Spectrophotometer with excellent repeatability accuracy

Ultra-high repeatability accuracy: dE*ab ≤ 0.02

1. Key technology

(1) Dual optical path design improves repeatability accuracy dE*ab ≤ 0.02

The dual optical path design monitors light source energy fluctuations while measuring the sample signal, reducing interference during measurement, obtaining higher measurement stability and improving the instrument's measurement repeatability index to dE*ab ≤ 0.02. This ensures the instrument, high standards of measurement speed, accuracy, stability and inter-stage difference consistency. The relevant technology is protected by a Chinese invention patent and a US invention patent.
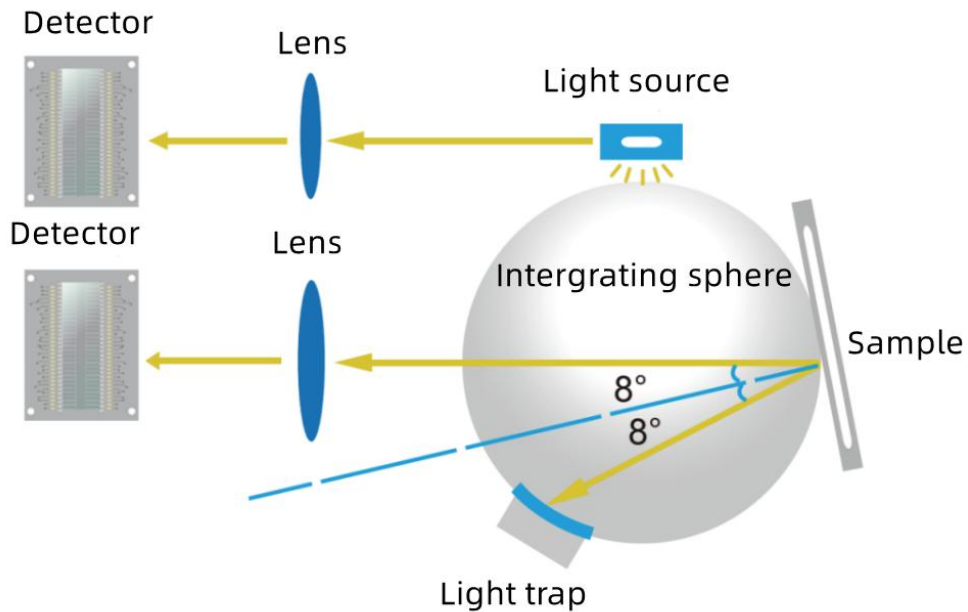

(2) Innovative 5 micron thick nano-integrated optics

Innovation is the soul of CHNSpec. After nearly 10 years of dedicated research, CHNSpec has adopted nano-integrated optics as the spectroscopic device, which can achieve nano-level spectroscopic capability with only 5 micron thickness of optics, once again leading the direction of innovation in the industry, crossing the technological blockade of foreign products and greatly enhancing the technical performance of the products. The relevant technology is protected by Chinese invention patents.
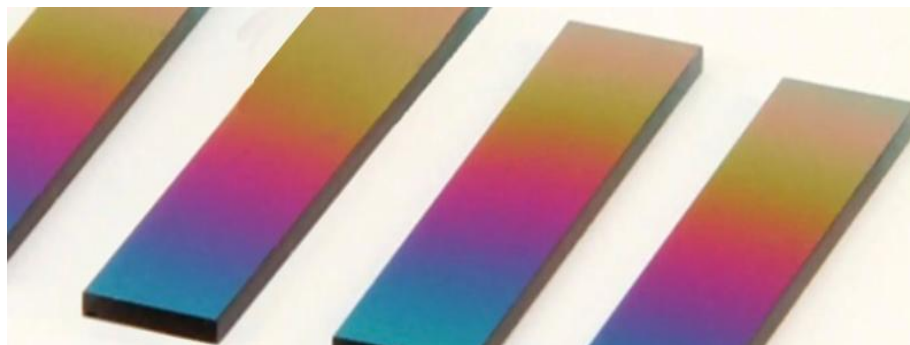
- Related techniques were published in the Chinese famous optical academic journals "Journal of Optics" and "Journal of Photonics"
"Optimized Design of Spectrophotometer Based on Real-Time Dual Optical Correction"
"The Design of SCE Measurement Gloss Correction Model for Color Measurement Instruments Based on D/8 Condition"

- The technology is protected by a Chinese invention patent
Colour measuring instrument and implementation method based on D/8 condition for light trap error correction   CN201310373360.1
A colorimeter for measuring the colour of objects using linear variable filters CN201310027285.3

- Related technologies are protected by US invention patents:
  SPECTROPHOTOMETRIC COLORIMETER BASED ON LED LIGHT SOURCE AND METHOD FOR REALIZING THE SAME   US9243953B1

- The relevant technology won the third prize of Science and Technology Progress of Zhejiang Province and the Excellent Product Award of China Instrument Society
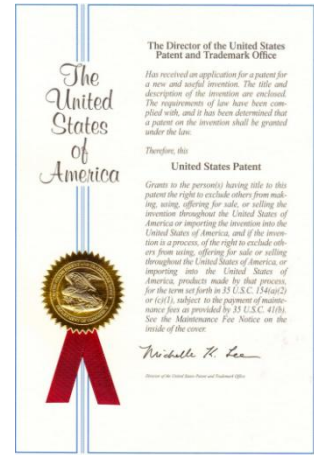
2. Product features

(1) Ultra-high repeatability accuracy: dE*ab ≤ 0.02

Repeatability accuracy is an important indicator to describe the accuracy of spectrophotometers. The DS600 series spectrophotometers are evaluated on the basis of a rigorous standard of repeatability, which is unmatched by any other spectrophotometer in its class.

(2) Excellent inter-stage consistency

The superior level of technology and craftsmanship ensures that the DS600 series has excellent inter-instrument agreement. The use of BCRA series standard colour bricks for colour transfer and colour value traceability guarantees an excellent level of inter-stage variation.

(3) Calibration base and zirconium reference with a Mohs hardness of 9 to calibrate the instrument, ensuring long-term stability

Compared to existing products, the DS600 series spectrophotometer does not require frequent manual calibration when in use. Simply place it on the calibration base and the instrument will automatically calibrate the overall instrument function and accuracy according to its own state and environmental factors, ensuring that the instrument is always in a stable state and ready for use.

The white plate in the calibration base is the basis of the instrument's work. Through long-term investment and research, CHNSpec has integrated the "artificial diamond" zirconium material as the calibration white plate, with a Mohs hardness of 9. As the material itself has the hardness and stability comparable to diamond, the surface of the calibration white plate will not be scratched and will not change colour with changes in temperature and humidity. This is a further improvement in the stability and durability of the calibration whiteboard compared to similar foreign and domestic products that use common industrial ceramics or even plastic as calibration whiteboards, ensuring the performance of the instrument.

Calibrated white plate (artificial diamond zirconium material)

- Mohs hardness: 9
- Spectral reflectance >90%
- No discolouration due to changes in temperature and humidity
- No discolouration by oxidation
- Ultra-high strength without scratching

(4)   The DS600 series supports 3 measuring apertures for selection

To facilitate the measurement of samples of different sizes, the DS600 series spectrophotometer supports three apertures for customer use: Φ8mm/Φ11mm+Φ4mm/Φ6mm+1*3mm, which can be flexibly applied to a variety of different usage and testing conditions.

(5)Over 30 measurement parameters and nearly 40 evaluation light sources available

The DS600 series spectrophotometers offer 30+ measurement indicators such as spectral reflectance, CIE-Lab, CIE-LCh, ΔE*ab, opacity, whiteness, yellowness, etc.; and nearly 40 evaluation light sources to choose from such as A, B, C, D50, D55, D65, etc., covering almost all colour measurement indicators and light source types in the industry.

(6) Built-in HD camera for clear observation of the measured area

The DS600 series spectrophotometer can obtain an image of the measured area through the camera when measuring, which can clearly locate the measured area of the sample and avoid inaccurate measurement due to wrong area.


(7) Support WeChat applet, Android, Apple, Hongmeng mobile APP

- The DS600 series spectrophotometers can be connected to a variety of mobile phones via a rich mobile app.
- Users no longer have to pass on the colour values of samples and physical objects, they can easily pass on colour data via WeChat.
- Users can find the most similar colours in multiple sets of colour cards.
- Users can create personal colour databases and enter information on colour cards for printing, paint and textiles. The colour libraries created can be uploaded to the cloud for easy colour processing with data sharing across multiple devices.
- Business users can create and manage their own colour card information library and colour recipes in the cloud, and share the information library and colour recipes to their own users through a unique invitation code.

WechatApp

APP Mobile APP
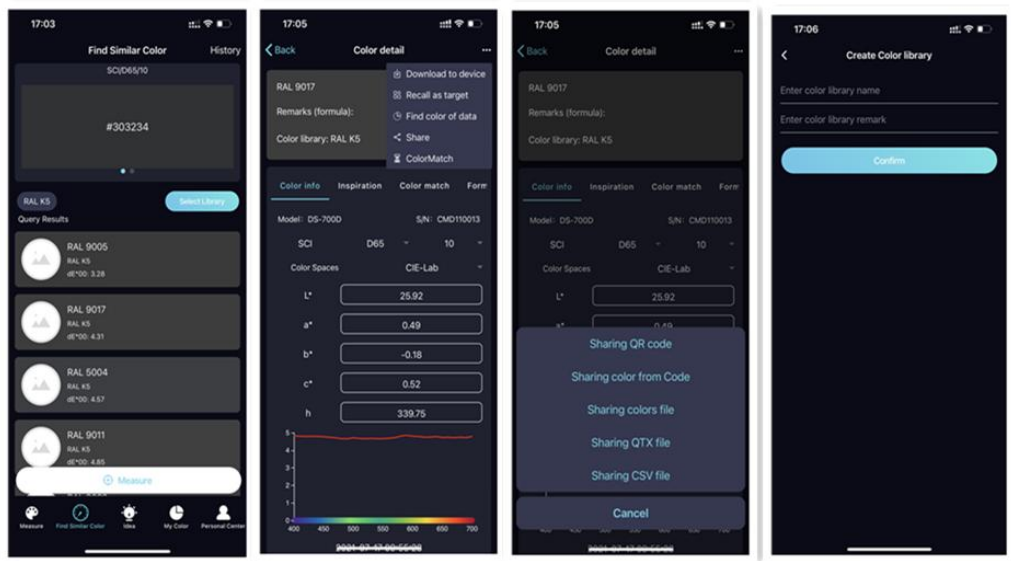
| Check color card number | Set standard with color | Share color data | creat individual color library |

(8) Use the powerful PC-based colour management system ColorExpert*

The DS600 series spectrophotometer is supplied with a Windows colour management system, ColorExpert, which connects to the DS600 series spectrophotometer via Bluetooth or USB cable.

ColorExpert is a full-featured colour management software with four functional modules: My Colours, Colour Check, Colour Matching System and Personal Centre.

ColorExpert
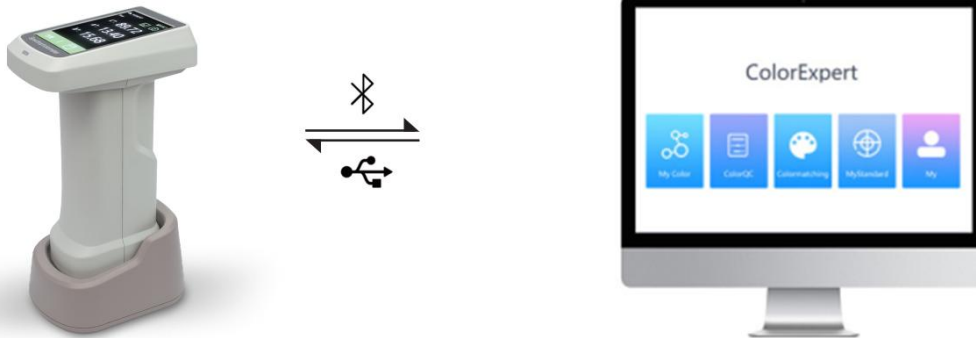
In the 'My Colours' function module, users can collect or create their own colour library from hundreds of other users' own shared colour libraries. The PC software and mobile app can share accounts and the colour library data follows the account to synchronise information between PC and mobile.

In the 'Colour QC' function module, the user can calibrate, measure and set up the spectrophotometer via the PC software. The user can use colours from the cloud database as specimens to measure colour differences, view spectrograms, colour difference graphs, specimen trial data and export the desired data test reports.

The "Colour Matching System" function module provides the user with a more convenient and efficient colour matching process. After the colour of the sample has been measured by the instrument, the system calculates the recipe in the recipe centre and automatically fixes the colour to achieve an accurate match. The system is suitable for computerised automatic colour matching applications in the paint, coating, printing and textile industries.

The 'Personal Centre' function allows users to edit their personal information, search for or delete connected instruments, manage downstream users and manage the colour library shared with downstream users.

3. **Function difference**

DS-600   DS-620   DS-660

Model	DS-600	DS-620	DS-660
Test condition	SCI	SCI+SCE	SCI+SCE
Repeatability	≤0.04	≤0.03	≤0.02
Inter-instrument Agreement	≤0.4	≤0.3	≤0.2
Aperture	Single aperture	Three apertures	Three apertures
UV light source	×	√	√
Camera function	×	√	√
MobileApp	×	√	√
PC software	√	√	√

4. Technical Parameter

Product model	DS-600	DS-620	DS-660
Measuring structure	D/8,SCI	D/8,SCI+SCE	
Measurement repeatability	$dE^*_{ab}≤0.04$	$dE^*_{ab}≤0.03$	$dE^*_{ab}≤0.02$
Inter-instrument Agreement	$dE^*_{ab}≤0.4$	$dE^*_{ab}≤0.3$	$dE^*_{ab}≤0.2$
Display accuracy	0.01		
Measuring/illumination aperture	Φ8mm/Φ11mm	Φ8mm/Φ11mm; Φ4mm/Φ6mm ; 1*3mm	
Color Spaces and Indices	Reflectance, CIE-Lab, CIE-LCh, HunterLab, CIE Luv, XYZ, Yxy, RGB, Color difference(ΔE^*ab, ΔE^*cmc, ΔE^*94,ΔE^*00),WI(ASTM E313-00,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger Stensby), YI(ASTM D1925,ASTM E313-00,ASTM E313-73), Blackness(My,dM),Color Fastness,		
Source condition	A,B,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,CWF,U30,U35,DLF,NBF,TL83,TL84,ID50,ID65,LED-B1,LED-B2,LED-B3,LED-B4,LED-B5,LED-BH1,LED-RGB1,LED-V1, LED-V2		
Light source	LED	LED+UV	
Measurement observation method	Visual	camera	
Calibration	Auto calibration		
Software support	Windows	Andriod,iOS,Windows, Wechat app	
Guaranteed accuracy	Guaranteed measurement	Guaranteed first class measurement	
observer	2°，10°		
Integrating sphere diameter	40mm		
Standards	CIE No.15,GB/T 3978,GB 2893,GB/T 18833,ISO7724-1,ASTM E1164,DIN5033 Teil7		
Ways of spectral	Nano-integrated spectral devices		
Sensor	Silicon photodiode array Dual 16-group		

Wavelength interval	10nm	
Wavelength range	(user viewable reflectance at 31 wavelengths)	
Reflectance determination range	0-200%	
Reflectance resolution	0.01%	
Measurement method	Single measurement, average measurement (2 to 99 measurements)	
Measurement time	approx. 1 second	
Interface	USB	USB，Bluetooth
Screen	Screen Full colour screen, 3.5	
Battery capacity	8000 continuous measurements on a single charge	
Life of light	10 年 100 万次 10 years and 1 million cycles	
Language	Simplified Chinese, English	
Storage	10,000 data items	Instrument :10,000 data ; APP: mass storage

* Diffuse illumination / 8° directional reception with specular reflected light included / specular reflected light removed

**White plate calibration with 30 standard deviations measured at 5 second intervals after white plate calibration

***BCRA Series II average of 12 colour plate measurements

**** illumination aperture is the actual aperture opening size of the instrument