Spectrophotometer

ColorLite
Innovative Colour Metrology

ColorLite sph900 and sph870

ColorLite offers you the perfect solution for controling the quality of your product colours

Innovative spectral Colour Metrology
„Made in Germany“

- Description
- Features
- Probe Head Versions
- Accessories
- Technical Data

ColorLite sph900 & sph870
Spectrophotometers

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Spectrophotometers

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ColorLite - how can we help you...?

- ColorLite designs and produces a wide range of high quality products for colour measurement, mainly for quality control applications.
- Our equipment is designed, so that using it is as simple as possible to use greatly aiding the reliability of results.
- Our spectrophotometers offer our customers a perfect solution for measuring colours of all types of materials. Made possible through our unique wide range of accessories.

ColorLite offers your company the perfect solution for the reliable control and communication of your product colours. Our spectral colour measuring equipment developed and produced by us in Germany is exemplary easy to use and through our wide range of accessories, very flexible.

The ColorLite GmbH was founded over 10 years ago, applying the results of 5 years of research work in the field of colour metrology gained at the University of Applied Sciences, Hannover.

Our products have been based on the technological advantages gained from these beginnings. All products carry on with this tradition of innovation, making them by far the most advanced spectrophotometers on the market.

To maintain this advantage ColorLite spends an over proportional amount of its resources in research and development.

Research projects in co-operation with renowned institutes and companies help us to develop the products that future industry needs.

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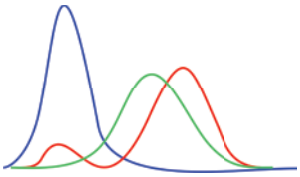
Colour Measurement Principles



How and why?

When we measure colours we are measuring a sensorial perception , its like measuring taste or odour.
By measuring colours the subjectivity of the perceived colour, or more importantly colour difference, is replaced by objective values. As the human colour visual system is based on three receptors, each with a different spectral sensitivity, colours can always be described by three values. The perceived colour is also dependent on the ambient light, which is a further variable affecting the colour. Another variable is the field of view, when looking at a larger surface a larger area of the retina is used which has a slightly different spectral response. Colour science differentiates between 10° and 2° viewing angles. In other words the colour changes slightly, depending on the size of the area viewed.

A spectrophotometer measures colours by illuminating the sample and analysing the light that is diffusely reflected. The resulting spectrum is compared to the spectrum of a known (normally white) surface and the spectral characteristics of the measured surface are calculated. This sample spectrum is then weighted with a standardised illuminant, for example for daylight (D65), and with the three spectra (colour matching functions 10° or 2°) derived from the human perception. This results in three values X, Y and Z which are not only dependent on the used illuminant (D65) but on the colour matching functions, 10° or 2°.
This sounds complicated but it is not; most industries use the same basics settings D65 illumination and 10° standard observer, which are setup and left. Colour differences are normally described by adding the differences of the three colour values (mainly DL*,Da* and Db*) together, resulting in a single value delta E (DE).

The main application area for colour measurement is as a quality control tool. Colour is a quality feature that you and your customers can see. Spectrophotometers ensure that colours can be compared to a reference standard independent of user, ambient light conditions and time. Standards can be a release sample, RAL colour scale (or any other colour scale) or any other reference which are digitised and stored indefinitely. Spectrophotometers measure a colour difference well in advance of the human eye on an ideal surface. This is defined by the repeatability, which is dependent on the sample, and should be factor ten better than the required smallest delta E.

The big advantage of colour measurement, apart from being 100 % objective, is that these standards can be assigned specified limits. This ensures that customers can be sure of deliveries with the correct colour and suppliers know that their products are within specs. Colour measurement enables producers to save resources by optimising the amount of colourants. On the other hand controlling colours specifications at the start and during production, reduces one of main reasons for reclamation and helps towards reducing waste and saving resources.

ColorLite sph900 & sph870
Spectrophotometers

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Overview ColorLite sph870 + sph900

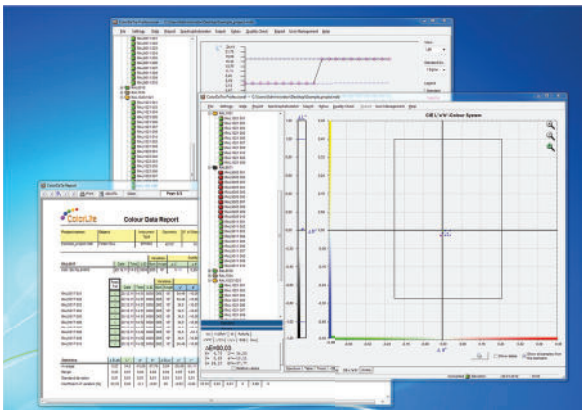
We offer you a complete solution

One of the key features of the ColorLite sph870/900 spectrophotometers is the ability to extend applications through the use of a wide range of available accessories.

The ColorLite sph870 and sph900 spectrophotometers are available with different types of probe head for different applications. Our accessory range is used to extend the application fields of your device and with the d/8° probe head adapter, ensure that results are compatible to all your customers or suppliers.

Our unique small external standard 45°/0° probe head

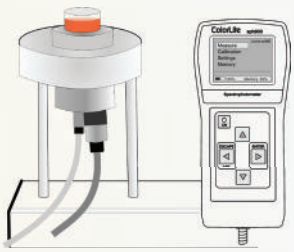
USB V2.0



ColorDaTra Basic + Professional PC Software

Universal accessories socket

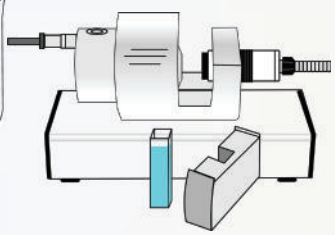
here are some accessory and probe head examples...



MA35-UK Stand

MA35-UK Probe head

MA38-SET



CA10-UK Stand

MA38 Probe head

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ColorLite sph900 & sph870
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Description - ColorLite sph870 + sph900

User friendly and flexible

The Spectrophotometers ColorLite sph900 and sph870 are a colour measuring instrument suitable for a wide range of applications, especially through the package of accessories on offer. The sph900 has all of the user friendly qualities and advantages of the sph870 but with up to date features such as a high resolution O-LED display (sph900 only). Not only does this high resolution display offer brilliant full colour contrast, but makes operating much easier as more information is displayed. The sph900 has high speed electronics enabling measuring time of less than one second.

Smallest probe head and highest specifications

Using a grating spectrometer with high specifications and ideal reproducibility makes the device perfect for customers with high quality demands typical in industries such as automobile. Ideal handling as the probe head is only 25 mm in diameter and just over 80 mm in length, weighing only 110 grams! Scans are simply triggered by pressing the sprung probe head downwards, against even the smallest of samples which can be held in the other hand.
Special probe heads are optional with a smaller aperture or with a V-block fitting for cables cylindrical probes such as cables and rods.

Wide range of accessories and probe head options

A comprehensive range of accessories permits use for a wide range of samples. For example it is possible to measure different powders, liquids, and inhomogeneous products such as granules. In addition to this a version with stainless steel waterproof (IP67) probe head is ideal for working in harsh, wet conditions typical for example in the food industry.

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Description - ColorLite sph870 + sph900

One device with all main geometries

Using supplementary accessories the sph870 and sph900 offers you the unique option of implementing different measurement geometries with one device.

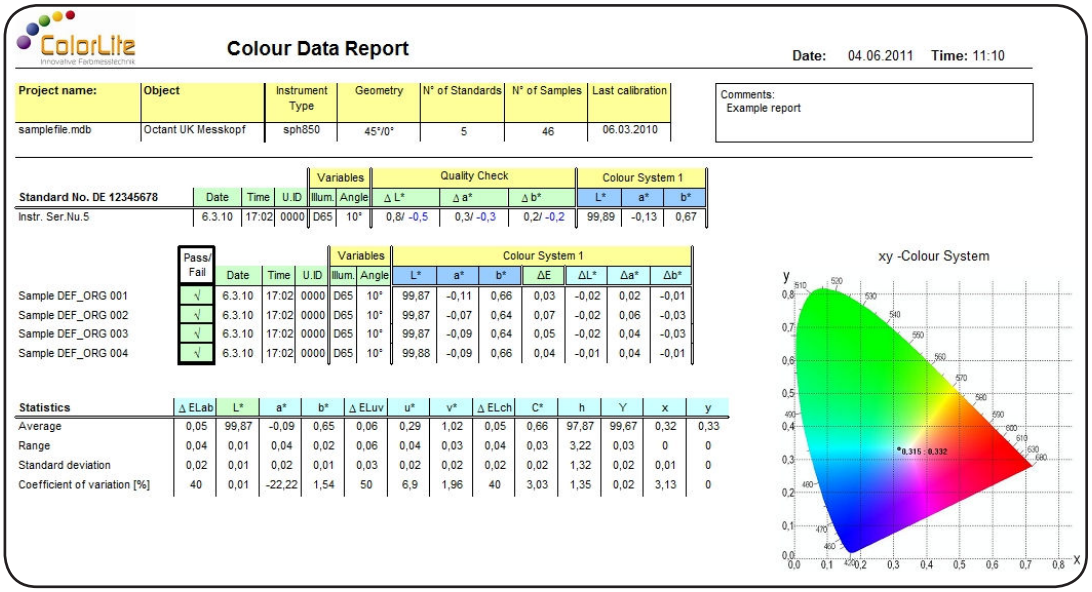
Apart from the two main probe head standards 45°/0° and d/8° the equipment can be used for transmission measurements in 0°/0° or d/0° mode. To measure inhomogeneous surfaces like granules or wood a adapter is available to expand the scanning to 38 mm or 80 mm.

State of the art technoloy

All the sph900 adapters using an auxiliary light source are controlled from the main unit over a smart interface. This recognises the accessory automatically and programs the settings accordingly.

Profesionelle Qualitätskontrolle mittels PC-Software

Our quality control database software ColorDaTra Professional with an online mode, is simple to use. It enables an easy operation and management of your colour data directly from the PC.



ColorLite
Innovative Farbmesstechnik

Colour Data Report

Date: 04.06.2011 **Time:** 11:10

Project name:	Object	Instrument Type	Geometry	N° of Standards	N° of Samples	Last calibration
samplefile.mdb	Octant UK Messkopf	sph850	45°/0°	5	46	06.03.2010

Comments:
Example report

				Variables		Quality Check			Colour System 1		
Standard No. DE 12345678	Date	Time	U.ID	Illum.	Angle	Δ L*	Δ a*	Δ b*	L*	a*	b*
Instr. Ser.Nu.5	6.3.10	17:02	0000	D65	10°	0,8/ -0,5	0,3/ -0,3	0,2/ -0,2	99,89	-0,13	0,67

	Pass/ Fail	Date	Time	U.ID	Variables Illum.	Angle	Colour System 1 L*	a*	b*	ΔE	ΔL*	Δa*	Δb*
Sample DEF_ORG 001	√	6.3.10	17:02	0000	D65	10°	99,87	-0,11	0,66	0,03	-0,02	0,02	-0,01
Sample DEF_ORG 002	√	6.3.10	17:02	0000	D65	10°	99,87	-0,07	0,64	0,07	-0,02	0,06	-0,03
Sample DEF_ORG 003	√	6.3.10	17:02	0000	D65	10°	99,87	-0,09	0,64	0,05	-0,02	0,04	-0,03
Sample DEF_ORG 004	√	6.3.10	17:02	0000	D65	10°	99,88	-0,09	0,66	0,04	-0,01	0,04	-0,01

Statistics	Δ ELab	L*	a*	b*	Δ ELuv	u*	v*	Δ ELch	C*	h	Y	x	y
Average	0,05	99,87	-0,09	0,65	0,06	0,29	1,02	0,05	0,66	97,87	99,67	0,32	0,33
Range	0,04	0,01	0,04	0,02	0,06	0,04	0,03	0,04	0,03	3,22	0,03	0	0
Standard deviation	0,02	0,01	0,02	0,01	0,03	0,02	0,02	0,02	0,02	1,32	0,02	0,01	0
Coefficient of variation [%]	40	0,01	-22,22	1,54	50	6,9	1,96	40	3,03	1,35	0,02	3,13	0

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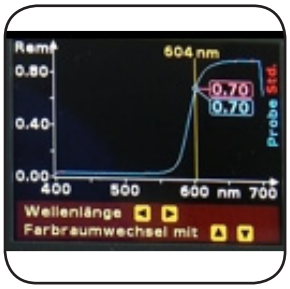
Features - ColorLite sph870 + sph900

External stainless steel probe head

The unique stainless steel probe head, only 25 mm in diameter, provides the perfect interface between the sample and instrument ensuring the most reliable results possible. Hold your sample in one hand and simply press the sprung probe head onto the surface to trigger the scan.

High contrast colour O-LED display (sph900 only)

Super high contrast O-LED full colour display, provides the perfect interface between the instrument and user ensuring very simple handling, reducing training time and increasing reliability. The 180° viewing angle of the O-LED display works without back lighting thus saving battery life.



User friendly

Only 4 Main levels:

Measure - Calibrate - Settings - Memory

Simple 4 button control.
Real photos explaining things step-by-step, for example the calibration routine.

The perfect light source – LED's

"The light source of the future" LED's (Light Emitting Diodes) ensure an excellent long and short-term stability of results and low maintenance costs. The pulse mode ensures that brightness levels stay high for a guaranteed 20 years.

AAD - automatic accessory detection

The external probe head can be attached to a variety of accessories for measuring different types of samples. The sph870 and sph900 AAD automatically changes internal settings depending on what accessory is attached.

AAD

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Features - ColorLite sph870 + sph900

Two main geometries in one device - 45°/0° AND d/8°

The two main geometries in use today are the 45°/0° and the d/8° geometry described in DIN 5033. The normal 45°/0° geometry of the ColorLite sph900/sph870 can be easily converted to a d/8°, using our optional accessory MA35-UK.

High optical resolution of 3.5 nm steps

One hundred and fifteen (115) 16-Bit spectral values are measured for each scan, using a highly robust optical grating and Hamamatsu line sensor. This ensures a good correlation, even with elaborate desktop spectrophotometers. Many spectrophotometers on the market measure only 30 or 40 points or less.

1000 standard colours in 5 folders and 3 ways of finding them

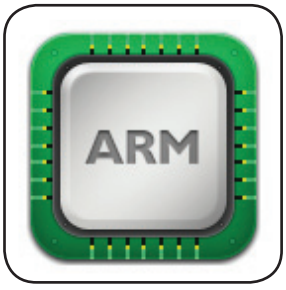
Store up to 1000 standard colours in 5 folders – each with an individual CIE dE or dL*,da*, db* tolerance. To find the correct colour use one of three methods, including a best match function.
Sort the standards by list or use our intelligent name recognition tool.

User mode and user management

User Mode – restricted functionality - prevents adjustment of settings or standards being deleted. User simply selects the standard colour and measures.
User management - When activated a four-digit user ID is stored with all colour data.

Super Fast - 32-Bit ARM RISC processor

The central processing unit of the ColorLite sph900 is a high performance 32-Bit RISC (Reduced Instruction Set Computer) processor. This enables a single scanning time of about 0.5 seconds. Which means the overall time needed for measuring samples is less than with any other spectral device on the market.



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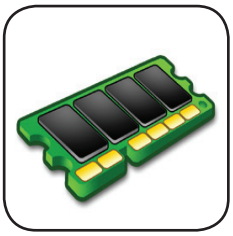
Features - ColorLite sph870 + sph900

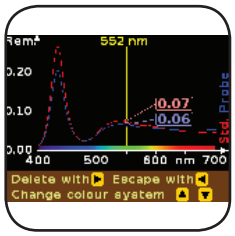
FRAM memory chips – no batteries needed

The high performance „Ferroelectric Random Access Memory“ chips have an operating life of at least 100 000 billion write operations and a data retention of 10 years. This ensures that no data or standards are lost. With no backup battery needed. Possible by using one of the most advanced memory chips technologies available.



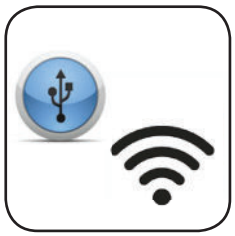
Spectrometer mode - optional

In this mode the unit can be used as a normal mobile spectrometer i.e. measure the spectral radiation (in 3.5 nm steps) and chromaticity values of any light source for example such as LED’s. To do this we determine a calibration file by measuring against a special spectral lamp which is stored on the device.



Communikation USB V2.0 (WiFi or RS232 option)

To optimise handling, you can transfer your data to a PC via USB 2.0 immediately during the measurement. Stored data can also be downloaded or colour standards (references) uploaded. As an option WiFi or RS232 can be used for this purpose.



Communication tool ActiveX - Optional

A list of commands in an ActiveX DLL library enables you to communicate with the spectrophotometer from your software.

Black soft touch coating

Means that the ColorLite sph900 /sph870 feels good in the hand. The rubber like surface offers an ideal grip on the instrument and at the same time simply looks great!

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Spectrophotometers

Features - ColorLite sph870 + sph900

Further features include

- storage for 1000 colour samples
- storage for 300 spectra 400 nm to 700 nm in 3.5 nm steps
- different probe head versions available
- multiple scanning with automatic averaging of 1 to 20 scans

Warning messages

- when the standard deviation threshold (0.01 to 2) is exceeded by multiple scans
- when the Metameric Index higher is as a variable limit
- for time dependent calibration warning 1 h to 24 hours
- for temperature dependent calibration warning 0 to 9
- when a high colour difference between the standard and the sample is measured
- when the samples are measured in a different mode to the standard
- when the self-diagnoses after calibration is not 100% okay.
- when the battery charge is low
- when the memory full is

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Spectrophotometers

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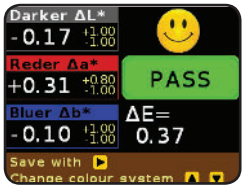
Color DaTra PC-Software

Spectrophotometers are mainly used to compare a sample colour to standard colour. The ColorLite sph870 and sph900 spectrophotometers will display these differences and absolute values in all commonly used colour scales. Exactly which data is displayed after measurnig a standard or sample can be programmed in the settings, according to the individual needs. Hereby it is possible to activate a number of different outputs and toggle between screens with the up and down buttons. Following are some of the colour data outputs available on the ColorLite spectrophotometers.

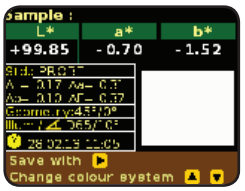
PASS / FAIL

A data output displaying the difference between the standard and a sample is Pass/ Fail. The CIE L*, a*, b* differences are translated into simple text „lighter“ or „darker“ etc. The PASS / FAIL output is dependent on the standard limits set as delta L*, delta a* and delta b* OR a simple delta E*ab / E cmc.



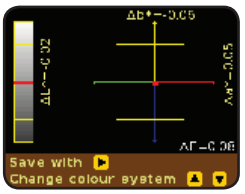
Absolute CIE L*a*b*

Sample or standard colours are displayed as absolute values together with time stamp and setings etc. Also the colour is displayed on the screen in a rectangular field.



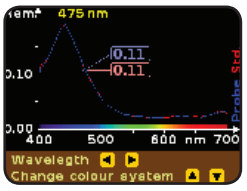
CIE L*a*b* Diagram

Samples are displayed relative to the standard. Also visible are the limits of the standard.



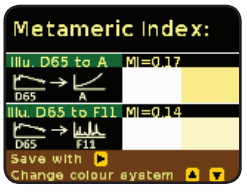
Spectral Data - Remission + Transmission Diagram

The ColorLite sph870 & sph900 spectrophotometers scan the remitted or transmitted spectrum in an intervall of 3.5 nm. This results in a sample of over 100 spectral values in the visible range.



Metameric Index

The perceived colour difference between two colours is always dependent on the spectral distribution of the illumination. The Metameric Index value describes to what extent the colour difference between a standard and sample varies when the standard illuminant is changed. from D65 to A and D65 to F11.



Best Match

Simplified output for use with the best match function. This tool automatically looks for the standard which is closest to the sample colour. The user can select from which internal folder the standard is selected.

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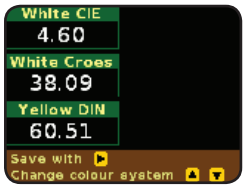
White and Yellow Index

The absolute values describing the whiteness and yellowness of the sample are displayed.

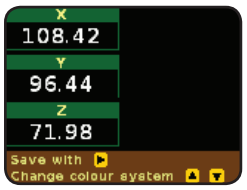


Y, x, y Values

The absolute values for Y which is often used as a brightness value and the chromaticity values x and y.

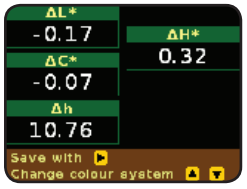
X, Y, Z Values

The absolute tristimulus values X, Y, Z are the main colour values. From these values most other colour values can be calculated.



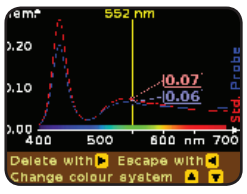
Delta L*, C*, h*, H* Values

After the CIE L*a*b* colour scale the L*,C*h* colour scale describes the lightness L*, saturation or chroma C* and hue h*.



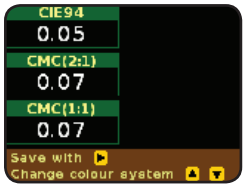
Spectrometer function

An additional optional function for measuring the emission spectrum of a light source. The exposure time can be manually or automatically set.



Delta-E cmc und Delta-E CIE94

Modified colour difference equations that better match the perceived colour difference.



Contrast Value LRV

The contrast value is calculated between the standard and sample readings as specified in the BS 8493:2008

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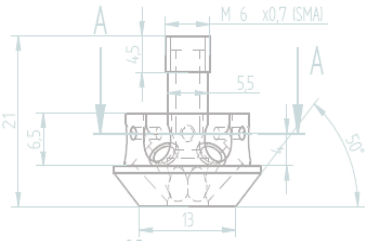


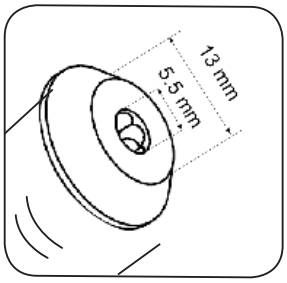
Probe head versions 45°/0°

The ColorLite sph870 and sph900 spectrophotometers are available with a wide range of probe heads. The probe heads are not interchangeable, so the probe head version has to be ordered according to the application.

The standard 45°/0° probe head

The 45°/0° probe head is optimal for most applications and can be used with a variety of adapters to expand the application field (see accessories). The name „45°/0°“ describes the standardised measurement geometry described in the DIN 5033. Hereby the samples are illuminated at an angle of 45° with a direct light source and the diffuse remitted light measured at 0°.
The probe head weighing only 170 grams is sprung and measurements are triggered by simply pressing downwards on the sample surface.
As the illumination is direct the measurement is gloss dependent, which means results correlate to the visual perception.

The 45°/0° probe head - s-version



The 45°/0° probe head in the s-version is the same size as the standard probe head above, but has a smaller aperture (5.5 mm) and a footprint of only 13 mm. The measuring spot is about 3 mm.
The probe is ideal for measuring extremely small or curved parts.
Typical applications for this probe head are measuring automobile interior parts, pharmaceutical products, curved moulded plastics parts.

Ordering Information + Specifications

Article No.	E11341	E11141	E11342	E11142
Model	sph870	sph900	sph870-s	sph900-s
Probe head	Standard 45°/0° geometry - according to DIN 5033			
Description	ColorLite sph870 with a standard probe head	ColorLite sph900 with a standard probe head	ColorLite sph870 with a s-version probe head	ColorLite sph900 with a s-version probe head
Scanning Area	3.5 mm		3.0 mm	
Aperture	8 mm		5.5 mm	
Dimensions: Probe head	25 mm diameter; 60 mm length			

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Probe head versions - special 45°/0°

The standard 45°/0° probe head - IP62 - version

The 45°/0° probe head is available with a protection window. This mainly is to prevent dust or powders soiling the opening of the optical fibre. The probe head will remain sprung, which can be used to trigger the scans.

The standard 45°/0° probe head - IP67 - version

The 45°/0° probe head is also available in completely water and dust proof version according to the IP67 standard. This probe head is for highly rugged applications and can be cleaned with running water. The solid stainless steel head can be ideally be used in the food industry as it can be disinfected.

Ordering Information + Specifications				
Article No.	E11343	E11143	E11344	E11146
Model	sph870-IP62	sph900-IP62	sph870-IP67	sph900-IP67
Probe head	Standard 45 °/0 °geometry - in accordance with DIN 5033			
Description	ColorLite sph870 with a standard probe head in IP-62 execution	ColorLite sph900 with a standard probe head in IP-62 execution	ColorLite sph870 with an IP67 probe head	ColorLite sph900 with an IP67 probe head
Scanning Area	3.5 mm		3.5 mm	
Aperture	8 mm		8 mm	
Dimensions: Probe head	25 mm diameter; 60 mm length		25 mm diameter; 60 mm length	

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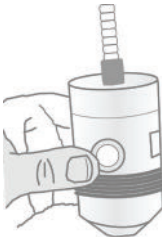
Probe head d/8°



For applications where only a d/8° probe head is required the ColorLite sph870 and the ColorLite sph900 are available with a directly connected sphere geometry. The d/8° describes the standardised measurement geometry according to DIN 5033. Hereby, the sample is illuminated with a diffuse light source and measured at an angle of 8°. The diffuse light is generated in an integrating (Ulbricht) sphere.

The probe head is made of a light weight POM (Polyoxmethalene) and has a button to trigger the measurements.
As the light source is diffuse i.e. the sample is illuminated from all directions (also opposite the measuring angle of 8°), the gloss reflected off the surface is measured together with diffuse remitted light. This means the results are independent of the gloss and measurements. This is ideal for measuring the colour of surfaces with uneven glossiness, as results will be more stable than with a 45°/0° probe head.

ColorLite offer stands for supporting the probe for different applications (see accessories).

The ColorLite spectrophotometers sph900 and sph870 are available with d/8° probe heads with 6 mm, 3 mm and 10 mm measuring areas. All versions can be supplied with a permanently installed gloss trap*.
For technical specifications see pages 31-32.

Ordering Information + Specifications

Article No.	E11349	E11752	E11348	E11751	E11350	E11753
Model *	sph870-3-UK	sph900-3-UK	sph870-6-UK	sph900-6-UK	sph870-10-UK	sph900-10-UK
Probe head	d/8 ° geometry - in accordance with DIN 5033					
Description	ColorLite sph870 with a d/8° probe head and 3 mm spot	ColorLite sph900 with a d/8° probe head and 3 mm spot	ColorLite sph870 with a d/8° probe head and 6 mm spot	ColorLite sph900 with a d/8° probe head and 6 mm spot	ColorLite sph870 with a d/8° probe head and 10 mm spot	ColorLite sph900 with a d/8° probe head and 10 mm spot
Scanning area	3 mm		6 mm		10 mm	
Aperture	8 mm		8 mm		13.5 mm	
Dimensions: Probe head	55 mm diameter; 102 mm length					
Weight: Probe head	250 g					

* All devices with a d/8° probe head can be ordered with a gloss trap denoted by „-GT“ ending of the

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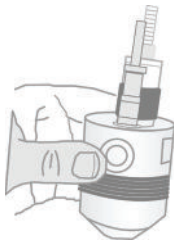
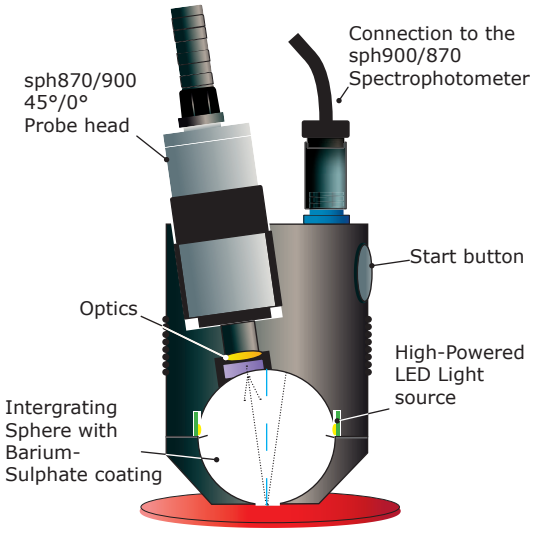


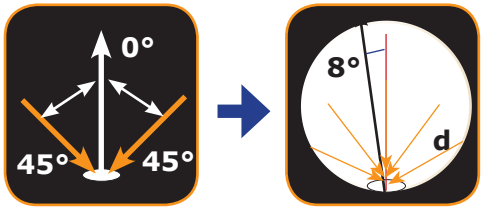
Adapter for the 45°/0° probe head

The MA35-UK probe head adapter - d/8° geometry

This unique adapter converts the 45°/0° probe head of the sph870 and sph900 spectrophotometer into a d/8° probe head in accordance to the DIN 5033 norm.
Nearly all colour measuring devices on the market are sold with one of two standard geometries. These are distinguished mainly by the type of illumination; direct or diffuse. A probe head with a 45°/0° geometry illuminates the sample with a direct light source at 45° and measures the diffuse remitted light at zero degrees (0°). A probe head with a d/8° geometry illuminates the samples with a diffuse light source and measures the remitted light at an angle of eight degrees (8°).

The 45°/0° probe head is sensitive to gloss, which means glossy surfaces which look darker are measured darker The d/8° probe head measures the gloss reflected at the 8° measuring angle together with the diffuse reflected „surface colour“, which makes the d/8° probe head much less sensitive to gloss. A gloss trap opposite the 8° viewing angle can be used to compensate this error, but this is also dependent on glossiness of the surface as only the gloss from this 8° angle is suppressed. Because of this fundamental difference the two main geometries are not compatible.





Delivery includes

- Probe head adapter MA35-UK
- White BAM calibration standard and black reference
- Certificate from the BAM (Bundesanstalt für Materialforschung) Berlin

Available accessories

- V-Block for measuring cylindrical samples
- Set for measuring liquids and powders with device holder, optical cuvette and stand
- Horizontal holder for transmission measurements of liquids, plastics etc.

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Adapter for the 45°/0° probe head

The MA35-UK probe head adapter - d/8° geometry (con't)

The adapter is available with different measuring areas. For most applications the 6 mm adapter is ideal, but for special applications 3 mm or 10 mm measuring spots are available. An ideal diffuse light source is created in the integrating sphere (Ulbricht Kugel - UK) through a special coating, with the upper layers being made of barium sulphate. All settings of spectrophotometer are automatically altered by connecting the adapter, using a very simple push-pull plug.

Only with a ColorLite sph870 or sph900 spectrophotometer will your measurements be 100% compatible to ALL your customers and suppliers - Now and in the future !

Ordering Information + Specifications						
Article No.	E13341	E13343G	E13342	E13342G	E13345	E13345G
Model	MA35-UK-6	MA35-UK-6G	MA35-UK-3	MA35-UK-3G	MA35-UK-10	MA35-UK-10G
Gloss Trap	No	Yes	No	Yes	No	Yes
Scanning Area	6 mm	6 mm	3 mm	3 mm	9 mm	9 mm
Aperture	8 mm	8 mm	4.5 mm	4.5 mm	10.5 mm	10.5 mm
Measurement Geometry	d/8° without gloss trap - Specular included or optional with gloss trap - Specular excluded					
Light Source	High powered LEDs - with a life span of over 20 Years					
Power Supply	1 WATT - supplied direct from the sph870/sph900					
Material	Lightweight Polyoxymethylene (POM)					
Weight	210 grams					
Dimensions	55 mm diameter x 78 mm length					
Coating:	Barium Sulphate					
Calibration	With certified white BAM* standard and black reference standard					

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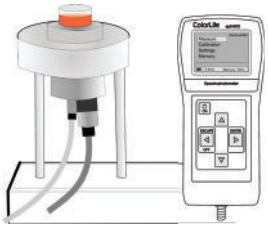
Stand for the d/8° probe head



MA35-UK-UP - Upright stand for d/8° probe head

Accessory for holding the d/8° probe head or probe head adapter in an upright position. This is needed for measuring various samples that can be placed on the opening of the probe head and measured using the d/8° geometry. Samples measured this way include:

- powders in a 25 mm glass cuvette (optional)
- cylindrical parts - additional using a v-block accessory (optional)
- very small objects that can be positioned with a spacer*
- relative small profiles that can be positioned with a spacer*
- highly glossy samples such as caps**

The set includes a stand for the sph80 and sph900 spectrophotometer which is easily clipped on to the holder and the viewing angle adjusted as needed. It has an integrated connection to the power supply (100-240 VAC).

The support for the d/8° probe head is made of black Polyoxymethylene (POM), easy to open with a clamp lever and supported by 2 steel rods. A light proof cover can be used to reduce the affects of ambient light.

Ordering Information + Specifications		
Stand - MA35-UK-UP Support for the d/8° probe head including holder for the sph870 or sph900 (device not included in the delivery)	Article No. E13474	
Light proof cap Prevents ambient light affecting results	Article No. E13494	
Glas cuvette Cylindrical cuvette made of optical glass Dimensions: 25 x 34 mm (h x d)	Article No. E15331	

See also positioning aids on page 28

**Spacer can be made customer specific by ColorLite*
*** For special applications ColorLite offers a modified version of the MA35-UK-UP*

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Probe head d/0° - 38 mm

The d/0° probe head - 38mm measuring area

The probe head illuminates the sample with a diffuse LED light source over an area of 38 mm. This version is used to measure inhomogeneous samples such as granules, foods or wood colours. The probe head is made of a light weight POM (Polyoxmethalene) and has an optional button to trigger the measurements for hand held applications.

A stand is available to support the probe, for measuring samples in a cuvette (see accessories).

Ordering Information + Specifications

Article No.	E11245	E11145	E11245T	E11145T
Model *	sph870-38	sph900-38	sph870-38-T	sph900-38-T
Probe head	d/8° geometry - according to DIN 5033			
Description	ColorLite sph870 with a 38 mm measuring spot	ColorLite sph900 with a 38 mm measuring spot	ColorLite sph870 with a 38 mm measuring spot and trigger button	ColorLite sph900 with a 38 mm measuring spot and trigger button
Scanning Area	38 mm			
Aperture	45 mm			
Dimensions: Probe Head	63 mm diameter; 135 mm length			
Weight: Probe Head	360 g			

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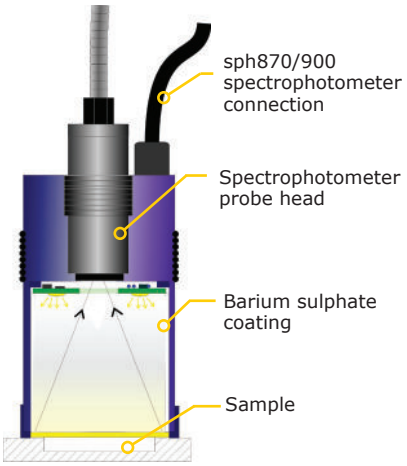
Adapter d/0° - 38 mm/ 80 mm

The MA38 and MA80 probe head adapter with 38 mm and 80 mm measuring area

Converts the sph870 or sph900 device with a 45°/0° probe head into a device with a measuring area of 38 mm/80 mm. This enables a reproducible colour measurement of extremely inhomogeneous samples such as wood surfaces, foods or granules.

The probe head adapter illuminates the sample over a large area with a diffuse LED light source. The probe is made of a light weight POM (Polyoxmethalene) and has an optional button to trigger the measurements for hand held applications. A stand is available to support the probe, for measuring samples in a cuvette (see accessories).



Ordering Information + Specifications

Article No.	E13331	E13331T	E13336
Model	MA38	MA38-T	MA80
Trigger Button	No	Yes	No
Measurement area	38 mm	38 mm	80 mm
Illustration			
Probe Head Geometry	d/0°	d/0°	d/0°
Dimensions	55 x 78 mm	55 x 78 mm	
Weight in grams	300	300	700
Light Source	High powered LEDs - with a life span of over 20 Years		
Power Supply	1 WATT - supplied direct from the sph870/sph900		
Material	Polyoxymethylene (POM)		
Coating	Barium Sulphate		
Calibration	With certified white BAM* standard and black reference standard		

** BAM Bundesanstalt für Materialforschung*

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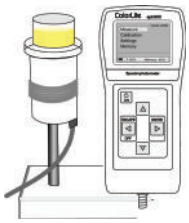

Accessories for the MA38 Probe head

MA38-Set/MA80-Set for measuring inhomogeneous

This set extends the small measuring spot of the normal 45°/0° probe head to a measuring area of 38 mm/80mm. The set is for measuring inhomogeneous samples such as pellets, plastic granules and liquids. Comprising of a MA38/MA80 probe head adapter. Casing made of Polyoxymethylen (POM) and light source from high powered LEDs. The unit is operated and powered from the spectrophotometer, which is attached by a holder. The spectrophotometer can easily be clipped on to the same holder with the viewing angle adjusted as needed. An integrated connection is used to connect the spectrophotometer to a power supply (100-240 VAC).

Included in the delivery:

- Probe head adapter with a white BAM tile used for calibrating
- Stand for supporting the MA38/80 adapter and spectrophotometer
- Optical cuvette
- Light proof cover used as a black reference

Ordering Information + Specifications		
MA38-Set Set for measuring inhomogenious samples including the MA38 adapter with stand and holder for the sph870 or sph900 spectrophotometer (device not included in the delivery)	Article No. E13332	
MA80-Set Set for measuring inhomogenious samples including the MA80 adapter with stand and holder for the sph870 or sph900 spectrophotometer (device not included in the delivery)	Article No. E13337	
MA38-Set (without an MA38) Same description as Article No. 13332	Article No. E13338	
Reflector with spacer Used to measure translucent liquids. Fits into the glass cuvette	Article No. E13493	
Replacement glass cuvette Glass optical cuvette 30 x 50 mm	Article No. E15332	
Metal cuvette Replacement metal cuvettes with glass floor	Article No. E15337	

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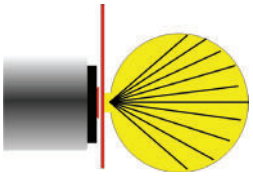
Transmission accessory - d/0° mode

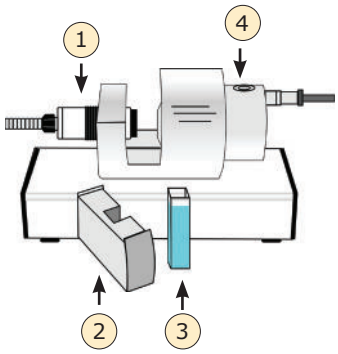


MA35-UK-CA10 - for transmission measurements

Accessory for measuring samples in transmission mode. On the one side of the device supports an integrating sphere, which is used as a diffuse light source, and on the other side of the sample the normal 45°/0° probe head is fixed to measure the transmitted light. This setup is used mainly for measuring transmission of translucent samples, such as:

- translucent liquids
- transparent liquids
- plastic sheeting of different thicknesses
- various plastic parts

The results transmission spectrum in the range between 400 to 700 nm, opacity, CIE L*a*b*-values, density or yellowness. The integrating sphere can be MA35-6-UK adapter or a single purpose light source: For measuring liquids in disposable plastic cuvettes we offer a holder which slots in between the light source and probe head.



1) Probe head
2) Cuvette holder
3) Disposable cuvette
4) Diffuse light source

Delivery includes:

- Holder for the MA35-UK adapter or light source (MA35-UK included)
- Stand for supporting the spectrophotometer
- Adapter for the use of 10mm disposable cuvettes, incl. 100 cuvettes

Ordering Information + Specifications	
MA35-UK-LS Integrating sphere MA35-UK-LS with same specifications as the MA35 adapter but simplified to be used as a light source only for the CA10-UK	Article No. E13352
Holder MA35-UK-LS (the same as Article No. 13352) without the MA35 adapter	Article No. E13351

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Transmission 0°/0° for the 45°/0 probe head

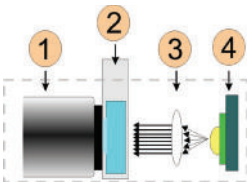
CA10 and CA10-LS sets for measurements of liquids

The CA10 and CA10-LS sets with integrated light source are used for measuring different types of liquids which are measured in standard sized 10 mm cells made of glass or disposable plastic.

The CA10 set is used for measuring opaque liquids in disposable cuvettes. As the CA10-LS has an integrated light source it is used for measuring transparent liquids in a 0°/0° transmission mode.

The light source is a high powered white LED, with the casing made of Polyoxymethylen (POM). Operation and power supply come from the spectrophotometer which can be easily clipped on to the holder and the viewing angle adjusted as needed.
The stand has an integrated junction to the power supply (100-240 VAC).

The delivery includes 100 disposable plastic cuvettes made of polymethylmethacrylat PMMA



1) Probe head
2) Disposable cuvette
3) Collimator
4) Direct light source

Ordering Information + Specifications

CA10-Set Set for measuring opaque liquids in disposable cuvettes with holder for the sph870 or sph900 spectrophotometer. Samples are measured in a reflectance mode only (device not included in the delivery)	Article No. E13452
CA10-LS Set Set for measuring transparent liquids in disposable or glass cuvettes with an integrated direct LED light source and holder for the sph870 or sph900 spectrophotometer (device not included in the delivery)	Article No. E13462
Disposable 10 mm cuvettes Plastic cuvettes 12.5 x 12.5 x 45 mm with a 10 mm optical path - 100 pieces	Article No. E15334
Working white standard Used to calibrate the CA10 with the probe head in the unit	Article No. E13522

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Accessories for measuring powders

Powders can be measured mainly by different methods; either the powder is measured directly in a powder form or it is pressed into a tablet form.

To measure the powder in its original form, an interface is needed to prevent the powder from soiling the probe head. Normally the powder is filled into a glass cuvette which is tapped on a solid surface, so that an even film of powder can be observed through the glass. ColorLite offers you this solution as a powder measurement set. But as we have a fully water and powder proof probe head (IP67 Version) on offer this can be used to measure powders directly without having to take a sample. The ColorLite probe head can be easily cleaned with a brush and/or under runing water after use.

A more complicated method is to press the powder before measuring into a tablet. The surface of the tablet can then be measured directly as if it is a solid. Again we advise using our IP67 probe head to measure the tablet also to prevent soiling. For measuring powder tablets we also offer a complete set with every thing needed.

Set 1 for measuring powders in glass cuvettes

The set includes a device holder for the spectrophotometer (not included) which is easily clipped on, with the viewing angle adjusted as needed. The holder has an integrated connection to the external power supply included. The probe head is supported in an upright position in a probe head holder. To calibrated the device in this position a working white standard is supplied. The working standard has to be calibrated against the BAM white standard first.

Included in the delivery:

- Probe head and device holder
  White ceramic tile 38 mm diameter used as a working standard
- Optical cuvette, cylindrical made of special glass. Dimensions: 30 x 50 mm (h x d)
- Mains power supply 100 - 240 VAC
- Light proof cover

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Accessories for measuring powders

Set 2 for measuring powders in in tablet form

For measuring fine grained powders ColorLite offers a complete set, as an accessory for the sph870 and sph900 (not included). The set includes the same probe head and spectrophotometer holder as in the set for measuring powders in cuvettes. But also includes a hand press and a powder form and piston.

The tablets are pressed against a glass which creates a perfect smooth surface. This surface can be measured direct by the spectrophotometer. To prevent the probe head from being soiled a shp870 or sph900 with IP-67 probe head can be used. As the colour values measured are dependent on the density of the powder, measuring powders in tablet form is the method with the best reproducibility.

To calibrated the device in this position a working white standard is supplied. The working standard has to be calibrated against the BAM white standard first.

Included in the delivery:

- Probe head and device holder
- White ceramic tile 38 mm diameter used as a working standard
- Powder press: Force = 1.5 kN, 110 x 360 x 160 mm (w x h xd), Weight = 7.5 kg
- Powder form + piston
- Mains power supply 100 - 240 VAC

Ordering Information + Specifications

PWD-Set 1 Set for measuring powders in glass cuvettes with holder for the sph870 or sph900 spectrophotometer (device not included in the delivery)	Article No. E13483
PWD-Set 2 Set for measuring powders as tablets with holder for the sph870 or sph900 spectrophotometer (device not included in the delivery). Delivery includes: - Maeder hand press, compression force 1.5 kN - powder holder with stamp - glass plate - positioning aid for measuring head	Article No. E13481
Glass cuvette - replacement Cylindrical cuvette made of optical glass Dimensions: 25 x 34 mm (h x d) 	Article No. E15331

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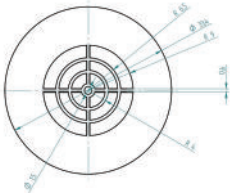


Accessories
Probe head positioning aids

Positioning tools for the 45°/0° probe head

The target device is made of black anodised aluminium with the crosshair made of stainless steel. A inner plastic sleeve on the 45°/0° probe head version prevents jamming.

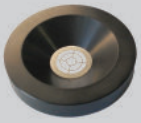
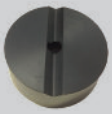
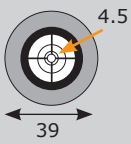
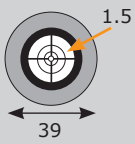
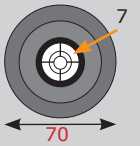
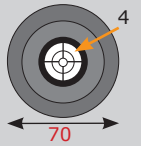
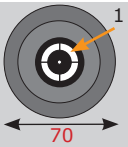
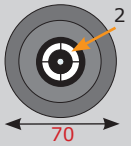
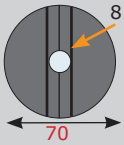
Positioning tools for the d/8° probe head

The target accessories are available for 3 mm and 6 mm probe heads.

The aperture accessories have a 1 mm or 2 mm opening used for minimising the measurement area accordingly. They are supplied with a auxiliary white standard so it is possible to calibrate together with aperture tool, so that absolute values still match.

The V-block accessory can be fitted to the MA35-UK probe head and enables cylindrical samples to be positioned exactly in the center of the probe head opening. The v-block can be best used together with the MA35-UK-UP stand which supports the probe in an upright position.

Ordering Information + Specifications

Article No.	E13511	E13513	E13512				E13346
Model	TD-4	TD-1.5	TD-7-UK	TD-4-UK	AP-1-UK	AP-2-UK	V-6-UK
Measurement area	3 mm	1 mm	6 mm	3 mm	1 mm	2 mm	6 mm
Aperture	4 mm	1.5 mm	7 mm	4 mm	1 mm	2 mm	8 mm
Illustration							
Used with Probe Head	45°/0°	45°/0°	d/8°	d/8°	d/8°	d/8°	d/8°
Diagram (dimensions in mm)							
Dimensions	39 x 13 mm	39 x 13 mm					
Weight	10 g	10 g					
Description	Target device for positioning the standard 45°/0° probe head	Target device for positioning the XS probe head	Target device for the d/8° probe head 6 mm scan area	Target device for the d/8° probe head 3 mm scan area	Aperture for measuring 1 mm area with the d/8 probe head	Aperture for measuring 2 mm area with the d/8 probe head	V-block cap for positioning the samples on the d/8 probe head

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ColorLite sph900 & sph870
Spectrophotometers

ColorLite
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Accessories
Supplement aids and spare parts

Battery pack

Article No.	E13411

Rechargeable battery made of 5 cells in NiMH (Nickel–metal hydride) technology. By using a low self-discharge version our equipment is always ready to use, even after a longer storage period. The battery simply clips on and off.

Power supply and device holder

Article No.	E13471	E13474
Model	HT-45-0	HT-D-8
Probe head	45°/0°	d/0°

For using the colorLite sph870 or sph900 as a desktop device we offer a stand which has a support also for the probe head. When using this accessory the spectrophotometer is supplied with power from a mains power supply (110V-240V, 50/60 Hz) which is included in the delivery. Available in two versions

padded carrying case

Article No.	E13501

The protection casing has an adjustable strap, a transparent front and a velcro fastener. The side has an extra strap for holding the probe head. Can be used for hands free applications.

Working standard - small

Article No.	E13521

White ceramic tile 10 mm in diameter, has a polished surface and is edged in a black pastic. The tile is delivered in a padded case. The standard can be used to protect the original 45°/0° BAM standard.

Working standard - large

Article No.	E13531

White robust ceramic tile 38 mm in diameter, has a polished surface and is edged in black plastic. The tile is delivered in a padded case. The standard can be used to protect the original 45°/0° BAM standard or can be used when a defined white back ground is needed.

Green Tile

Article No.	E13591

The equipment is calibrated with a white BAM standard (d/8° probe heads also with a black reference), but to check if the spectrophotometer is working 100% correctly a independent green tile can be measured. The tiles that we supply for this task, are from a company (CERAM) that produces tiles with a guaranteed stability over time and designed for colour metrological applications. Dimensions 50 x 50 mm.

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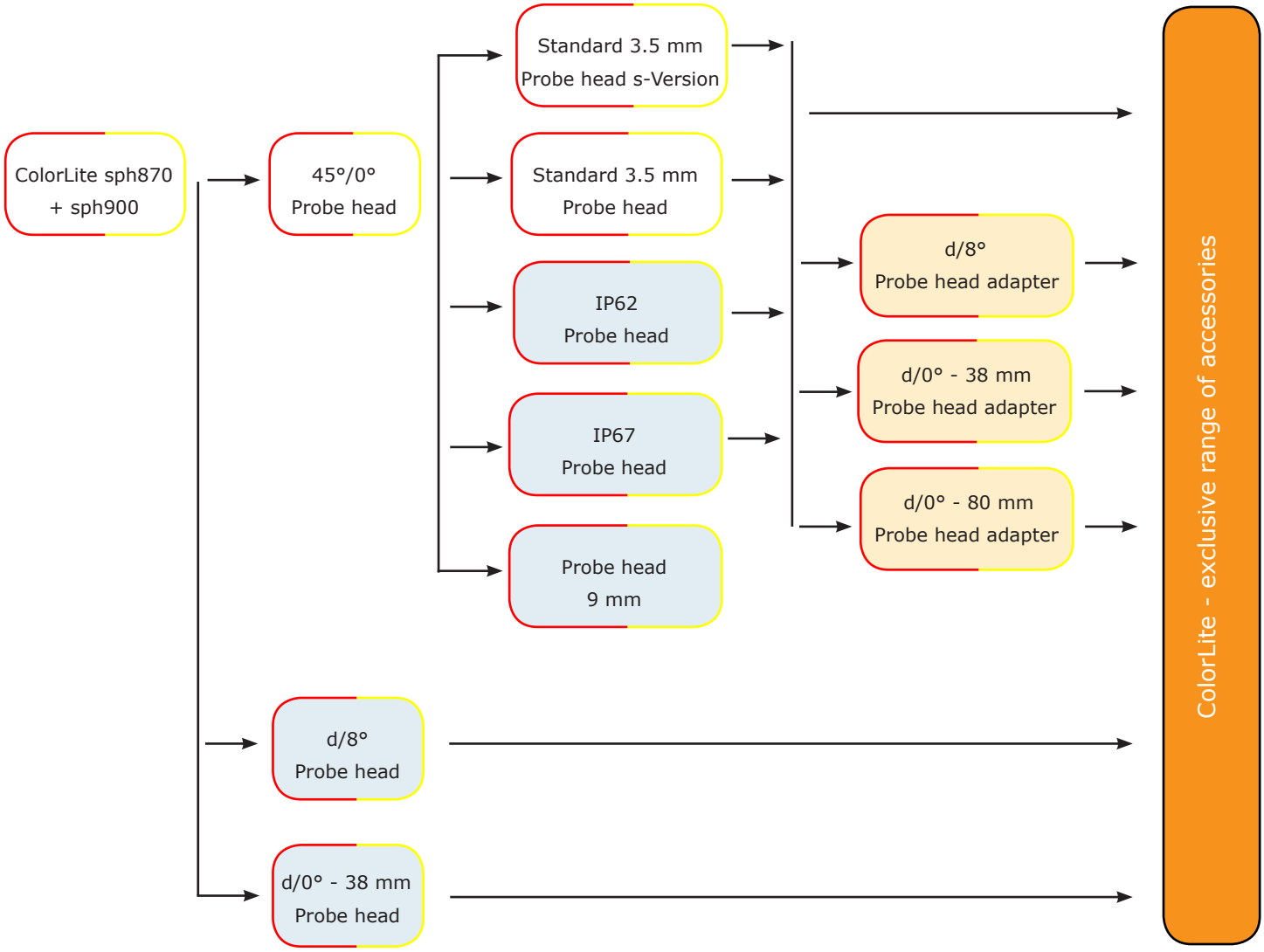
Probe Head Overview



	Standard Version
	Special Versions
	Probe Head Adapters
	Accessories

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Technical Data

Below the technical data typical for all models. For model dependent data please see text in the pages above.

Funktion	ColorLite sph900	ColorLite sph870
Measurement Geometry	45°/0° - or d/8° - according to DIN5033 optional 45°/0° AND d/8° with MA35-UK adapter	45°/0° - or d/8° - according to DIN5033 optional 45°/0° AND d/8° with MA35-UK Adapter
Illuminants	D65, D55, D50, A, C1, C2, C3, F11 all other illuminants available on demand	D65, D55, D50, A, C1, C2, C3, F11
Standard Observer	2° and 10°	2° and 10°
Data Output / Colour Scales	XYZ, Yxy, ΔE CIE L*a*b*, L*u*v*, L*C*h, Hunter Lab Remissions Spectrum with cursor displaying wavelength and %, CIE-L*a*b* Diagram incl. tolerance limits	XYZ, Yxy, ΔE CIE L*a*b*, L* u* v*, L*C*h, Hunter Lab CIE-L*a*b* Diagram incl. tolerance limits
Quality Control Tolerance Limits and Colour Differences	ΔE CIELab; ΔL, Δa, Δb; ΔL, Δu, Δv; ΔL, ΔC, Δh; Min/Max, PASS/FAIL ΔECMC (1:1 and 1:2), CIE ΔE94 Metameric-Index for D65/A and D65/F11 according to DIN 6172	ΔE CIELab; ΔL, Δa, Δb; ΔL, Δu, Δv; ΔL, ΔC, Δh; Min/Max, PASS/FAIL
Other Values	Contrast: LRV (Light Reflectance Value) according to - BS 8493:2008 Various White-Index values Various Yellowness-Index values Grey-Index Hazen/APHA; JOD (CA10-LS Adapter needed)	not available
Spectral Light Source Measurement	Spectra and chromaticity measurement of light sources such as LED‘s - optional	Spectra and chromaticity measurement of light sources such as LED's - optional
Sample photos	350 Colour photos to visualise scanning area Dimension: 160 x 120 Pixel	not available
Displayed Spectral Range	400 to 700 nm	400 to 700 nm
Spectral Resolution	Holografic grating-Spectrometer FWHM** @ 500 nm < 10 nm Scanning in 3.5 nm intervals Resolution: 115 x 65.536 steps per scan	Holografic grating-Spectrometer FWHM** @ 500 nm < 10 nm Scanning in 3.5 nm intervals Resolution: 115 x 65.536 steps per scan
Display	High resolution O-LED colour display: High contrast and low-power 1/4-VGA, 320 x 240 Pixel	High resolution TFT-colour display: High contrast, 1/4-VGA, 320 x 240 Pixel
Repeatability	< 0.03 ΔE CIELab	< 0.05 ΔE CIELab
Light Source	White and blue LED‘s Life span > 20 years	White and blue LED's Life span > 20 years
Scanning Time	Complete measurement cycle with calculation and readout time: 0.5 sec	Complete measurement cycle with calculation and readout time: 0.5 sec

**Full width at half maximum

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Technical Data continued

Function	ColorLite sph900	ColorLite sph870
Multiple Scanning	Mean calculation of 1 to 20 individual measurements with colour values and standard deviation statistics displayed	Mean calculation of 1 to 20 individual measurements with colour values and standard deviation statistics displayed
Power Supply	Rechargable battery NiMH 6-Volt /1100 mAh Operating time > 15 hours Charging time 1.5 hours Optional - operation with power supply	Rechargable battery NiMH 6-Volt /1100 mAh Operating time > 15 hours Charging time 1.5 hours Optional - operation with power supply
Automatic Accessory Recognition	An accessory is detected and device settings automatically modfied accordingly	An accessory is detected and device settings automatically modfied accordingly
Calibration	With white standard certified by the Federal Institute for Materials Research (Bundesanstalt for Materialforschung -BAM), optional - 2-stage calibration with working standard	With white standard certified by the Federal Institute for Materials Research (Bundesanstalt for Materialforschung -BAM), optional - 2-stage calibration with working standard
User-Mode	Limited user rights - Password protected	Limited user rights - Password protected
Upload Standards from PC	Yes	Yes
Memory	Memory for 1000 standard colours Memory for 1000 colour values Memory for 300 spektra (400-700nm / 3.5nm) Memory for 350 sample-photos (160 x 120 Pixel)	Memory for 1000 standard colours Memory for 1000 colour values Memory for 300 spektra (400-700nm / 3.5nm)
Standard Colour Management	Standards loaded by list with Best-Match tool Standards loaded by index-no. Standards loaded by entering name	Standards loaded by list with Best-Match tool Standards loaded by index-no. Standards loaded by entering name
PC-Interface	USB 2.0 RS232 - optional	USB 2.0 RS232 - optional
Accessories	For the measurement of inhomogeneous samples, transparent, translucent and opaque liquids, powders in cuvettes or tablet form. Holder/stand with power supply:110-240V, 50/60 Hz	For the measurement of inhomogeneous samples, transparent, translucent and opaque liquids, powders in cuvettes or tablet form. Holder/stand with power supply:110-240V, 50/60 Hz
Dimensions	Device with battery: 180mm x 82mm x 40mm - 370g Probe head 45°/0°: 60mm x 25mm Ø - 170g Probe head d/0°: 78 mm x 56 mm Ø - 250g	Device with battery: 180mm x 82mm x 40mm - 370g Probe head 45°/0°: 60mm x 25mm Ø - 170g Probe head d/0°: 78 mm x 56 mm Ø - 250g
Climatic Conditions	Ambient temperature: 15°C to 45°C Relative humidity: max. 85 % non-condensing	Ambient temperature: 15°C to 45°C Relative humidity: max. 85 % non-condensing

Included in the delivery of all our spectrophotometers are:

- BAM Certificate
- Aluminium carrying case with foam padding
- Battery charger
- USB cable

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