VISO SYSTEMS LabSpion

User Manual

Revision: May 2021

Congratulations on purchasing your new Viso Systems LabSpion. Before using this product, please read the Safety Information.

This manual contains descriptions and troubleshooting necessary to install and operate your new Viso Systems product. Please review this manual thoroughly to ensure proper installation and operation.

For news, Q&A and support at Viso Systems, visit our website at www.visosystems.com

Other manuals in this series for which the latest version can be downloaded from www.visosystem.com*, include:*

- LabSpion Assembly manual
- Light Inspector User Guide (Software)
- LabFlicker User Manual
- VISO Reference CALI-T50 User guide (calibration light source)

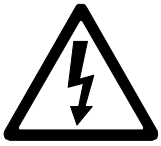
Contents

Safety Information

Warning! This product is not for household use.

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

Preventing electric shocks



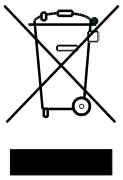
Make sure the power supply is always grounded.

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 Systems products are supplied in compliance with Directive 2012/19/EU on waste - electrical and electronic equipment (WEEE) together with the RoHS Directive 2011/65/EU with amendments 2015/863. 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 Systems products.

Introduction

About this document

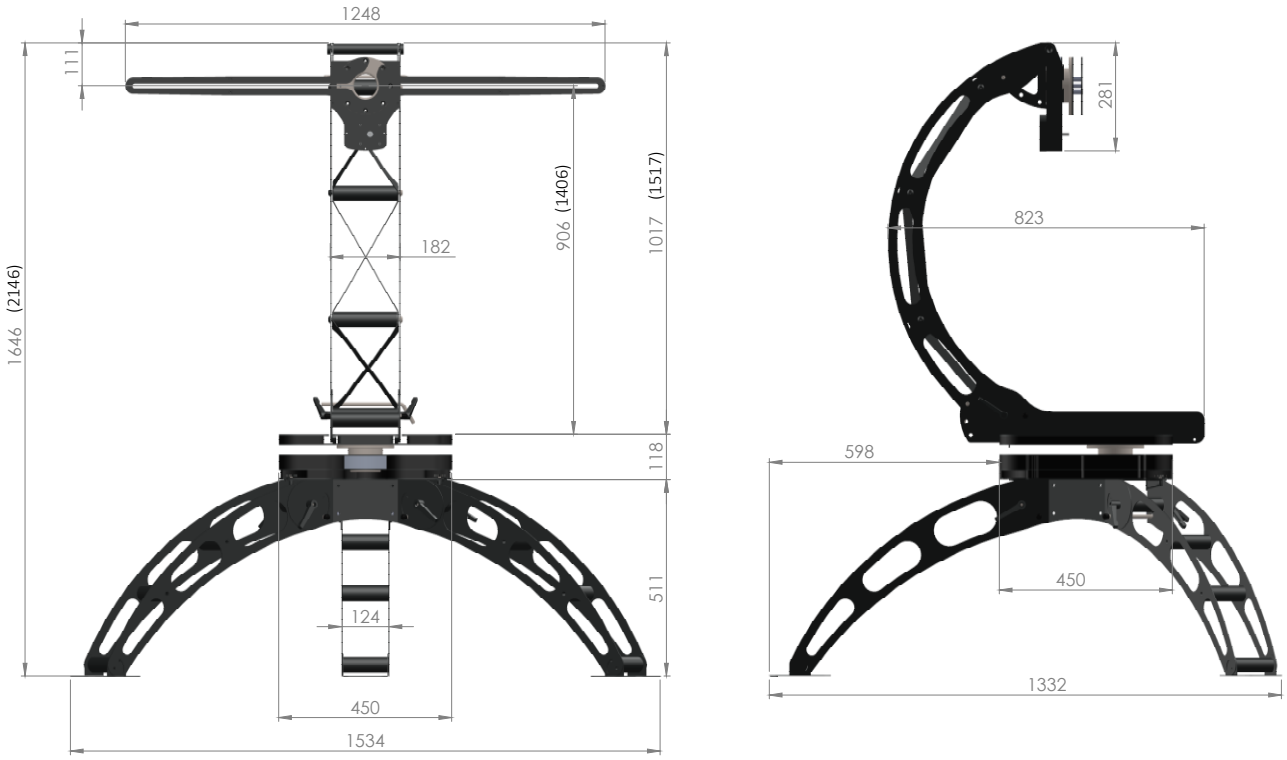
These guidelines describe the installation process of the LabSpion followed by the typical measurements of various light sources..

About the LabSpion

The LabSpion is a revolutionary new far field goniometer system with a spectrometer sensor that makes it possible to measure all photometric measurements quickly and efficiently. The Light Inspector software enables it to quickly measure, save and export the newly obtained data.

Product Dimensions

The minimum distance between the LabSpion goniometer and the back wall is 1 meter. The minimum distance between the sensor and the end wall is 0.5 meters.



All dimensions in millimetres – LabSpion with 1.5 m tower. With 2.0 m tower in parenthesis.

Packages and Weight

- LabSpion item list
- Base
- Tower
- Stand
- C-plane head
- Lamp Bracket
- E27 Lamp holder
- Tripod
- Sensor
- Cali T50
- Bosch Cross Line Laser

Documents

- Assembly Manual
- Sensor Calibration Certificate

- Cali T50 certificate

Base: 27 kg

Tower + C-Plane Head: 25 kg

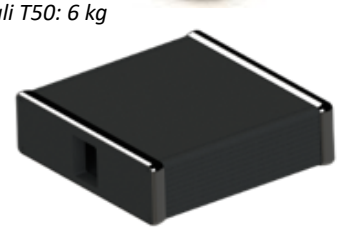
Stand: 24 kg

E27 Holder

Lamp Bracket

Tripod

Sensor + Cali T50: 6 kg



Assembly Box

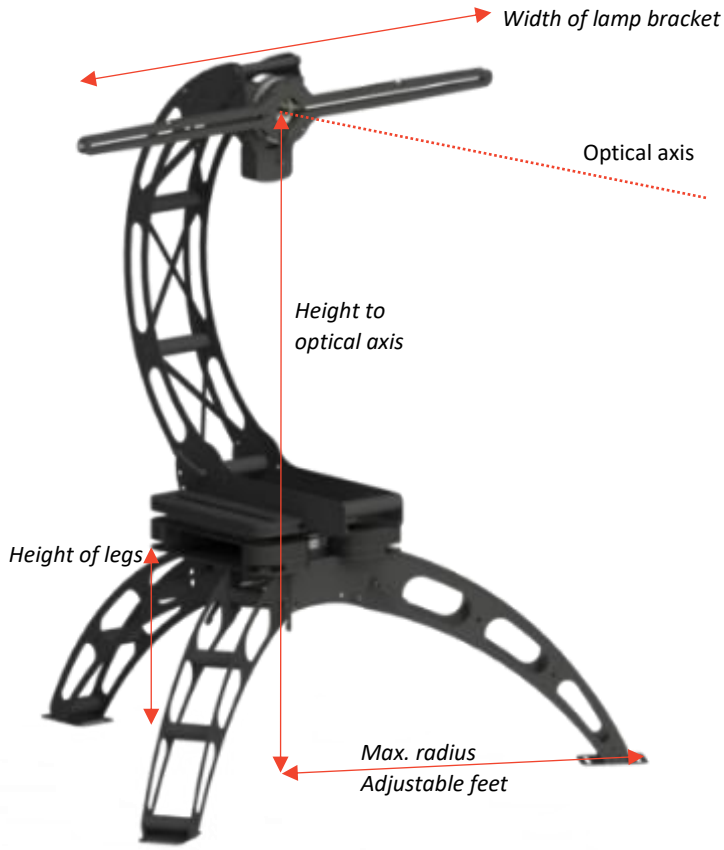
- 2 m IEC power cord
- 5 m USB cable
- 3 m RJ45 for connection between LabSpion Base and C-Plane Gonio Head

- 25 m RJ45 cat 5 for connection between LabSpion Base and LabSensor
- Bulb adaptor: E27, E14, G10, B22.
- Laser Distance Plate
- 1 x Steel Pin 200 mm
- 2 x Steel Pin 45-degree handle
- 6 x Plastic end caps for pins
- 2 x Small Lamp Brackets + M10 Handles + 20 mm Plastic Spacer
- 2 x M8 Handle + Thumb Screw for Base attachment
- 8 x M6x35 mm Screws for Lamp Bracket mounting
- 8 x 20 mm plastic spacers for Lamp Bracket mounting
- 2 x M6 Thumb Screws for Laser Distance Plate

Shipping Packages	Shipping Dimensions	Shipping Volume	Weight
1. Sensor + Cali	560 x 565 x 350 mm	0.111 m^3	6 kg
2. Base	510 x 510 x 220 mm	0.057 m^3	27 kg
3. Bracket + Tripod + Assembly Parts	1,655 x 295 x 320 mm	0.156 m^3	8 kg
4. Tower + C-plane Gonio	455 x 350 x 1,180 mm	0.188 m^3	25 kg
5. Stand	610 x 605 x 820 mm	0.814 m^3	24 kg

Total shipping weight: 90 kg.
Total shipping CBM: 1,814 m^3
The shipment is done in a total of 5 packages.
Dimensions on a single pallet: L:168 W:90 H:120

Goniometer dimensions



Dimensions	1.5 m Tower	2.0 m Tower
Recommended min. room height	2.40 m	2.90 m
Recommended min. room width	2.00 m	2.40 m
Height to optical axis	1.55 m	1.80 m
Max. radius feet	0.85 m	
Height of legs	0.51 m	
Width of lamp bracket	1.25 m	
Max. system height incl. lamp	2.30 m	2.80 m
Max. system width incl. lamp/feet	1.60 m	2.00 m

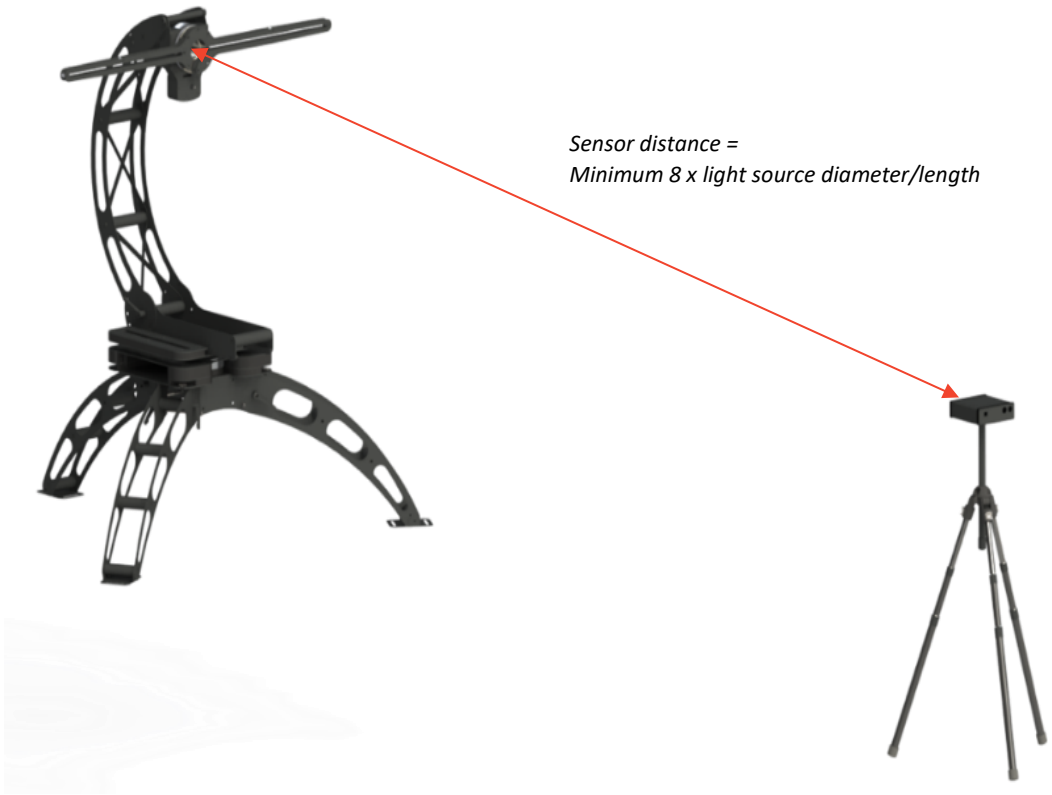
Room Considerations

Laboratory environment

- Always keep your laboratory clean from dust and particles. Dust may interfere with measurement if it accumulates on and around the sensor by introducing straylight and disturbing translucence. Dust and particles in the mechanical parts of the goniometer may disturb functionality and may cause wear on motors, belts and bearings. Disconnect all USB cables and power supplies, and vacuum clean your goniometer regularly (normally every month) to remove dust. Mount a brush on the vacuum cleaner handle. Dry off all external surfaces with a clean, dry, cotton cloth (avoid statics).
- Avoiding air currents is necessary to minimize cooling of devices under test. Limit air flow (e.g. from air conditioning systems or draught) around the system (may alter light source intensity).
- Limit heat transmission from light source through mounting system. Should be mounted as realistically as possible
-

The standard test conditions and tolerance intervals of CIE DIS 025 (laboratory conditions)	**Standard test condition**	**Tolerance interval**
Ambient temperature	25.0 °C	±1.2 °C
Surface temperature for device under test	Nominal operating temperature t_p	±2.5 °C
Air movement	Stationary air	0 m/s to 0.25 m/s

Sensor Distance

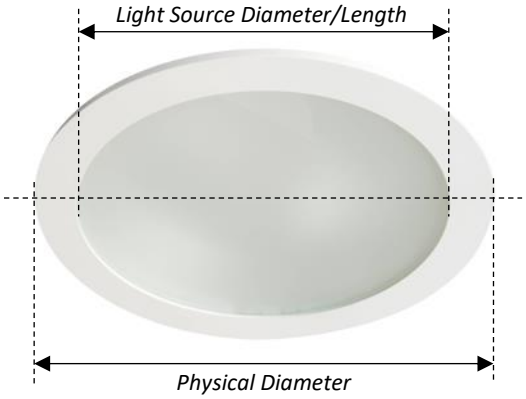


The measurement method used in the LabSpion system is called “far field”, which means that the distance between the measuring light source and the sensor should be at least 8 times the diameter/length of the light source as shown below.

According to CIE S 025/E:2015, minimum measuring distances should be (D is the largest dimension of the luminous area):

- Beam angle ≥90° (in all measurement planes): ≥5xD (Viso Systems ≥8xD)
- Beam angle ≥60°: ≥10xD
- Narrow angular distribution / steep gradients: ≥15xD
- Large non-luminous areas with maximum distance S: ≥15x(D+S)

Please note that “light source diameter/length” is only the illuminated part of the luminaire!



Light source diameter/length	Minimum sensor distance	
	Wide beam	Narrow beam
250 mm	2 m	3.8 m
500 mm	4 m	7.5 m
1,000 mm	8 m	15.0 m
1,500 mm	12 m	22.5 m
1,500 mm	16 m	30 m

Goniometer Dark zone

Normally when doing light measurement, a completely dark room is needed. But with the LabSpion it is not a necessity for the whole room to be dark, as the sensor uses a special directional sensor. This means having only the goniometer zone dark will be sufficient as shown below.

The Dark Zone is recommended to be 2 meters or more.

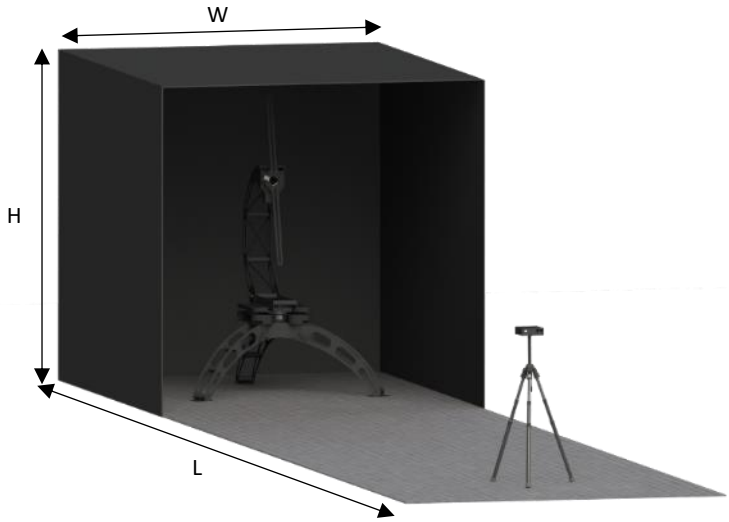
A room can be darkened either by painting the walls black or using a black curtain.

A black Molton curtain can work better than a painted wall, as the folds in the curtain can function as small light bafflers trapping the light.

Note: If you have the option to have a fully dark room, this should this should be your first choice.

Minimum Room Dimensions

As the distance to the sensor must be at least 8 x luminaire diameter plus the physical properties of the goniometer (1 m) and the sensor (0.5 m), we can calculate the minimum dimensions of the room to be as shown below.



Luminaire diameter	W = Room width	H = Room height	L = Room length*
0.25 m	1.7	2.2	3.5 – 5.5 m
0.50 m	1.7	2.2	5.5 - 9.0 m
1 m	1.7	2.3	9.5 - 16.5 m
1.5 m	2.0	2.4	13.5 - 24.0 m
2.0 m	2.4	2.9	17.5 – 31.5 m

Depending on light distribution* - see *page 10, Sensor Distance*

Ambient Conditions

- Room temperature – maintain at 25°C +/-1°C (within 1 m)
- Limit heat transmission from light source through mounting system which should be mounted as realistically as possible
- Limit air flow (e.g., from air conditioning systems or draught) around the system

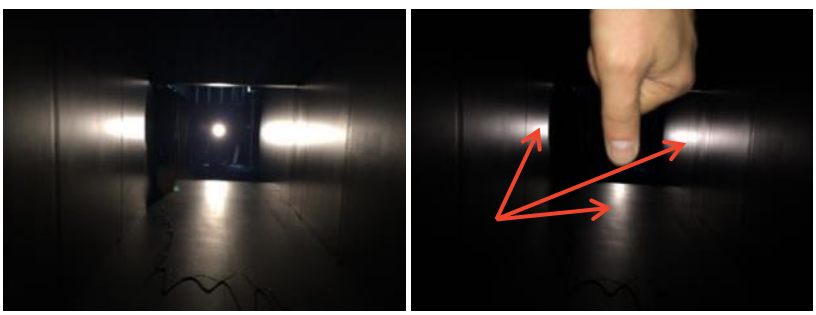
Measuring through a Door Opening

In cases where the length of the room is not sufficient for larger luminaires, the sensor can be placed outside a door opening to extend the sensor-to-light source distance as shown below. Placing the sensor outside of the room using a door opening does not adversely affect the measurement. In fact, the doorway opening can help reduce stray light.

It should be noted that if the outside room is not dark, the “calibrate to ambient” functionality must be used to deduct the ambient light from the measurement.

Narrow Room Considerations

Even a dark wall or floor can reflect light also known as stray light. This results in measurement values which are too high. When the sensor is close to the walls or floor the stray light can enter the sensor and give higher measurement result.

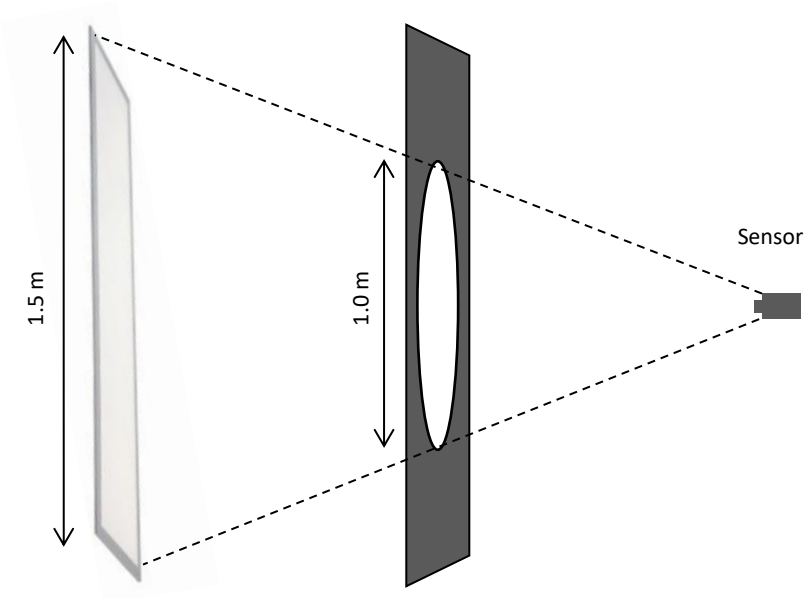


Light reflected into sensor from the walls and the floor

A stray light check can easily be done by standing at the sensor position and blocking the light from the sensor with your finger and checking if any other light is visible.

Light Baffle

One of the simplest solutions to eliminate stray light is to place a port hole (light baffle) as illustrated below.



Creating a Light Baffle

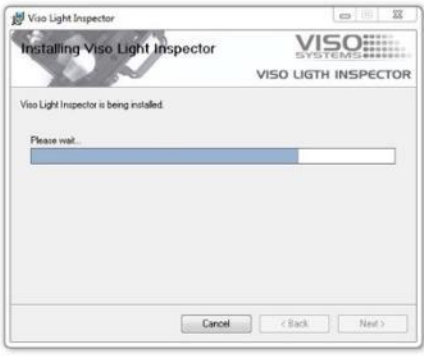
Creating a light baffle can be done by using a black curtain and making a circular hole in the middle, as shown below. Place the light baffle between the goniometer and sensor at a distance where the lamp is visible from the sensor.



The LabSpion can measure luminaires with a maximum length/diameter of 150 cm, so the size of the light beam halfway from the sensor to the lamp will be 75 cm. Consequently, a light baffle placed halfway needs to have a diameter of 75+25 cm to compensate for small errors in installation.

The procedure of cutting out a light baffle along with the final result is shown above.

Installation



Software Installation

Before you can start using the LabSpion, the free "VISO LIGHT INSPECTOR" software must be installed on your PC. It is supported on all newer windows platforms. Use the following link to download the latest version:

http://www.visosystems.com/download-light-inspector/

- Please make sure the LabFlicker is not connected to the computer during software installation
- Make sure to install version 5.28 or later for LabFLicker or the LabFlicker will not be supported by the Light Inspector
- Run the .msi file and follow the installation instructions
- USB drivers are automatically installed.

Your measurements are not lost when updating to a newer version or uninstalling and reinstalling. All measurements will always remain in your document folder. If you want to remove all your measurements go to the 'Light Inspector' folder and delete them manually.

Typical folder location:

C:\Users\'Username'\Documents\Viso Systems\Light Inspector

Or if stored in dropbox:

C:\Users\'username'\Dropbox

Connecting Power

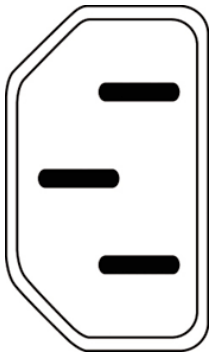
The LabSpion comes with a standard IEC power-in connector and with a standard Euro Power Cable, but any power cable can be used as the LabSpion supports any outlet voltage from 90-260VAC.

The power-in connector supplies power to the goniometer motor, the power analyzer and the light source being measured. This means the power feed to the system is also what is being delivered to the light source to be measured.

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:

- Blue wire to **neutral**
- Yellow and green wire to **grounding** (earth)
- Brown wire to **live**

Connecting USB

The LabSpion is connected to the computer using a USB connector type A to B. A 5 m USB cable is included with the LabSpion, however any USB cable supporting USB2.0 can be used.

The USB will provide communication and power to the LabSpion's main board processor. But to run the power analyzer and the photo spectrometer, power must be connected.

Start the "Viso Light Inspector" software after having connected the USB and the connection to the LabSpion 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.

Connecting the LabSensor

The LabSpion is connected to the LabSensor with a RJ45 cable, which is supporting the transfer of data and power between the two parts.

Warning

Do not connect the LabSensor to the C-plane motor connector, this could damage the LabSensor.

Connecting the C-plane Goniometer

The C-plane goniometer is connected to the LabSpion base through a RJ45 cable. The LabSpion will automatically detect the C-plane goniometer.

Warning

Do not connect the C-plane motor to the LabSensor connector, this could damage the LabSpion.

Connecting Lamp Power

The LabSpion has a built-in power analyzer and power switch. The power switch is used when running in ambient light correction mode. The lamp will be switched off before a measurement, so that the values of the ambient light can be obtained and subsequently subtracted from final measurements.

The maximum current supported by the lamp output is 3A, which is 660W at 220VAC and 330W at 110VAC.

AC Power Supply Cable Plug

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

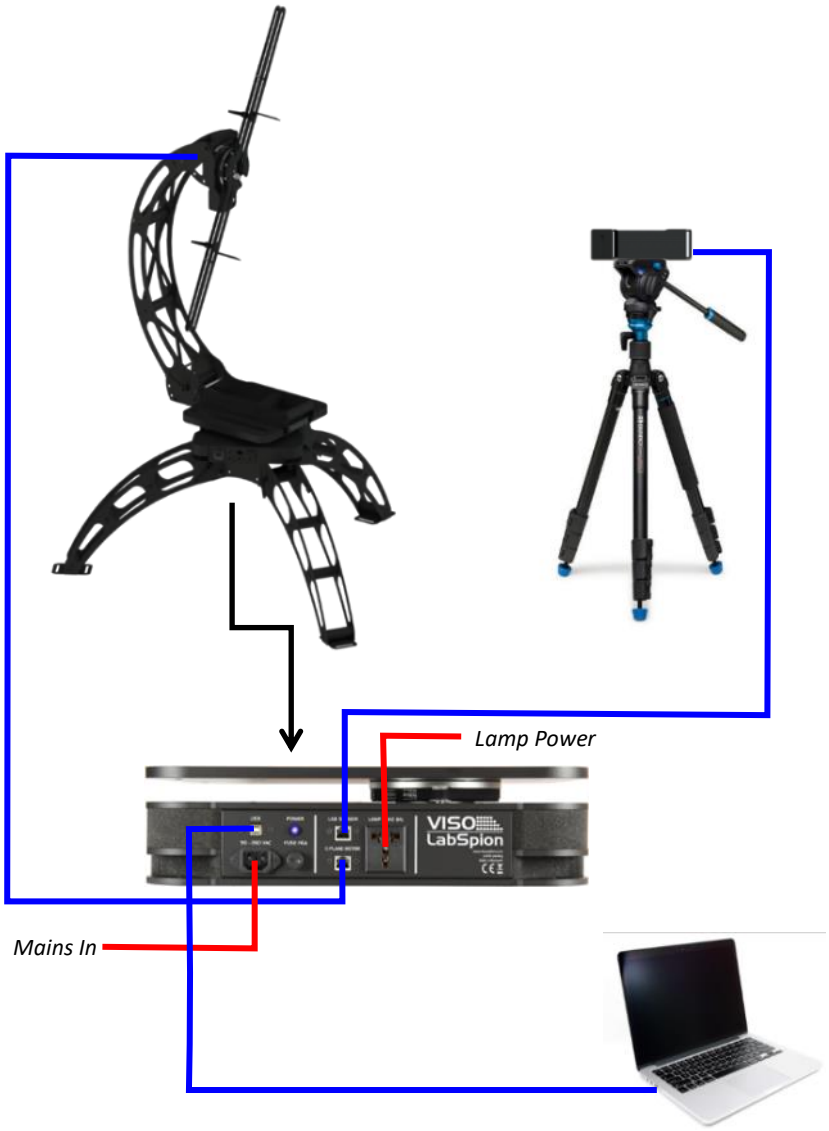
A grounding-type (earthed) power plug that fits the local power outlet must be used. You can acquire an IEC power cable with a suitable grounding-type plug from most of consumer electronics stores.

When installing the plug connect pins as follows:

- Yellow and green wire to grounding (earth)
- Blue wire to neutral
- Brown wire to live

Connecting Diagram

Below there is the connection diagram showing the different connections in order to make the system operational.



Leveling of the Base

After unfolding and securing the base, the base must be levelled. Initially, place a bubble level over two legs (orthogonal to the third leg). Adjust one leg via the adjustable shoes on the base until level.

Turn the bubble level 90 degrees to be parallel to the third leg and adjust to level again.

Alignment of the Sensor

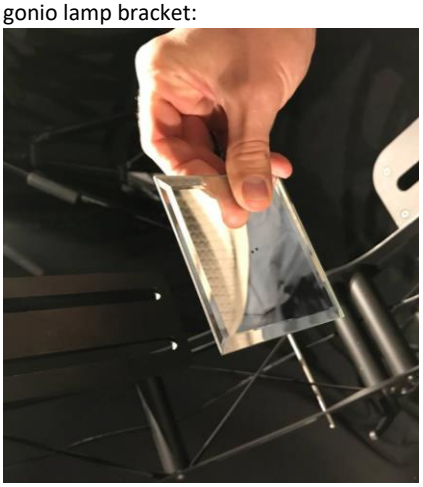
Before making any measurements, it is important to place the sensor at an appropriate distance and to align it accordingly to the goniometer.

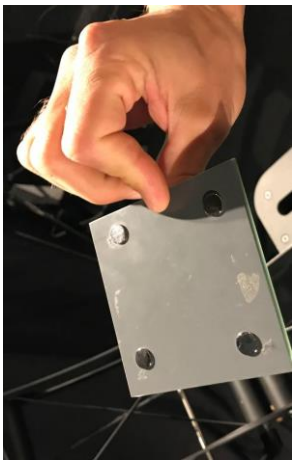
Height alignment

The sensor needs to be levelled in the same height as the center of the goniometer, i.e. the optical axis.

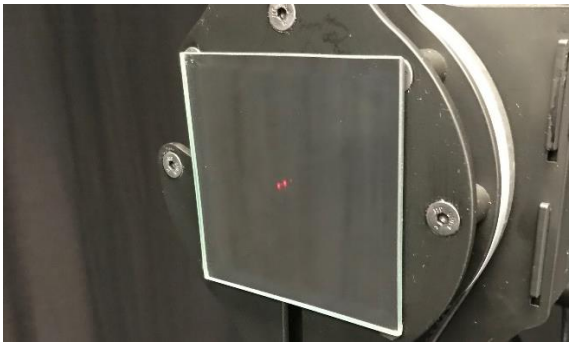
This is done in three steps, that should be repeated regularly:

1) Move the sensor on the sensor tripod to the desired measuring distance (See more details in in "Guidelines to building or improving your own lighting lab")
2) Roughly level the height of the sensor housing with the optical axis, normally around 154 cm above floor level.
3) Point the sensor accurately to goniometer center with the included mirror. The mirror has magnets on the rear side. Attach the mirror to center of the gonio lamp bracket:



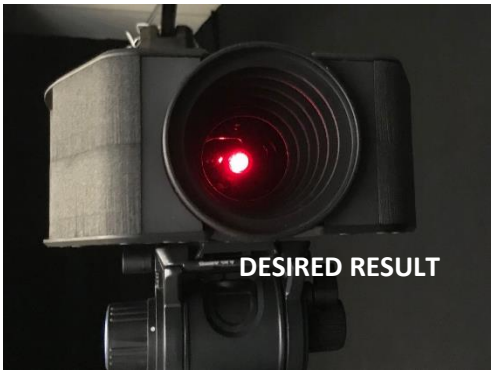


Then turn on the laser on.



You will now get the reflected red laser beam back onto the sensor housing. Adjust the position, height, and direction of the sensor until the laser beam hits the sensor:

For LabSensor Model II:

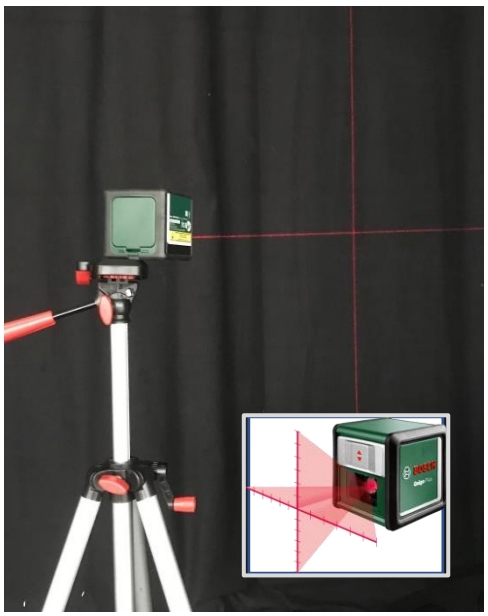


Now, you are sure that your sensor is aligned with the optical axis and being pointed directly to the centre of the goniometer, and you can turn the laser off.

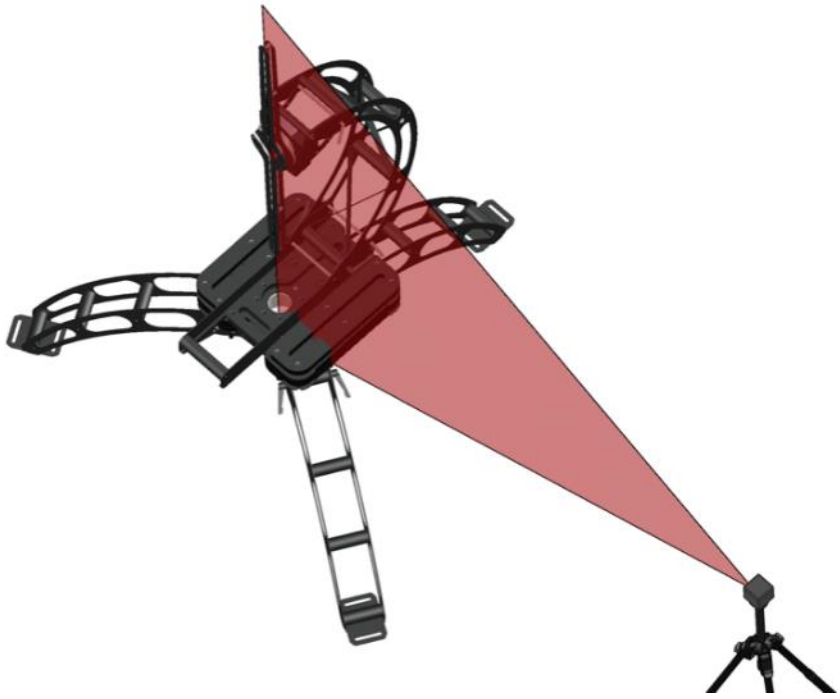
Set distance of the sensor

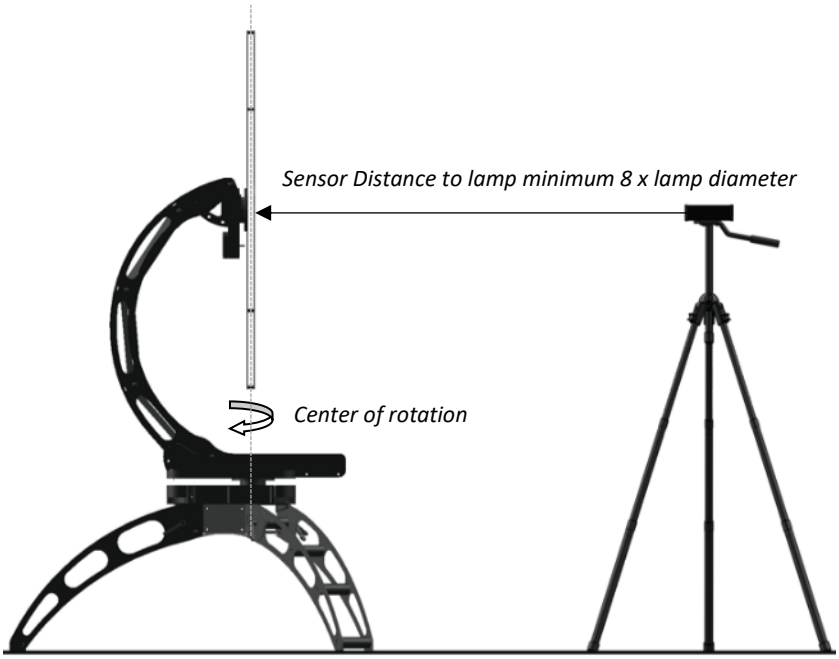
To set the correct distance, align the lamp bracket so the front is in center of rotation of the Base. This can be done with the laser as shown below or simply move the Tower back and forth until you can see it is in center of rotation.

Use the included cross-laser and mount it on the small, included tripod:



Then, then vertically align the front of the lamp bracket to the center hole in the base.





Now you are ready to measure the precise distance from the sensor. Press the 'Measure Distance' button on the back of the sensor and the distance will be automatically set in the software. A window will appear in the software showing the distance set, press ok or hit enter to this. Make sure that the distance is measured to the photometric center as described in page 25. Also read more about about measuring distances in "Guidelines to building or improving your own lighting lab"

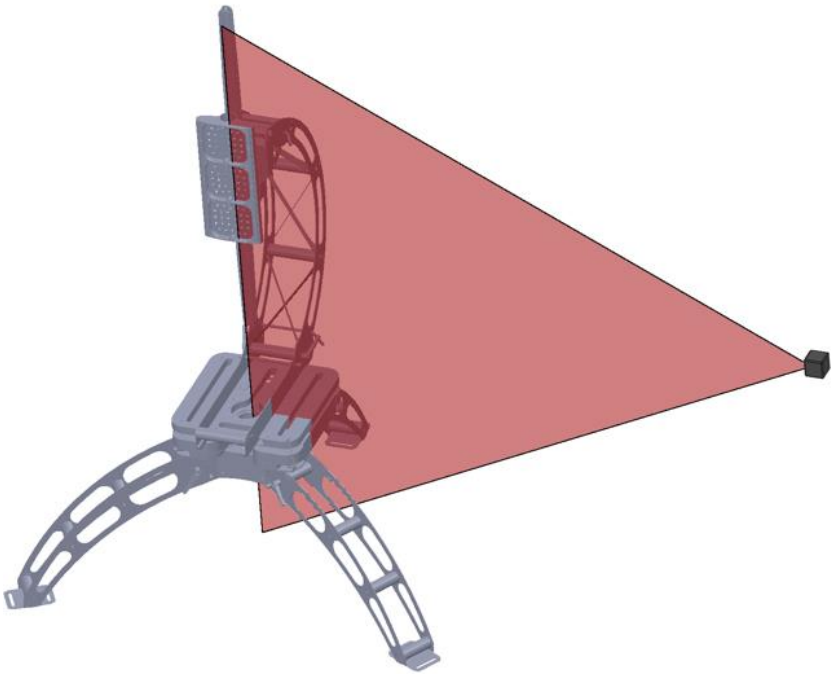
Please note: Some materials reflect the laser beam poorly. If so, temporarily place a small label or a post-it note on the front of the light source where the laser beam meets the luminaire optics.

Mounting and Alignment of the Lamp

Use of the Laser Level Tool (some models)

Aligning the lamp to be measured is key to ensure a precise measurement. Specific tools to align the lamp relative to the center of rotation, namely center alignment bracket and an aligning laser box, are included with the LabSpion system. First, place the center alignment bracket in the middle of the rotating opening. It is designed in such a way that it will always be in the middle of the opening.

Then place the laser box on the wall, table or a tripod next to the LabSpion and align the lamp to the center bracket as shown in the illustrations below.

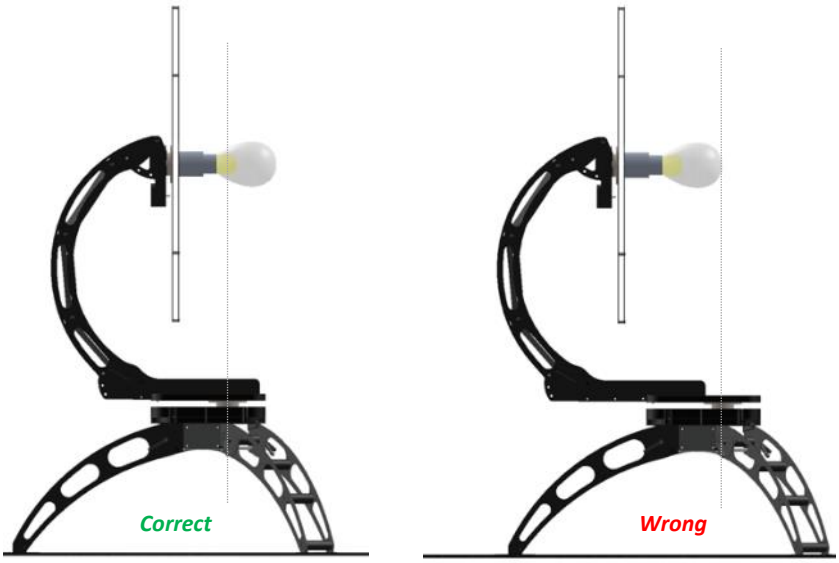


Laser box

Please note: The laser module inside the laser tool is hanging loosely so the laser beam will be level although the tool is placed on an off-level surface or wall.

Adjust Lamp to Laser

The laser box will shoot two perpendicular beams which form crosshairs, but it is only the vertical beam that is used for this alignment. When the vertical beam hits the center bracket, the center of the lamp can aligned to this.

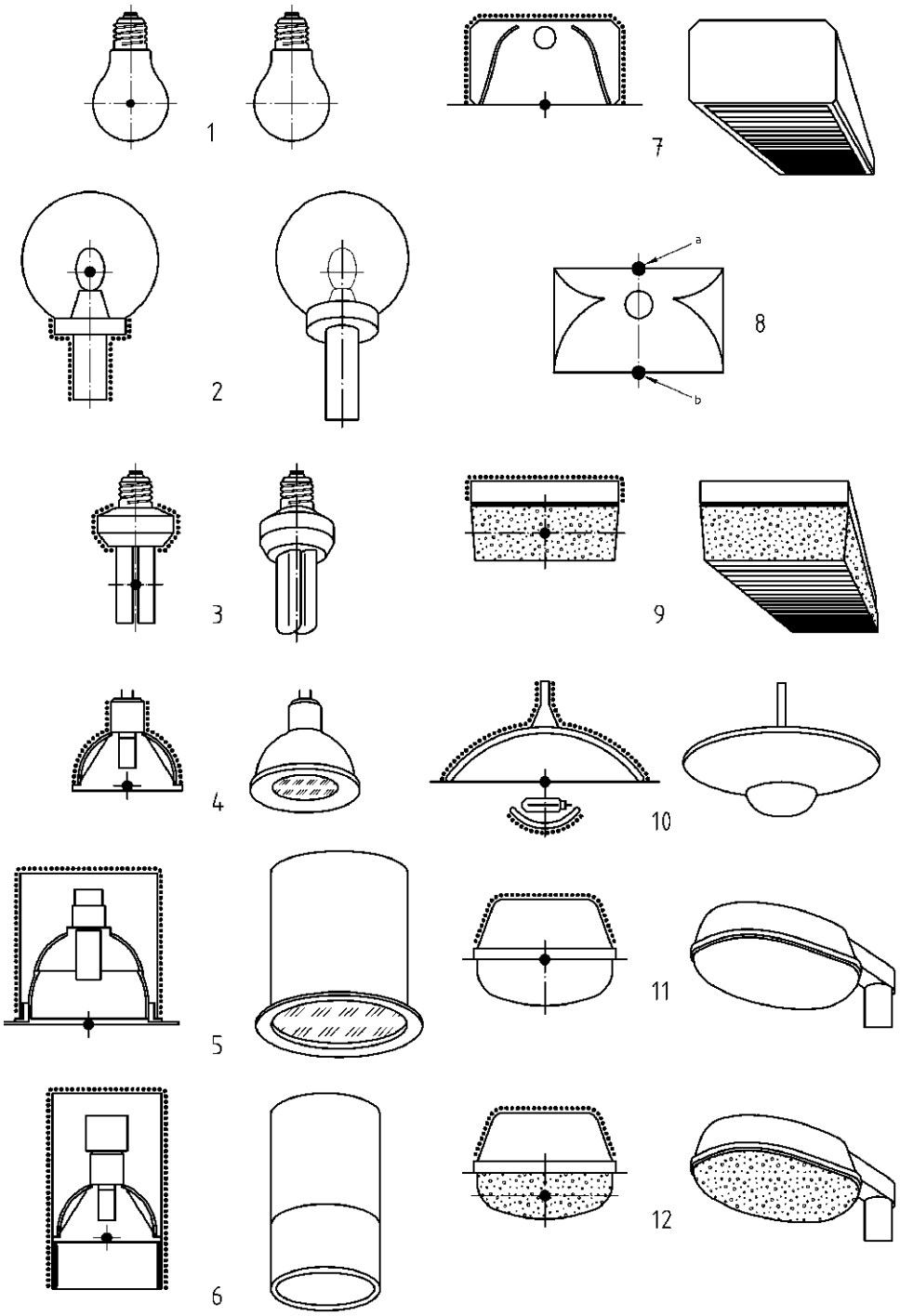


The EU standard (EN 13032-1:2004) states that luminaires with transparent sides or without closed sides should be centered at the lamps photometric center. See photo above.

Luminaires other than those above have the definition of their photometric center given in the publication on the next two pages.

Center of Luminaires

The black spot marks the photometric center of the different lamps (EN 13032-1:2004). This photometric center is what should be aligned with center of rotation of the Base.



Presentation	Explanation
●	Photometric centre
▬▬▬	opaque, substantially black
/// /// ///	opaque, dif use or specular ref ectant
⁘⁘⁘⁘⁘	translucent, clear
.....	compartment

Photometric centre of light sources

1) **Incandescent lamp**
2) **With a clear cover**
3) **Compact f uorescent lamp**
4) **Ref ector lamp**
5) **Luminaire with ref ecting mirror**
6) **Luminaire with shield, substantially black**
7) **Luminaire with opaque sides**
8) **Direct-indirect luminaire**
   a) **Luminant area 1 with photometric centre 1**
   b) **Luminant area 2 with photometric centre 2**
9) **Luminaire with dif using/prismatic sides**
10) **Indirect luminaire with secondary ref ector**
11) **Outdoor luminaire with clear cover**
12) **Outdoor luminaire with dif using/prismatic cover**

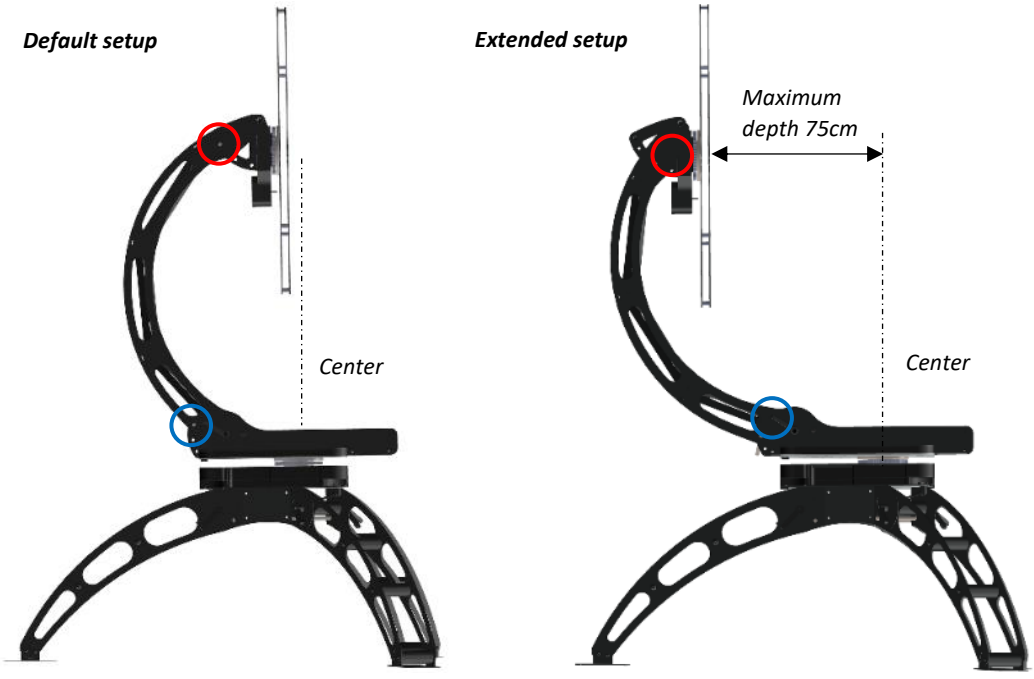
Mounting of Luminaires with a Static Base

It is convenient to keep the base of the LabSpion still when mounting various light sources for measurement. Therefore, the system comes with a magnetic lock which is located on the back of the LabSpion Base as shown on pictures below:

When the lock is closed, the Base is fixed and lamps can easily be mounted. If a measurement is started with the Base locked a warning will appear in the Light Inspector software, asking you to unlock the base before continuing (see pictures below).

Adjustment of the Lamp Holder Arm

In situations when a lamp with a big depth needs to be measured, for instance a high bay lamp, the large horizontal dimensions of the lamp will make it impossible to align it with the center of rotation. There for the default geometry of the LabSpion must be modified. Consider the following two illustrations:

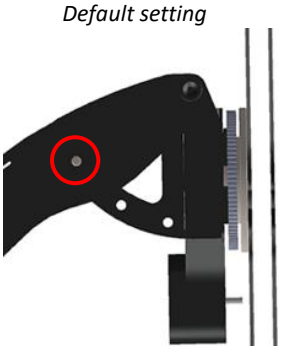


The illustration to the left is the default upright position of the LabSpion and on the right the modified version of the LabSpion's geometry is shown. The arm with the Tower is tilted backwards leaving more room for horizontally expanding luminaires.

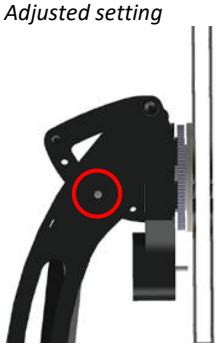
To tilt the Tower backwards:

1. Loosen the two large handles on each side of the Tower, move the pin (see blue circles) to the next position and then tighten the two handles again.
2. Move the pin that holds the c-plane head to the next position (see red circles)

Default setting



Adjusted setting



Example of a high bay lamp placement is presented below:

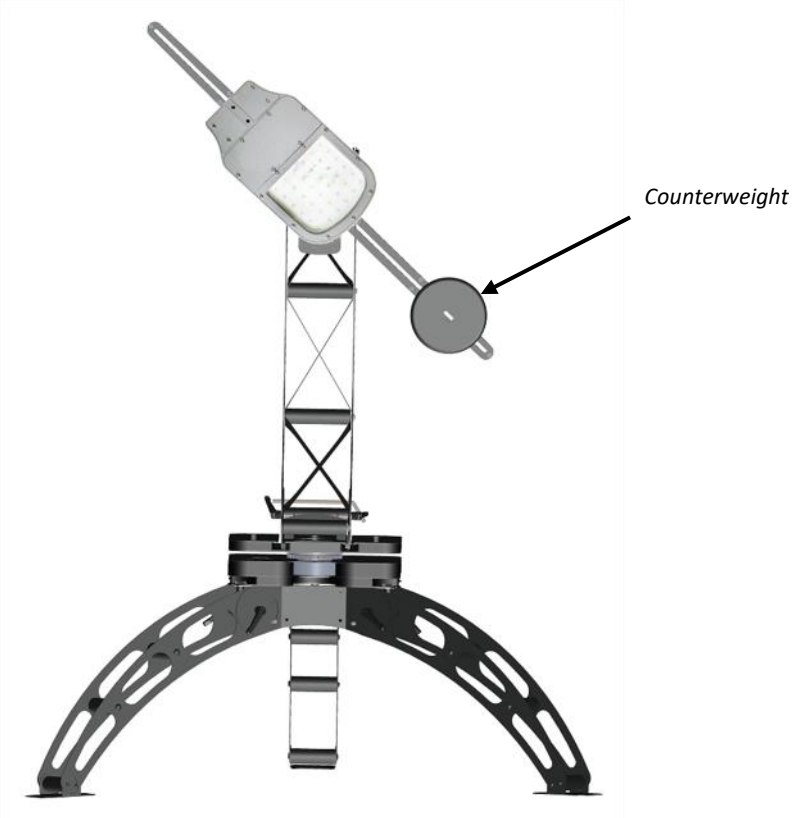
Default setup

Extended setup

Please note: The lamp holder arm is designed for a maximum weight of 25 kg in the default upright position. When tilting the arm backward this load will decrease. When tilted to the most extended position the arm will carry up to 10 kg.

Mounting Luminaires with Counter Weight

In some luminaires, such as streetlights, the weight is unevenly distributed. The center mass point of such a lamp is not coinciding with the central alignment of the LabSpion. To balance the central position of such a luminaire, a counterweight must be used. See the picture below.



Making Measurements

Aligning the Sensor

Before making any measurements, it is important to place the sensor at an appropriate distance. The LabSpion is a far field goniometer system, which means that the distance between the sensor and the lamp should be equal to or larger than eight times the luminous area length/diameter.

For very spiky or narrow distributions, it is recommended to extend the measuring distance even further, 10-15 times the luminous area length/diameter.

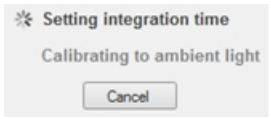
Further info, see page 20.

Making a Measurement

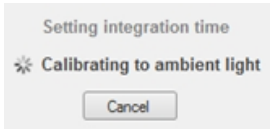
Download the lastest version of the Viso Light Inspector software from https://www.visosystems.com/products/light-inspector-software/ and open the app.

1 A measurement is simply started by clicking on the play icon on the menu bar

2 Then the integration time is set automatically



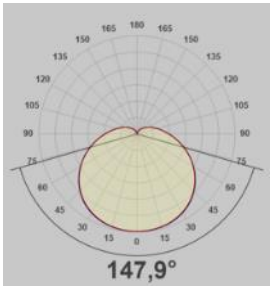
3 The ambient light level is automatically measured by turning off the light source



4 The power is then measured and stored

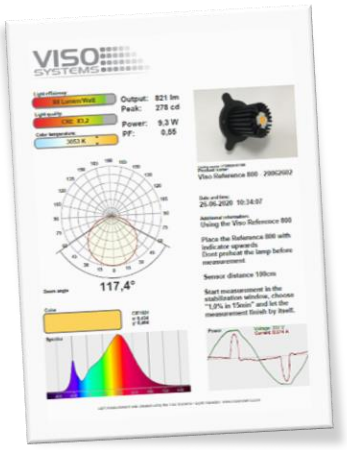
5 The light source is then rotated at 180 degrees to prepare for measurement

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

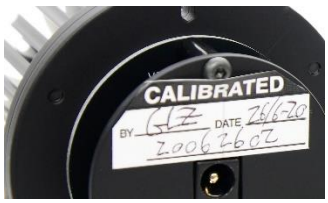


For an in-depth walkthrough of the Light Inspector software, go to the 'Light Inspector Manual'

Checking the Calibration Status



A special Viso reference light source (Reference 800) is included in the package. The light source has its own power supply, and both parts are labelled with identical calibration date and numbers. Never measure without the original power supply.



Right after factory calibration of your system, the reference light source was measured and a certificate was issued. The certificate is part of the delivery. The certificate can also be downloaded from Viso's website using the calibration number on the labels.

With the reference lamp you can quickly check your calibration status:

- Check whether the total flux in lumen and peak candela is close to the original values
- Check whether the shape of the spectrum is close to the original shape.
- Check whether the spectrum looks spiky or jagged.

If you are not happy with the result, the system needs to be calibrated. Viso recommends calibration every year, or minimum every 2 years. Viso provides calibration service, or you may do your own calibrations using the Viso CALI-T50 or other traceable calibration light sources.

Check-up Procedure

- Place the Reference 800 with the indicator (the oblong hole in the base) upwards
- Do not preheat the light source before measurement
- Centre the light source in the gonio.
- Set the measuring distance to 200 cm.
- Start measurement normal measurement. In the stabilization window, choose "1,0% in 15 min." and let the measurement finish by itself.

Specifications

Measurement method	Far Field, Type C

Physical Dimensions

Shipping dimensions (L x W x H)	See Product Dimensions in page 5
Shipping weight	90 kg
Dimensions (L x W x H)	See Product Dimensions in page 5
Weight	78 kg
Sensor distance	0.5 - 50 m (minimum 8 x lamp diameter)
Sensor distance setup	Automatic detection
Lamp diameter range	0 – 150 cm
Lamp maximum weight (tower in upright position)	25 kg

Electrical

Power supply input	90 - 260 VAC, 50/60 Hz
Power consumption	60 W (Idle 15 W)
USB current consumption	200 mA
Power analyzer voltage range	90 VAC - 260 VAC <+/- 0.2V
Power analyzer current range	0 – 3 A (Avg: +/- 0.1 mA)
Power analyzer power range	0 – 300 W (Avg: +/- 0.001 W)
Power analyzer sample rate	70,000 samples/sec

Photometric

Intensity, lux at sensor (Equal to candela @ 1m)	0.2 – 200,000 <+/- 2,5%
Intensity, candela @ 0,5 m	0.05 – 50,000 <+/- 2,5%
Intensity, candela @ 1 m	0.2 – 200,000 <+/- 2,5%
Intensity, candela @ 5 m	5 – 5,000,000 <+/- 2,5%
Intensity, candela @ 10 m	20 – 20,000,000 <+/- 2,5%
Intensity, candela @ 20 m	80 – 80,000,000 <+/- 2,5%
Colour temperature	1,000 K-10,000 K <+/- 35 K
Colour rendering index	0-100 <+/- 0.7
Angular resolution BASIC MODE	5-degree step (About 20 sec measurement time per C-plane)
Angular resolution HIGH MODE	1-degree step (About 1 min measurement time per C-plane)
Angular resolution - highest resolution	0,1-degree step (About 5 min measurement time per C-plane)
Spectrometer	Ibsen Photonics FREEDOM (Custom Viso (high sensitive transmission grating)
Spectrometer range	360 - 830 nm (1024 pixels)
Spectrometer detector	Hamamatsu S11639-01
Calibration	Fully calibrated with certificate
Re-calibration	Every 1 year (Maximum 2 years)

At Viso Systems we design, develop and manufacture OEM- and customer-specific goniophotometer solutions. Our mission is to support customers with powerful, yet easy-to-use control and measurements solutions. Products are developed and manufactured in Copenhagen, Denmark.

VISO SYSTEMS

Light measurement made easy