LightSpion

Patent pending

User guide

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VISO SYSTEMS

Dimensions

Weight: 5 kg

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Safety Information

Warning! This product is not for household use.

Read this manual before installing and operating the controller, follow the safety warnings listed below, and study all the cautions in the manual.

Preventing electric shocks

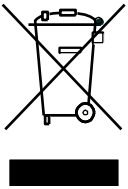
Make sure the power supply is always grounded.

Use a source of AC power that complies with the local building and electrical codes, that has both overload and ground-fault protection.

If the controller or the power supply are in any way damaged, defective, wet, or show signs of overheating, disconnect the power supply from the AC power and contact Viso Service for assistance.

Do not install or use the device outdoors. Do not spray with or immerse in water or any other liquid.

Do not remove any covers or attempt to repair the controller or the power supply. Refer any service to Viso.



Disposing of this product

Viso products are supplied in compliance with Directive 2002/96/EC of the European Parliament and of the Council of the European Union on WEEE (Waste Electrical and Electronic Equipment), as amended by Directive 2003/108/EC, where applicable.

Help preserve the environment! Ensure that this product is recycled at the end of its lifetime. Your supplier can give details of local arrangements for the disposal of Viso products.

Introduction

About the LightSpion

The LightSpion is a revolutionary new portable lighting measurement device making it possible to measure all aspects of a light source within a few seconds.

Package contents

The LightSpion package contains the following items.

- The LightSpion portable measurement system
- Light Inspector software USB key
- Viso calibration certification - digital certificate
- E27 goniometer base light holder
- Light source alignment tool
- E14, B22, GU10 from E27 socket converters
- 2 m IEC power cord
- 2 m USB cable

About this document

These guidelines describe the installation process of the LightSpion controller followed by the typical measurements of various light sources.

Installation

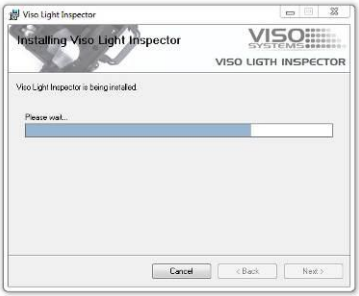
Software installation

Before you can start using the LightSpion, the Viso Light Inspector software must be installed. It is supported on all windows platforms.

Use the following link to download the latest version: http://www.lightdataserver.com/software/Viso%20Systems/LightInspector.htm

Please make sure the LightSpion is not connected to the computer during software installation.

Run the .msi file and follow the installation instruction.



USB drivers are automatically installed.

Your measurements are not lost when installing newer versions or uninstalling. All measurements will always remain in your document folder.

Connecting power

The LightSpion comes with a standard IEC power-in connector and with a standard euro power cable, but any power cable can be used as the LightSpion supports any outlet voltage from 90-260VAC.

The power-in connector supplies power both to the goniometer motor and to the power analyser and then subsequently to the measuring light source. It means that the power is identical to the one of the measuring light source.

AC power supply cable plug

Warning: Risk of an electric shock! Plug installation shall be performed by a qualified electrician.

A grounding-type (earthed) power plug that fits the local power outlet must be used. You can acquire an IEC power cable with a suitable grounding-type plug from most of consumer electronics stores.

When installing the plug connect pins as follows:

yellow and green wire to grounding (earth)

blue wire to neutral

brown wire to live

Connecting USB

The LightSpion is connected to the computer using a USB connector type B. A 2m USB cable type A to B is included in the LightSpion case, however any USB cable supporting USB2.0 can be used.

The USB provides communication and power to the LightSpion's main board processor, power analyser and photo spectrometer, meaning that the photo spectrometer can be used only with the connected USB.

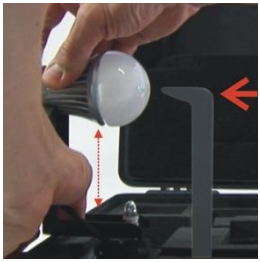
Start the Viso Light Inspector software after having connected the USB; the connection to the LightSpion will be established automatically. A successful connection is shown with a green "Connected" icon in the upper right corner of the Viso Light Inspector software.

You can connect and disconnect the USB without restarting the Viso Light Inspector software, as the connection is always established automatically as soon as the USB connector is plugged in and vice versa.

Making measurements

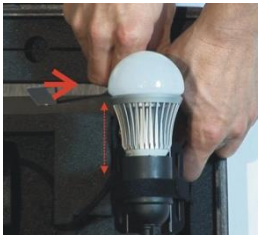
Measuring light source (bulbs and spots)

Before making any measurements it is important to align the investigated light source. Use the alignment tool located in the front compartment of the LightSpion case and place it in front of the light source.

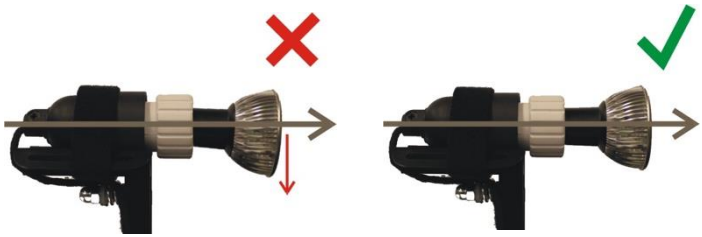


Then adjust the height by sliding the lamp holder bracket up and down.

Turn the lamp holder 90 degrees and set the centre of rotation by sliding the lamp forward and backward, so that the centre of the illumination part of the lamp is aligned with the alignment tool.

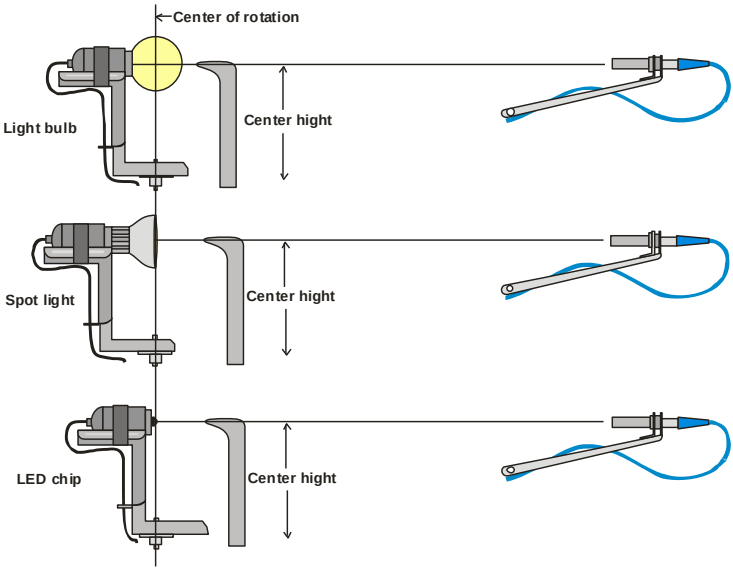


When measuring light sources with narrow beam angles it is important to ensure that the light is pointing straight horizontally to make certain that the centre of the beam is scanned at the correct point as shown below.



After alignment turn the light source back pointing straight towards the optical sensor.

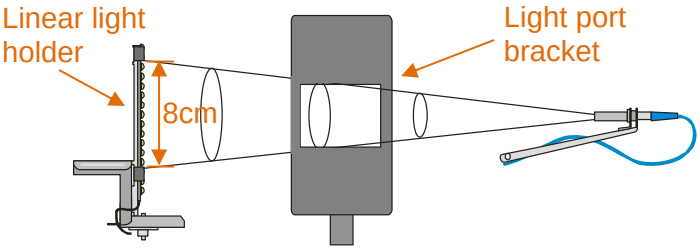
The different alignment examples are shown below:



Measuring linear lights (strips and tubes)

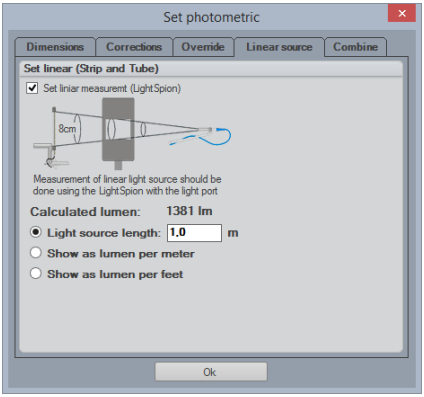
The LightSpion can also measure linear light sources such as LED strips or tubes. The width of the linear tubes cannot exceed half of the maximal diameter, which is 8 cm. That means the maximum width of the linear tube is 4 cm.

To measure a linear light source a “light port bracket” must be used to ensure that only a fixed portion of the linear light sources is being measured as shown below.



The “light port bracket” ensures that only 8cm of the linear light source is captured. The actual length of the light source is then inserted into the software after the measuring process is finished.

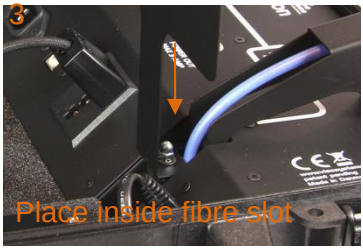
Click *Edit -> Photometric -> Linear sources* to insert the real length of the source to the software. The complete light output of the linear light sources is then calculated.



For linear light sources of flexible lengths such as LED strips it is also

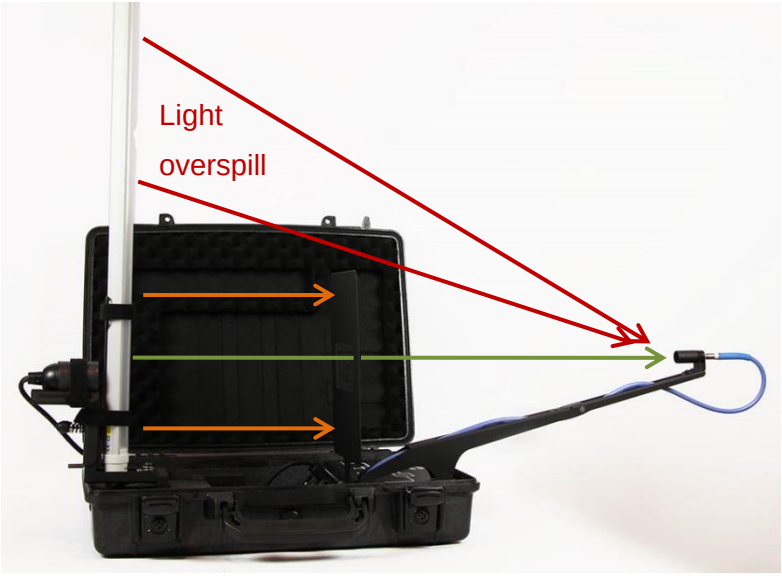
possible to get the light output information specified in lumen per meter or foot.

The “light port bracket” should be place in the LightSpion case to ensure the correct measurement as shown below:



The “linear light holder” is set and used as shown in the pictures below:

6 check for light overspill



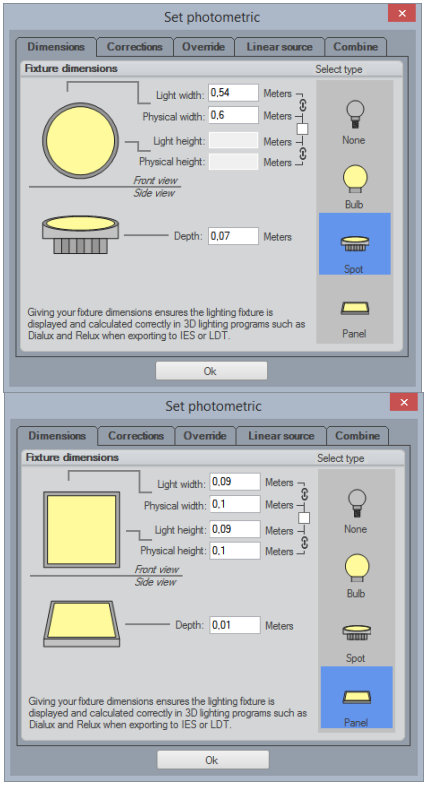
Light overspill, which is the light received by the detector outside of the light port bracket area, can increase the measured value of the luminous flux.

A newly designed extension for the light port bracket will prevent the light overspill. The extension is smoothly

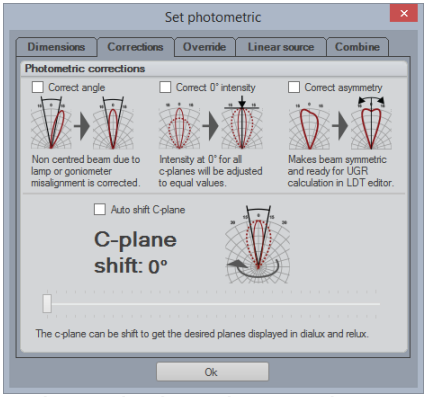
attached on top of the port bracket as shown in the pictures below.

Photometric parameters and corrections.

To calculate the correct lighting outputs for further visualisation, it is necessary to insert the dimensions of the measured lighting fixtures (bulbs, spots and panels) in the table as shown in the figures. The table is found under *Edit -> Photometric-> Dimensions*. This feature enables the data files to reflect the luminous and physical dimensions for an accurate 3D visualisation in lighting software.



The photometric adjustments introduced in the relevant compartment of the same table are useful when measuring light sources with asymmetric or tilted intensity distribution curves; for example, outdoor or automotive lighting fixtures can yield slight tilts, which are corrected by the software, as shown in the relevant picture.



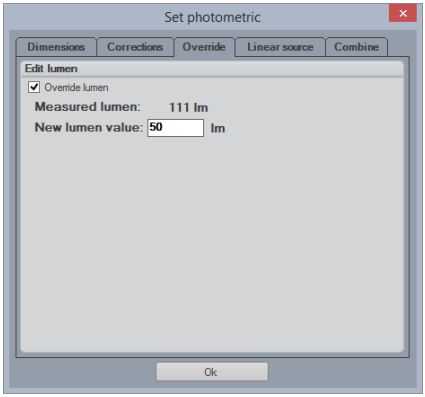
“Correct angle” adjusts the off-centred intensity distribution relative to the 0˚axis, so that it becomes symmetric.

“Correct 0˚intensity” equates the intensities at the 0˚axis for all of the c-planes during a measurement, as sometimes the intensity values for different c-planes can vary due to goniometer misalignment.

“Correct asymmetry” modifies the profile of the distribution to be vertically symmetric. Such a symmetry is required for further calculation of UGR (unified glare rating) in an LDT editor. However, this modification should not be applied for light sources with off-centred beams, like street lighting systems.

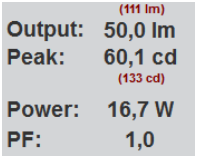
“Auto shift C-plane” allows the software to automatically choose and display the C-plane with the highest value of the intensity distribution in candela. This option is useful when the data files are opened in Dialux or Relux.

“Override” option can be used to modify the flux in lumen, so that the exported pdf report shows the desired value in accordance with the customer’s desires (for instance, 110 lm in the report versus 109 lm from the measurement).

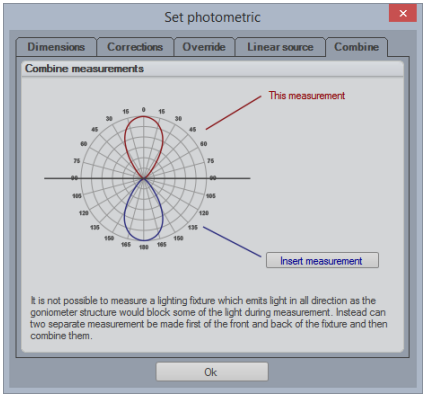


It is important to keep in mind that the new flux value also affects the calculated intensity in candela.

However, in the original data file the measured values will always be displayed in parenthesis above the overridden numbers.



At present, it is challenging to measure a lighting fixture, which emits light in 4π (all directions), as the goniometer structure can block some light. However, to overcome this difficulty the front and back of the lighting fixture are measured separately. The two intensity distributions are then merged together presenting an overview of a fully-spherical illumination. Thus, the *“insert measurement*” button will open a dialogue for the additional data file, and then the two curves will be combined.

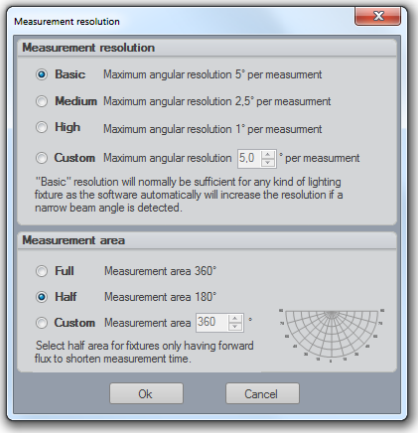


Radio waves precautions

It is recommended **not to have** a receiver or a transmitter of radio waves in the vicinity of a working LightSpion. Thus it is advisable to keep your smartphones and other electronic devices away from the system as they can interfere with the spectrometer and perturb the final results.

Quality selection

It is possible to manually select the measurement quality beforehand in *Setup -> Measurement* quality.



The Viso Light Inspector uses the basic resolution by default. Yet, there are three different levels: basic, medium and high. Each quality level increases the number of measurements made during the goniometer operation, it also increases the photo spectrometer integration time whilst lowering the noise level of the photo spectrometer measurements.

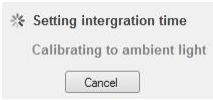
Increasing the quality results in substantial extension of the measuring time and is in normal circumstance not recommended as the system automatically detects if a lamp has a beam shape which requires a higher resolution as described on page 21.

Fully automatic

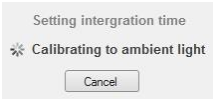
The Viso Light Inspector software makes fully automatic measurements by default. It adjusts the photo spectrometer to the background light environment by firstly turning off the light source and secondly measuring the background light level, which is subsequently subtracted from the following measurements. Therefore the measurements can be done even in a lit room. The adjustment of the exposure time of the photo spectrometer (also known as the integration time) is also done automatically.

A measurement is simply started by clicking on the play icon.

Then the integration time is set automatically.

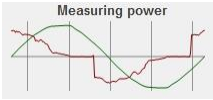


The ambient light level is automatically measured by turning off the light source.

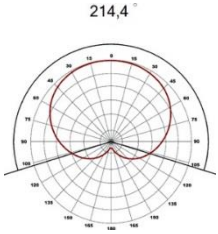


The light source is then rotated at 180 degrees to prepare for measurement.

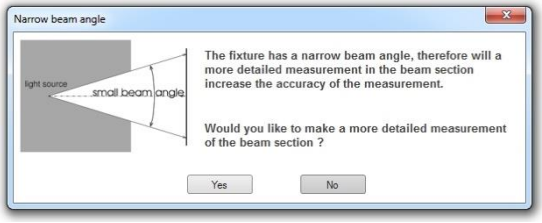
The power is then measured and stored.



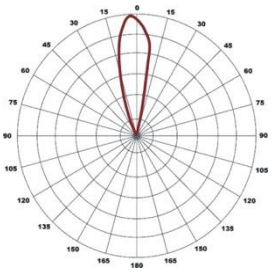
The complete 360 degrees angular light field is then measured and the beam angle is calculated.



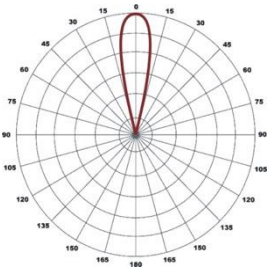
Light sources with narrow beam angles can have insufficient number of measurements in order to generate an accurate result. In such a case the Viso Light Inspector software will ask you automatically, whether you would like to have a more detailed scan of the beam section.



The increase in measurement quality after a detailed re-scan of the narrow beam section can be seen below.



Before a detailed auto re-scan



After a detailed auto re-scan

Upon completion the main characteristics are calculated and displayed: the total luminous flux in lumen, the colour rendering index CRI, the efficiency in lumen/watt, the peak light intensity in candela, the power and power factor.

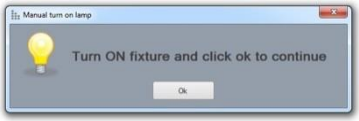
Further details about the measurement data can be found in the chapter "Measurement data".

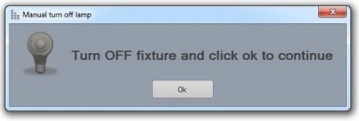
Manual power control

In some cases it is necessary to control the power of the light source manually. For example, when measuring flash light on batteries, as the LightSpion's power analyser won't be able to turn on and off the light source automatically. Another example could be a low voltage light source such as LED chips. The external power supply of such chips has low response time when turned on and off, therefore it would lead to an inaccurate result of the ambient light level.

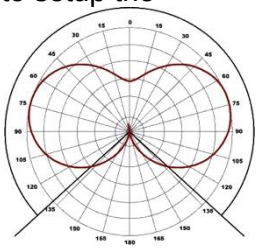
To enable the manual power control select *Setup -> Power control* and select manual power control.

When the manual power control has been selected the Viso Light Inspector will ask you to manually turn on and off the light source when necessary, as shown below.



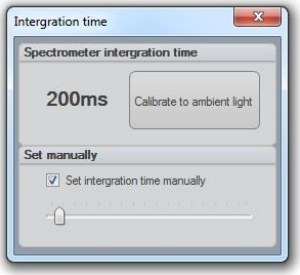


Manual setup of the integration time



In some rare cases it could be desirable to setup the integration time of the photo spectrometer manually. One case could be when measuring a light source emitting most of the light to the sides instead of in the central direction. As the automatic setup of the integration time is done in the centre at 0 degrees, the integration time would be too high, resulting in saturation of the photo spectrometer and leading to an inaccurate measurement.

The integration time of the photo spectrometer can be set manually by selecting *Setup -> Integration time*.



Independently running spectrometer

The photo spectrometer can also be used to run independently to test different light sources that might be too large for a complete goniometer measurement or to have a real-time update on how the light source behaves over time.

To start the photo spectrometer independent operation click on the spectrum scan icon.

During the independent run mode the light intensity output in candela, CRI, and colour temperature are being continuously updated.

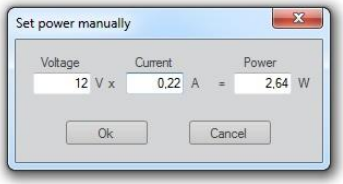
The integration time can be changed during the free run scan, as explained in the previous chapter to ensure a correct resolution.

NOTE: After changing the photo spectrometer integration time the spectrum should be “Calibrated to ambient light”.

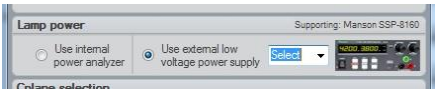
Measurement of low voltage lamps

When measuring low voltage light sources such as 12 volt MR16 lamps or strips must an external low voltage power supply be used.

Any low voltage power supply can be used. If you want the measured power to be seen from the low voltage side must the power details be typed in manually by going into Edit->Power.



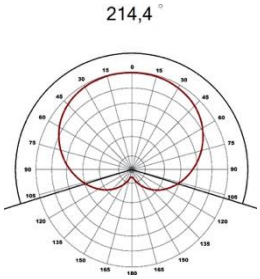
It is also possible to have the low voltage measured automatically by using a Manson SSP-8160, KORAD KA3005P or VELLEMAN PS3005D low voltage power supply which can communicate via USB with the Light Inspector software by going into Setup->Options->Lamp power. The SSP-8160 ranges from 0-42VDC both in constant voltage and constant current mode. Viso System does not distribute the Manson power supply but it can be bought online at many resellers.



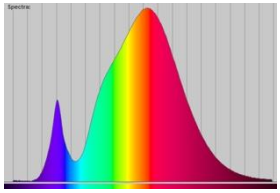
Measurement data

After the goniometer measurement is complete the following results are displayed.

1. The angular light distribution shows the amount of light from the non-rotational symmetrical part of the light source. This field distribution is used to calculate the beam angle.



2. The complete integrated spherical spectrum is shown in the spectral window. Integrated spherical spectrum signifies a spectrum that is mathematically integrated from all of the individual spectra in the spatial distribution. Thus it represents the equivalent of a spectrum obtained from an integrating sphere.



3. The complete integrated spherical spectrum calculated in the previous step is utilised to calculate the luminous flux in lumens.

The peak intensity output in candela is also displayed, which accords to the highest level of the light output during goniometer measurement.

4. The power is measured by sampling a voltage and a current at a rate of 50.000 samples per second to ensure high resolution and thus high power precision.

The power factor (PF) indicates the quality of power consumption, where 1.0 being the best (it is generally achieved with a pure resistive load such as a tungsten lamp) and 0.0 being the worst. For a satisfactory level, the PF value should be located between 0.5 – 1.0. You can refer to the quality chapter in order to figure out the power standards for different countries and regions.

5. The efficiency in lumens per watt is calculated by dividing the luminous flux in lumens to the power consumption. The result is displayed in the efficiency bar with a corresponding colour, where 100 lumen/watt it shown as the outmost green. The standard maximum value of 100% efficiency is 683 lumen/watt.

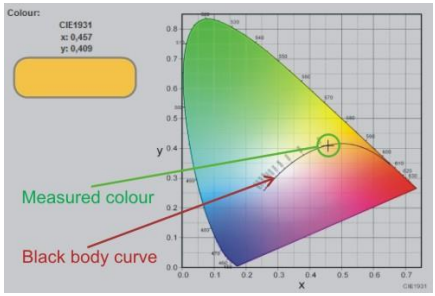
6. The CRI is calculated using the standard 8 reflectance colours in order to figure out the ability of the light source to transmit colours, thus indicating the quality of the radiated light. 0 being the worst quality and 100 being the best quality equal to that of the Sun.

The CRI can only be used for white light. If the CRI is not indicated that means that either the radiated light does not meet the criteria for white light or that light levels are too low to be measured.

7. The photometric colour temperature indicates the colour of the white light and is displayed in kelvin. Where 6000K is considered as cold and 2500K as warm. The kelvin scale was initially derived from the temperature of the tungsten filament. Therefore the high temperature of the filament is considered as cold light and vice versa. If the colour temperature is not displayed, it means that either the radiated light does not

meet the criteria for white light or that light levels are too low to be measured.

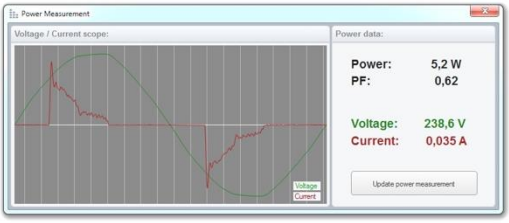
8. At a closer look, the radiated colour is shown with x and y coordinates in the CIE1931 diagram. The diagram illustrates all visible to the human eye colours. It is based on an experiment conducted in 1931 with a number of participants aiming at figuring out the eye's perception of colour.



The black line in diagram is called the black body curve. It illustrates all colours that are defined as white colours from warm to cold. The point corresponding to the measured colour is shown with a black cross. It can be used to check the whiteness of a colour, by checking how close it is to the black body curve: the closer it is to the black body curve the more accurate is the white colour.

Power details

A detailed voltage and current data can be viewed by clicking on the scope button or selecting “View->Power details”



The real-time data of the voltage and current is shown in the power details window: the green line illustrates voltage (it should have a sinus curve). The upper part of the sinus curve can sometimes have a flat top, which is explained by the power grid distortions. The current is presented with a red line, it is displaying how the current is consumed by the light source.

The power factor is an indication of how well the current is consumed through a voltage period. The power factor is calculated according to the following principle: the value of the actually consumed power is divided by the product of the voltage and the current. PF = Power / (Voltage x Current) = 5,2 / (238,6 x 0,035) = 5,2 / 8,35 = 0,62.

When the transformation of the current by the light source is not efficient, the source will consume more current than necessary.

When the current is not consumed by the light source efficiently, the cabling during installation should be adjusted accordingly. The excess current will result in power loss due to cables’ heating, etc. A general rule is the following: a 10W light source with a PF 0.5 must be connected to an installation capable of supplying 20W. The corresponding formula reads installation W = Power/PF.

Example 1

Shows a standard 60W tungsten bulb with an ideal PF of 1.0 and a current curve that is identical to the voltage.

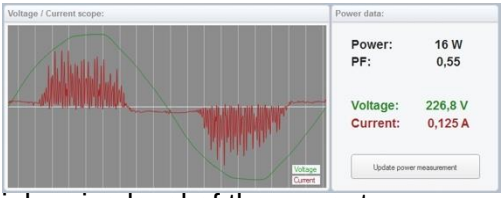
Example 2

Shows a LED bulb that has a passive capacitor power supply, which results in a high phase shift between current and voltage, thus resulting in a very low power factor of 0.19.

Example 3

Shows a LED bulb of a medium quality switch-mode driver with a high capacity peak load, thus a medium quality power factor of 0.62.

Example 4



Shows a LED bulb having a switch-mode driver with a particularly bad filtering. It results in a high noise level of the current. Therefore this level of noise would probably not be able to pass the EMC noise level requirements.

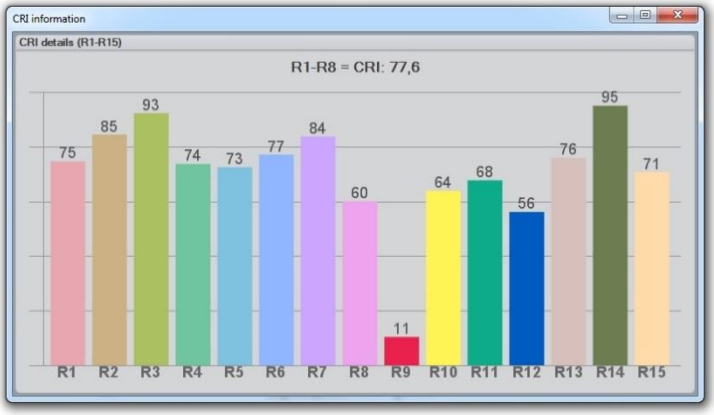
CRI details

The CRI defines the quality of white light, it is also known as the Colour Rendering Index or Ra. The value of CRI shows how much the spectrum of a light source resembles that of the Sun, thus the ability of the light source to reproduce the colours of an object as if it were illuminated by the Sun.

The CRI is calculated with the help of the standard test colours, which examine the chromatic adaptation of light.

The standard set consists of 15 test colours, but only the first 8 of them (known as R1-R8) are used to calculated the CRI, whereas the remaining R9-R15 are typically not used. However, sometimes LED lights do not have a red light component (which is considered in the R9 measurement), that is why it is becoming more common to include the R9 measurement as well.

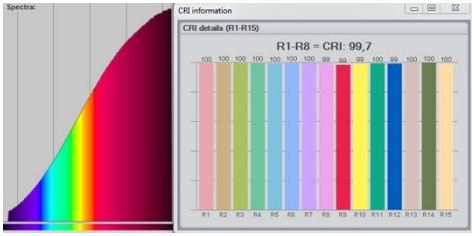
R9-R15 values can be view in the CRI details window, which is opened by clicking on the CRI bar or selecting *View -> CRI details*.



According to the colours table above, we can see that the red light of R9 is rather low compared to the rest of the values. In some cases R9 can even be negative due to particularly low levels of the red light.

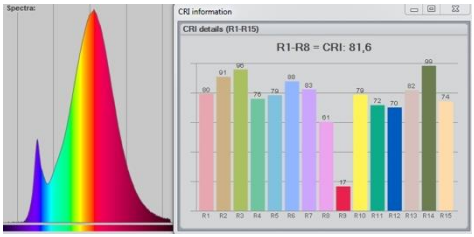
Example 1

Shows a standard tungsten lamp. Its continuous spectrum has the closest resemblance to the Sun, therefore the CRI values are the highest.



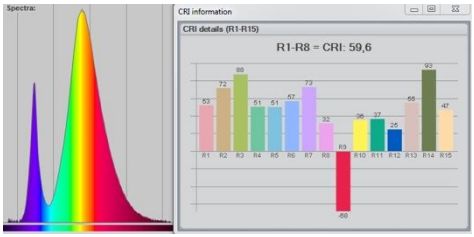
Example 2

Shows a Philips LED bulb with a low red R9 value.



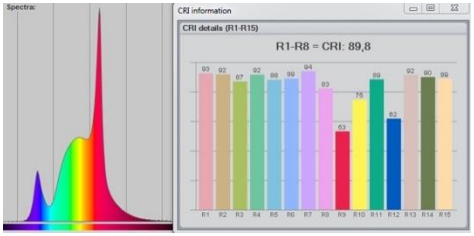
Example 3

Shows a standard LED bulb with a negative red R9 value due to the lack of red light in the spectrum.



Example 4

Shows a LED bulb with an additional red colour boost, so that the LED's R9 value is increased.



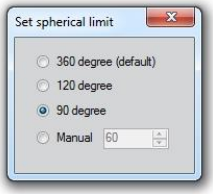
Spherical limit

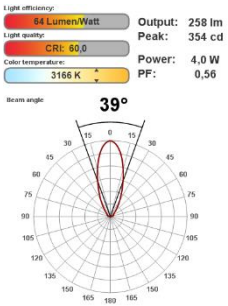
Spherical limit allows the user to constrain the area of the luminous flux integration. It is also known as measuring luminous flux in a Φ cone.

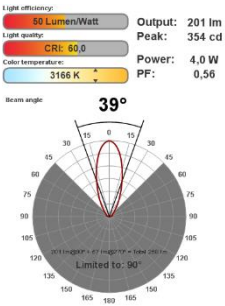
Luminous flux measurement is generally done in a full sphere of 360°. The new EU regulations (EU No 1194/2012), however, require the measurement of the directional lamps in a 90° or 120° cone, meaning that light illuminated only inside of that cone is considered for the calculation of the efficient luminous flux.

The spherical limitation can be set by clicking Edit -> Spherical limit.

Spherical limitation does not need to be set before a measurement, although it can be set afterwards, also for the previously made full-on 360° measurements. Below is an example of the differences in the flux at 90° cone, where 57 lm is considered as a waste outside the 90° cone.



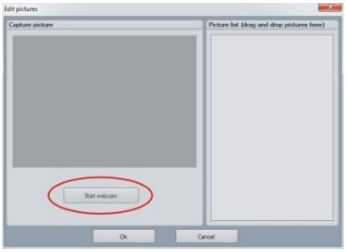




Attaching pictures

You can easily attach pictures to your measurements via dragging and dropping them towards the area of the picture frame.

It is also possible to use a webcam to snap pictures of the measured light sources for quick references. To use the webcam click on the picture frame to open a picture editor.

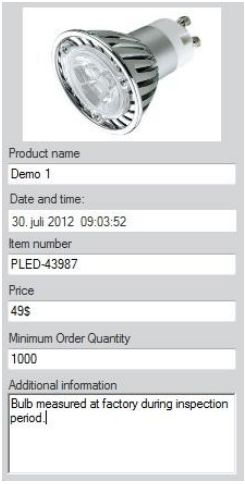


Afterwards click on the start webcam button for the webcam to start and add as many pictures as you like. The first picture in the picture editor will be used as the primary one, which accompanying the measurement by default.

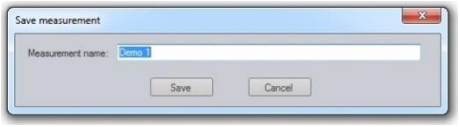
Pictures can be moved or deleted by right clicking on each pictures.

Saving measurement

Fill in and store all the necessary information about each measurement in the appropriate section, as shown in the picture.



To save the measurement simply click on the save icon or select *File -> Save as*.



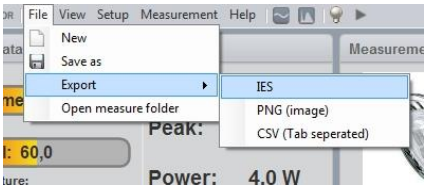
Measurements are stored in the Measurement library in an alphabetic order.

Measurements are physically stored in “My documents\Viso Systems\Light Inspector\” as .fixture files.

The folder can also be opened through selecting *File -> Open measure folder*. When some files are added or removed, it is then necessary to restart the program, so the library can be updated.

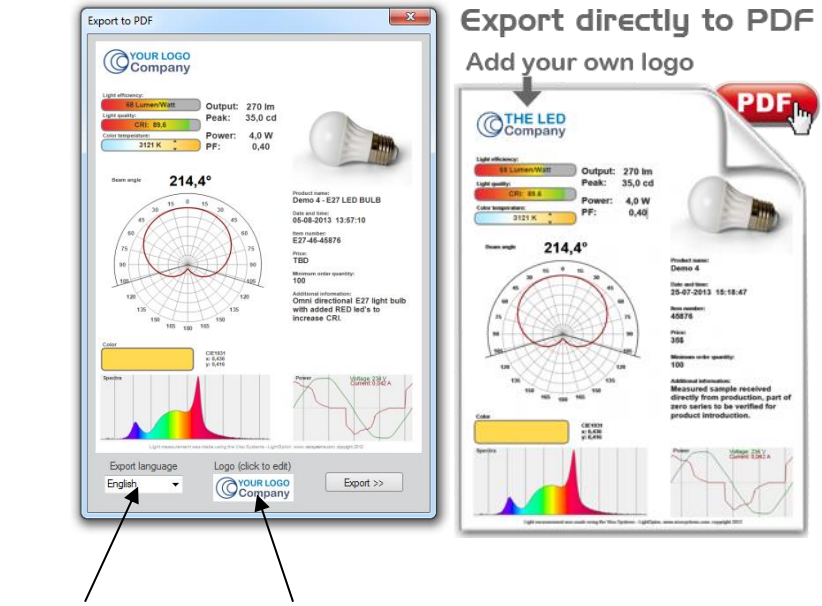
Exporting to IES/LDT

It is possible to export the measurements to IES or LDT formats to be further used in Dialux or other 3D lighting design software. To export to IES simply select *File -> Export -> IES* or LDT.



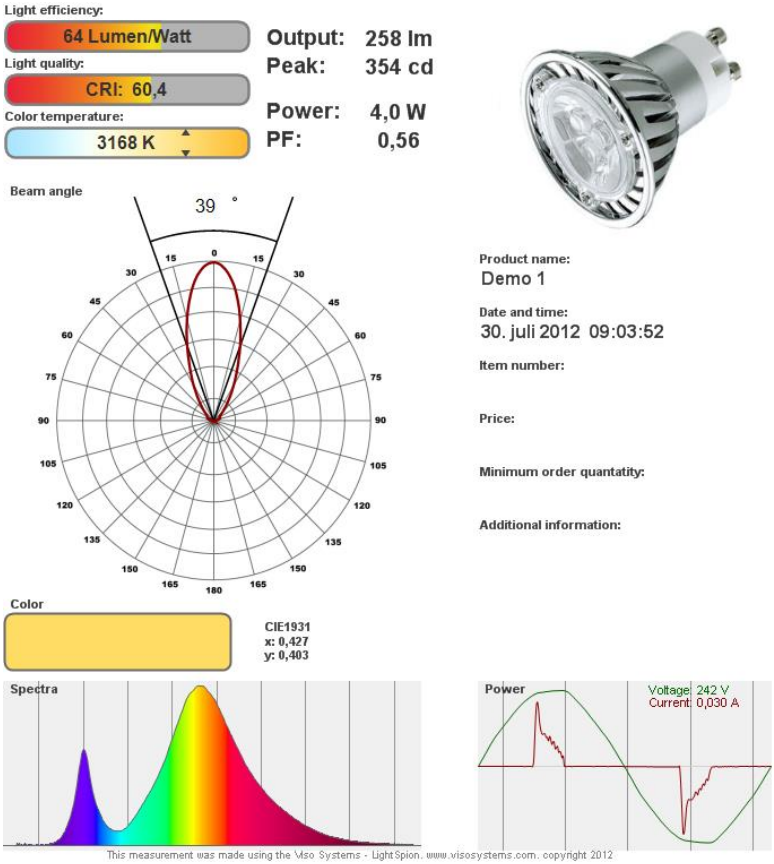
Exporting to PDF

All measurements can be exported directly to a PDF document. Firstly select the measurement and then click *File -> Export -> PDF*. It is also possible to implement your own logo in the PDF, and export to different languages like English, German and Chinese. A typical export procedure is shown below.



Exporting to PNG

All measurements can be exported to a PNG picture file to be used in reports, sales and marketing materials. To export pick a measurement in your measurement library and then select *File -> Export -> PNG* (Image). A typical export is shown below.



Exporting to CSV

Measurements can be exported to a CSV tab separated file, so that the measurement data can be imported into Excel or other calculation software for further manipulation. To export to CVS click *File -> Export -> CSV* (Tab separated)

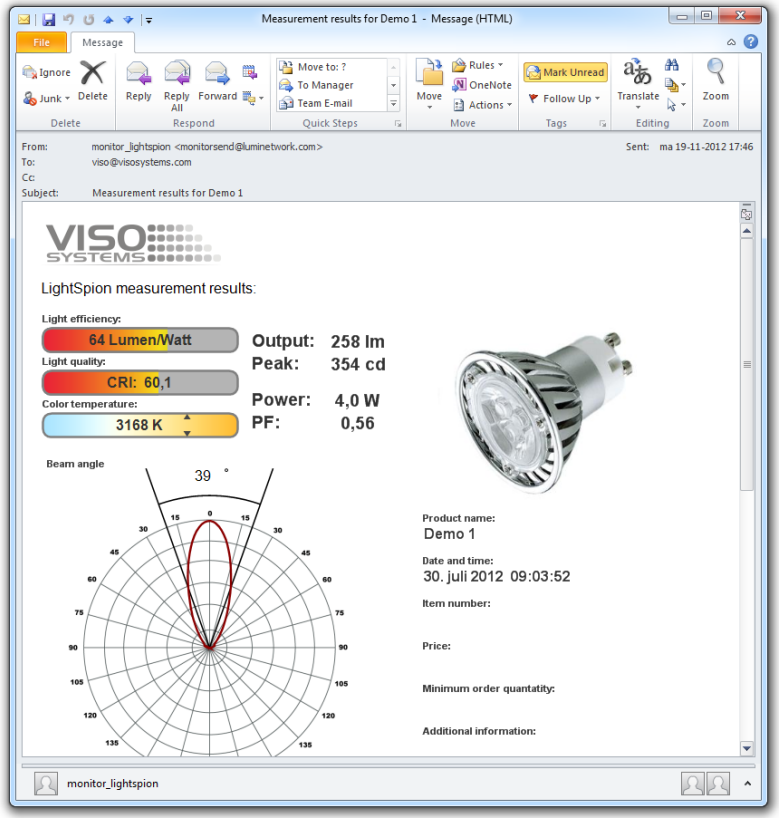
The contents of the CVS file can be seen below:

Product name	**Demo 1**
Date and time	**30. juli 2012 09:03:52**
Item number	
Efficiency	**64**
CRI	**60**
CCT	**3166**
Lumens	**257,9**
Peak cd	**353,75**
Power	**4,01**
PF	**0,56**
CIE x	**0,427**
CIE y	**0,403**
Angle	**Candela**
-179,55	**0,46**
-178,65	**0,43**
-177,66	**0,48**
-176,67	**0,47**

Etc…

Emailing measurement

The Viso Light Inspector software is capable of directly emailing measurements by clicking on the email icon.

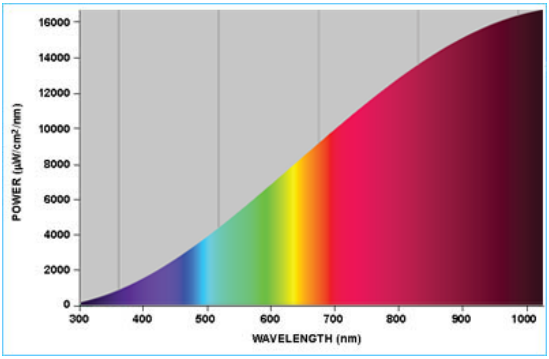


Advanced setup

Custom calibration

The LightSpion is delivered in a pre-calibrated condition. It is also possible to make a custom calibration of the photo spectrometer if desired. This could be necessary if the LightSpion is to be certified by an official agency, which will perform its own calibration and afterwards issue certification documents.

To make a custom calibration a calibration source must be used, the spectrum of which in a directional point at a certain distance is known. Such a spectrum is usually specified as power in uW/cm2/nm, as shown below.



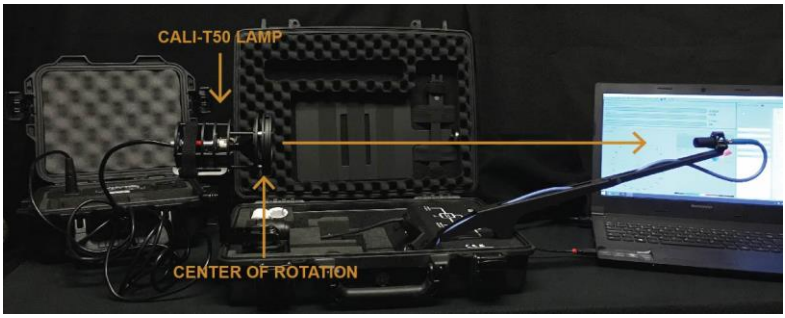
Calibration sources can be obtained from a number of suppliers, in this example will we use the CALI-T50 from Viso Systems which is a tungsten irradiance lamp. The spectrum of the calibration source is usually provided in a .lmp file (lamp file).

NOTE! Making a custom calibration does not delete the Viso factory calibration. You can always switch between factory and custom calibration at any time.

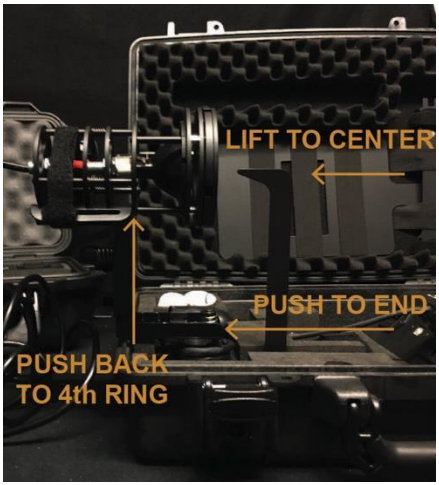
These steps shows how to make a custom calibration.

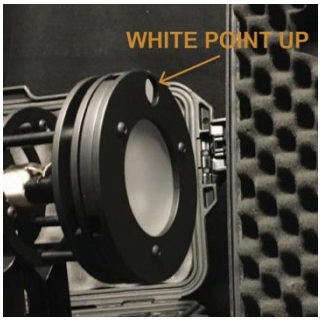
IMPORTANT: Calibration must be made in a dark environment, with non-reflective surfaces.

1. Place the calibration lamp at the centre of the rotation motor and make sure it is lifted to the right height by using the alignment tool.

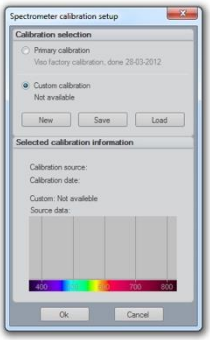


The lamp must be pointed directly towards the sensor. Sometime is might be necessary to unplug RJ45 cable to the motor to enabling precise alignment.

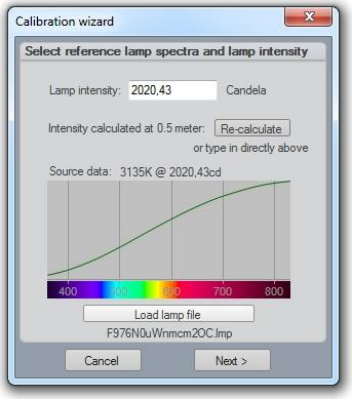




2. Open the Viso Light Inspector software connected to the LightSpion via USB and select *Setup -> Spectrometer calibration*. Then select custom calibration and click on the new button. Note: The primary factory calibration will not be lost, and you can always return it.

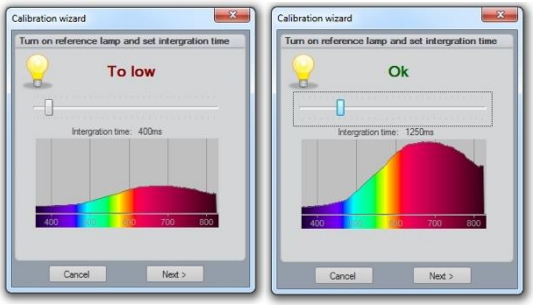


3. Select “Load lamp file” to load the calibration source spectrum. The system will automatically calculate the intensity of the source in candela based on the lamp file at a distance of 0.5m. If the measurements are done at a different distance, then click on the re-calculate button. If you don’t know the lamp distance but know the intensity value in candela simply insert it directly into the candela box.

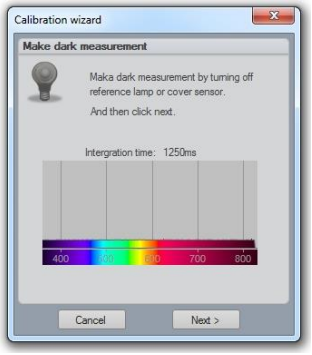


4. Make sure the calibration source has been turned on for some time or at least 30 min so the output is stable.

5. Click next and set the integration time to a maximum possible value to ensure the highest resolution, and therefore the best calibration quality.



6. Click next and cover the sensor or turn off the calibration source so the dark reference spectra can be measured.



7. Click next – and the calibration is then finished.

When you close the calibration dialog will you be asked if you want to save the calibration to the device. When selecting yes will the custom calibration be saved inside the device you can always switch back to the factory calibration at any time.

Accuracy

The accuracy of the LightSpion device consists of the sum of individual accuracies of the comprising parts as follows:

- Photo spectrometer accuracy
- Optical sensor accuracy
- Circular field accuracy

The accuracies of these devices are described below.

Photo spectrometer accuracy

The spectrometer used in the LightSpion is Ocean Optics STS-VIS.

The accuracy of the spectrometer has been previously tested in a wide temperature range from -10 to +50 degrees, therefore the device is adjusted for a temperature drift.

The linearity of the photo spectrometer is corrected to have an error < +/- 0.5% from 15-95% full scale (2500 - 14000 counts net).

The effect of the linearity error will also affect the colour and CRI measurements so the complete series of measurement errors are as follows:

Intensity error	*< +/- 1.5%*
Colour temperature error	*< +/- 35 Kelvin*
CRI error	*< +/- 0.7%*

Optical sensor accuracy

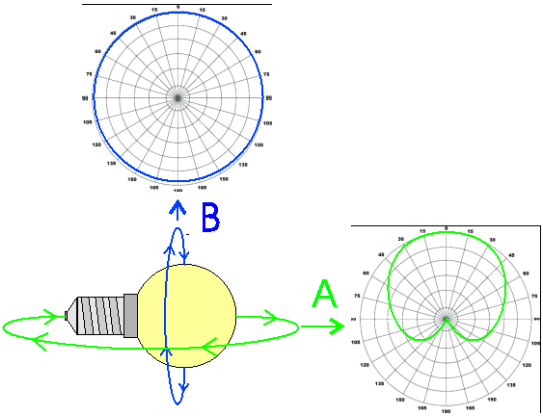
The accuracy of the sensor depends on a change of a sensitivity field as a function of position (it is also called the

sensitivity span). The measurement setup with an indicated sensitivity span of less than +/- 1%

Circular field accuracy

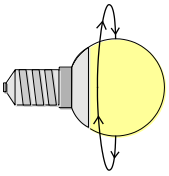
The LightSpion measures the luminous flux in lumen, which accounts for light radiated in all directions. Lumen measurement is generally done with the help of an integrating sphere, which allows to collect light radiated in all direction into one point.

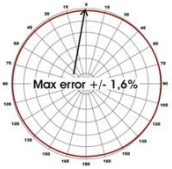
The LightSpion uses goniometer technology to obtain this measurement. It captures light from one section of the light source and afterwards calculates the complete flux value based on this section, as shown below (section “A” is presented in green).



The principle behind it is based on a consideration that the opposite field “B” is circular (see in the picture above). Most of the light sources and fixtures have nonuniform circular “A” and “B” fields. In some particular cases the deviation from a circular uniformity of the “B” field is caused by a physical geometry of the light source. A series of test measurements of different types of light sources was made to account for such errors.

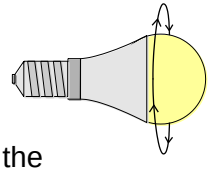
1. A LED bulb with a frosted glass cone.

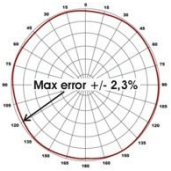




For this type of light sources the "B" field is almost completely circular and therefore it has a small error when measured only using the "A" field.

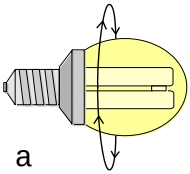
2. A LED bulb with a frosted plastic cone.

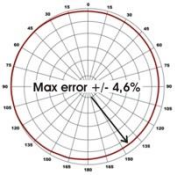




The plastic cone exposes the led. Thus it has a slightly deviated distribution of the "B" field, which results in a higher error value.

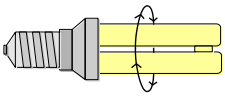
3. Fluorescent bulb with a frosted cone.

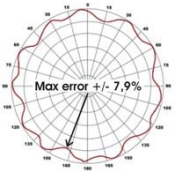




The large field of light from a fluorescent bulb and a nonuniform wearing of the glass tubes increase the error compared to LED.

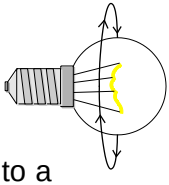
4. Fluorescent open bulb.

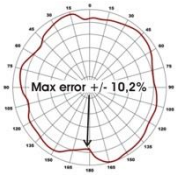




A non-frosted coned fluorescent bulb exposes the glass tube completely therefore producing an oscillating "B" field, which depends on the number of tubes.

5. Incandescent clear glass.



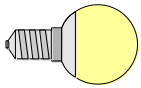


Old-fashioned incandescent bulb gives the largest error due to a non-circular tungsten thread.

Luminous flux accuracy

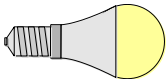
The total flux accuracy is calculated for each type of light sources by summation of the 3 kinds of error: spectrometer intensity error + sensor error + circular field error = total lumen accuracy

1. LED bulb with a frosted glass cone.



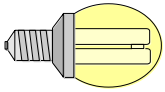
1,5% + 1% + 1,6% = accuracy = <+/- 4,1%

2. LED bulb with a frosted plastic cone.



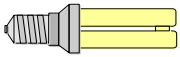
1,5% + 1% + 2,3% = accuracy = <+/- 4,8%

3. Fluorescent bulb with a frosted cone.



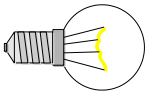
1,5% + 1% + 4,6% = accuracy = <+/- 7,1%

4. Fluorescent open bulb.



1,5% + 1% + 7,9% = accuracy = <+/- 10,4%

5. Incandescent clear glass.



1,5% + 1% + 10,2% = accuracy = <+/- 12,7%

The average accuracy is then calculated as follows:

spectrometer intensity error + sensor error + (circular field error type1+ type2+ type3+ type4+ type5) / 5 = total average lumen error

=

1,5% + 1% + (1,6%+2,3%+4,6%+7,9%+10,2%) / 5 =

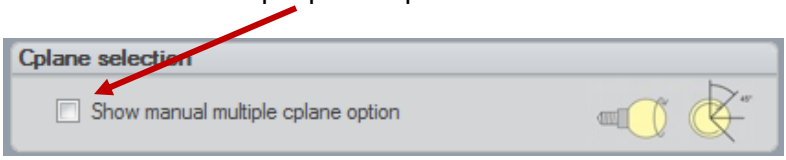
Total average lumen accuracy < +/- 7,82%

Multiple planes for asymmetric lamps

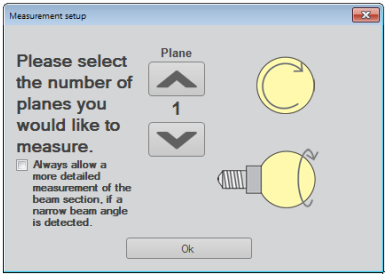
As explained is the section above can the accuracy of the a light measurement increase if the circular field of lamp is not symmetric.

If you wish to measure asymmetrical lamps with higher accuracy can you use the multiple plane option.

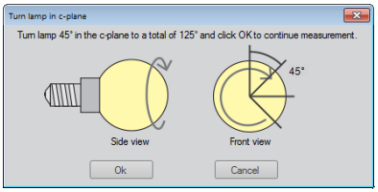
To measure multiple planes must the multiple plane option be enabled by going into Setup->Options a check the “Show manual multiple plane option” as shown below.



When multiple plane option is selected will the software ask before each measurement how many planes you would like to get measured. You can select upto maximum 4 planes.



As the LightSpion only has one automatic turning axis will it ask you after measuring each plane to turn the lamp manually to measure the next plane.



Specifications

Physical dimensions

Shipping dimensions (L x W x H) ..... 46 x 17,5 x 37,5 cm

Shipping weight .....6 Kg

Dimensions (L x W x H)..... 43 x 11,5 x 33,5 cm

Weight .....5 Kg

Sensor distance..... 66 cm

Light sources diameter range.....0 - 80 mm

Light source maximum weight.....2 Kg

Electrical

Power supply input .....90 to 260 VAC, 50/60 Hz

Power consumption.....15 W

USB current consumption .....200 mA

Power analyser voltage range.....90VAC-260VAC <+/- 0.5V

Power analyser current range .....0-3A (Avg: +/- 0.5mA)

Power analyser power range.....0-300W (Avg: +/- 0.1W)

Power analyser sample rate.....70.000 samples/sec

Photometric

Flux, lumen ..... 10 – 100.000 +/- 7.82%(see Lumen accuracy)

Intensity, candela.....0.5 - 50.000 <+/- 4%

Colour temperature.....1.000K-10.000K < +/- 35K

Colour rendering index ..... 0-100 <+/- 0,7

Angular resolution standard .....7.5 degrees/step (auto detect)

Angular resolution highest.....0.1 degrees/step

Spectrometer type .....STS Ocean Optics

Calibration .....Fully calibrated plug and play solution

Re-calibration ..... Every 2 years

Control and interface

Control interface ..... USB 2.0

Control connector ..... USB-B

Connections

AC power in (power supply) ..... IEC 3-pin

AC power out source load ..... Universal socket

Light source adaptors E27, E14, B22, GU10

PC ..... USB B

Approvals

Power supply ..... cUL/UL, CE, CCC, TUV, FCC

Power analyzer - photometer ..... CE

Warranty

Warranty period ..... 2 years

Ordering information

LightSpion ..... P/N LIGSP001