



Color spectrometer

JCS

JCS 100 / JCS 200



PROFESSIONAL MEASURING

Original version

User Manual Color Spectrometer

Version 1.2
2026-03
en
JCS-BA-e-2612

en

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SAUTER

SAUTER JCS**Color spectrometer****User Manual Color Spectrometer**

Version 1.2 2026-03 Original version

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1 Technical Specifications

SAUTER Model	JCS 200	JCS 100
Optical geometry	D/8 (diffuse illumination, 8-degree viewing angle), SCI/SCE mode (specular component included/specular component excluded), complies with CIE No. 15, GB/T 3978, GB 2893, GB/T 18833, ISO 7724-1, ASTM E1164, DIN 5033 Part 7	
Characteristics	Dual-beam CMOS sensor; used for quality control of color differences in plastics engineering, paints and inks, textile and garment printing and dyeing, printing, the ceramics industry, and other sectors for measuring fluorescence samples.	
Light Source	Combined full-spectrum LED light source, UV light source	
Integrating sphere size	Φ40mm	
Sensor	CMOS sensor with dual beam splitting	
Wavelength range	400–700 nm	
Measuring aperture	JCS 200 with two apertures: MAV: Φ8 mm/Φ10 mm; SAV: Φ4 mm/Φ5 mm	JCS 100 six apertures: MAV: Φ8 mm/Φ10 mm; SAV: Φ4mm/Φ5mm; LAV: 1x3mm
Reflective component	SCI/SCE	
Color space	CIE LAB, XYZ, Yxy, LCh, CIE LUV, s-RGB, HunterLab, βxy, DIN Lab99	
Color difference formula	ΔE^*_{ab} , ΔE^*_{uv} , ΔE^*_{94} , $\Delta E^*_{cmc}(2:1)$, $\Delta E^*_{cmc}(1:1)$, ΔE^*_{00} , $DIN\Delta E_{99}$, $\Delta E(Hunter)$	
Colorimetric index	Spectral reflectance, WI (ASTM E313, CIE/ISO, AATCC, Hunter), YI (ASTM D1925, ASTM 313), metamerism index Mt, color fastness, color strength, opacity, 555-tone classification, Munsell (C/2) (Implementation of a mobile app)	
Observer angle	2°/10°	
Lighting	D65, A, C, D50, D55, D75, F1, F2 (CWF), F3, F4, F5, F6, F7 (DLF), F8, F9, F10 (TPL5), F11 (TL84), F12 (TL83/U30), U35, NBF, ID50, ID65	
Display	Spectrogram/values, color sample values, color difference values/graph, PASS/FAIL result, color simulation, color offset	
Measurement time	Approx. 1 s	

Reproducibility	Chromaticity: MAV/SCI, within ΔE^*_{ab} 0.03 (After preheating and correction, the average value of the panel was measured 30 times at 5-second intervals); Spectral reflectance: MAV/SCI, standard deviation within 0.08% (400 nm to 700 nm: within 0.18%)	Chromaticity: MAV/SCI, within ΔE^*_{ab} 0.02 (After preheating and correction, the average value of the panel was measured 30 times at 5-second intervals); Spectral reflectance: MAV/SCI, standard deviation within 0.08% (400 nm to 700 nm: within 0.18%)
Inter-instrument error	MAV/SCI, within ΔE^*_{ab} 0.3 (Average for 12 BCRA Series II color tiles)	MAV/SCI, within ΔE^*_{ab} 0.2 (Average for 12 BCRA Series II color tiles)
Display accuracy	0.01	
Measured reflectance range	0–200%	
Reflectance resolution	0.01%	
Measurement mode	Single measurement, average measurement (2–99 times)	
Locating method	Stabilizer position	Stabilizer position + camera positioning
White calibration	Automatic contact calibration	Non-contact automatic calibration
Dimensions	94 x 68 x 188 mm	
Weight	270 g	
Battery	Lithium battery, 3.7 V, 5000 mAh, 8000 cycles in 8 hours	
Mounting hole	M5 x 5 mm, pitch 0.8 mm	
Light source lifespan	More than 1.2 million measurements over 10 years	
Screen	2.8-inch TFT true-color touchscreen, capacitive	
Interface	USB	
Data storage	Standard 500 items, sample 10,000 items (a file may contain SCI/SCE); PC mass storage	
Software support	Android, Windows	
Language	English, Chinese	
Operating environment	0–40°C, 0–85% RH (non-condensing), altitude < 2000 m	
Storage environment	-20~50°C, 0~85% RH (non-condensing)	

2 Declaration of Conformity

The current EC/EU Declaration of Conformity can be found online at:

<https://www.kern-sohn.com/shop/de/DOWNLOADS/>

3 Device Overview

3.1 Scope of delivery

- Power adapter
- USB cable
- User Manual
- SQCX PC Software (download from the SAUTER website)
- App (download from the SAUTER website)
- Charging station with white and black calibration plates
- Protective case
- Wrist strap
- Lens caps:

JCT 100:

MAV: $\Phi 8\text{mm}/\Phi 10\text{mm}$

SAV: $\Phi 4\text{mm}/\Phi 5\text{mm}$

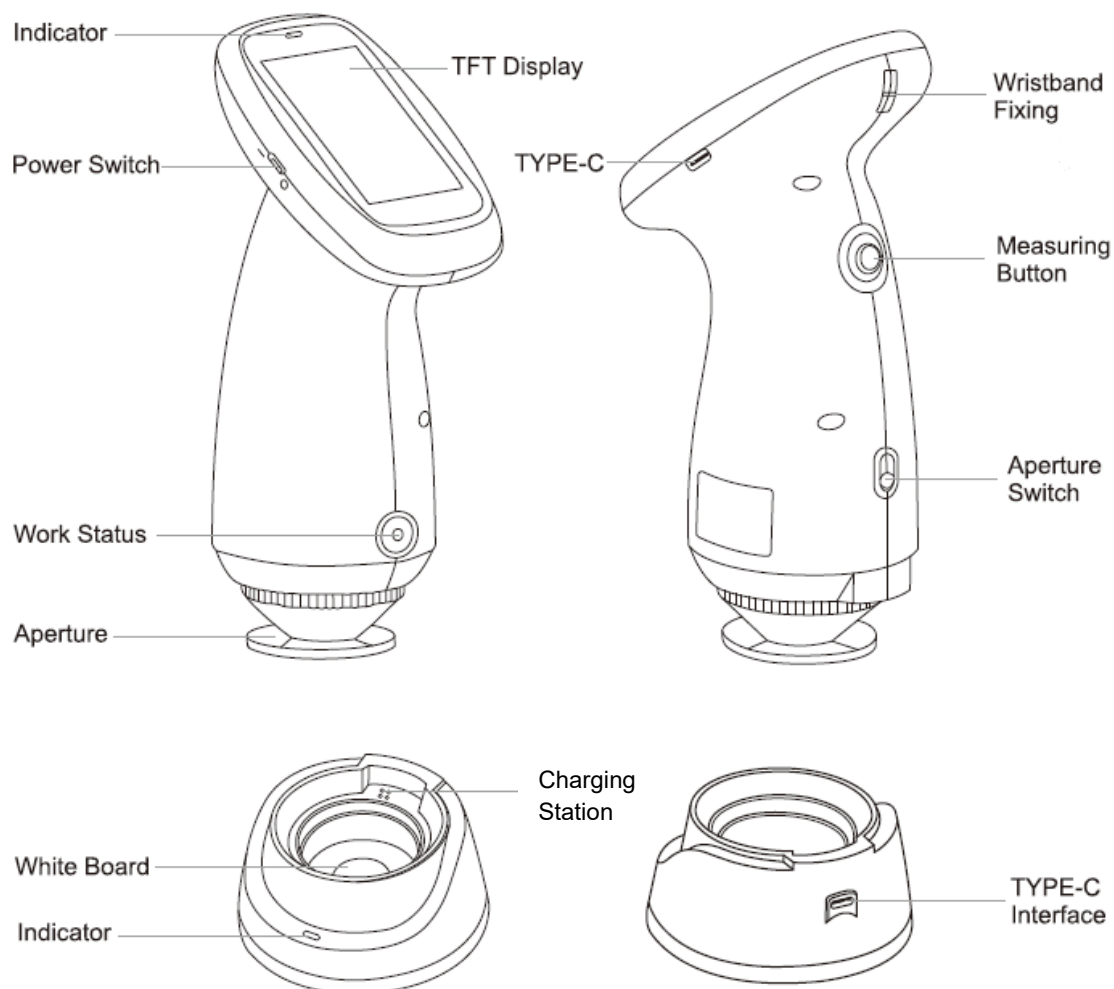
LAV: 1x3mm

JCT 200:

MAV: $\Phi 8\text{mm}/\Phi 10\text{mm}$

SAV: $\Phi 4\text{mm}/\Phi 5\text{mm}$

3.2 Components



Description	Function
Power Switch	Turn on/off
Type C Interface	Communication with the PC and charging of the internal battery (5V/2A).
Measuring Button (Measurement button)	Starts the measurement
Aperture Switch (Aperture Switch)	Switch from SAV (4 mm lens diameter) to MAV (8 mm lens diameter)
Indicator (LED display)	➔ Red: Low battery, below 20% ➔ Green: Battery level above 20% ➔ Yellow: Device docked in the charging station
Wristband attachment	Option for attaching the wristband
Charging Station	For charging the device, with integrated white calibration plate

4 Basic Information (General)

4.1 General Information on Warning Labels

This user manual uses warning notices to alert you to potential personal injury or property damage in specific situations.

Signal word	Description
DANGER	Failure to follow this warning will result in serious injury, permanent disability (e.g., loss of a limb), or death to the user or third parties
WARNING	Failure to follow this warning may result in serious injury, permanent disability (e.g., loss of a limb), or death of the user or third parties
CAUTION	Failure to follow this warning may result in minor injuries or temporary impairment of the user or third parties (e.g., minor cuts)
NOTE	Failure to follow this warning may result in property damage

Symbols in warning notices :

Symbol	Meaning
Warning signs	Warning signs alert you to hazards that may result in personal injury. The symbol indicates the type of hazard.
	Indicates general hazards or a hazardous area
	Warning of electrical voltage
	Warning of flammable substances
	Warning of flammable substances
	Warning regarding electrostatic-sensitive components

4.2 Intended use

Use the precision measuring instrument exclusively for determining color spectra and wavelengths. To use the device as intended, avoid drastic changes in the device's external environment during measurement, such as flickering ambient light and rapid temperature fluctuations. During measurement, hold the device steady, keep the

measurement aperture close to the object being measured, and avoid vibrations and movement. Keep the instrument clean and tidy.

After use, place the device and its accessories in the carrying case and store them properly. The device should be stored in a dry and cool environment.

If you have any questions, please contact SAUTER or visit our website at www.sauter.eu.

4.3 Improper Use

The measuring device is not intended for medical use.

Do not use the device in potentially explosive areas or for measurements in liquids and on live parts. This device is not waterproof and cannot be used in environments with high humidity or water mist. Prevent liquids, powders, or solid foreign objects such as water and dust from entering the measuring opening and the housing.

Unauthorized structural modifications, additions, or alterations to the device are prohibited. Unauthorized modifications may impair the accuracy of the device or even cause irreversible damage to it.

4.4 Warranty

The warranty is void if

- Failure to follow our instructions in the operating manual
- Use outside the described applications
- Modification or opening of the device
- Mechanical damage and damage caused by media, liquids, natural wear and tear
- Improper setup or electrical installation
- Improper assembly or electrical installation

5 Basic warnings and safety instructions

5.1 Follow the instructions in the operating manual



Read the operating instructions carefully before putting the device into service or using it, even if you already have experience with SAUTER devices. Always keep the instructions in close proximity to the device.

5.2 Staff Training

The device may only be used by persons who have read and understood the operating instructions, particularly the Safety chapter.

5.3 Safety

⚠ WARNING	
	Read all safety warnings and instructions. Failure to follow the safety instructions and guidelines can result in electric shock, fire, and/or serious injury. Keep all safety instructions and guidelines for future reference. • Make sure that people or objects are never located under the load, as they could be injured or damaged! • Do not modify the design of the measuring device. This can lead to incorrect measurement results, safety hazards, and damage to the measuring device • Do not operate the device in or place it in potentially explosive rooms or areas. • Do not operate the device in a corrosive atmosphere. • Do not submerge the device in water. Do not allow liquids to enter the interior of the device. • The device must only be used in a dry environment and under no circumstances in rain or at relative humidity levels exceeding the operating conditions. • Protect the device from prolonged direct sunlight. • Do not expose the device to strong vibrations. • Do not remove any safety signs, stickers, or labels from the device. Keep all safety signs, stickers, and labels in a legible condition • Do not open the device

⚠ WARNING	
	Risk of injury from electric shock! • There is a risk of short circuits caused by liquids entering the housing! • Do not submerge the device or its accessories in water. Ensure that no water or other liquids enter the housing. • Work on electrical components must only be performed by an authorized service provider!

⚠ WARNING	
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	Risk of suffocation! Do not leave packaging materials lying around carelessly. They could become a dangerous toy for children. • The device is not a toy and does not belong in the hands of children. • This device may pose a hazard if used improperly or for purposes other than intended by untrained personnel! Ensure that personnel are properly qualified !
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⚠ WARNING	
	Electrostatically sensitive device! • The device can be destroyed by electrostatic discharges. Connectors for RF signals are particularly at risk. • Please follow the handling instructions for electrostatic-sensitive components.

⚠ WARNING	
 	Improper use of rechargeable or non-rechargeable batteries can cause them to catch fire, explode, emit toxic fumes, or release corrosive liquids. Therefore, the following applies to all rechargeable and non-rechargeable batteries: • Protect from fire and heat. • Never expose to high pressure or microwaves. • Do not allow them to come into contact with liquids or chemicals. • Never allow the electrical contacts of rechargeable and non-rechargeable batteries to come into contact with metal objects or short-circuit. • Never modify rechargeable batteries, batteries, or chargers. • Never recharge batteries. • Never use or charge a defective, damaged, or deformed battery. • Do not use power adapters that do not meet the technical specifications. Otherwise, the battery's service life may be shortened, or an electric shock may occur, which could damage the device or cause a fire. • If the device is not used for an extended period, disconnect the external power supply to prevent the device from overheating and causing a fire. • If you do not use the device for an extended period, you should charge it every two weeks; otherwise, the internal battery may be slightly damaged, making it impossible to use the device again

CAUTION	
• Keep a sufficient distance from heat sources. • Do not use the device in environments with high humidity or water mist.	

 NOTE

- To prevent damage to the device, do not expose it to extreme temperatures, extreme humidity, or moisture.
- Do not use harsh cleaners, abrasives, or solvents to clean the device.

6 Transport and Storage

Note

Improper storage or transport of the device may result in damage. Follow the instructions for transporting and storing the device.

Transport

Use the carrying case included in the delivery to transport the device and protect it from external influences.

Storage

When the device is not in use, observe the following storage conditions:

- dry and at a temperature between , protected from frost and heat
- protected from dust in the carrying case
- the storage temperature complies with the technical specifications

Packaging/Return Shipping

Returns are only possible within the limits of the general terms and conditions. Keep all parts of the original packaging for any necessary return shipping.

- Only the original packaging may be used for return shipping.
- Disconnect all connected cables and loose/movable parts before shipping.
- Reattach any transport securing devices that were provided.
- Secure all parts against slipping and damage.

7 Unpacking and Commissioning

7.1 Unpacking



In the event of a return, please follow the instructions in the chapter “Packaging/Return Shipping”

Upon receipt of the device, check immediately to ensure that no transport damage has occurred and that the outer packaging, the housing, other parts, or even the device itself have not been damaged. If any damage is visible, please notify SAUTER GmbH immediately.

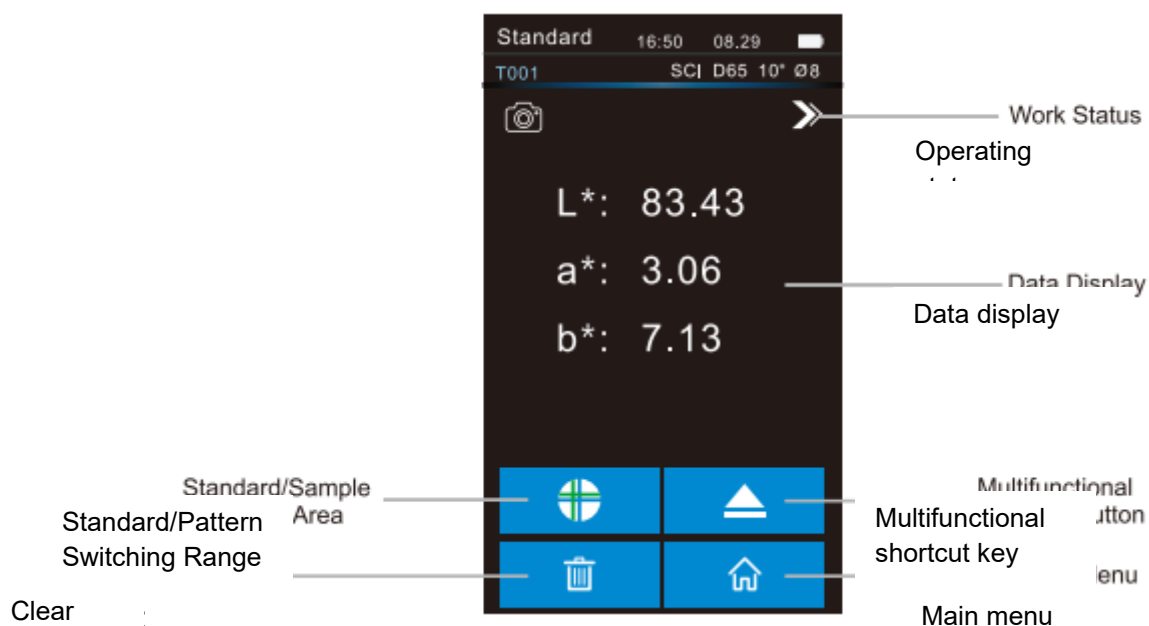
7.2 Initial Setup

To ensure the meter functions properly, it must be fully charged in the charging station using the supplied power adapter before use .

8 Menu

8.1 Navigating the Menu

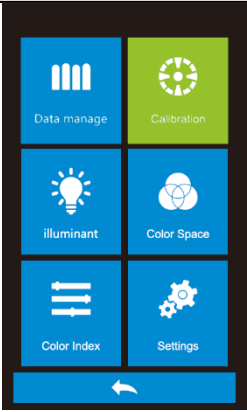
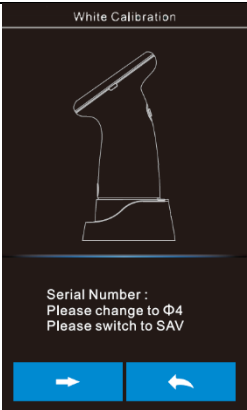
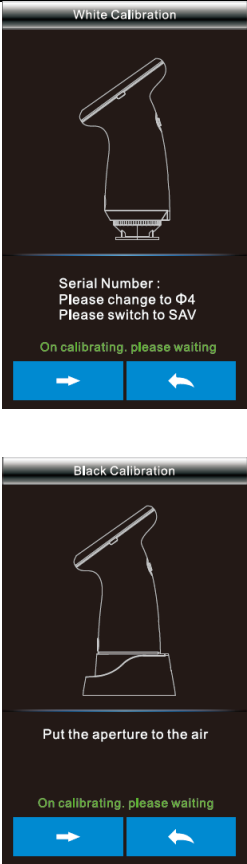
After turning on the device, the start screen appears and leads to the measurement



To open the main menu, click the " " button. The main menu provides access to the other menus:



9 Calibration (Black and White Calibration)

Black and White Calibration	
Click on Calibration (Black and White Calibration) in the main menu to open the Black and White Calibration menu	
The number of the whiteboard and the aperture used are displayed in the user interface. Align the measuring aperture with the panel and press it firmly. After you have correctly set the panel number and the measuring aperture, press the "➡" button or the "Measure" button to start the white calibration.	
The message "On calibrating, please waiting" appears on the screen and the display turns yellow. Once the white calibration is successfully completed, the system automatically switches to the black calibration menu. If any issues arise during white calibration, a corresponding message window will appear. Click the "➡" button or press the "Measure" button to perform the device's black calibration, after which the message "On calibrating, please waiting" will appear on the screen and the display will turn yellow. If the black calibration is successful, the system automatically returns to the main menu. If problems occur during black calibration, a corresponding message window will appear.	

10 Basic Operation

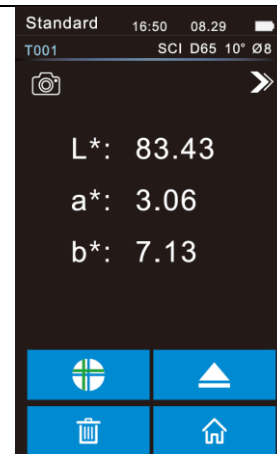
10.1 Standard measurement

The measurement is divided into standard measurement and sample measurement. Standard measurement is generally used to measure the chromaticity data of the target sample, while sample measurement is used to measure the color difference or contrast-chromaticity data between the sample and the target sample.

After turning on the device and performing proper black-and-white calibration, the measurement can be performed (customers can set the appropriate light source, color space, and color index in the main menu interface as needed). If you are not in the measurement interface, you can click the "←" button on the interface to return to the measurement interface.

Note: The system's default color space is CIE lab, the color difference formula is ΔE^*ab , and the color index is CIE1976

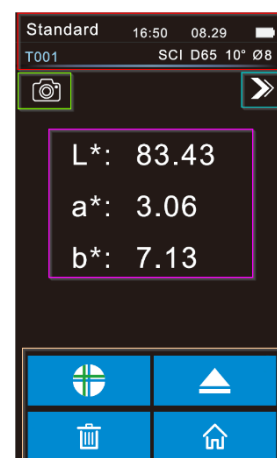
Align the sample to be measured with the device's measurement aperture and press it firmly. Press the measurement button lightly; the LED indicator will change from yellow to green, indicating that the measurement is complete.

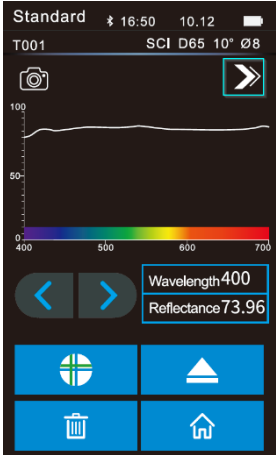
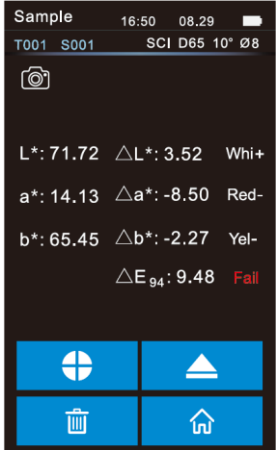
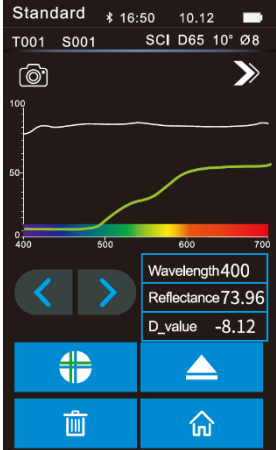


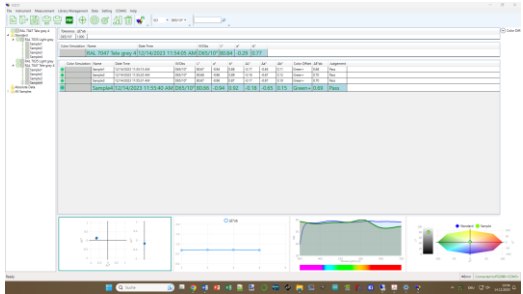
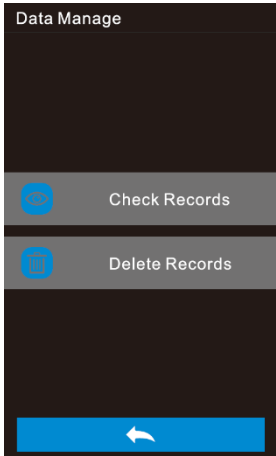
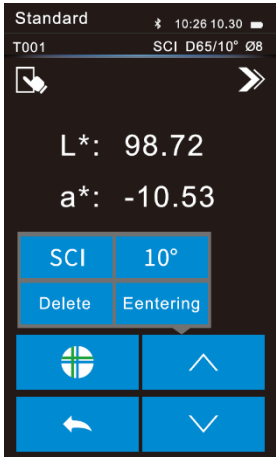
In the areas marked in red, you will find information about:

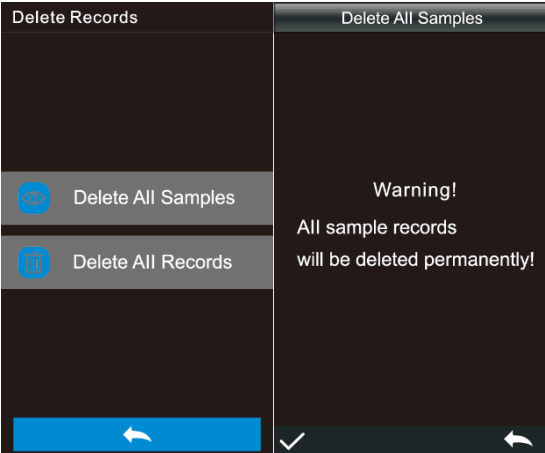
- Standard or Sample measurement mode
- Time
- Month/Day
- Battery status
- Sample number, starting with "T000".
- Measurement mode
- Light source
- Observer angle
- Aperture size

Green-marked area:
Taking pictures



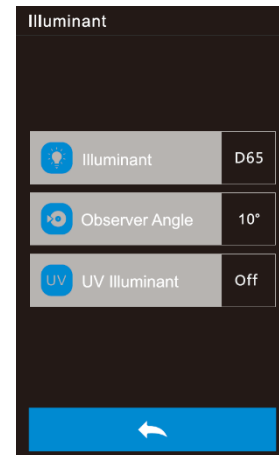
Pink-marked area: Display of measured chroma data according to the selected color space Orange-highlighted area: • Multifunctional shortcut button • Main menu • Delete Standard/Pattern selection area	
Light blue area: Switch the display to the reflectivity display. Use the wavelength change button to move the measurement point; click the "  " button, and the reflectance of the currently measured sample and the wavelength of the light will change in 10 nm increments	
Sample measurement screen interface, including the sample name (SXXX), the sample's chroma value, color difference value, color deviation, and measurement result	
Reflectance: Difference between the measurement sample and the selected standard. Use the wavelength change button to move the measurement point; click the "  " button, and the reflectance of the currently measured sample and the wavelength of the light will be changed in 10 nm increments	

10.2 PC communication	
USB Once the client program is installed on the PC, the connection between the device and the PC is automatically detected via a USB data cable. If the connection is successful, the device can be fully controlled via the software, and the corresponding samples can be tested and analyzed. The software takes over the overall control of the device, testing and analyzing the corresponding samples.	
10.3 Data Manage	
Click on Data Manage in the main menu. Data management is primarily used to review and manage the measured data sets.	
10.4 Check Records	
In Data Management, click Check Records to enter the standard record. Note: The instrument displays two decimal places when verifying the chromaticity value of the standard record. Click "▼" to check the next data record, and "▲" to check the previous data record. Click on "↺" to perform the following operations: SCI, 10, Delete Records, and Import Standard Samples.	

10.5 Delete Records	
Click on "Delete Records" in the data management interface. "Delete Records" is divided into "Delete All Records" and "Delete All Samples." Click the corresponding option; a warning message will appear. Click "✓" to delete all relevant records. To cancel the operation, click "⬅️."	
10.6 Lighting	
Click "Lighting" in the main menu to open the light settings interface.	

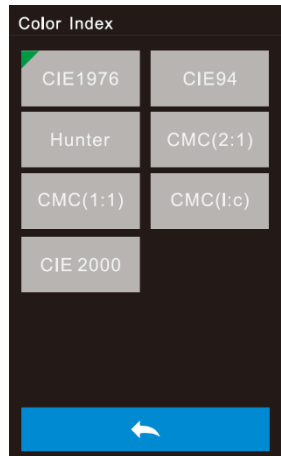
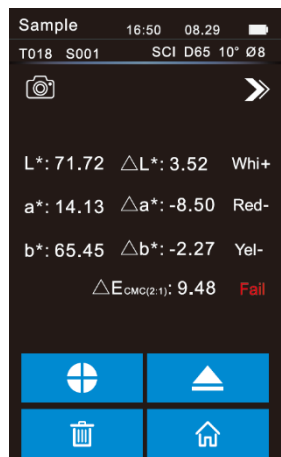
The user sets the appropriate light source according to the actual measurement conditions. In the illumination interface, you can set the system's standard viewing angle, standard light source type, and UV light source (different device types have different configurations). Click on the observer angle to switch between 10 and 2 (°). Here, 10 corresponds to the CIE1964 standard and 2 to the CIE1931 standard.

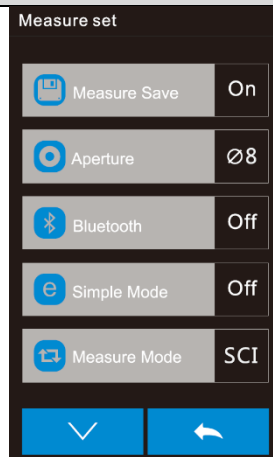
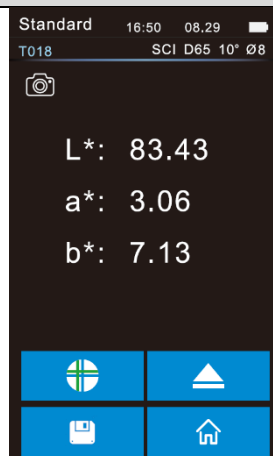
Click on the UV light source to turn it on. It is recommended to turn on the UV light source when testing fluorescent samples and to turn it off when testing ordinary samples.



Click on the light source; the following options are available: D65, D50, A, C, D55, D75, F1, F2(CWF), F3, F4, F5, F6, F7(DLF), F8, F9, F10(TPL5), F11(TL84), F12 (TL83).



10.7 Color Space	
Click "Color Space" in the main menu. Select the appropriate color space to complete the color space setting. Color options include CIE LAB, XYZ, Yxy, LCh, CIE LUV, s-RGB, HunterLab, etc. The selection depends on the model options.	
10.8 Color Index	
Click "Color Index" in the main menu to open the Color Index window. Let's take the "Color Difference Formula" setting as ΔE^*00 as an example for a detailed explanation. Color Index interface, color difference formula options are: ΔE^*00, ΔE^*UV, ΔE^*94, $\Delta E^*CMC (2:1)$, $\Delta E^*CMC (1:1)$, ΔE^*00, ΔE (Hunter).	
Calculating the color difference using ΔE CMC (2:1)	

10.9 System Settings	
In the main menu, click on System Set (System Settings). These include the measurement settings and device settings.	
10.10 Measure Set	
In the System Settings, click "Measure Set" to open the interface for measurement settings. The settings include automatic data logging, aperture selection, simple mode, measurement mode, display settings, tolerance settings, average measurement, print settings, and other options. You can review and select various setting options	
10.11 Save Measurement	
If automatic measurement saving is enabled, each test sample is automatically saved in the device; otherwise, the data set is not automatically saved after the sample test is complete, but only after manually clicking the save icon 	
10.12 Measuring aperture	
This series of devices is equipped with an 8 mm diameter measuring aperture and a 4 mm diameter measuring aperture, and various 1*3 diameter measuring aperture models are equipped with different measuring apertures. If the	

measured surface of the sample is large and uniform, it is recommended to use the Ø 8mm measuring aperture, and if the measured surface of the sample is small, it is recommended to use the Ø 4mm or Ø 1*3 measuring aperture. Switching the measuring aperture (Ø 8mm/Ø 4mm/Ø 1*3) must be done in three steps:

Step 1:

Insert the aperture, turn the measuring aperture counterclockwise, and remove the original aperture. Align the measuring aperture to be installed with the mounting opening of the integrating sphere and turn it clockwise. When you hear a "click," this means that the measuring aperture is properly aligned with the buckle position of the integrating sphere, i.e., the measuring aperture to be installed is now in place.

Step 2:

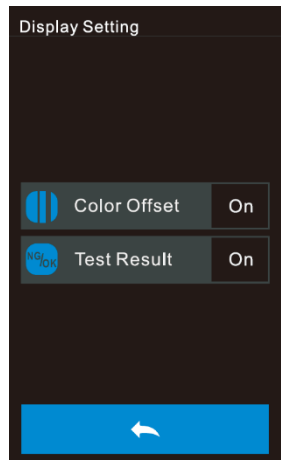
Switch the position of the optical lens. If the mounted Ø8mm aperture is used for measurement, set the aperture switch to the MAV position; if it is a Ø4mm measuring aperture, set the aperture switch to the SAV position; if the mounted Ø1*3 aperture is used, set the aperture switch to the SAV position.

Step 3:

Switch the aperture setting in the device software and manually set the aperture the corresponding Ø8mm, Ø4mm, or Ø3 aperture.

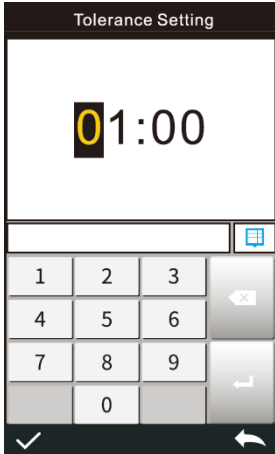
Note: The size of the measuring aperture, the position of the optical lens, and the aperture setting in the software must match to ensure accurate test results. Ø1x3 aperture, the corresponding optical lens position is SAV, and the software displays 1*3; Ø4mm diameter, the corresponding optical lens position is SAV, and the software displays Ø4mm; Ø8mm aperture, the corresponding optical lens position is MAV, and the software displays Ø8; There is a corresponding display in the status bar of the test interface.

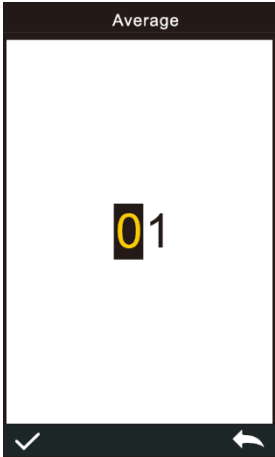
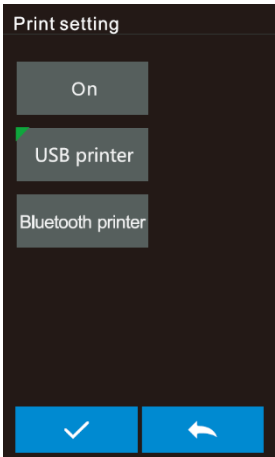
Note: After switching the measurement aperture, black-and-white calibration must be performed again before a new data test can be conducted.

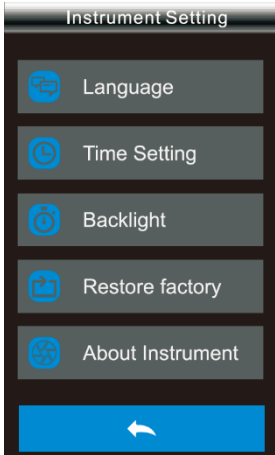
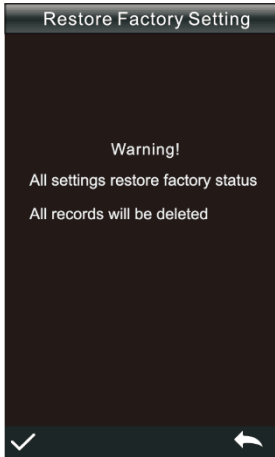
10.13 Simple Mode	
After simple mode has been enabled, return to the measurement page for the standard measurement. After the standard measurement, the device automatically switches to sample measurement mode.	
10.14 Measurement Mode	
SCI includes the specular reflection measurement mode; SCE excludes the specular reflection measurement mode. On this device, the SCI/SCE test mode is switched via the traditional method of adjusting mechanical optical shutters. In SCI measurement mode, the motor drives the paddles to block the mechanical optical traps, and in SCE measurement mode, the paddles are opened. During standard measurement, the device automatically performs SCI and SCE measurements, and the test time is approximately 3 seconds. When measuring the sample, the device measures according to the measurement mode set by the customer. The user can set the measurement mode to SCI, SCE, or I+E depending on the requirements of the measurement products, and some models offer only a limited number of options. I+E is the SCI+SCE mode. The measurement time for SCI/SCE alone is approximately 1.5 seconds, and simultaneous measurement of SCI+SCE takes 3.2 seconds. If the device's current measurement mode is SCI (SCI is displayed in the operating status area), the device checks only the SCI data of the sample; if the display mode is set to SCE, the corresponding chromaticity data is displayed as "-", and the spectral data and color index are not displayed.	
10.15 Display Settings	
Click Display Settings in the main menu. Here you can set whether to enable color deviation and the display of test results. When color deviation is turned on, the color deviation of the sample compared to the standard is displayed when the sample is measured; when it is turned off, nothing is displayed. If the test result display is enabled, during sample measurement, if the test result exceeds the tolerance range defined by the standard sample, the message "unqualified" is displayed; if the sample's error is	

within the standard sample's tolerance range, the message "qualified" is displayed.	
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10.16 Tolerance Setting

Select "Tolerance Setting" in the measurement settings to access the tolerance query settings. The user can set the tolerance values in the tolerance settings according to color management requirements. After selecting the number to be changed, the numeric keypad appears. Press the "✓" to move the cursor to the next digit. When the cursor is on the last digit, press the "✓" button to save the setting and return to the measurement settings. If you do not want to set or change the tolerance, press the "←" button to return to the main menu. Once the tolerance setting is complete, the device automatically evaluates whether the total color difference ΔE^* meets the tolerance value set by the user during the sample measurement. If the total color difference ΔE is less than the tolerance value, it is accepted; if it is greater than the tolerance value, it is rejected.	
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10.17 Average (Average Measurement)	
If the sample to be measured is relatively large or not very uniform, the average reflectance of multiple points can be obtained by measuring a variety of representative test points. Then, the calculated chromaticity data can better represent the true chromaticity value of the sample to be measured, and the device can perform a 2–99 average measurement. Click "Average" in the main menu, where you can set the number of measurements to average. Then enter the average number of measurements and click "✓" to confirm. If the average number of measurements is 1, measure in the conventional manner; if it is greater than 1, the measurement results will be averaged based on the specified number of measurements during standard and sample measurements.	
10.18 Print Setting	
The microprinter is not a standard accessory and must be purchased separately. Use a USB printer to print the current measurement report (some models). The "Print Setting" is turned off by default in the "System Settings" of the main menu. If you need to print, you can turn on the corresponding printer. Using a USB printer: The user can connect the microprinter to the device via USB. Once the microprinter is connected to the device via USB, it can perform the measurement and printing process on the measurement interface. The	

device sends the current measurement data to the printer, and the printer completes the printing process.	
10.19 Instrument Settings	
Click "Instrument Set" in the system settings to access the device settings. Device settings include language selection, time settings, screen backlight timeout, factory reset, and device-specific options. You can review and select various setting options	
10.20 Restore Factory Settings	
Click "Restore Factory Settings" in the system settings to access the interface. Click "✓" to delete all measurement records and user settings and restore the device to its factory state; click "⬅" to cancel this process. Note: The device will delete all data and user settings and be reset to factory settings. None of the data can be recovered. Please use the device with caution.	

11 Battery Operation / Power Supply

WARNING



Risk of fire and explosion due to improper charging or a defective battery



Fire or explosion can cause serious injury

- ⇒ Be sure to follow the instructions regarding batteries in the Safety chapter.
- ⇒ Observe national and international transport regulations for devices with a built-in lithium-ion battery.
- ⇒ Do not replace defective batteries yourself! Contact SAUTER or an authorized dealer directly.

This device is equipped with a built-in rechargeable lithium-ion battery. Please use the original battery and do not substitute it with any other type of battery to avoid damage to the device or other malfunctions.

- Nominal voltage 3.7 V
- Capacity 3200 mAh

The battery should be fully charged before first use. Use the included power adapter for this purpose.

12 Interfaces

The device features a USB

12.1 USB-C

The device's USB-C port is a universal interface; it can be used to connect to and communicate with a PC, with the device automatically detecting the connection; it can also be used to connect printers.

The USB-C port on the base is a charging port that can be used to charge the device (5V/2A).

Note: You cannot connect two USB-C ports simultaneously to the data cable for charging!

13 Maintenance, Servicing, and Disposal



Disconnect the device from the power supply before performing any maintenance, cleaning, or repair work.

13.1 Cleaning

Clean the device with a damp, soft, lint-free cloth. Make sure that no moisture penetrates the housing. Do not use sprays, solvents, alcohol-based cleaners, or abrasive cleaners; use only plain water to dampen the cloth.

13.2 , and Repair

Do not make any modifications to the device or install any replacement parts. Contact the manufacturer for repairs or device inspections.

13.3 Disposal



Old devices and accessories do not belong in household waste.

The operator must dispose of the packaging and device in accordance with applicable national or regional laws at the user's location.

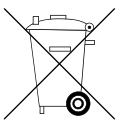
The device consists of various components and materials, such as:

- Electronic components (circuit boards, electrical wires)
- Plastic (housing)
- Metal

Improper disposal of the device can have harmful effects on people and the environment.

Proper and environmentally sound disposal can prevent harmful effects and allow for the recovery of raw materials.

Disposal of rechargeable and non-rechargeable batteries:



Rechargeable and non-rechargeable batteries do not belong in household waste.

The operator must dispose of rechargeable and non-rechargeable batteries in accordance with applicable national or regional laws at the user's location.

14 Battery Act

Note in accordance with the Battery Act (BattG):

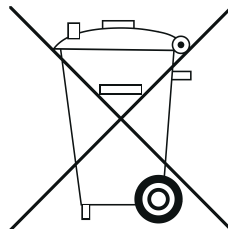
INFORMATION



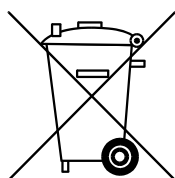
- The following information applies to Germany.

In connection with the sale of batteries and rechargeable batteries, we, as a retailer, are required by the Battery Act to inform end consumers of the following:

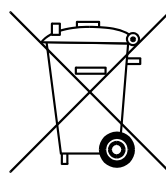
- End consumers are legally obligated to return used batteries and rechargeable batteries.
- Batteries and rechargeable batteries can be returned free of charge to municipal collection points or retailers after use. The batteries/rechargeable batteries must have reached the end of their normal useful life; otherwise, precautions must be taken to prevent short circuits.
- The return option is limited to batteries and rechargeable batteries of the type we currently carry or have carried in our product range, as well as to the quantity that end consumers typically dispose of.
- A crossed-out trash can symbol means that you must not dispose of the batteries or rechargeable batteries in household waste under any circumstances. Old batteries or rechargeable batteries may contain hazardous substances that can harm people and the environment if not disposed of properly.



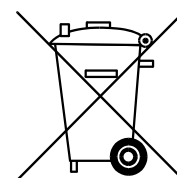
- Batteries containing hazardous substances are marked with a symbol consisting of a crossed-out trash can and the chemical symbol (Cd = cadmium, Hg = mercury, or Pb = lead) of the heavy metal responsible for the classification as containing hazardous substances.



Cd



Hg

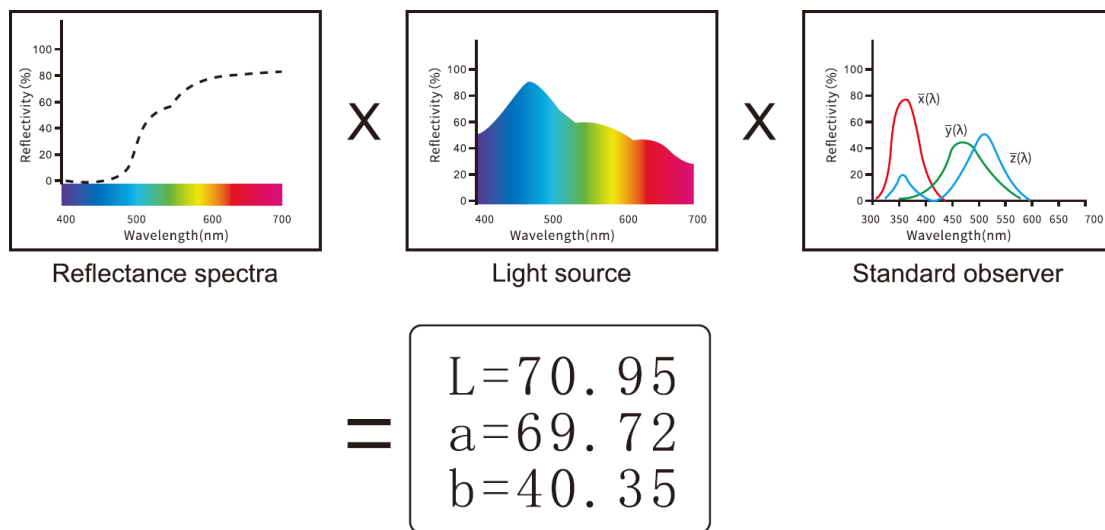


Pb

15 Appendix

15.1 Color

When observing colors, there are three elements: the light source, the object, and the observer. Changes in any of these three elements affect the observer's color perception. If the light source and the observer remain unchanged, the object determines the observer's color perception. The reason an object can influence the final color perception is that the object's reflectance spectrum (transmittance spectrum) modifies the light source's spectrum. Different objects have different reflectance spectra (transmittance spectra). (Spectrum) modulation to obtain different results, because the observer does not change, so that it presents different colors; the principle is shown in the figure below.



15.2 Color Difference Formula

CIE 1976 ΔE^*ab

$$\Delta E^*ab = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]^{1/2}$$

$$\Delta L^* = L_1^* - L_0^*$$

$$\Delta a^* = a_1^* - a_0^*$$

$$\Delta b^* = b_1^* - b_0^*$$

CIE 2000 ΔE00

$$\Delta E_{00} = [((\Delta L^*)/(K_L(L^*) S_L))^2 + ((\Delta C^*)/(K_C(C^*) S_C))^2 + ((\Delta H^*)/(K_H(H^*) S_H))^2 + R_T ((\Delta C^*)/(K_C(C^*) S_C))((\Delta H^*)/(K_H(H^*) S_H))]^{1/2}$$

$$L' = L^*$$

$$a' = a^* (1 + G) \quad G = 0.5(1 - \sqrt{((C^*)^7_{ab})/((C^*)^7_{ab} + 25^7)})$$

$$b' = b^*$$

CIE 2000 ΔE00

$$\Delta E^*_{94} = [((\Delta L^*)/(K_L(L^*) S_L))^2 + ((\Delta C^*_{ab})/(K_C(C^*) S_C))^2 + ((\Delta H^*_{ab})/(K_H(H^*) S_H))^2]^{1/2}$$

$$S_L = 1$$

$$S_C = 1 + 0.045 C^*_{ab}$$

$$S_H = 1 + 0.015 C^*_{ab}$$

15.3 Color Offset Assessment

- Al+ stands for whitish, Al- for blackish
- Aa+ stands for reddish, Aa- for greenish
- Al+ stands for yellowish, Al for bluish

15.4 Color Difference Perception

The NBS color difference unit is derived from the unit used in the color difference calculation formula established by Judd-Hunter. The color difference of a color is referred to as an "NBS color difference unit" when the absolute value is 1. The new color difference formulas developed later often intentionally adjusted the units to be close to the NBS units. For example, the units of color difference formulas such as Hunter Lab, CIE LAB, and CIE LUV are nearly the same as the NBS units (not identical). Therefore, do not misunderstand that the color difference units calculated by other color difference formulas are all NBS units.