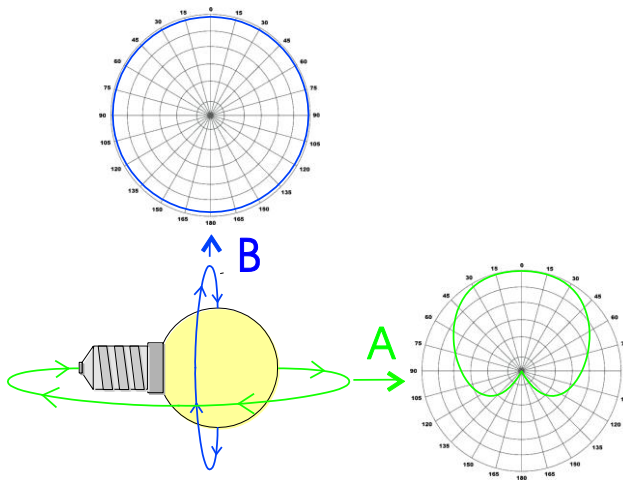


Circular field accuracy

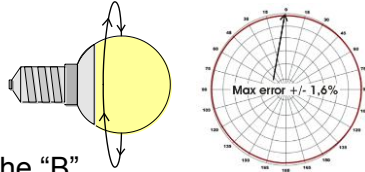
The LightSpion measures the luminous flux in lumen which is the complete amount of light radiated in all directions. Lumen measurement is normally done using an integrating sphere which collects all light in all direction into one point.

The LightSpion uses goniometer technology to obtain this measurement, by only measuring light in one section of the light source an afterwards calculates the complete lumen value based on this section shown below in green as section “A”.



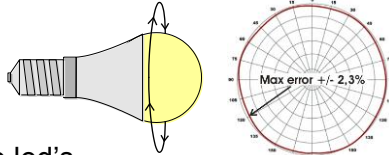
To enable the LightSpion to make such measurement using one field only requires that the opposite field is “B” is circular. Most light sources and fixtures has a non-circular “A” and a circular “B” field. But sometimes is the circular field “B” of a light source not completely circular due to physical construction of the light source. Errors due to the “B” field being non-circular can be calculated by making a series of test measurements of different types of light sources. On the next page is “B” field measurements done for different types of light sources to determine the error of the “B” field asymmetry.

1. LED bulb with frosted glass cone.



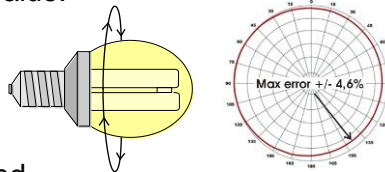
For this type of light source is the "B" field nearly completely circular and therefore is subject to a very small error when measured using the "A" field only.

2. LED bulb with frosted plastic cone.



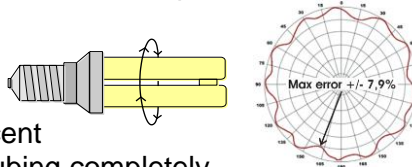
The plastic cone exposes the led's and therefore has a bit more uneven distribution of the "B" field and thus a higher error value.

3. Fluorescent bulb with frosted cone.



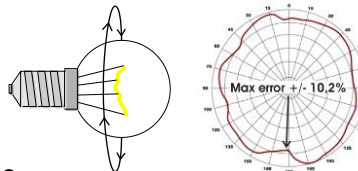
The large field of light from and fluorescent bulb and the uneven wear of the glass tubes increases the error of measurement compared to LED.

4. Fluorescent bulb open.



Non-frosted coned fluorescent bulb exposes the glass tubing completely and therefore produces an oscillating "B" field depending on the number of tubes.

5. Incandescent clear glass.



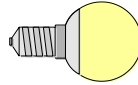
Old fashion incandescent bulb gives the largest error due to the non-circular tungsten thread creating the illumination.

Lumen accuracy

The total lumen accuracy can be calculated for each of the different types of light sources by adding all 3 types of error:

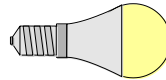
spectrometer intensity error + sensor error + circular field error = total lumen accuracy

1. LED bulb with frosted glass cone.



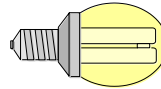
$$0,5\% + 2\% + 1,6\% = \text{accuracy} = \underline{\leq \pm 4,1\%}$$

2. LED bulb with frosted plastic cone.



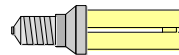
$$0,5\% + 2\% + 2,3\% = \text{accuracy} = \underline{\leq \pm 4,8\%}$$

3. Fluorescent bulb with frosted cone.



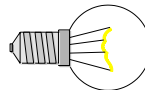
$$0,5\% + 2\% + 4,6\% = \text{accuracy} = \underline{\leq \pm 7,1\%}$$

4. Fluorescent bulb open.



$$0,5\% + 2\% + 7,9\% = \text{accuracy} = \underline{\leq \pm 10,4\%}$$

5. Incandescent clear glass.



$$0,5\% + 2\% + 10,2\% = \text{accuracy} = \underline{\leq \pm 12,7\%}$$

The average accuracy can be calculated as following:

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

=

0,5% + 2% + (1,6%+2,3%+4,6%+7,9%+10,2%) / 5 =

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

Specifications

Physical

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.....	65 cm
Range of light source diameter	0 - 80 mm
Maximum light source weight	4 Kg

Electrical

Power supply input	90 to 260 VAC, 50/60 Hz
Power consumption	15 W
USB current consumption	200 mA
Power analyzer voltage range.....	30VAC-400VAC <+/- 0.2V
Power analyzer current range	0A-3A (Avg: +/- 0.1mA)
Power analyzer power range.....	0W-300W (Avg: +/- 0.001W)
Power analyzer sample rate.....	80.000 samples/sec

Photometric

Lumen.....	10 – 10.000 +/- 7.82%(see Lumen accuracy)
Candela	0,3 - 20.000 <+/- 2,5%
Color temperature	1.000K-10.000K <+/- 35K
Color rendering index (CRI)	0-100 <+/- 0,7
Angular resolution LOW MODE	typ. 50
Angular resolution HIGH MODE.....	typ. 300
Spectrometer type	STS Ocean Optics
Calibration	Fully calibrated plug and play solution

Re-calibration Every 2 years

Control and interface

Control interfaceUSB 2.0

Control connector USB-B

Connections

AC power in (power supply) IEC 3-pin

AC power out source loadUniversal socket

Light source adaptors E27, E14, B22, GU10

PC USB B

Approvals

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

Power analyzer - photometer CE

Ordering information

LightSpion..... P/N LIGSP001