

Contents

Notes.....	1
1 Storage.....	1
2 Application.....	1
Overview.....	2
Structure.....	3
1.1 Appearance.....	3
1.2 Keys.....	4
1.3 Power.....	7
1.3.1 Battery.....	7
1.3.2 Power Adapter.....	8
Operation.....	10
2.1 Calibration.....	10
2.2 Main Menu.....	12
2.2.1 Measurement interface.....	12
2.2.2 Calibration.....	14
2.2.3 Measurement Settings.....	14
2.2.4 Data Record.....	20
2.2.5 System Settings.....	21
2.2.6 Information.....	22
Technical Parameter.....	23

Notes

1 Storage

- Upon long time no use , cut off external power and remove the battery to avoid damage to the instrument resulting from battery fluid overflow.
- Store in a cool, dry environment with a temperature of $-20^{\circ}\text{C} \sim 50^{\circ}\text{C}$ and a relative humidity of 85% or less.

2 Application

- Keep the standard whiteboard clean and avoid contamination of the standard whiteboard with stains, dust, etc.
- When using the instrument, the ambient temperature is $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$, the relative humidity is 85%, no condensation
- Avoid using the instrument in an environment with strong magnetic fields, severe vibration, dust, and smoke to prevent abnormal instrument data and performance failure.
- Avoid foreign matter such as liquid, powder, solid, etc. entering the inside of the instrument to prevent abnormal measurement data.

Overview

The spectrophotometer is based on the International Lighting Commission CIE relevant standards, the national standard R & D and production of professional spectrophotometer. Using a new import of key components, well-designed, with accurate and stable, simple operation, easy to understand, economical and practical and so on.

The spectrophotometer applies to the color quality control, color difference control, color difference analysis, sampling testing and online testing for industries as textile, printing and dyeing, garments, shoes, leather, chemical, plastic, pigment, paint, ink, printing, metal, photography and toys etc., as well as to the auxiliary color matching during the processes as injection, inking, painting and spraying coating etc.

Structure

1.1 Appearance

6. Show screen

4. Save

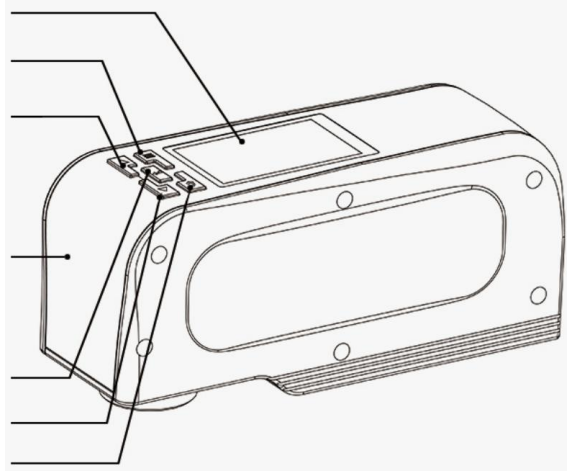
1. Up

7. Body

5. Confirm

2. Down

3. Return



10. Switch

11. Printing interface

12. Battery cover

13. DC connector

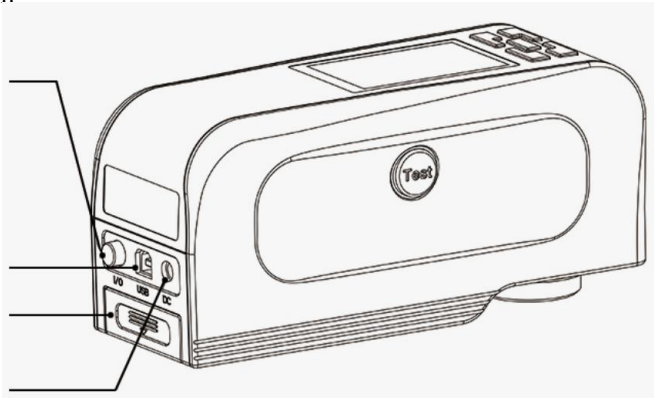


Figure 1. Instrument Appearance

1.2 Keys

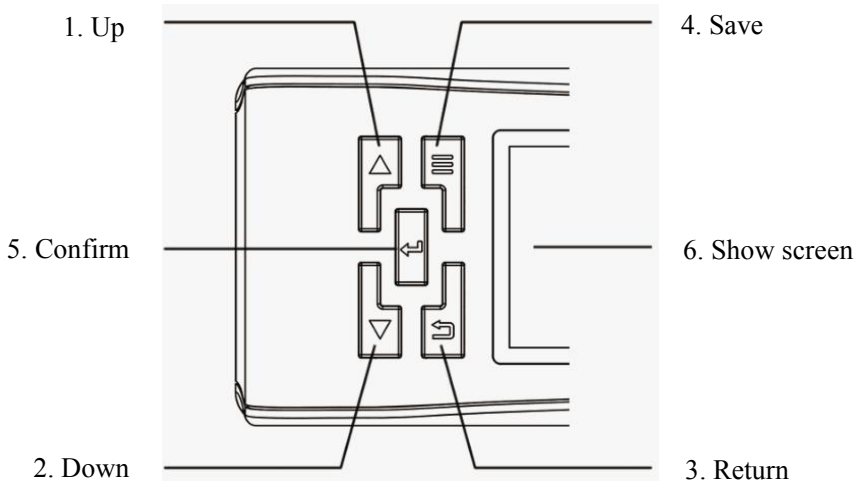


Figure 2. Bird's View

Up  - move the position of the cursor in the screen; adjust the value of the activated items.

Down  - move the position of the cursor in the screen; adjust the value of the activated items.

Returning  - Return.

Saving  - Save settings.

Confirm  -Confirm or activate selected items in the screen;
fast switching between "standard measurement" and "sample measurement".

Show screen - Show measurement result etc.

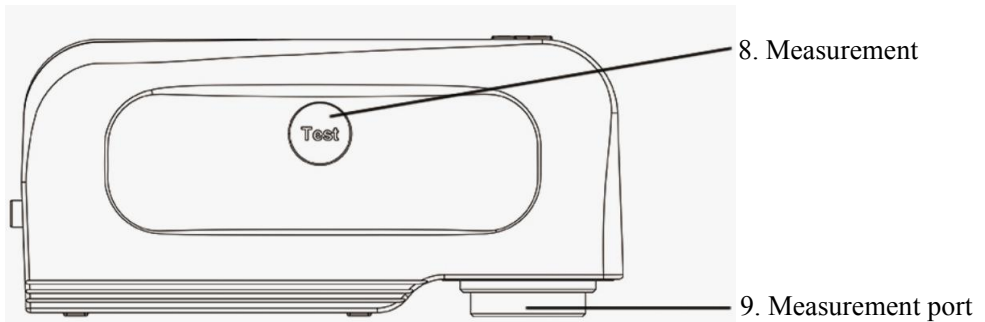


Figure 3. Right View

Measurement - Measuring

Measurement port - Optical channel for measuring.

11. Printing interface

10. Switch

13. DC connector

12. Battery cover

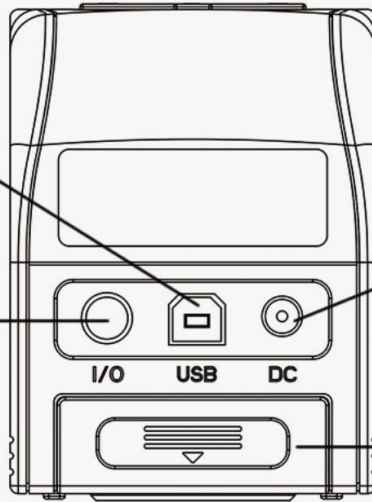


Figure 4. Back View

Switch - In (I) or Out (O) of the instrument.

Printing interface - connect to the printer to print the measuring data.

Battery cover - cover for the special lithium battery compartment

DC connector - dedicated power adapter connector.

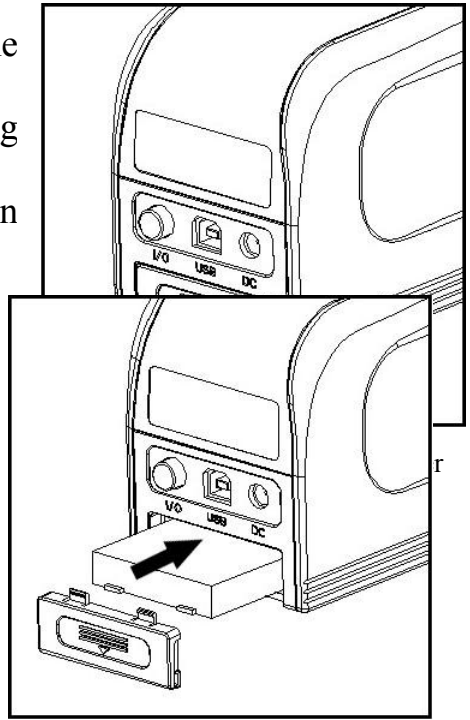
1.3 Power

The spectrophotometer is powered by dedicated power adapter or special lithium batteries, the use of other facilities for power supply may damage the spectrophotometer.

Ensure that the Switch is on Out (O) before connecting to the power adapter or mounting the battery.

1.3.1 Battery

1. First check and confirm if the Switch is on Out (O), then following the arrow direction as shown on Figure 5, take out the battery cover by pressing down.



2. Mount the battery into the compartment as shown in Figure 6, pay attention to the front and back of the battery.

Figure 6. Mounting the battery

3. Follow the directions on Figure 7, press up to mount the battery into the compartment.

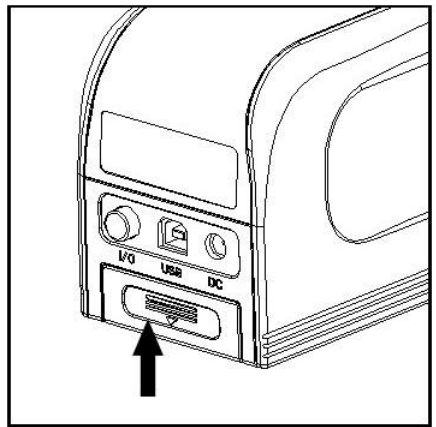


Figure 7. Mounting the battery cover

1.3.2 Power Adapter

1. First check and confirm if the switch is on Out (O).
2. Plug the input cable of the power adapter as shown on Figure 8 into the DC connector.

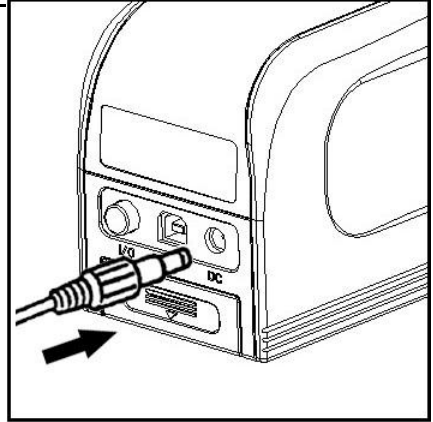


Figure 8. Power Adapter connection

Operation

2.1 Calibration

Pressing the power button, the colorimeter starts and enters the calibration interface after power on, shown as Figure 9, there are white calibration, black calibration.

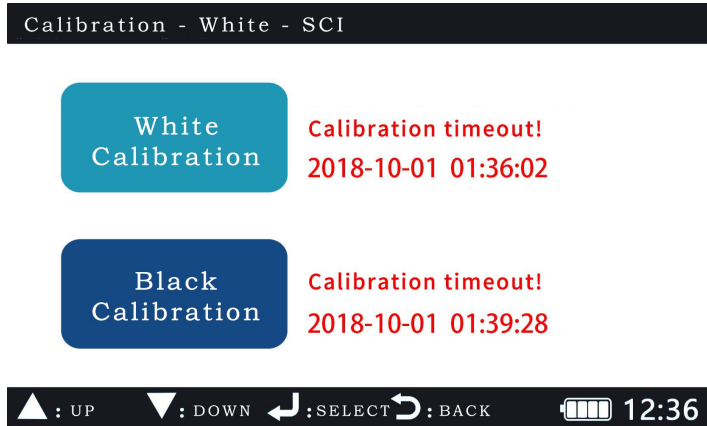


Figure 9. Calibration Interface

First insert the whiteboard into the measurement port, and then press the confirm or measurement key, the instrument enters the white calibration, as shown in Figure 10.

Calibration - White - SCI



Figure 10. White Calibrating

The black calibration is similar to the white calibration. Align the measurement port with the black cavity, and then press the confirm or measurement key. The instrument enters the black calibration, as shown in Figure 11.

Calibration - Black - SCI



Figure 11. Black Calibrating

2.2 Main Menu

After the calibration, press “Enter” to enter the main interface of the system menu. As shown in Figure 12, there are 6 items “Measurement”, “Calibration”, “Measurement Settings”, “Data Record”, “System Settings” and “Information”.

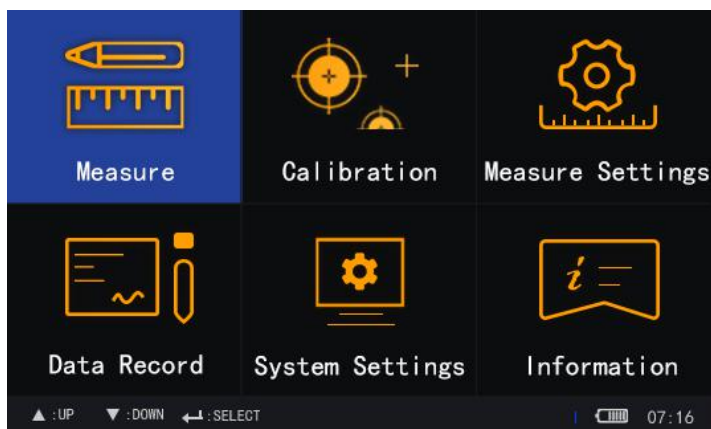


Figure 12. Main Menu

2.2.1 Measurement interface

In the main interface of the menu, select the “Measure” item and confirm that the interface jumps to the “Standard Measurement” interface, as shown in Figure 13, press the measurement button to measure the standard;

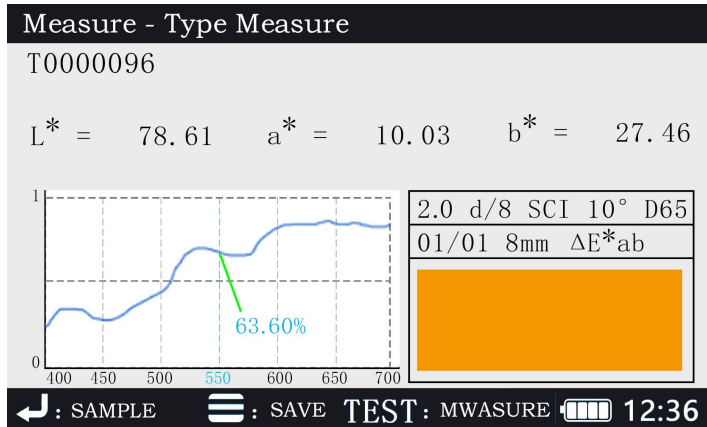


Figure 13. Standard Measurement

After the standard measurement, press “Enter” to jump to the “Sample Measurement” interface, as shown in Figure 14, press the measurement button to measure the sample.

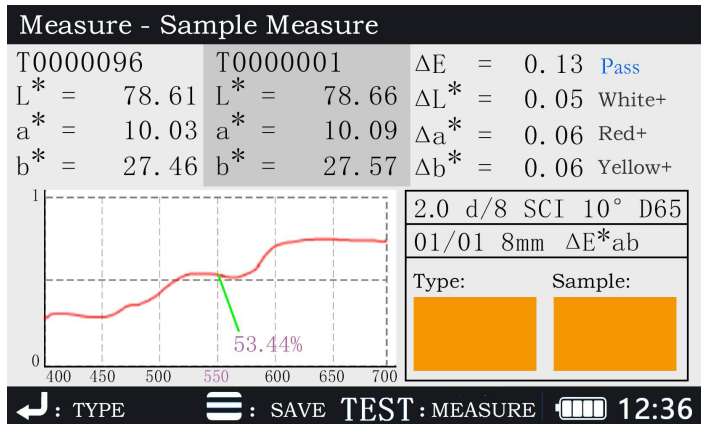


Figure 14. Sample Measurement

In FIG. 13 and FIG. 14, in the graph showing the reflection spectrum of the measured object, there is a vertical dotted line on the leftmost side, and the position of the broken line can be controlled by the “Up” and the

“Down” key, each time moving 10 nm, next to the dotted line is a percentage number that shows the reflectivity of the wavelength at which the dashed line is currently located.

2.2.2 Calibration

Select “Calibration” and confirm, the interface will jump to the “Calibration” interface, as shown in Figure 15, at this time, black and white calibration can be performed.

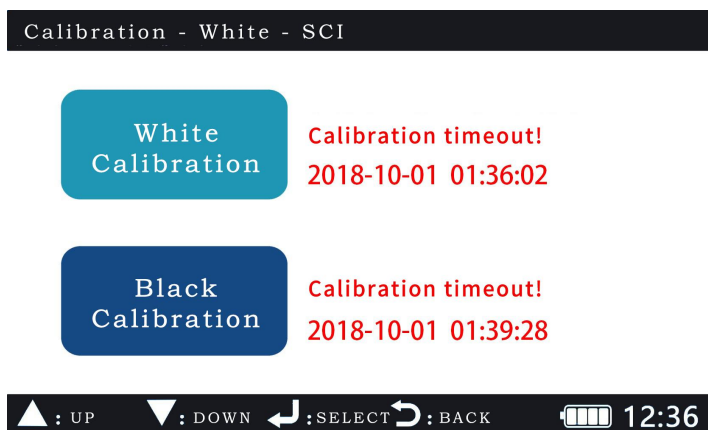


Figure 15. Black and white calibration

2.2.3 Measurement Settings

In the main interface of the menu, select the “Measurement Settings” and confirm that the interface jumps to the “Measurement Settings”, as shown in Figure 16.

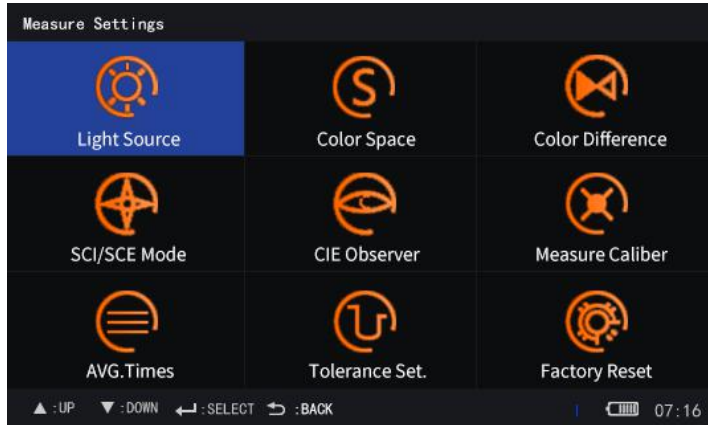


Figure 16. Measurement Settings

Select “Light Source” and confirm that the interface jumps to the “Light Source Settings” interface. As shown in Figure 17, the measurement light source has many standard light sources: A, D55, D65, and F1, F4, F11 (TL84) and so on.



Figure 17. Light source setting

Select “Color Space” and confirm, the interface jumps to the “Color

Space Settings” interface, as shown in Figure 18, the color space has CIE L*a*b*, CIE L*a*b*, Hunter LAB and so on.

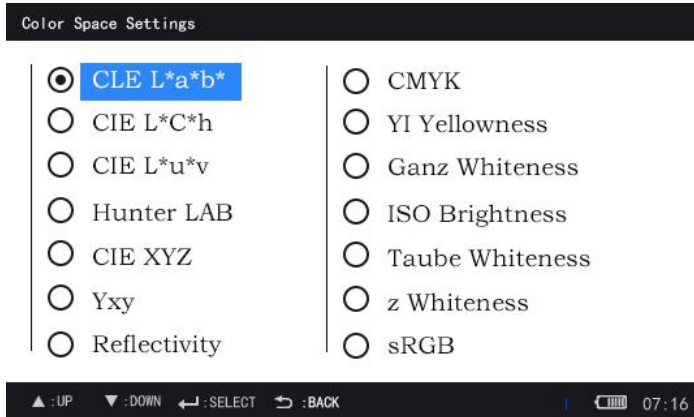


Figure 18. Color space setting

Select the “color difference” and confirm, the interface jumps to the “color difference formula setting”, as shown in Figure 19, the color difference formula has CIE ΔE^*ab , ΔE^* HunterLab, ΔE^* CMC(2:1) and so on.

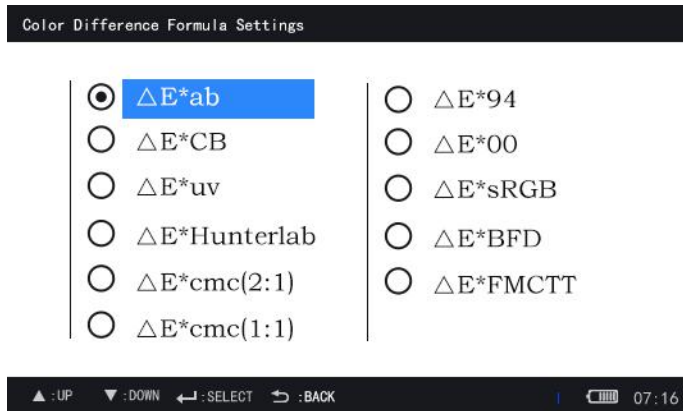


Figure19. Color difference formula setting

Select “SCI/SCE Mode” and confirm that the interface jumps to the “SCI/SCE Mode Settings”. As shown in Figure 20, the observer contains:

SCI(Specular Component Include) and SCE(Specular Component Exclude).

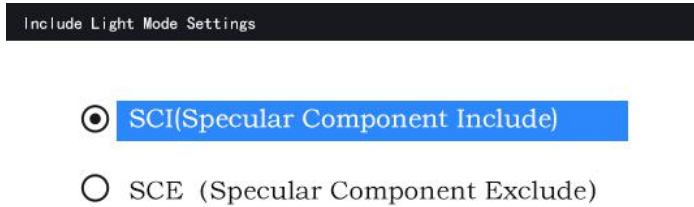


Figure 20. SCI/SCE Mode Settings

Select “CIE Observer” and confirm that the interface jumps to the “Observer Settings”. As shown in Figure 21, the observer contains: CIE10° Standard Observer (1964) and CIE2° Standard Observer (1931).

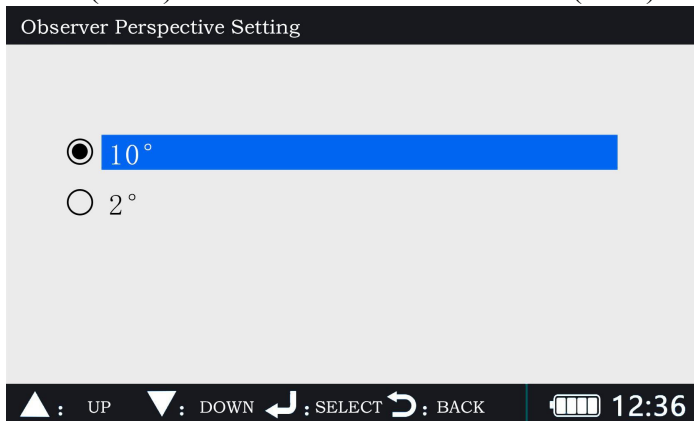


Figure 21 Observer setting

Select “Measuring Caliber” and confirm, the interface will jump to the “Measuring Caliber Setting”, as shown in Figure 22, at this time, the caliber of the instrument can be set (the caliber of the instrument must be

replaced by the corresponding size at the same time).

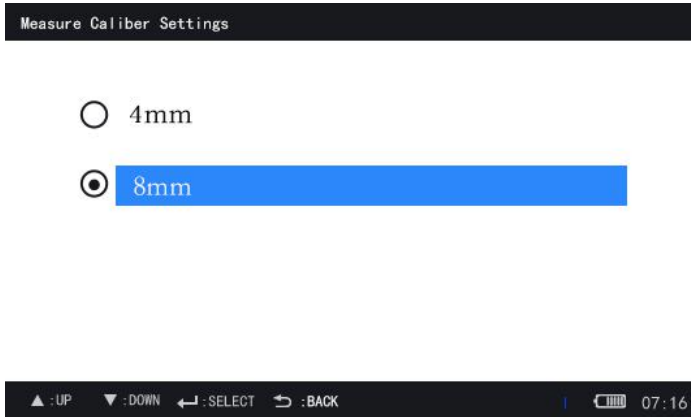


Figure 22. Measuring Caliber

Select “Average measurement times” and confirm, the interface jumps to the “Average measurement times setting”, as shown in Figure 23, the average number of measurements can be set at this time.



Figure 23. Average measurement times setting

Select “Tolerance Setting” and confirm that the interface jumps to the “Tolerance Setting”, as shown in Figure 24. At this time, the standard for judging whether the measured color difference is acceptable can be set.

Tolerance Setting

Tolerance: 2.0



Figure 24. Tolerance setting

Check “Restore Factory Settings” and confirm that the interface pops up the dialog box, as shown in Figure 25.

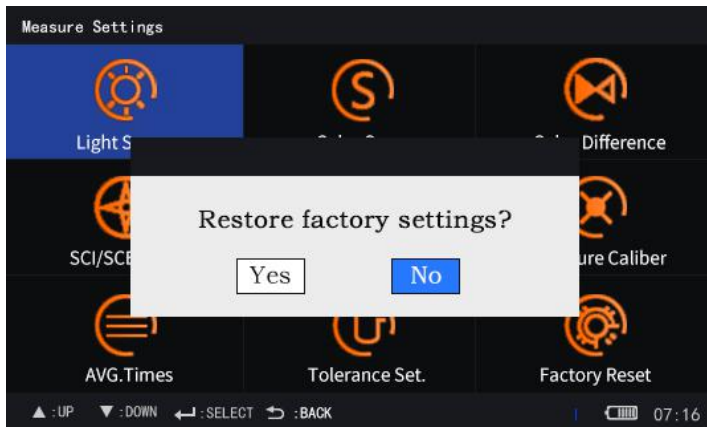


Figure 25. Restore Factory Settings

2.2.4 Data Record

Select the “Data Record” item in the main interface of the menu, and confirm that the interface jumps to the “Standard Record”, as shown in Figure 26.

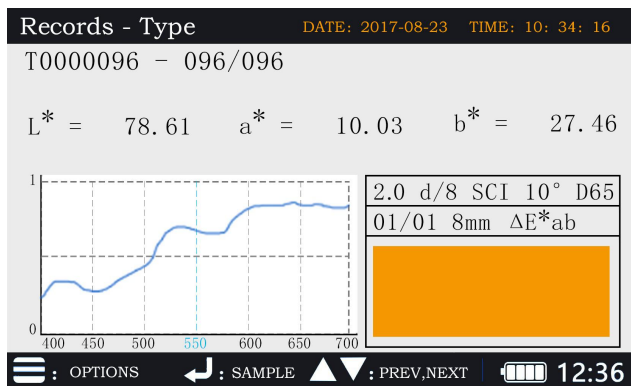


Figure 26. Standard Record

In the “Standard Record” interface, press “Confirm” and the interface will jump to the “Sample Record” under the standard, as shown in Figure 27.

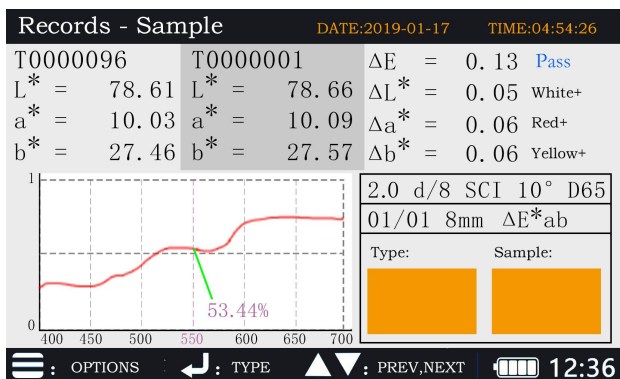


Figure 27. Sample record

In the record interface, if you want to view the reflectivity of a specific wavelength, you can transfer the corresponding record to the measurement interface. In the measurement interface, you can obtain the reflectance of the corresponding wavelength by positioning the wavelength by “Up” and “Down” key.

2.2.5 System Settings

In the main interface of the menu, select the “System Settings” item and confirm that the interface jumps to the “System Settings”, as shown in Figure 28. In this interface, the user can set the data storage mode and the printing method when connecting the micro printer., system language, screen backlight time, instrument automatic shutdown time, system time.

The screenshot displays the 'System Settings' menu with the following options:

- SaveMode: ☐ Manual ☒ Auto
- PrintMode: ☒ Manual ☐ Auto
- Language: ☒ 简体中文 ☐ 繁體中文 ☐ English
- BacklightTime: Second
- AutoPowerOffTime: Minute
- Date(Year-Month-Day) : - -
- Time(Hour:Minute:Sec) : : :

At the bottom, there is a navigation bar with icons for UP, DOWN, BACK, and SELECT, along with a battery status icon and the time 12:36.

Figure 28. System Settings

2.2.6 Information

Select “Information” and confirm, the interface will jump to the “About Device”, as shown in Figure 29, where you can check the instrument information.

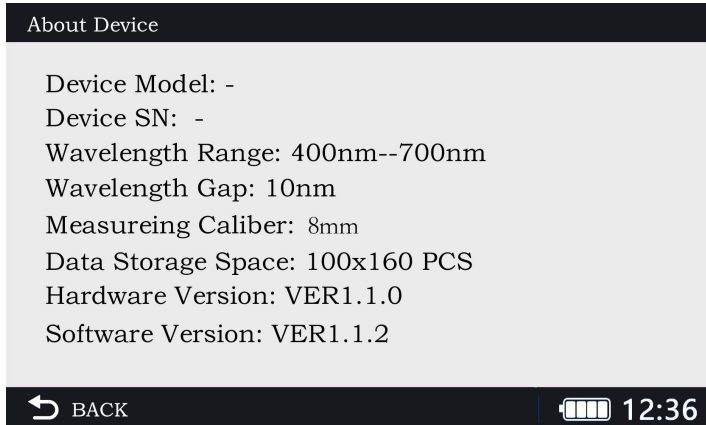


Figure 29. About Instrument

Technical Parameter

Model	WS2300(Single Caliber)	WS2600(Switchable Caliber)
Geometric Conditions	d/8	
Color Space	CIEL*a*b*、CIEL*C*h、Hunter LAB	CIEL*a*b*、CIEL*C*h、CIEL*u*v*、Hunter LAB、CIEXYZ、Yxy、Reflectivity、CMYK、YI Yellowness、Ganz、R457 Whiteness、Taube Whiteness、z Whiteness、sRGB
Standard Light Source	A、D50、D65、F1、F4、 F11(TL84)	A、C、D50、D55、D65、D75、F1、F2 (CWF)、F3、F4、F5、F6、F7、F8、F9、F10、F11(TL84)、F12(U30)
Light Source	Combined LED	
Color Diff. Formula	ΔE^*ab 、 $\Delta E^*HunterLab$ 、 $\Delta E^*CMC(2:1)$	ΔE^*ab 、 ΔE^*Ch 、 ΔE^*uv 、 $\Delta E^*Hunter$ 、 $\Delta E^*cmc(2:1)$ 、 $\Delta E^*cmc(1:1)$ 、 ΔE^*94 、 ΔE^*00 、 ΔE^*sRGB 、 ΔE^*BFD 、 ΔE^*FMCII
Measuring Caliber	Facula 4mm(Caliber $\Phi 6mm$)、 Facula 8mm(Caliber $\Phi 11mm$)、 Facula 16mm(Caliber $\Phi 16mm$)	Switchable: Facula 4mm(Caliber $\Phi 6mm$)& Facula 8mm(Caliber $\Phi 11mm$) Single: Facula 16mm(Caliber $\Phi 16mm$)
SCI/SCE	SCI	SCI/SCE
Sensor Array	Line array CMOS@256 pixels	
Spectral Way	Concave diffraction grating	
Observer	CIE10°(1964)、CIE2°(1931)	
Wavelength coverage	400nm~700nm	
Wavelength interval	10nm	
Measuring interval	2.5 Second	
Reflectance range	0%-200%	

Spectrophotometer User Manual

Repeated accuracy	$\Delta E < 0.07$ (take the deviation average after 30 times measuring the whiteboard)	$\Delta E < 0.05$ (take the deviation average after 30 times measuring the whiteboard)
Table Difference	$\Delta E < 0.4$ (Measure the RAL 12-color blocks)	$\Delta E < 0.3$ (Measure the RAL 12-color blocks)
Light source life	More than 50,000 hours	
Battery power	Measuring more than 10000 times	
Display screen	TFT true color 2.8inch@(16:9)	
Data storage capacity	Storage Standard 100 groups	
	Sample 16,000 groups	
Operating temperature	0°C-40°C (32°F-104°F)	
Storage temperature	-20°C-50°C (-4°F-122°F)	
Working humidity	Relative humidity less than 85%, without condensation	
Weight	340g	
Size	199*68*90mm	
Package Size	400*340*200mm	
Standard accessories	Power adapter, standard white board, standard black cavity, lithium battery, specification, PC software	
Optional accessories	Software(Advanced Version), Micro printer, Locating block	