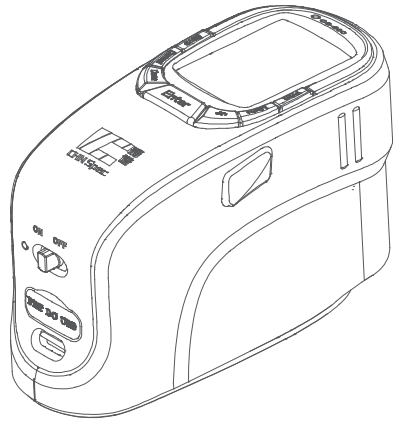
彩谱 CHN Spec

领先的中国色彩与光泽分析专家
China's leading expert of color and gloss analysis

彩谱 CHN Spec

分光系列测色仪
产品使用说明
CS-580/600
CS-650/660



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CATALOGUE
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分光测色仪使用须知

1、分光测色仪是基于分光技术平台的测色仪，主要用于测量样品的光谱数据、光谱图、色度值、色差值、呈现合格/不合格、历史数据、色彩仿真示意图等。结构紧凑轻便测试高度精准、操作简易。

2、分光测色仪广泛应用于实验室、工厂、或现场操作，足以在几乎所有应用领域的质量控制中实现优秀的色彩测量。

3、限制性保修的时间段是自购买本仪器开始起（时间：如一年）的时间。如果您的仪器需要服务，请将仪器带到当地的销售部或通过网址：www.hzcaipu.com 联系我们来进行维修。

4、为了避免仪器精度受影响，请不要将仪器私自拆开。如果由于私自拆卸机器或不正确的使用而导致仪器损坏，请用户自行负责。

注意事项

1、 本机属精密仪器,不能承受因跌落而导致的碰撞,使用时请放置于相对平整的地方。

2、 本机不能防潮或抗潮，受潮或液体溅入易损坏本机，需在干燥的环境中存放。

3、 本机的屏幕是由玻璃制成，受到异常外力或锐器的作用易损坏。

4、 本公司建议使用原配电源适配器。

5、 为保障本机正常工作，请不要在过冷或过热的地方存贮和使用，也勿将本机放置在潮湿或阳光长期直射的地方，更不要在强震等恶劣的环境中使用本机，以免发生意外。

6、 为了保证测试的准确性，请在测试之前仔细检查锂电池。

7、 本机是精密仪器，使用时请避开强电磁干扰。

8、 为保证测量准确，请不要用本机测量不平整的表面。

9、 为保证测量准确，测试时请保持仪器平稳，不要摇晃。

10、测试时请将仪器的测试口紧贴测试物体表面，但不要用力按压。

11、本机属精密仪器，使用完毕请将仪器装入包装箱内保管。

12、本机及说明书如有进一步改进或补充，恕不另行通知。如有疑问，敬请垂询本公司。

分光测色仪功能描述

1、可实现多个颜色参数的测试：
ΔE*ab,ΔE*ch,ΔE*uv,ΔE*cmc(2:1),ΔE*cmc(1:1),ΔE&94,ΔE*00,
ΔEab(Hunter),555色调分类,CIE-L*a*b*,L*C*h,L*u*v,XYZ,Yxy,
反射率,Hunter-lab,Munsell MI,CMYK等具体详看技术参数；

2、大容量存储空间；

3、超大TFT显示屏；

4、良好的人机交互界面；

5、采用LED光源，使用寿命更长；

6、低功耗设计，大容量可充电锂电池配置；

7、具有低电能提示功能，数据空间满提示功能；

8、可同时测量SCI(包含镜面反射)和SCE（消除镜面反射）；

9、USB传输数据，PC软件管控色彩数据；

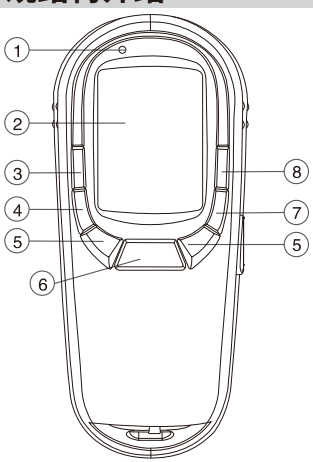
10、可连接微型打印机进行打印。

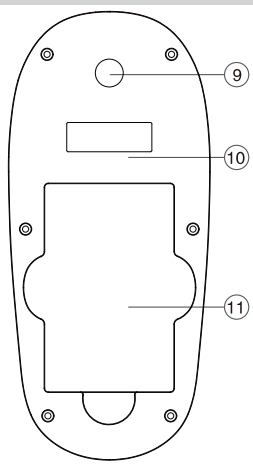
技术参数

产品型号	CS-580	CS-600	CS-650	CS-660
测量条件	观察者角度：2°/10° 照明：d/8（散射光源，8度观测角），SCI(包括镜面反射分量), SCE(不包括镜面反射分量)同步测量功能 (符合 CIE No.15、ISO 7724/1、ASTME1164、DIN 5033 Teil7、 JIS Z8722 Condition c 标准)			
积分球尺寸	Φ40mm,Avian-D全漫反射表面涂层			
测试口径	A型：10mm，B型：4mm、6mm			
照明光源	CLEDs(全波段均衡Led光源)		脉冲氙灯	CLEDs(全波段均衡Led光源)
感应器	双光路阵列传感器			
测量波长范围	400~700nm		360~740nm	400~700nm
波长间隔	10nm			
光谱半带宽	5nm			
反射测定范围	0~200%			
分辨率	反射率：0.0001			
观察者角度	2°/10°			
观测光源	A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,CWF,U30,DLF,NBF,TL83,TL84,U35			
显示	光谱图/数据，样品色度值，色差值，合格/不合格结果，颜色偏向，显示测量区域，历史数据色彩仿真，手动输入标准样，生成检测报告			
测量间隔时间	约2秒			
测量时间	2秒	0.5秒	约2秒	0.5秒
测量口径	A型：10mm,B型：4mm,6mm			
颜色空间	CIE-L*a*b,L*C*h,L*u*v,XYZ,Yxy,反射率	CIE-L*a*b,L*C*h,L*u*v,XYZ,Yxy,反射率,Hunter-lab、Munsell MI、CMYK、RGB、HSB		
色差公式	ΔE*ab,ΔE*CH,ΔE*uv,ΔE*cmc(2:1),ΔE*cmc(1:1),ΔE*94,ΔE*00	ΔE*ab,ΔE*CH,ΔE*uv,ΔE*cmc(2:1),ΔE*cmc(1:1),ΔE*94,ΔE*00,ΔEab(Hunter),555色调分类		

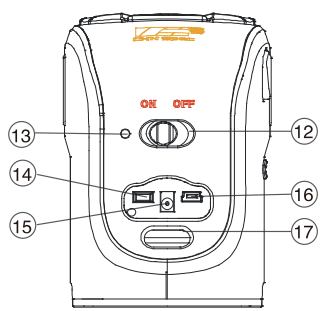
其它色度指标	WI(ASTM E313-00,ASTM E313-73,CIE/ISO,AATCC,Hunter,Taube Berger Stensby), YI(ASTM D1925,ASTM E313-00,ASTM E313-73),Tint(ASTM E313,CIE,Ganz), 同色异谱指数Milm,沾色牢度,变色牢度,分光反射率：标准偏差在0.08%以内 ISO亮度，8光泽度，A密度，T密度，M密度，E密度			
重复性	色度值:ΔE*ab 0.03(校正后, 以间隔5s测量白板30次标准偏差), 最大值0.05		色度值:ΔE*ab 0.02 (校正后,以间隔5s测 量白板30次标准偏差), 最大值0.04	色度值:ΔE*ab 0.015 (校正后,以间隔5s测量 白板30次标准偏差),最 大值0.03
台间差	ΔE*ab 0.2以内(BCRA系列 II 12块色板测量平均值)			
电池电量	可重复充电,连续测量10000次,7.4V/6000mAh			
接口	USB，蓝牙（可定制）			
存储数据	20000条测试数据			
照明光源寿命	5年150万次	10年300万次		10年300万次
尺寸	181*73*112mm(L*W*H)			
重量	约550g(不含电池)			
显示屏	全色真彩屏			
操作温度范围	0~45°C，相对湿度 80% 或更低(在 35 ° C 下),无水气凝结			
存储温度范围	-25 ° C 到 55 ° C,相对湿度 80% 或更低(在 35 ° C 下), 无水气凝结			
标准附件	电源适配器、锂电池、说明书、颜色管理软件、驱动软件、说明书电子版、颜色管理教程 数据线、黑白校准盒、保护盖、便携包、电子色卡、计量检测报告			
可选附件	粉末成型器、微型打印机			
配色系统	不可配	可配		
UV光源	不含UV光源		含UV光源	不含UV光源
特别说明	1.分光测色仪潘通版在CS-600的基础上增加了色卡查找功能。2.仪器若有AB型号，则A型为大口径版本，B型为小口径版本。			

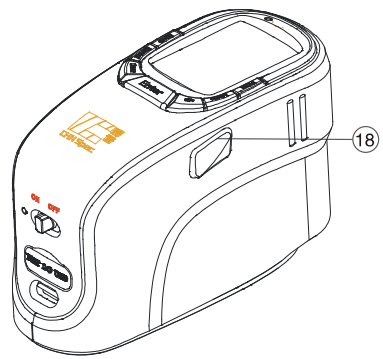
外观结构介绍





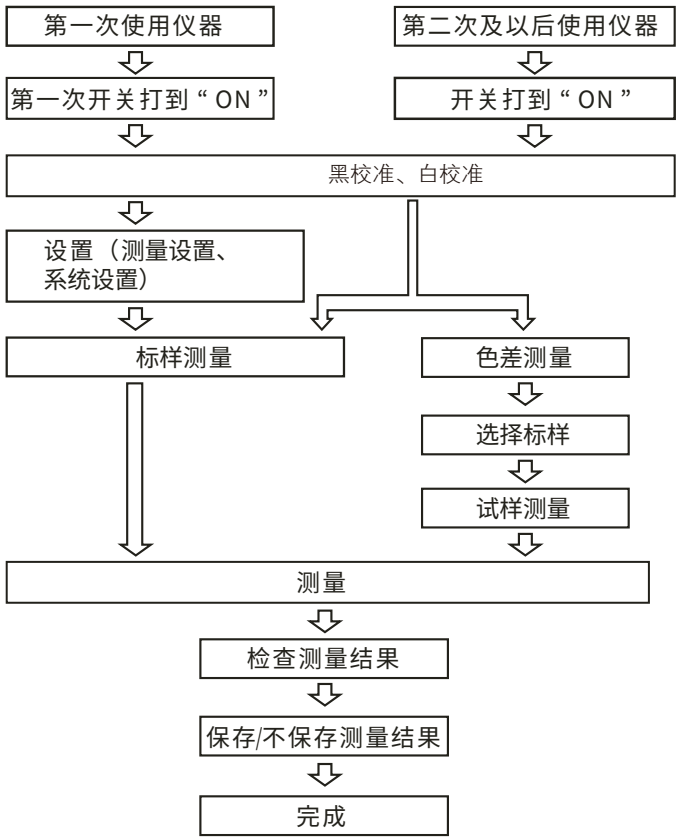
① 测试指示灯
② 显示屏
③ 保存键
④ 取消/后退键
⑤ 上/下选择键
⑥ 确认键
⑦ 菜单键
⑧ 打印键/摄像头取景键
⑨ 测试孔
⑩ 测试面板
⑪ 锂电池





⑫ 开、关机键
⑬ 电源指示灯
⑭ 微型打印机接口
⑮ 直流适配器插孔
⑯ USB端口
⑰ 绳钩
⑱ 测试键

测量流程图



程序界面介绍

A-1

主页面

① 标题栏：显示当前页面的主要功能信息。

② 工作区：显示页面下属子菜单的主要功能或是测试时的数值。

③ 状态栏：指引当前操作情况。

程序基本操作方法

通过Up、Down选择键，选择“ 相应的功能按钮 ”，按“ Enter ”键进入“ 选择的功能界面 ”进行相应操作，按“ Cancel ”键返回上一步骤，“ Save ”键对测试结果或状态设置进行保存，“ Menu ”调出菜单，“ Print ”输出打印测试数据或在测量界面时调出取景定位功能。

测量：用户可以测量样品的各项颜色参数，测量样品与标样之间的颜色差异测试以及查看所保存的测试记录等。

数据查看：在该页面中用户可以查看已保存的标样下的各项参数。并可对选择的样品进行查看试样、删除和编辑名称操作。

设置：用户可以对仪器测量条件的各项参数进行选择设置。

USB通信：用户可以通过USB接口与PC机连接进行数据传输，以及进行上位机操作。

测量

在主页面，通过Up、Down选择键,选择“ 测量 ”图标，“ Enter ”键进入“ 测量 ”页面。

在该页面下，用户可以测量样品的色空间、色度指标参数，查看样品的光谱反色率等信息。还可以测量样品与标样之间的色差、色度指标参数，查看样品与标样的光谱反射率对比，以及查看对样品合格与否的判断。

标样测量

B-1

按“ Print ”键，先影像定位测量区域，再按“ Test ”键，“ 滴 ”声后完成测量，查看测试结果。

测试结果的标题栏中，第一列为标样名称，当按“ Save ”键保存后，显示为保存之后的标样名，若标样未保存，则标样名称一律显示为“ Txxx ”。

第二列为测试结果的测量条件，格式为测量条件/光源/观察者，测量前可在“ 测量设置 ”中进行设置（参看设置）。第三列为可查看的内容，可通过“ Enter ”键选择查看测量标样的光谱反射率数据。

查看标样测量中光谱反射率时，通过Up、Down键移动光标，即可查看不同波长反射率值。

试样测量

C-1

在上面的标样测量完成并保存后，按“ Menu ”键，即可进入该标样下的“ 试样测量 ”界面，按“ Test ”键进行测量，“ 滴 ”声后完成色差测量，查看测量结果。再次按下“ Test ”键可进行新的色差测量。与标样测量相同，试样测量在未保存时，在测量结果的标题栏中，第一列名称中的试样名称显示为“ Sxxx ”，保存后则显示为保存后的名称。

在“ 数据查看 ”界面下，同样可以进行色差测量。通过Up、Down键选择已有的标样，按“ Enter ”键进入查看所选的标样。然后在“ 查看标样 ”页面下，按“ Menu ”键，进入该标样下的试样测量界面，按“ Test ”键进行测量。“ 滴 ”声后完成色差测量，查看测试结果。再次按下“ Test ”键进行新的色差测量。

注：色差测量前请先设置容差。（参看容差设置）

在“ 试样测量 ”页面中，，可按“ Enter ”键，通过Up、Down选择光谱反射率。

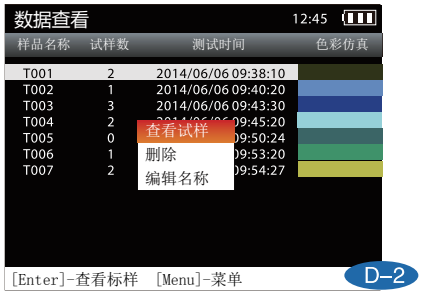
数据查看

D-1

在主页面，通过Up、Down选择键，选择“ 数据查看 ”图标，按“ Enter ”键进入“ 数据查看 ”页面，查看已保存标样名称、试样数、测试时间以及色彩仿真等信息。

D-2

通过Up、Down选择键选择所需查看的标样，按“ Enter ”键即可查看所选标样的测试数据。



通过Up、Down选择键选择所需查看的标样，按“ Menu ”键，即可弹出菜单窗，通过Up、Down选择键，进行查看试样、删除、编辑名称等操作。

D-3

查看试样：查看所选样品作为标样下的所有色差测试记录。按“ Menu ”键即可在弹出如图所示的菜单窗，对所选测试记录进行删除、编辑名称等操作。

删除：将删除该标样及标样下的所有色差测试记录。

编辑名称：编辑更改所选样品的名称。

设置

通过Up、Down选择键选择 ” 设置 ” 图标，按“ Enter ”键进入“ 设置 ”页面，有测量设置和系统设置两种。

E-1/1

测量设置：在该页面下，用户可以对仪器测量中的显示内容光源、观察者、容差、测量平均数及SCI/SEC模式等选项进行设置。

系统设置：在该页面下，用户可以对语言、时间、电源管理进行设置，以及对仪器进行恢复出厂设置，查看本仪器的版本号信息。

黑校准：在该页面下，用户可以对仪器进行黑校准。

白校准：在该页面下，用户可以对仪器进行白校准。

测量设置

E-2/1 通过Up、Down选择键选择，按“ Enter ”键进入“ 测量设置 ”页面。

E-3/1

显示设置：通过Up、Down选择键选择“ 显示设置 ”，按“ Enter ”键进入显示设置页面。按Up和Down键，选择您所需要显示的色空间、色坐标或者指数，按Enter键确认。当您选择某一项后，测量页面将显示您所选的内容。
注：”同色异谱“ 按Enter键后，可以对需要进行同色异谱比较的光源和观察者角度进行设置。

E-4/1

光源选择：通过Up、Down选择键选择“ 光源选择 ”，按“ Enter ”键进入光源设置页面。本页面下可以选择在测量页面显示任一种光源下的测量数据。本仪器提供A光源、C光源、D50光源、D55光源、D65光源、D75光源、F1光源、F2光源、F3光源、F4光源、F5光源、F6光源、F7光源、F8光源、F9光源、F10光源、F11光源、F12光源、CWF光源、U30光源、DLF光源、NBF光源、TL83光源、TL84光源、U35，共25种光源。通过Up和Down键进行选择光源选择。

E-5/1

观察者：通过Up、Down键选择“ 观察者 ”，按“ Enter ”键进入观察者选择页面。本仪器提供2°、10°两种标准观察视角，通过Up、Down键选择。

E-6/1

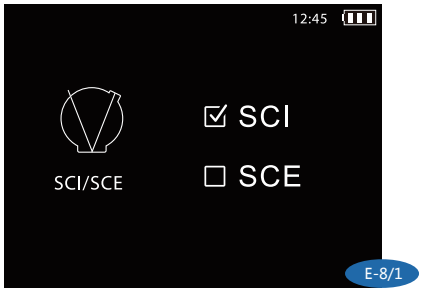
容差设置：通过Up、Down键选择“ 容差设置 ”，按“ Enter ”键进入容差设置页面。Up、Down键修改数值，按“ Enter ”键确认。

E-7/1

平均设置：通过Up、Down键选择“ 平均设置 ”，按“ Enter ”键进入平均设置页面。Up、Down键修改平均测试次数，按“ Enter ”键确认。

E-8/1

SCI/SCE：通过Up、Down键选择“ SCI/SCE ”，按“ Enter ”键进入SCI/SCE选择页面。本仪器提供SCI、SCE两种集合测量条件，通过Up、Down键选择。



E-9/1

保存设置：通过Up、Down键选择“ 保存设置 ”，按“ Enter ”键进入保存设置页面。Up、Down键选择手动保存或自动保存，按“ Enter ”键确认，其中勾选自动保存后每次标样测量与试样测量均会自动保存（例如显示为T040和S001），而勾选手动保存则不会自动保存（即显示为Txxx和Sxxx）。

E-10/1

添加标样：通过Up、Down键选择“ 加标样 ”，按“ Enter ”键进入添加标样选择页面。通过Up、Down键和Enter键可选择多种颜色空间，具体设置所需要的颜色标量，然后进行添加，颜色模拟区域可对设置的标样提供直观的视觉参考。

系统设置

F-1/1

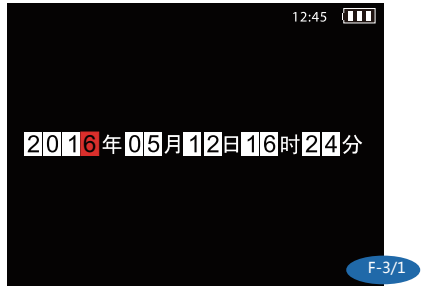
通过Up、Down选择键选择，按“ Enter ”键进入该“ 系统设置 ”页面。“ 系统设置 ”页面中可进行：语言设置、时间设置、电源管理、恢复出厂、查看版本等操作。

F-2/1

语言选择：通过Up、Down选择键选择“ 语言选择 ”，按“ Enter ”键进入语言设置页面。本仪器提供英文、中文两种界面语言，通过Up、Down键选择。

F-3/1

时间设置：通过Up、Down选择键选择“ 时间设置 ”，按“ Enter ”键进入时间设置页面。设置修改本仪器的测量显示时间，可对年、月、日、时、分进行设置，Up、Down键选择修改项，“ Enter ”键确认，再按Up、Down键修改数值，按“ Cancel ”键选择保存、退出。



F-4/1

电源管理：通过Up、Down选择键选择“ 电源管理 ”，按“ Enter ”键进入电源管理页面。可对仪器的背光时间、关机时间进行修改设置。Up、Down键选择修改项，“ Enter ”键确认，再按Up、Down键修改数值，按“ Cancel ”键选择保存、退出。
(注：背光时间设置为0时代表不关背光；关机时间设置为0时代表不自动关机)

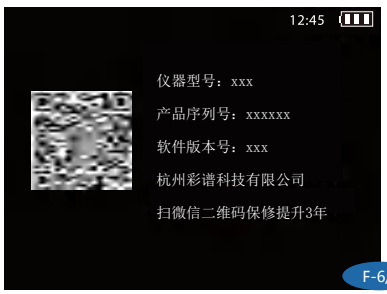
F-5/1

恢复出厂：通过Up、Down选择键选择“ 恢复出厂 ”，按“ Enter ”键进入恢复出产页面。恢复出厂后，所有的数据将会被删除，并且设置系统将会恢复到默认设置。选择保存、退出。

F-6/1

版本：通过Up、Down选择键选择“ 版本 ”，按“ Enter ”键进入版本查看页面。显示本仪器的版本号信息，包括仪器型号、产品序列号、软件版本号以及公司名称。

（注：版本号若有更改，恕不另行通知。）



黑校准

F-7/1

将仪器测量口放在黑腔上，按“ Enter ”键进行校准。短鸣“ 滴 ”声后完成黑校准，按“ Test ”键进行测量。

白校准

F-8/1

将仪器测量口放在白板上，按“ Enter ”键进行校准。短鸣“ 滴 ”声后完成白校准。

USB通信

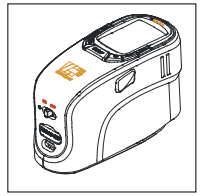
G-9/1

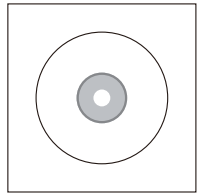
在主页面，通过Up、Down选择键，选择“ USB通信 ”图标，按“ Enter ”键，进入“ USB通信 ”页面。
使用本仪器标配的USB数据线将仪器与PC机相连，根据提示安装驱动（驱动程序在本仪器提供的光盘内，具体软件的使用请参考软件的帮助文档）当驱动程序正确安装，将如图显示。正确安装后即可在PC机上进行上位机操作。

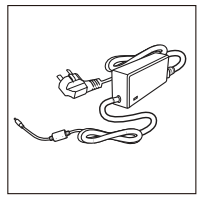
G-9/2

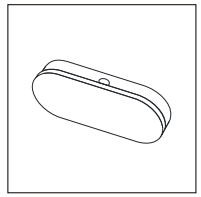
当USB线未插入USB接口或USB线与USB接口接触不良时，将如图显示。插入USB接口或重新插入即可正常连接，进行上位机操作。

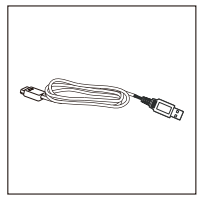
标配件

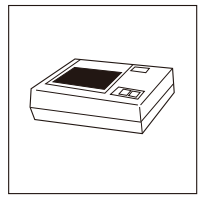

主机

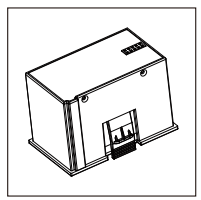

数据管理软件光盘

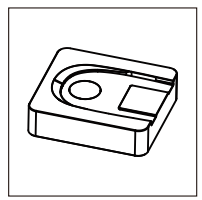

外部电源适配器


黑白校准盒

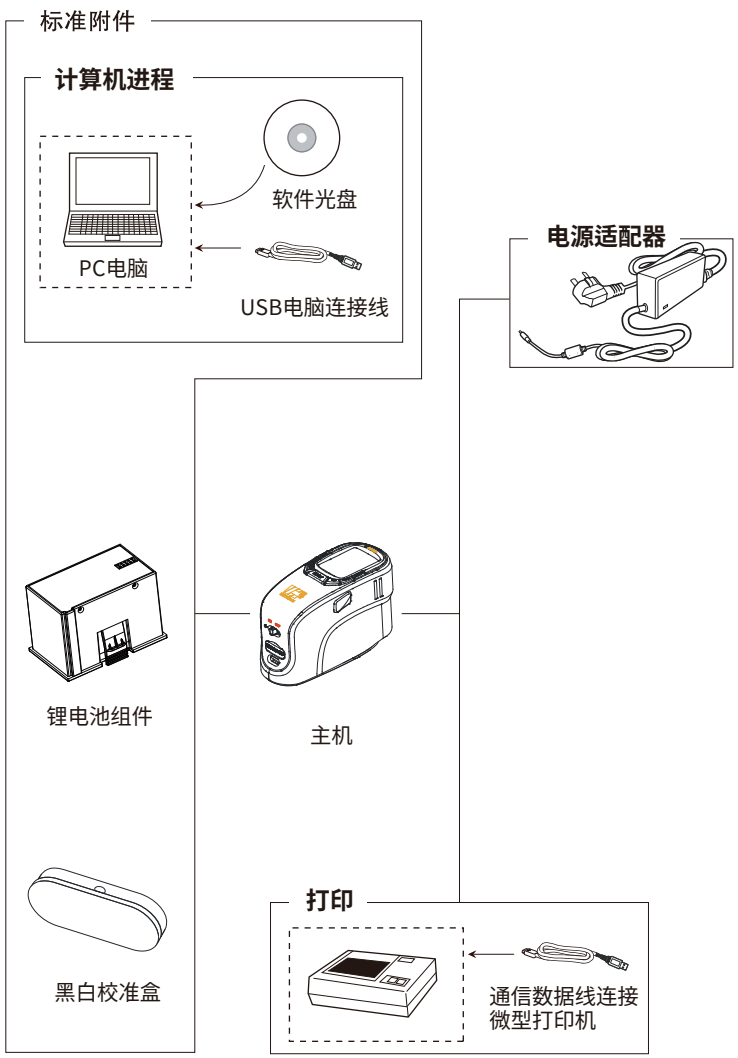

USB数据线


打印机（可选附件）


锂电池组件


粉末测试盒（可选配件）

系统配置图



异常处理

异常情况	分析	处理方法
1、仪器无法开机	1、检查仪器是否连接到外部直流电源适配器或是否装了电池组 2、检查电池电量是否充足	安装电池或插入直流电源
2、开机后不能进入主程序	1、检查是否进行过校准 2、检查校准过程是否有误	重新进行校准再次进入
3、测量结果报错	检查容差设置是否合理	重新调整容差设置
4、测试数值异常	1、检查测量时仪器及测试品是否平稳，测量口与测量 面接触是否紧密良好 2、检查测量物体是否太薄漏光 3、检查测量部位是否是混色	1、保持仪器及测试品平稳 2、在测试品底部放置一个厚的塑料垫或一张白纸 3、测量单一颜色部分，不要测量混色部位使用直流电源
5、两次测量结果相差较大	检查电池消耗是否在20%以下	使用直流电源

测试结果分析

▼ΔE总色差的大小 $\Delta E^*ab=\sqrt{(\Delta L^*)^2+(\Delta a^*)^2+(\Delta b^*)^2}$

ΔL+值表示偏白，ΔL-值表示偏黑；Δa+值表示偏红，Δa-值表示偏绿；Δb+值表示偏黄，Δb-值表示偏蓝。当一种颜色用CIEL*a*b*表示时，L*表示明度值；a*表示红/绿值及b*表示黄/蓝值。

▼CIE LAB

CIE LAB色空间是基于一种颜色不能同时既是绿又是红、也不能同时既是蓝又是黄这个理论而建立。所以，单一数值可用于描述红/绿色及黄/蓝色特征。当一种颜色用CIE*a*b*表示时，L*表示明度值；a*表示红/绿值及b*表示黄/蓝值。

▼CIE LCH

CIE LCH颜色模型采用了同L*a*b*一样的颜色空间，但它采用L*表示明度值；C*表示饱和度值及h表示色调角度值的柱形坐标。

公司声明

- 本公司向用户承诺，我们生产的测色仪系列产品，保修期限为购买之日起的三年时间内有效，正常使用情况下非人为造成的故障问题，本公司将负责给予免费维修，超过保修期或人为因素导致的故障，本公司将提供维护，将收取维修材料及相关费用。（详细保修参看彩谱保修细则）
- 本公司对于第三者因使用本产品引起的任何损失或索赔不负任何责任。
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CHN Spec

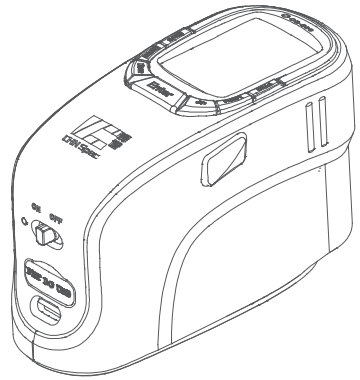
China's leading expert of color and gloss analysis

CHN Spec

SERIES OF SPECTROPHOTOMETER

OPERATION MANUAL

CS–580/600
CS–650/660



Service hotline:+86 571 85888707

Address:No.166,Wenyuan North Road,Jianggan District,Hangzhou City,China

WARNING

Please do not disassemble the product without the assistance of customer support center, If you have any questions, please contact the local agency.

www.chnspec.com

V. 2022.1

CATALOGUE

Terms of use

1.Our spectrophotometer is the first model in China that adopts spectrum splitting technology. It is mainly used to measure the sample spectral value, color value, color difference value,etc. It is portable model with compact structure which makes it easy to carry out, accurate and high precise.

2.Our spectrophotometer is widely used in factories, labs and on spot. It can achieve great color measurement result in the quality control of almost all fields.

3.The warranty period starts from date you purchase. If you need warranty service, please go to a local sales division of our company nearby, or visit the website www.chnspec.com to contact us for repair.

4.To avoid damage to instrument accuracy or precision, please do not disassemble the instrument. Damage to the instrument caused by disassembly or improper use is NOT included in the warranty.

Notes

1.Carefully put the instrument on a flat surface.

2.This instrument is not moisture proof,Please store the instrument in a dry area.

3.Large force, or sharp objects may damage the screen.

4.It is recommended to use the original power adapter with the instrument.

5.To ensure that the instrument works properly,please do not store, or use the instrument in places that are too hot or too cold; please do not put the machine in damp locations, or directly under sunlight. Do not use the instrument in severe environment such as strong shock or quake.

6.Check battery before usage.

7.Please avoid strong electromagnetic interference in usage.

8.Please do not use the instrument to measure surfaces that are not flat.

9.Please keep the instrument steady; do not shake the instrument in usage.

10.Please put the instrument directly on the spot to be measured, but do not apply strong force.

11.If this user manual is further updated, we are not obliged to notify you.
12.If any questions, please contact us directly.

Instrument functions

1.To test multiple color parameters:
ΔE*ab,ΔE*ch,ΔE*uv,ΔE*cmc(2:1),ΔE*cmc(1:1),ΔE&94,ΔE*00,
ΔEab(Hunter),555,color classification,CIE-L*a*b*,L*C*h,L*u*v,XYZ,Yxy,
Hunter-lab,Munsell MI,CMYK

2.Large data storage space;

3.TFT display screen;

4.Friendly man-machine interactive interface;

5.LED light source, and possess longer service life;

6.Low power consumption design, high capacity rechargeable lithium-ion battery configuration;

7.Low battery prompt function; full data space prompt function;

8.To measure SCI (specular component included) and SCE (specular component excluded) at the same time;

9.USB data transfer, PC color QC software;

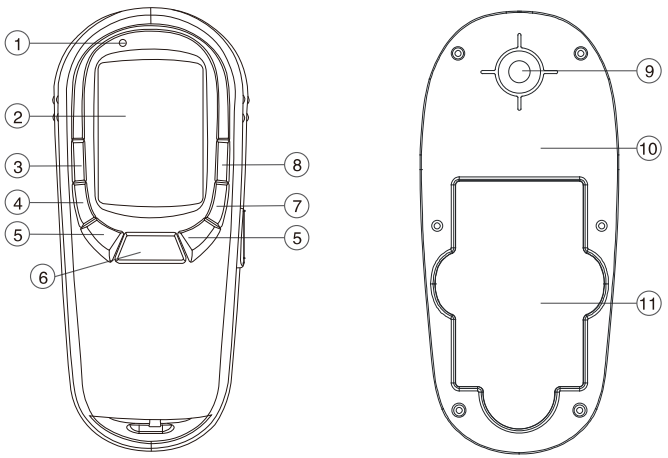
10.Be able to connect with the mini-printer for printing.

Technical Parameters

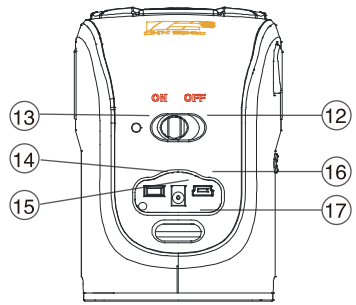
Model	CS-580	CS-600	CS-650	CS-660
Measurement condition	Observation angle：2°/10°,D/8（Diffused lighting，8 degrees observe angle）, SCI（specular reflection included）,SCE（specular reflection excluded）simultaneous measurement. （conform to CIE No.15、ISO 7724/1、ASTM E1164、DIN 5033 Tei17、JIS Z8722 Condition c standards）			
Size of integrating sphere	Φ40mm，Alvan diffused reflection surface coating			
Test caliber	A model:10mm,B model:4mm、6mm			
Illumination	CLEDs(entire wavelength balanced LED light source)		pulse xenon lamp	CLEDs
Sensor	dual light path sensor array			
Wavelength range	400~700nm		360~740nm	400~700nm
Wavelength Pitch	10nm			
Half Band Width	5nm			
Measurement Range	0~200%			
Resolution	Reflectivity：0.0001			
Observer	2°/10°			
Measurement light source	A,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,CWF,U30,DLF,NBF,TL83,TL84,U35			
Data being displayed	SPD distribution/data，sample's color values，color difference values/graph，pass/fail results，color error tendency，color simulation，display measurement area，history data color simulation，manual input standard sample，generate measurement report			
Measurement time interval	2seconds			
Measurement time	2seconds	0.5second	2seconds	0.5second
Aperture	Type A：10mm,Type B：4mm,6mm			
Color space	CIE-L*a*b,L*C*h, L*u*v,XYZ,Yxy, Reflectivity	CIE-L*a*b,L*C*h,L*u*v,XYZ,Yxy,Reflectivity,Hunter-lab、Munsell MI、CMYK、RGB、HSB		
Color difference equation	ΔE*ab,ΔE*CH, ΔE*uv, ΔE*cmc(2:1), ΔE*cmc(1:1), ΔE*94,ΔE*00	ΔE*ab,ΔE*CH,ΔE*uv,ΔE*cmc(2:1),ΔE*cmc(1:1),ΔE*94, ΔE*00,ΔEab(Hunter),555,color classification		

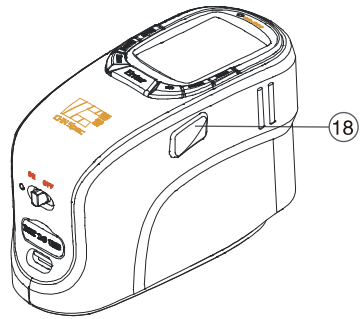
Other Index	WI(ASTM E313-00,ASTM E313-73，CIE/ISO,AATCC,Hunter,Taube Berger Stensby), YI(ASTM D1925,ASTM E313-00,ASTM E313-73),Tint(ASTM E313,CIE,Ganz), metamerism index Milm, adhesive/changing color fastness Standard deviation within 0.08% ISO luminance,8 gloss, A density, T density			
Repeatability	Color values: ΔE*ab<=0.03 (When a white tile is measured 30 times at 5-seconds interval), Maximum value 0.04	Color values: ΔE*ab<=0.02 (When a white tile is measured 30 times at 5-seconds interval),Maximum value 0.04	Color values: ΔE*ab<=0.015 (When a white tile is measured 30 times at 5-seconds interval),Maximum value 0.03	
Inter-instrument agreement	ΔE*ab within 0.2(BCRA color charts II, average of the 12 charts)			
Battery	rechargeable, 10000 continuous tests, 7.4V/6000mAh			
Interface	USB，bluetooth （customizable）			
Data storage	20000 samples			
Light source Lifetime	1.5 million tests for 5 years	3million tests for 10 years		3million tests for 10 years
Size	181*73*112mm(L*W*H)			
Weight	550g(without battery)			
Display screen	Full color true color screen			
Work temperature range	0~45℃, relative humidity 80% or below(at 35°C),no condensation			
Storage temperature range	0~25℃~55℃, relative humidity 80% or below(at 35°C),no condensation			
Standard accessories	DC adapter, Lithium battery, manual, color management software, drive software, electronic manual, color management guide, USB cable, black/white calibration tube, protective cover, portable bag			
Optional accessories	Powder molding machine, micro printer			
Color matching system	Does not match		matches	
UV light source	Does not include		included	Does not include
Special Note	The Pantone version of the spectrophotometer adds a color card search function to the CS-600. A and B, A is for instrument with aperture 10mm and B is for instrument with other aperture size.			

Appearance and structure



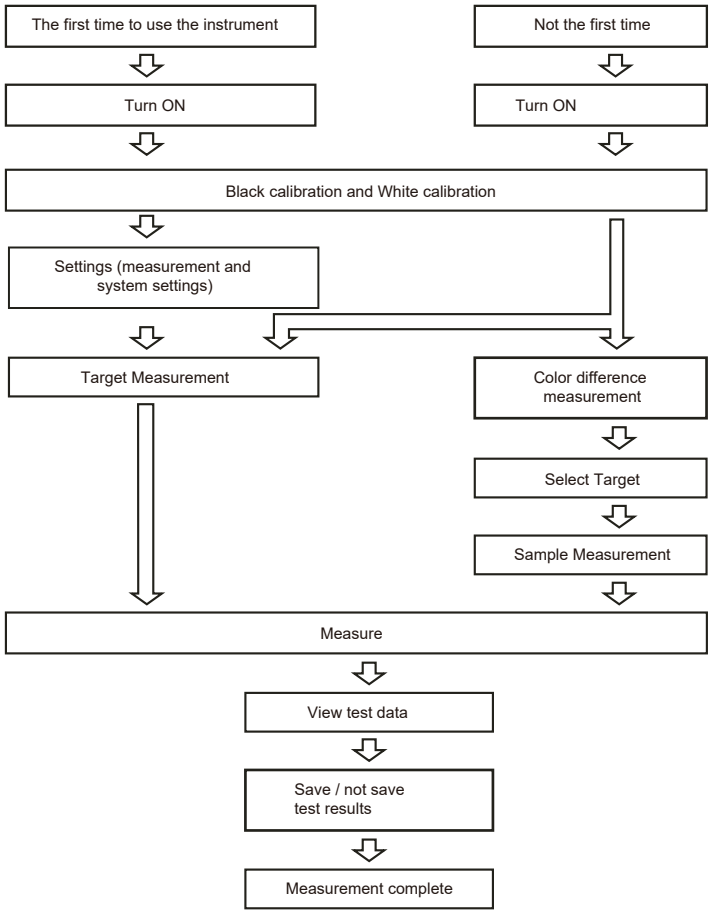
1. Test indicator light
2. Display screen
3. Save
4. Cancel / Back
5. Up / down
6. Enter
7. Menu
8. Printing/Camera
9. Measurement Aperture
10. Measurement panel
11. Battery cover





12. On & Off
13. Power indicator
14. Micro-printer Interface
15. DC adapter socket
16. USB Interface
17. Rope groove
18. Test

Measurement flow chart



Program interface

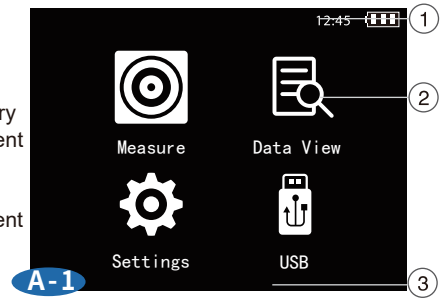
A-1

Main interface

① Title area: display primary functions of the current page

② Working area:display primary functions of sub-pages of current page, or measurement data

③Condition area: display current conditions of the current page



Basic operations:

Use up or down buttons to select the function, then press “Enter” to enter that function’s sub-page; press “Cancel” to return to the previous page, “Save” to save measurement data or system settings; “Menu” to show the menu, “Print” to print measurement data or call out camera view.

Measurement: the user can measure the color values of the sample, color differences, and view saved measurement data;

Data view: in this page the user can view the measurement data under saved target, and can view, delete or edit the name of selected sample;

Settings: user can change the measurement and system settings under this page;

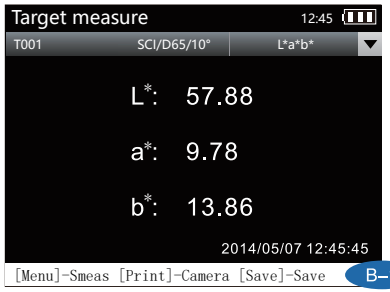
USB user can use the USB cable to connect the instrument to with PC.

Measurement

In the main page, use up and down buttons to select “measure”, and press “Enter” to enter the measurement page.

Under this page, user can measure the sample’s color values, reflectance and so on; and can measure the color difference between two samples and compare their reflectance figure.

Target measurement

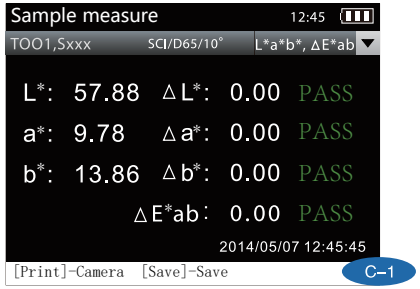


B–1

Press “print” to view the area being measured, then press the “Test” .
In the title of the measurement results, first column is target name, after pressing “save” to save, it will show the saved name; before being saved, target’s default name would be “Txxx”.

Second column shows measurement conditions, isuch as, light source ,observe angle and test mode, all of which can be changed in the “settings” page. The third column includes data that can be viewed; press “Enter” to view the reflectance value and figure of the selected data.
When viewing reflectance, press “Up” and “Down” to see reflectance value at different wavelengths.

Sample measurement



C–1

After measure and save at least one target, press “Menu” to enter the sample measurement page under this target. Press “Test” to measure the color difference; which is same as measuring target, after pressing “save” to save, it will show the saved name; before being saved, sample’s default name would be “Sxxx”.

Sample test can also be done under data view page. Press “Up” and “Down” to select a target, and press “Test” to measure the color difference.

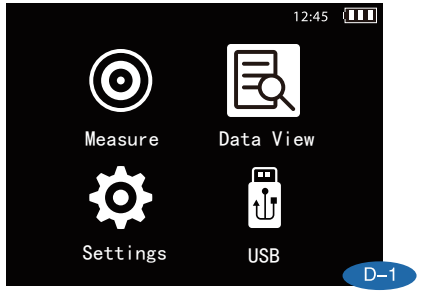
Note: please set the tolerance before measurement;

On sample measurement page, press “Enter”, and then you can select reflectance with “Up” and “Down”.

Data View

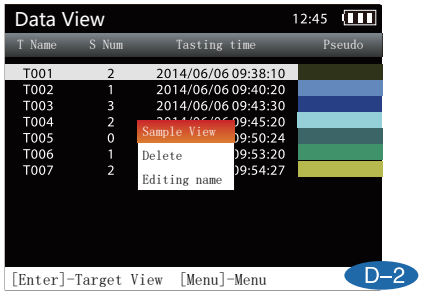
D–1

In the main page, use “Up” or “Down” to select “Data View”, press enter to enter the data view page, and view saved target.



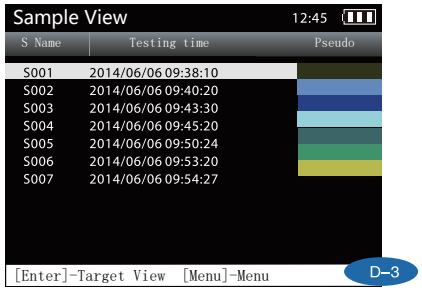
D–2

Use “Up” or “Down” to select the target, then press “Enter” to view the measurement results of selected target.



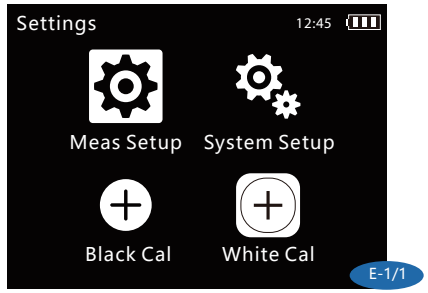
D–3

Use “Up” or “Down” to select the target, then press “Menu” to open a menu, in which you can view or delete a standard sample, or change its name. Delete will also delete all test samples under the target.



Settings

In the main page, use up and down buttons to select “Settings”, and press “Enter” to enter the settings page.



E-1/1

Measure Setup: user can change settings of light source,observer,SCI/SCE, tolerance,average,etx

System Setup: user can set language, time and power; do factory reset, and check the version of the instrument.

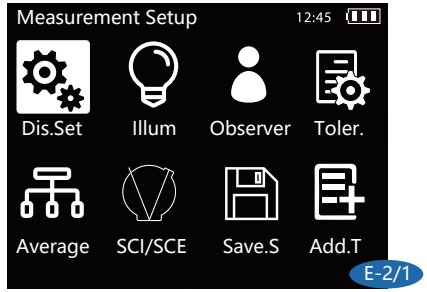
Black calibration: the user can black calibrate the instrument.

White calibration: the user can white calibrate the instrument.

Measurement setup

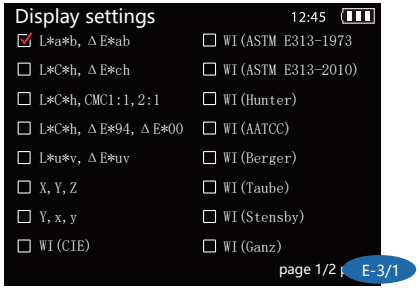
E-2/1

Use “Up” and “Down” to select; press “Enter” to enter measurement setup page.



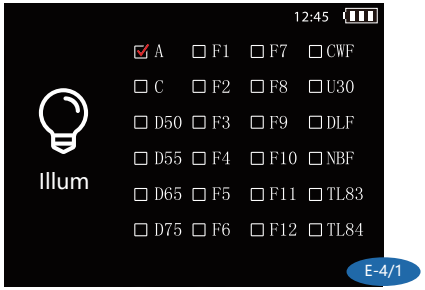
E-3/1

Display settings: “Up”/ “Down” to select; “Enter” to enter display settings page. Press “Up” or “Down”, select the color space, color values or indices you need, and confirm with “Enter” . Then, the measurement page would show the values you need.
Note: after selection “Metamerism”, you can set the observer and light source for metamerism comparisons.



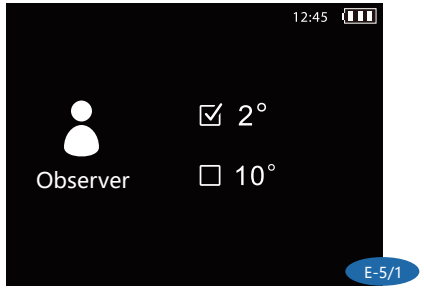
E-4/1

Light source: Use “Up” or “Down” to select; press “Enter” to enter light source selection page. Under this page, you can choose any light source , including A, C, D50,D55, D65, D75, F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, CWF, U30, DLF, NBF, TL83 and TL84 light sources, which is a total of 24 light sources. Use “Up”, “Down” and “Enter” to confirm your choice.



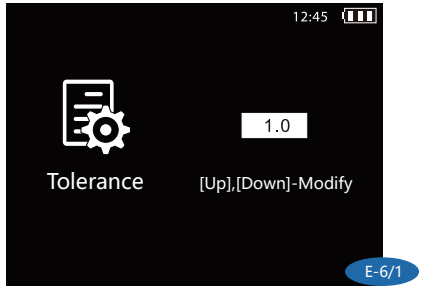
E-5/1

Observer: Use “Up” or “Down” to select; press “Enter” to enter observer settings page.
The instrument offers two angles: 2° and 10°. Select with “Up” or “Down”.



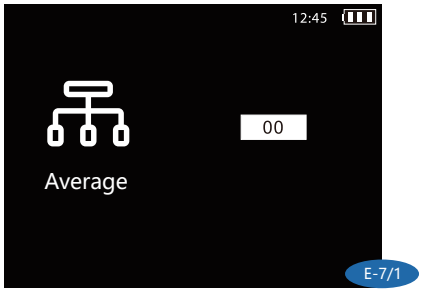
E-6/1

Tolerance settings: Use “Up” or “Down” to select; press “Enter” to enter tolerance settings page. Use “Up” or “Down” to set the values and press “Enter” to confirm.



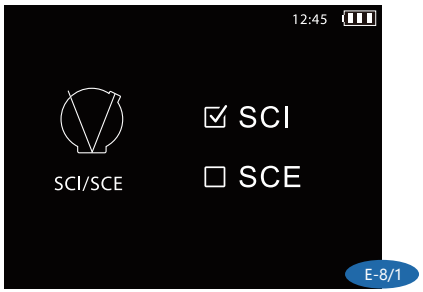
E-7/1

Average: Use “Up” or “Down” to select; press “Enter” to enter average settings page. In this page, the user can set how many measurement for average. Use “Up” and “Down” to set the values or press “Enter” to confirm.



E-8/1

SCI/SCE: Use “Up” or “Down” to select; press “Enter” to enter SCI/SCE selection page. This instrument offer both SCI (Specular Component Included) and SCE (Specular Component Excluded) measurement modes.

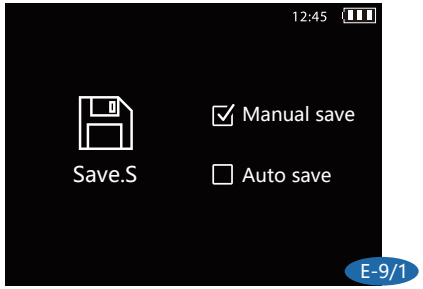


E-9/1

Save setting: Use “Up” or “Down” to select; press “Enter” to enter “Save.S” page. Use “Up” or “Down” to select “Manual Save” or “Auto Save”, press “Enter” to confirm.

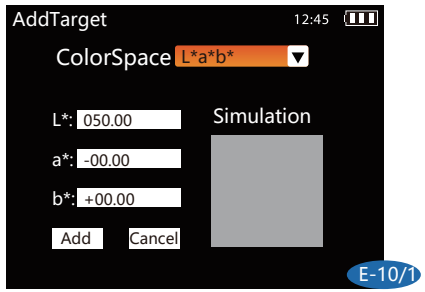
Auto Save: the target and sample test resultst will be automatically saved and named every time (T040,S001).

Manual save: the target and sample measurement will be saved and named by the user (such as Txxx、Sxxx）.



E-10/1

Add Target : Use “Up” or “Down” to select; press “Enter” to enter “Add.T”page. Press “Up” , “Down” and “Enter” , select the color space and enter the vale you need. Use “Up” and “Down” to choose “Add” and press “Enter” to confirm. After saving, simulation area can show the target color you added



System setup

F-1/1

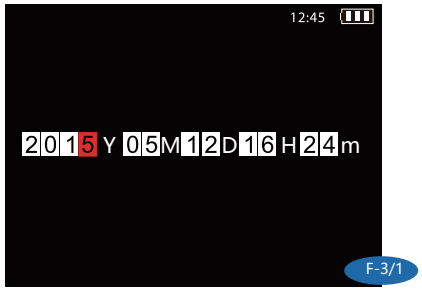
Use “Up” and “Down” to select; press “Enter” to enter system setup page. In the system setup page, you can enter these sub-pages: settings for language, time, power, reset all and version.

F-2/1

Language: Use “Up” or “Down” to select; press “Enter” to enter language selection page. Use “Up” or “Down” to choose flanguage: Chinese or English.

F-3/1

Time setting: Use “Up” and “Down” to select; press “Enter” to enter time settings page. Use “Up” and “Down” to select the value you want to change and press “Enter”; then use “Up” and “Down” to set the value, press “Enter” to confirm. Finally, press “Cancel” to save the values or exit time setting.

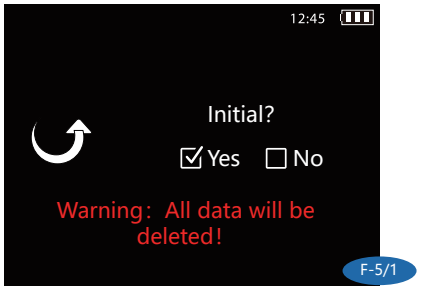


F-4/1

Power: Use “Up” and “Down” to select; press “Enter” to enter power settings page. Use “Up” and “Down” to set lighting time and power off time. Use “Up” and “Down” to select the value you want to change and press “Enter”; then use “Up” and “Down” to set the value, press “Enter” to confirm. Finally, press “Cancel” to save the values or exit time setting.

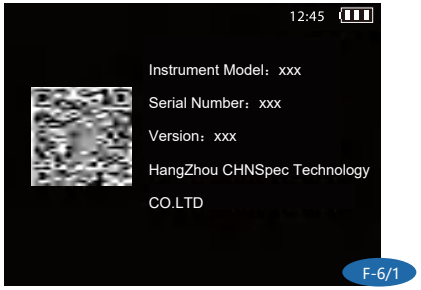
F-5/1

Reset All:Use “Up” or “Down” to select; press “Enter” to enter reset all page. This action will delete all data and restore all to default settings.

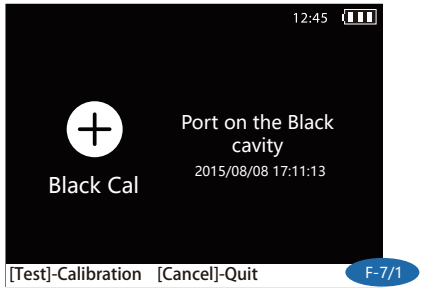


F-6/1

Version: Use “Up” and “Down” to select; press “Enter” to enter version page. In this page you can view the instrument’s model, serial number, software version and company name.
(Note: the software version may be subjected to change without notice)



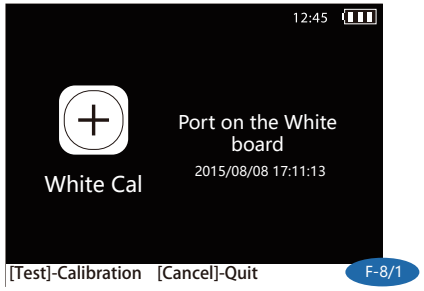
Black calibration



F-7/1

Put the measurement aperture on the black cavity, press “Test” to calibrate.

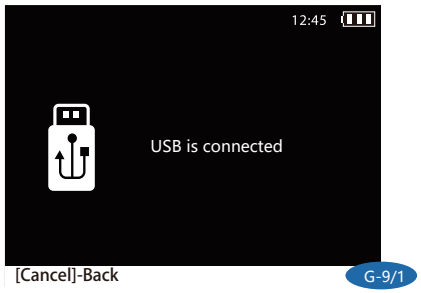
White calibration



F-8/1

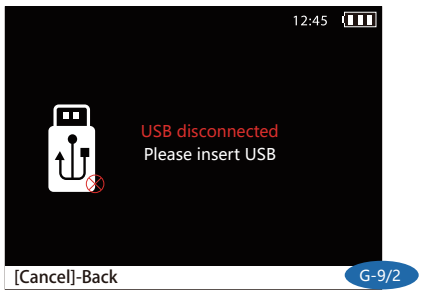
Put the instrument on white tile. Press “Enter” to calibrate.

USB



G-1/1

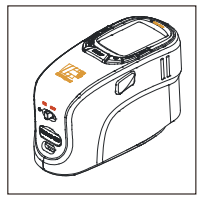
In the main page, Use “Up” and “Down” to select; press “Enter” to enter USB page.
Use the USB cable provided with the instrument to connect the instrument to PC. Install the driver program as instructed (driver program is in the CD provided with the instrument). The USB will be connected correctly after the driver program is installed, as shown in the above picture.

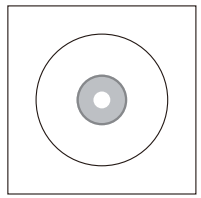


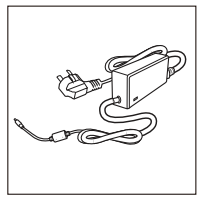
G-1/2

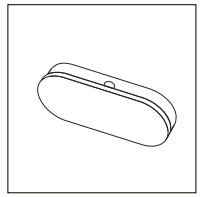
After entering the USB connection page, if USB is not connected, or connected unsuccessfully, the page will be USB cable. Use the shown in the above picture to connect again.

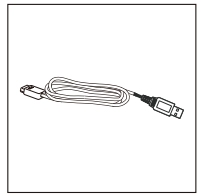
Standard accessories

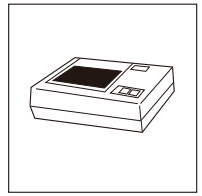

Main instrument

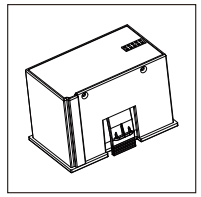

software CD

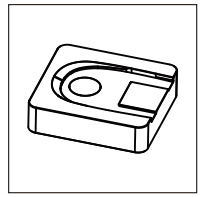

Power adapter


Black/white calibration box

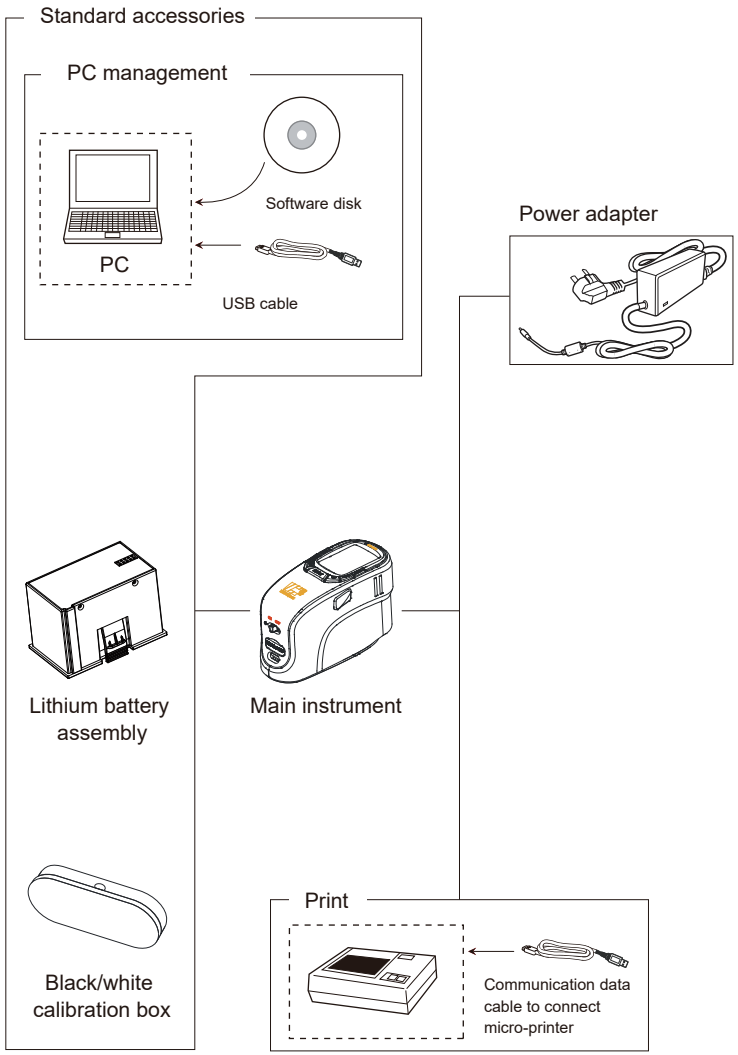

USB cable


Mini-printer(optional)


Lithium battery assembly


Powder holder(optional)

System deployment diagram



Trouble Shooting

Error	Analysis	Handling
1. Instrument can not switch on	1. Check battery or power adapter 2. Check battery power	Install battery or connect power adapter to outside power source
2. Unable to enter main program processes after switch on	1.Check if the instrument is calibrated 2.Check if there are errors during calibration	Calibrate again, and then enter the main program
3.Exception in measurement results	Check if the tolerance setting is reasonable	Check and change tolerance settings
4.Unreasonable measurement results	1.Check if the instrument is lying stably on a flat sample 2.Check if the sample is too thin 3.Check if there are multiple colors in the test area	1.Make sure instrument is lying flat 2.Put a thick piece of white paper under sample 3.Only check single color
5. Large difference between two measurements	Check if the battery is under 20%	Use power adapter

Testing Result Analysis

▼ΔE Color Difference Scale $\Delta E^*ab=\sqrt{(\Delta L^*)^2+(\Delta a^*)^2+(\Delta b^*)^2}$

ΔL+ represents white, ΔL- represents black, Δa+ represents red, Δa- represents green, Δb+ represents yellow, Δb- represents blue. When we use CIE-L*a*b* to show a clolr, L* is balck or whilte. a* is red or green.b* is yellow or green.

▼CIE LAB

CIE LAB is color space based on the fact that a color can't be both red and green, or both blue and yellow, because these colors oppose each other.So a single data could be used to describe red/green and yellow/blue. When we use CIEL*a*b* to describe a color,L* means lightness, a* means red/green and b* means yellow/blue.

▼CIE LCH

CIE LCH adopts same color space as L*a*b*, but its L* represents lightness, c* represents saturation and h* represents hue.

Company’s statement

1.The company promises that our spectrophotometer offers one year of warranty after purchase date. Non-artificial damage under normal use is subjected to free warranty. The company offers repair services for artificial damage, or damage after the warranty time limit; however, the repair services would require fees relative to the damage.
2.The warranty only holds for the person, or company who purchased the instrument. Damage occurred by the third party usage would not be eligible for warranty service.
3.The company is not responsible for data loss because of error, repairing, or power outages. To prevent loss of important data, please save copies of the data on your PC.
4.The copyright ownership of the instrument and its associated software belong to CHNSpec and is protected by the Copyright Laws of People’s Republic of China.
5.Our company sells the instrument does not mean we transfer the copyright, or any intellectual property’s ownership to the user.
6.The specifications and information in this manual are subjected to further updates without notice.