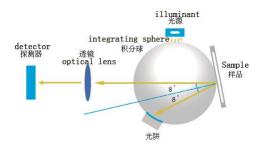
Spectrophotometer CS-650

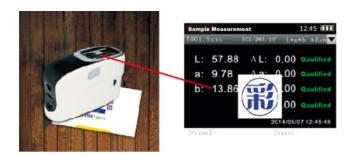


1) Our device adopts internationally agreed observe condition D/8 (Diffused illumination, 8°viewing) and SCI (specular component included)/SCE(specular component excluded). It could be used for metallurgy industry, paint industry, textile industry, plastic industry, food industry, building material industry and other industries for color measurement.



2) Camera to view the testing area

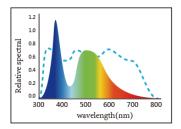
Our spectrophotometers include a camera; the user can clearly see the measurement area to avoid measurement errors.

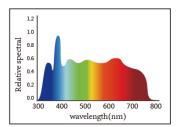


3) CLEDs light source – spectrally balanced LED light source (Patent Right No.: ZL2013107548347)

LED light source that has balanced intensity across visible spectrum avoids the spectral deficiency in certain parts of the spectrum in common white LEDs, and guarantees the

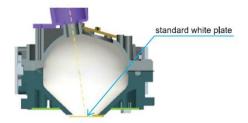
speed of the measurement and the accuracy of the results. This research finding has been published in national leading optical journal, Chinese Optics Letter.





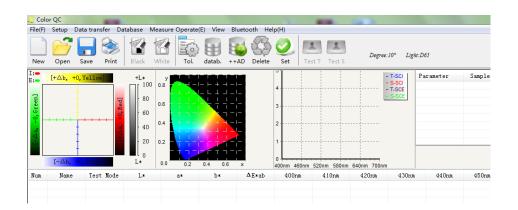
4) Every Test Calibration Technology (Patent Right No.: ZL201310373360.1)

Currently, most instruments use standard white boards for calibration. When white tile is damaged, instrument's accuracy or precision will no longer be guaranteed. In CHNSpec's spectrophotometers, it adopts innovative ETC (Every Test Calibration); standard white board is included in the optical system, and therefore has reliable accuracy and repeatability in every measurement.



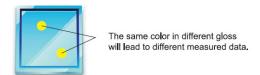
5) Free Color QC Software

Our spectrophotometer comes with free color QC software for connecting with PC to generate and print test reports.



6) Automatic gloss compensation technology (Patent Right No.: ZL20130519382X)

Different gloss or different instrument's lighting or observation conditions will largely affect the measurement of color. The automatic gloss compensation technology guarantees the accuracy of color measurement data for surfaces of different gloss. This research finding is published in international leading journal Optik.



7) Innovative SCS optical engine (Patent Right No.:ZL201210337619.2)

Adopt innovative single-grating-dual-light-paths light splitting system: SCS optical engine which creates the best measurement repeatability for portable spectrophotometers in the industry, and guaranteed accurate measurement.



8) Device Guarantee



9) Technical Data

source TL84,NBF,U30,CWF	Туре	CS-650	
sphere Illumination Light source Pulse Xenon Lamp	Illumination	included)/SCE(specular component excluded) simultaneous measurement (conform to CIE No.15, ISO7724/1, ASTM E 1164,	
Sensor dual light path sensor array Wavelength range 360-740nm Wavelength interval 10nm Half spectral width 5nm Reflectivity range 0-200% Reflectivity resolution 0.01% Observation angle 2°/10° Measurement light source TL84,NBF,U30,CWF Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time interval Measurement time 2 seconds Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)		Φ40mm, Avian diffused reflection surface coating	
Wavelength range Wavelength interval Half spectral width Reflectivity range 0-200% Reflectivity resolution Observation angle 2°/10° Measurement light source A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,DLF,TL8 TL84,NBF,U30,CWF Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time interval Measurement time 2 seconds Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference formulas ΔE*ab, ΔΕ*CH, ΔΕ*uv, ΔΕ*cmc(2:1), ΔΕ*cmc(1:1),ΔΕ*94,ΔΕ*00 ΔΕαb(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)		Pulse Xenon Lamp	
Wavelength interval Half spectral width Snm Reflectivity range 0-200% Reflectivity resolution Observation angle 2°/10° Measurement light source Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time interval Measurement time color space Color space Color difference formulas Color difference ΔΕ*ab, ΔΕ*CH, ΔΕ*uv, ΔΕ*cmc(2:1), ΔΕ*cmc(1:1),ΔΕ*94,ΔΕ*00 ΔΕab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Sensor	dual light path sensor array	
Half spectral width Reflectivity range 0-200% Reflectivity resolution Observation angle 2°/10° Measurement light source A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,DLF,TL8 TL84,NBF,U30,CWF Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time interval 1 second Measurement time Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference formulas ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Wavelength range	360-740nm	
Reflectivity range Reflectivity resolution Reflectivity resolution Observation angle 2°/10° Measurement light source TL84,NBF,U30,CWF Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time interval Measurement time 2 seconds Color space Color space Color difference formulas ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Wavelength interval	10nm	
Reflectivity resolution 0.01% Observation angle 2°/10° Measurement light A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,DLF,TL8 source TL84,NBF,U30,CWF Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time 1 second Measurement time 2 seconds Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Half spectral width	5nm	
Observation angle2°/10°Measurement light sourceA,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,DLF,TL8Data being displayedReflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement reportMeasurement time interval1 secondMeasurement time2 secondsColor spaceCIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSBColor difference formulasΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sortOther colorimetric indicesWI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Reflectivity range	0-200%	
Measurement light source A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,DLF,TL8 TL84,NBF,U30,CWF Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time interval Measurement time 2 seconds Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference 6 ΔΕ*ab, ΔΕ*CH, ΔΕ*uv, ΔΕ*cmc(2:1), ΔΕ*cmc(1:1),ΔΕ*94,ΔΕ*00 ΔΕab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Reflectivity resolution	0.01%	
TL84,NBF,U30,CWF Reflectance curve /data, color values, color difference values, pass/fail color tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement report Measurement time interval Measurement time 2 seconds Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Observation angle	2°/10°	
Data being displayedcolor tendency, color simulation, camera view, historical data color simulation, manually input standard, generate measurement reportMeasurement time interval1 secondMeasurement time2 secondsColor spaceCIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSBColor difference formulasΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00ΔEab(Hunter),555 shade sortWI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	_	A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,DLF,TL83, TL84,NBF,U30,CWF	
Interval Measurement time 2 seconds Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference formulas ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Data being displayed		
Color space CIE-L*a*b, L*C*h, L*u*v, XYZ, Yxy, Reflectance Hunterlab,Munsell MI,CMYK,RGB,HSB Color difference formulas ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1),ΔE*94,ΔE*00 ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)		1 second	
Color space Hunterlab, Munsell MI, CMYK, RGB, HSB Color difference formulas ΔE*ab, ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1), ΔE*94, ΔΕ*00 ΔEab(Hunter), 555 shade sort WI(ASTM E313-10, ASTM E313-73, CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00, ASTM E313-73); Tint(ASTM E313, CIE, Ganz)	Measurement time	2 seconds	
formulas ΔEab(Hunter),555 shade sort WI(ASTM E313-10,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)	Color space	snace	
Other colorimetric indices Berger, Ganz, Stensby); YI(ASTM D1925, ASTM E313-00,ASTM E313-73); Tint(ASTM E313,CIE,Ganz)			
ISO luminance, 8 gloss, A density, T density, M density, E density	Other colorimetric		
light splitting reflectivity: standard deviation within 0.08%		light splitting reflectivity: standard deviation within 0.08%	
Repeatability color values:ΔE*ab<=0.02, Maximum:0.04	repeatability		
Battery capacity rechargeable, 10000 continuous tests, 7.4V/6000mAh	Battery capacity	rechargeable, 10000 continuous tests, 7.4V/6000mAh	

Interface	USB	
Data storage	20000 test results	
Light source longevity	5 years, 1.5 million tests	
Inter-instrument agreement	ΔE*ab within 0.2(BCRA color charts II, average of the 12 charts)	
Size	181*73*112mm(L*W*H)	
Weight	about 550g(does not include battery's weight)	
Display	True color screen that includes all colors	
Work temperature range	0~45°C, relative humidity 80% or below(at 35°C),no condensation	
Storage temperature range	-25°C to 55°C,relative humidity 80% or below(at 35°C),no condensation	
Standard accessories	power adapter, lithium battery, manual, color QC software, USB cable, black/white calibration tile, protective cover, portable bag, packing list, warranty card	

10) Application



11) Packing List



Qty.	Name	Qty.	Name
1	Main Instrument	1	Power Line
1	Operating Manual	1	USB Cable
1	Driving Software	1	Black/White Calibration Tile
1	Color QC Software	1	Verification Certification
1	Packing List	1	Warranty Card