LS176
Colorimeter

User Manual V1. 1

QR code for app installation
https://www.linshangtech.cn/a/170/

Please read this manual carefully before using and reserve it for reference.

I Product Introduction

The instrument is a handheld multifunctional colorimeter. It has a 3.5-inch IPS color display and capacity touch panel, which has an excellent operating experience. The instrument integrates multiple color charts and can quickly match the measured color to the closest color code. It also has color difference comparison function, color difference threshold can be set and a variety of color difference formulas can be selected to achieve rapid QC testing. The instrument can also connect to APP for color measurement and sharing. It is also equipped with a powerful PC software to meet various needs of customers. The instrument meets the requirements about grade 1 colorimeter in the Chinese JJG 595-2002 Verification Regulation of Colorimeters and Color Difference Meters in all directions employing full-spectrum LED light source and advanced spectral sensor.

II Parameters

Illumination geometry	D/8, specular component include (SCI)
Illumination light source	Full spectrum LED light source
Spectral Range	400-700nm
Spectral Interval	10nm
Measuring aperture	8mm
Measurement conditions	Light source D65, field of view 10°
Measuring time	About 1s
Color space	CIE Lab, Luv, LCh, Yxy, CMYK, RGB, Hex, WI-98, WI-Gauz, WI-Hunter, YI-98, Reflectance
Color difference formula	ΔE*ab, ΔE*uv, ΔE*94, ΔE*cmc(2:1), ΔE*cmc(1:1), ΔE*00
Repeatability	Standard deviation ΔE*ab is within 0.03 (Measurement condition: the average value of 30 measurements on the whiteboard at an interval of 3s after calibration)
Inter-Instrument Agreement	△E*ab<=0.4, based on avg. of 12 BCRA series II tiles
Dimension	179mm * 64.5mm * 93mm
Weight	About 471g
Power supply	Rechargeable lithium battery 3.7V@4000mAh, can measure 10,000 times continuously under full charge
Display	480 * 320 dot matrix IPS color screen

Language	Simplified Chinese, English
Charging port	USB (Type-C)
Data transmission	USB, Bluetooth
Operating temperature range	0~45℃, 0~85%RH (no condensation)
Storage temperature range	-25~55℃, 0~85%RH (no condensation)

III Features

1. The instrument is fashioned with a full-spectrum LED light source and spectral sensor, and it meets the requirements of the national metrology grade 1 machine.

2. Adopt a 3.5-inch capacity touch panel with human-machine interaction interface for convenient operation.

3. Contains multiple electronic color charts, which can quickly match the closest color code with a color chart matching accuracy rate higher than 90%.

4. QC testing function: the color difference threshold can be set and a variety of color difference formulas are optional.

5. A variety of color spaces are available, suitable for various needs of color measurement.

6. Can store 1000 colors and 1000 color comparison records with large storage space.

7. Can connect to APP for color sharing.

8. A powerful function of color difference analysis as well as data import and export with PC software.

9. The instrument has a built-in compensation optical path with stable values, allowing long-period calibration.

10. With built-in rechargeable lithium battery, the instrument can measure continuously for 10,000 times under full charge.

IV Operation

1. Power on/off

Power on: Short press the power button to turn on the colorimeter.

Power off: Long press the power button to turn off the colorimeter or press "Power off" in the menu bar, If automatic power off is set, the instrument will automatically power off as no operation time exceeds the

set value, when the time of no operation is longer than the set automatic power off time. When the colorimeter is connected to the App via Bluetooth, it will automatically power off with no operation over 30 minutes.

2. Calibration

After entering "calibration" interface, you can perform calibration operation as the calibration animation, or skip the calibration. It is recommended to calibrate after a long time of no usage.

You can also set the language in calibration interface. If displayed in Chinese, press "English" for English; if displayed in English, press "中文" for Chinese.


For failed calibration, the possible reasons are as below:

◆ The bottom cap is not closed properly;

◆ The standard tile on the bottom cap needs to clean;

◆ The attenuation of the light source leads to failure of normal use and it needs to be returned to the factory for inspection and repair.

3. Measurement

To enter the main measurement interface, there are two modes: "Color Scan" and "Color Compare". You can press the button at the bottom of screen to switch and the selected mode will turn blue.
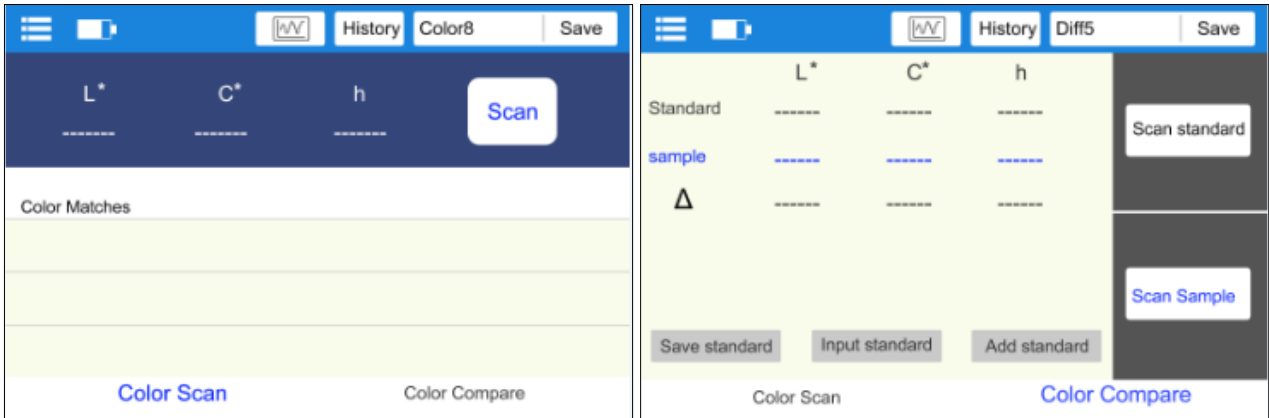
3.1 Color Compare

In the "Color Compare" interface, press the "Scan Standard" button to set current value as standard. Press the "Scan Sample" button to use current value as sample.

Short press the button to scan, and this value will replace the last record.

When the standard is measured or added and sample is measured, color difference between the two colors will be calculated with the following results:

◆ **LabCh difference Δ**

LabCh difference Δ: sample color data minus standard color data. The color cast direction between the two is judged by ΔL, Δa and Δb.

◆ **ΔE value**

The value of ΔE is calculated according to the selected color difference formula.

◆ **QC test**

Suitable for color difference inspection in production process. If ΔE is higher than the set threshold, it will read "unqualified" and shown in red; if ΔE is less than or equal to the set threshold, it will read "qualified" and displayed in green.

The following steps can be performed after completing the color difference comparison:

● **Save**

To save the comparison result, press "Save" on the upper right corner. You can choose default or name the record manually.

● **History**

If users need to view the saved comparison results, click "History" to view the color difference comparison record, and enter the history interface to view the next record by sliding left and right.

● **Lab/LCh/[⎍]**

Click this button, you can switch back and forth between the 3 interfaces of Lab, LCh and reflectance spectrogram.

● **ΔE Setup**

Set ΔE calculation formula and QC test threshold.

● **Save standard**

The standard color can be saved in "My Colors" for further use.

● **Input standard**

The user can manually input the Lab value or LCh value as standard.

● **Add standard**

You can choose any color in "My Color" as standard. Press the "Add Standard" button, select any color you want in "Add Standard" interface, the selected color will be used as the standard color and get back to Color Scan interface.

3.2 Color Scan

In the "Color Scan" interface, short press the button or press "Scan" button on LCD screen to trigger the color scan.

The interface will be as below:
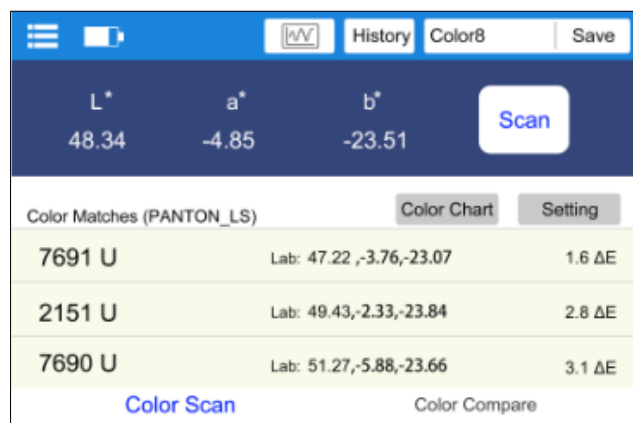
◆   Sample Data: After scan, the scan button area will display the color data. . The user can set the

data type in Setting.

◆ Color Matches: According to the color chart selected by the user, the closest three color codes are matched and displayed.

The following steps can be performed after completing the color scan:

● **Save**

Press "Save" on the upper right corner to save scanned color in "My Colors". The record can be saved with a default name or named manually.

● **History**

If users need to view the saved comparison results, click "History" to view the color difference comparison record, and enter the history interface to view the next record by sliding left and right.

● **Lab/**🔲

Click this button, you can switch back and forth between the 2 interfaces of the data value interface and the reflectance spectrogram.

● **Color Chart**

Select one set of color charts for matching, then samples will be only compared within this chart. Three closest color codes will be matched.

● **Setting**

Select parameters for the scanned color.

4. Menu bar

In the measurement interface, click the "▤" icon on the upper left corner to pop up the menu bar, with the following options: Settings, My colors, Compare History, Device info, Calibration and Power Off.

4.1 Settings

Items in "Parameter Setting" include: ΔE setting, color chart selection, parameter setting, shutdown time

setting, language and restoring default settings.

- **ΔE Setup**

ΔE setup includes ΔE threshold setting and color difference formula selection. There are six color difference formulas: ΔE*ab, ΔE*uv, ΔE*94, ΔE*cmc(2:1), ΔE*cmc(1:1), ΔE*00 and ΔE*00. The ΔE threshold is used for QC testing the range of 0.1-50.

- **Select Color Chart**

To select a set of color charts for color matching in the "Color Scan" interface.

- **Color Format**

There are 11 color spaces including Lab, Luv, LCh, Yxy, CMYK, RGB, Hex, YI-98, WI-98, WI-Gauz, and WI-Hunter.

- **Auto Off setting**

Choose whether to set the auto off and auto off time with a range is 1-30 minutes.

- **Language**

Support Simplified Chinese and English.

- **Restore to defaults**

To restore parameters to the factory settings.

4.2 My Colors

Colors scanned by the user are stored in "My colors", up to 1000 records. You can swipe the screen to turn pages, delete, modify names, search, and view color data.

4.3 Compare History

Color compares are stored in "Compare History", up to 1000 records. You can slide the screen to turn pages, delete, modify the name, search and view the comparison records.

4.4 Device Info

"Device Info" displays the basic information of the instrument, including: Device Model, Serial number, Production date, Calibration date, Battery level, Firmware Version, and Device Status.

4.5 Calibration

The instrument can be calibrated in Calibration interface at any time.

4.6 Power Off

Press "Power off" to power off the instrument.

V Bluetooth Connection

1. App Installation

The colorimeter APP supports Android operating system 7.0 and above as well as iOS system 7.0 and above. Choose one of the following methods to install:

1) Scan the QR code on the cover with a mobile browser or WeChat, follow the prompts to download and install Lscolor.

2) Search for "LScolor" from the iOS App Store or Google Play App market and follow the prompts to download and install LScolor.

App icon

Precautions:

Open the App during the installation process or after the first installation, the mobile phone will prompt the permission of setting, the customer needs to allow all of them, otherwise the App cannot search for the device, and App cannot be used.

2. Device connection

Turn on the colorimeter, open the App, after display of LOGO. enter the "Connect Device" interface and automatically start searching for Bluetooth devices. The searched devices will be displayed at the bottom of the interface. Click the device that matches the SN of the colorimeter and wait for the device to connect. Once connected, it will jump to "Calibration interface.

Precautions:

1) If there is a Bluetooth connection error or failure, you can restart the App and the colorimeter, or turn off/start Bluetooth in the setting interface and reconnect.

2) Click the "Browse" button, App is not connected to the colorimeter, you can enter the App to view historical data.

3. APP operation

The APP has the same function of color scan and color compare as the instrument with the same operation. The only difference is that the APP has color sharing function, and can import and export colors.

3.1　Color sharing

There are two ways to share colors:

a)　Scan a color in the "Color Scan" interface, press the "Share" icon to share the scanned color in image format or data format (the sharing methods are: WhatsApp, WeChat, email, etc.).

b)　In the "My Colors" folder, select the colors to share and click "Share" icon to share the colors in data format.

3.2　Color import

Users can import colors shared by others into their own App, but the colors must be scanned by the same model of colorimeter. Both single color and batch of colors can be imported as follows:

Take WeChat sharing and import on Android as an example, find the file to import with a name of "import_mycolor" and long press the file to be imported.
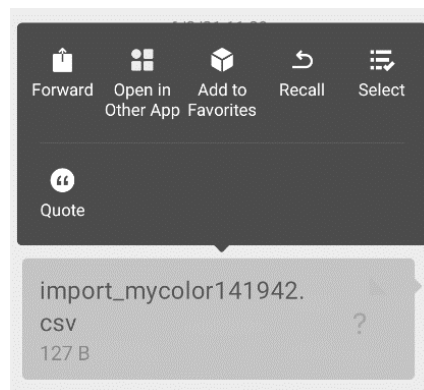
If use the iOS system, click the file and download it first, and then select "Open with other app" to realize data sharing.

a)　If the above interface appears, click "Open with other app" and select the App "LScolor", after confirmation, jump to the import interface and select the file to complete the import.
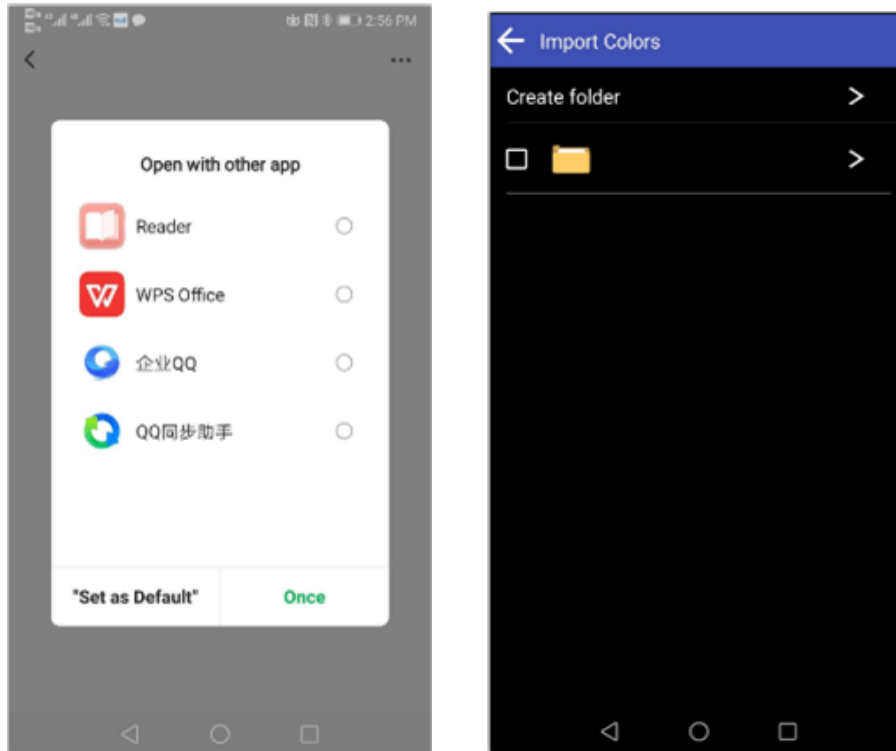
b) If the import has completed, it will prompt "Import successful". After pressing "Confirm", the imported color will be displayed. After the import is completed, the import can be checked as the first record under the folder.

c) If the product model does not match, it will prompt "Unmatched device model ". Please connect to the   correct model before importing.

VI PC Software

You can use the PC software to connect the computer via USB. The software has function of read my color to the computer, write my color or stdcolor (standard color chart) to the instrument, read color difference record, color difference measurement, export excel, record qualified, unqualified number and total statistics, generate and print test report. For specific operation, please refer to the "Colorimeter Software Operation Manual".
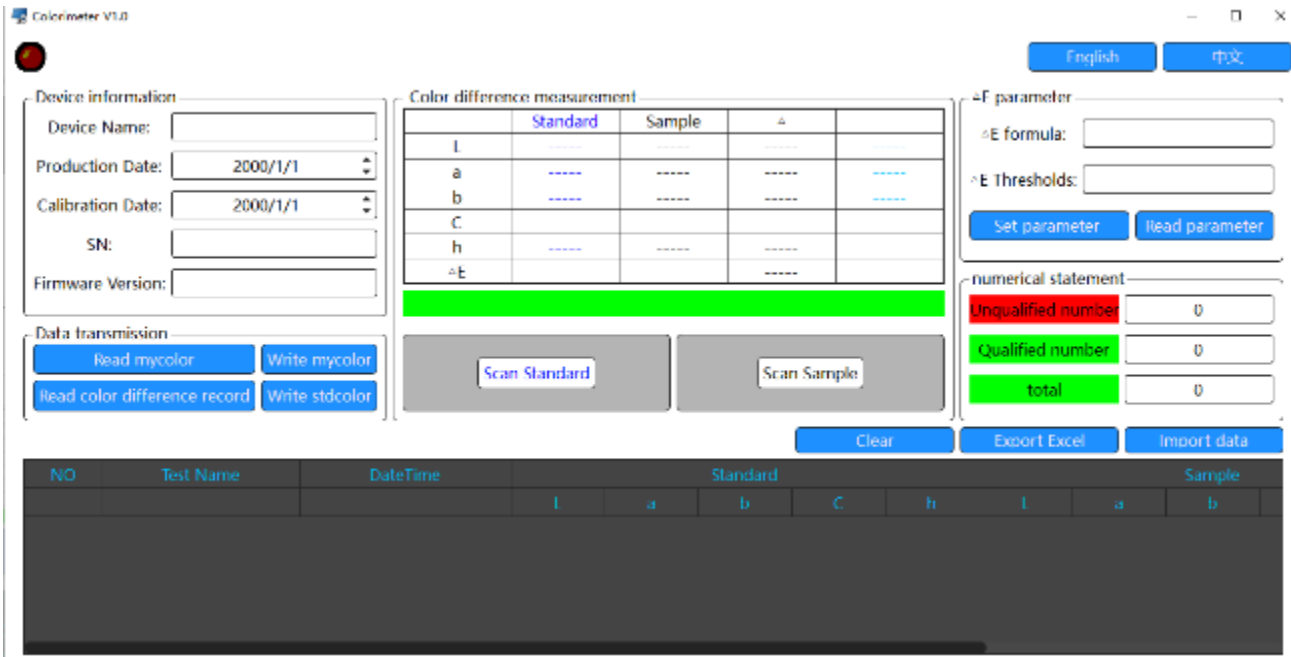
VII Precaution

1. When the colorimeter has not been used for a long time, it is recommended to perform calibration before using.

2. Please ensure that the sample is evenly colored with a flat and clean surface, otherwise it will affect the measurement accuracy.

3. After the base is removed from the host, it should be stored in a clean place to avoid contamination of the standard tile.

4. Do not insert any object inside the colorimeter to clean it, as this will damage it and affect measurement accuracy and operational safety.

5. Charge the colorimeter in time when the battery is out of power.

6. If not in use over 6 months, charge it regularly to prevent the battery from over-discharge and damage.

7. It's recommended to calibrate the instrument once each year. And we offer calibration service.

8. Due to different mobile phone displays, there may be a slight color difference between the actual color and the color displayed on the mobile phone App.

VIII Locating Plate

In order to meet the requirements for precise alignment of some measurement areas, the colorimeter is equipped with a locating plate.
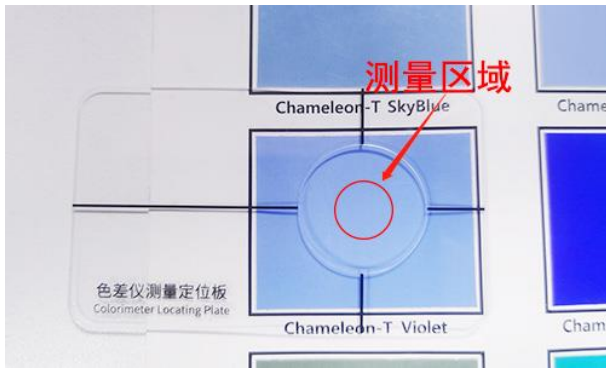
Measurement area
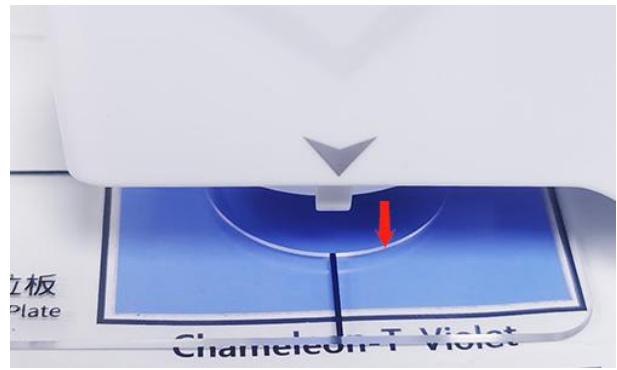
Place the meter on the positioning hole

Measurement result

IX Packing List

No.	Description	Quantity	Unit
1	Colorimeter	1	Set
2	USB cable	1	pcs
3	U disk (software)	1	pcs
4	Cleaning cloth	1	pcs
5	Locating plate	1	pcs
6	User manual	1	pcs
7	Certificate / Warranty card	1	pcs

X Service

1. The colorimeter has one-year warranty. If the meter works abnormally, please send the whole instrument to our company for maintenance.

2. Provide users with spare parts and lifelong maintenance services.

3. Provide the users with the gauge calibration service.

4. Free technical support for long term.

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