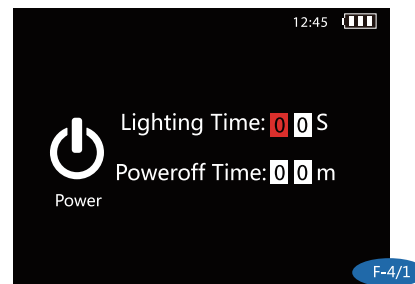
F-3/1

Time setting: Use “Up” and “Down” to select; press “Enter” to enter time settings page. Use “Up” and “Down” to select the value you want to change and press “Enter”; then use “Up” and “Down” to set the value, press “Enter” to confirm. Finally, press “Cancel” to save the values or exit time setting.



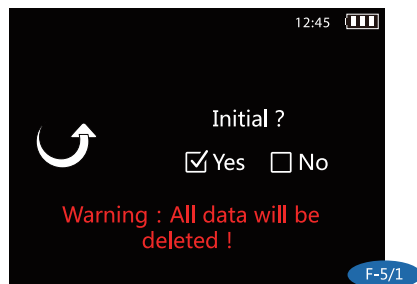
F-4/1

Power management: Use “Up” and “Down” to select; press “Enter” to enter power management settings page. Use “Up” and “Down” to set backlight time and time for the instrument to automatically turn off. Use “Up” and “Down” to select the value you want to change and press “Enter”; then use “Up” and “Down” to set the value, press “Enter” to confirm. Finally, press “Cancel” to save the values or exit time setting.



F-5/1

Reset All: Use “Up” and “Down” to select; press “Enter” to enter reset all page. This action will wipe all data and restore all to default settings.

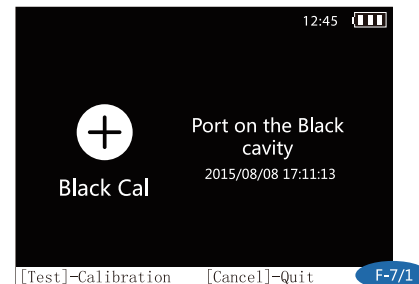


F-6/1

Version: Use “Up” and “Down” to select; press “Enter” to enter view version page. In this page you can view the instrument’s model, product serial number, software version and company name.  
(Note: the software version may be subjected to change without notice)



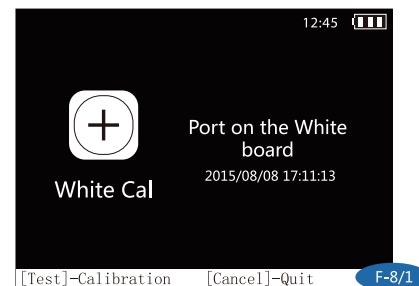
## Black calibration



F-7/1

Put the measurement slot on the black cavity, press “Enter” to calibrate; calibration is finished after short “beep” sound; then press “Cancel”.

## White calibration



F-8/1

Put the instrument on standard white board. Press “Enter” to calibrate. Calibration is finished after the short “Beep” sound.

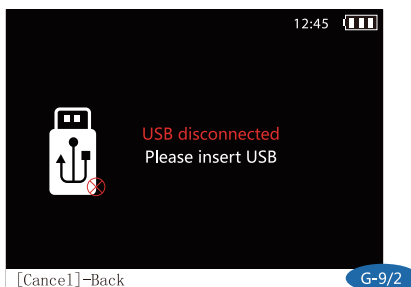
## USB communication



G-1/1

In the main page, Use “Up” and “Down” to select; press “Enter” to enter USB connection page.

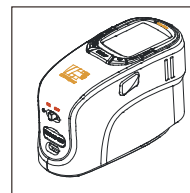
Use the USB cable provided with the instrument to connect the instrument to PC. Install the driver program as instructed (driver program is in the CD provided with the instrument). The USB will be connected correctly after the driver program is installed, as shown in the above picture.



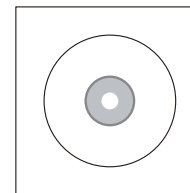
G-1/2

After entering the USB connection page, if USB is not connected, or connected unsuccessfully, the page will be like this. Use the cable to connect again.

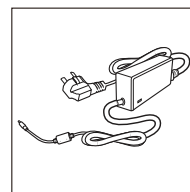
## Standard accessories



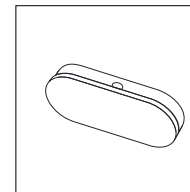
Main instrument



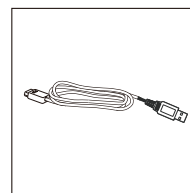
Data management software CD



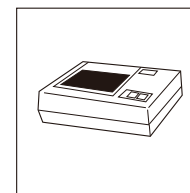
Power adapter



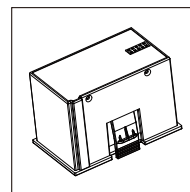
Black/white calibration box



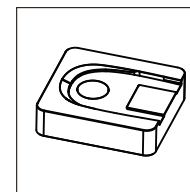
USB cable



Mini-printer(optional)



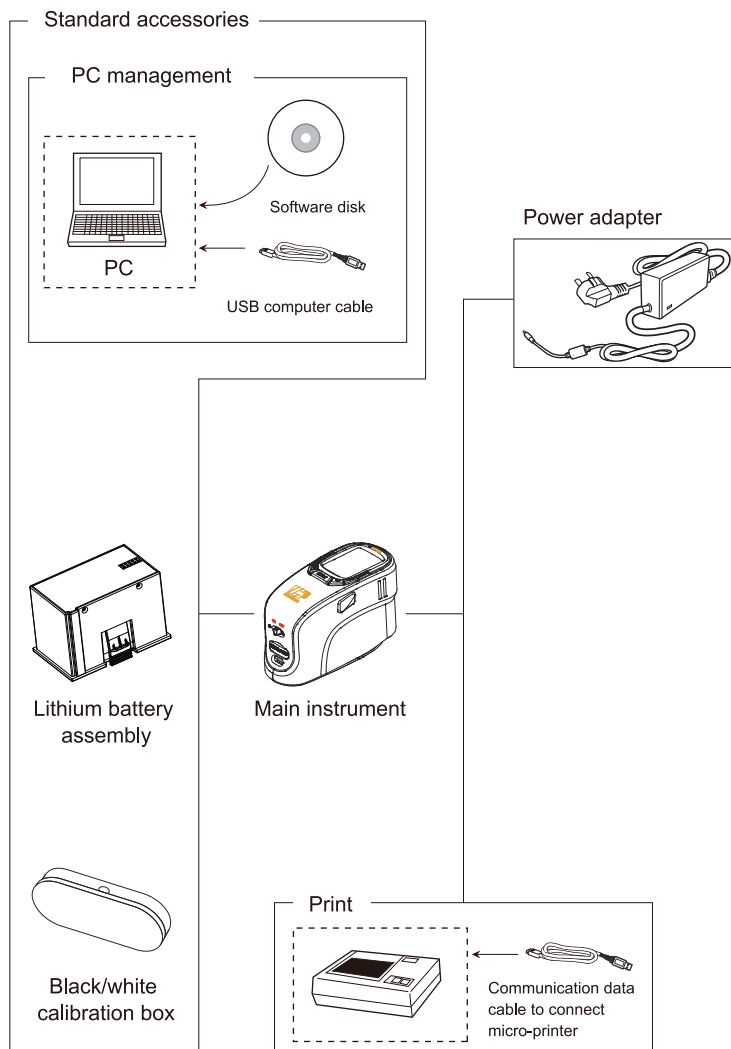
Lithium battery assembly



Powder holder(optional)



## System deployment diagram



## Error handling

Error	Analysis	Handling
1. Unable to power up	1. Check battery or power adapter 2. Check battery power	Install battery or connect power adapter to outside power source
2. Unable to enter main program processes after powering up	1. Check if the instrument is calibrated 2. Check if there are errors during calibration	Calibrate again, and then enter the main program
3. Exception in measurement results	Check if the tolerance settings are reasonable	Check and change tolerance settings
4. Unreasonable measurement results	1. Check if the instrument is lying stably on a flat sample 2. Check if the sample is too thin 3. Check if there are multiple colors in a small spot being tested	1. Make sure instrument is lying flat 2. Put a thick piece of white paper under sample 3. Only check spots of single color
5. Large difference between two measurements	Check if the battery is under 20%	Use power adapter

## Testing Result Analysis

▼  $\Delta E^*ab$  Color Difference Scale  $\Delta E^*ab = \sqrt{(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2}$

$\Delta L^+$  represents white,  $\Delta L^-$  represents black,  $\Delta a^+$  represents red,  $\Delta a^-$  represents green,  $\Delta b^+$  means yellow,  $\Delta b^-$  represents blue. When we use  $CIE^*a^*b^*$  to show a color,  $L^*$  is black or white,  $a^*$  is red or green,  $b^*$  is yellow or green.

▼ CIE LAB

CIE LAB is color space based on the fact that a color can't be both red and green, or both blue and yellow, because these colors oppose each other. So a single data could be used to describe red/green and yellow/blue. When we use  $CIE L^*a^*b^*$  to describe a color,  $L^*$  means lightness,  $a^*$  means red/green and  $b^*$  means yellow/blue.

▼ CIE LCH

CIE LCH adopts same color space as  $L^*a^*b^*$ , but its  $L^*$  represents lightness,  $c^*$  represents saturation and  $h^*$  represents hue.

## Company's statement

- 1.The company promises that our spectrophotometer offers one year of warranty after purchase date. Non-artificial damage under normal use is subjected to free warranty. The company offers repair services for artificial damage, or damage after the warranty time limit; however, the repair services would require fees relative to the damage.
- 2.The warranty only holds for the person, or company who purchased the instrument. Damage occurring under third party usage would not be eligible for warranty service.
- 3.The company is not responsible for data loss because of error, repairing, or power outages. To prevent loss of important data, please save copies of the data on your PC.
- 4.The copyright ownership of the instrument and its associated software belong to our company and is protected by the Copyright Laws of People's Republic of China.
- 5.Our company sells the instrument does not mean we transfer the copyright, or any intellectual property's ownership to the user.
- 6.The specifications and information in this manual are subjected to further updates without notice.