VISO SYSTEMS LabSpion

User Manual

Revision: JUNE 2025

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 https://www.visosystems.com/user-manuals/ , include:

- *LabSpion Assembly manual*
- *Light Inspector User Guide (Software)*
- *VISO Reference CALI-T50 User guide (calibration light source)*
- *VISO Reference CALI-DT300 User guide (calibration light source for UV-VIS-NIR)*
- *VISO Reference REF-800 User guide (reference light source)*
- *Guidelines for building a lighting laboratory*

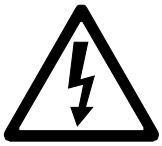
Contents

Safety Information

Warning! This product is not for household use.

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

Preventing electric shocks



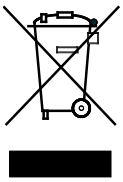
Make sure the power supply is always grounded.

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

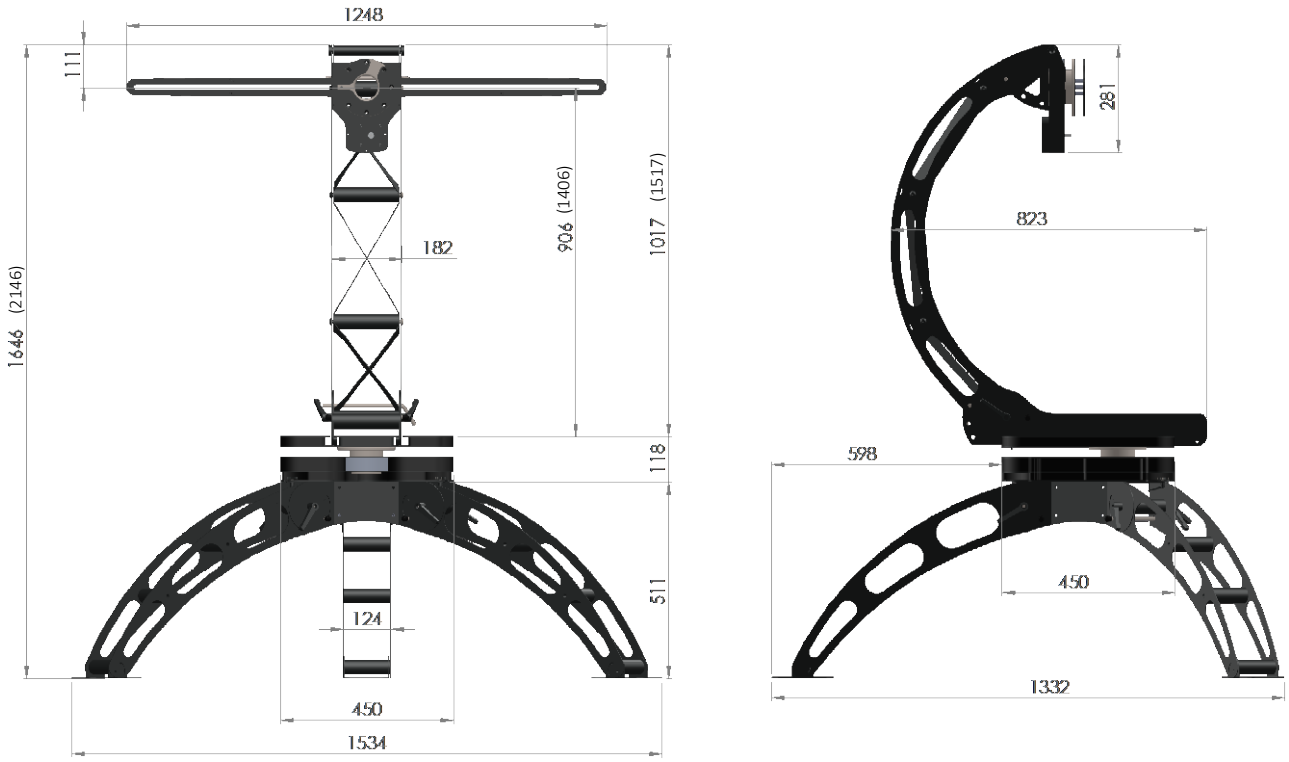
These guidelines describe the installation process of the LabSpion followed by the typical measurements of various light sources..

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

(Shown lamp bracket: Previous version -> 2025)

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

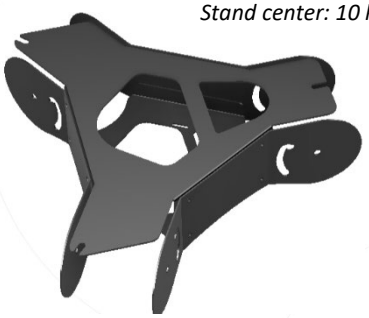
Documents

- Assembly Manual
- Sensor Calibration Certificate
- Cali T50 certificate

Base: 30 kg

Tower + C-Plane Head: 27 kg

Stand center: 10 kg



E27 Holder

3x stand legs: 12 kg

Lamp Bracket

Tripod

Cali T50
REF- 800
Sensor

10 kg

Assembly Box

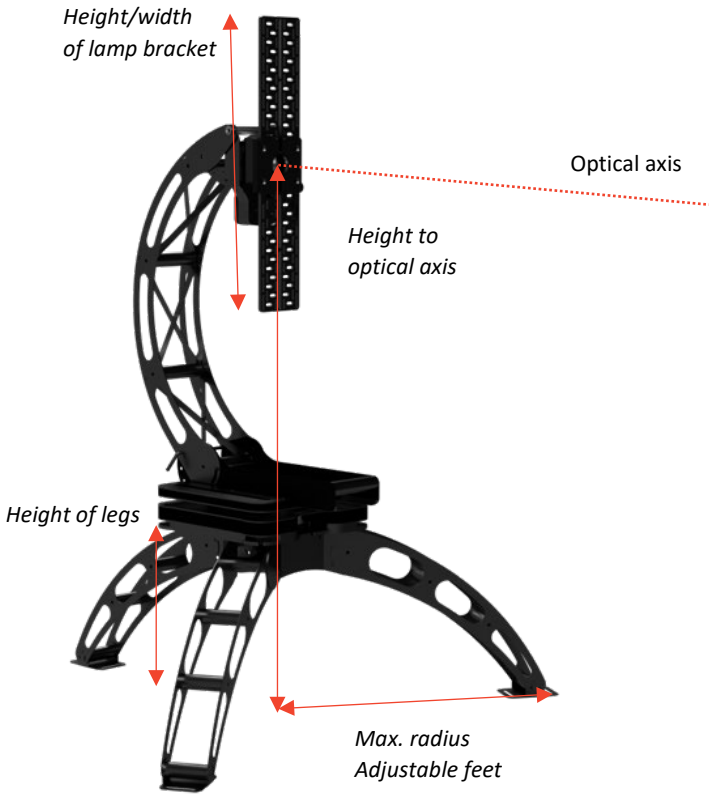
- 2 m IEC power cord
- 5 m USB cable
- 3 m RJ45 for connection between LabSpion Base and C-Plane Gonio Head
- 25 m RJ45 cat 5 for connection between LabSpion Base and LabSensor
- Bulb adaptor: E27, E14, G10, B22.
- Laser Distance Plate
- 1 x Steel Pin 200 mm
- 2 x Steel Pin 45-degree handle
- 6 x Plastic 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	0.80 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

An appropriate darkroom laboratory is necessary for making accurate measurements with Viso LabSpion.

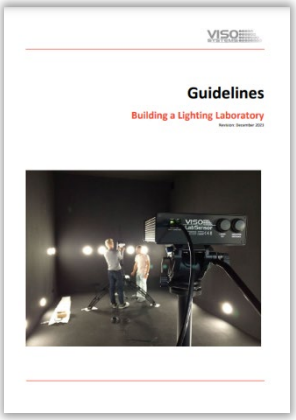
Ideally, all surroundings in your lab should be totally absorbing. For visual light this mean densely black, as most Viso spectrometers sensor just work in the visual 60-830 nm range.

For Viso UV sensors: UV-light is very easily absorbed, so most surfaces are quite “UV-black”, however mirror-like surfaces should be avoided.

For Viso NIR sensors: NIR-light Is difficult to handle. The best absorbers are black, heavy materials, that can absorb a lot of heat. Black is not black and very few materials absorb all light.

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, stray light can enter the sensor and give too high measurement result.

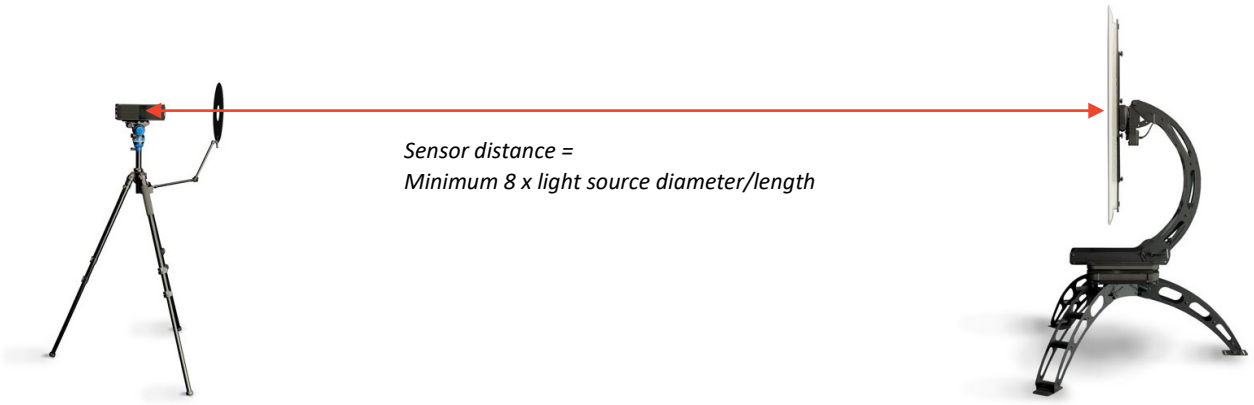
For all details regarding laboratory considerations (Laboratory environment, goniometer Dark zone, etc.), please refer to:



Guidelines – Building a lighting laboratory:
https://data.visosystems.com/content/manuals/guidelines_building_a_lighting_laboratory.pdf

Sensor Distance

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



Sensor distance =
Minimum 8 x light source diameter/length

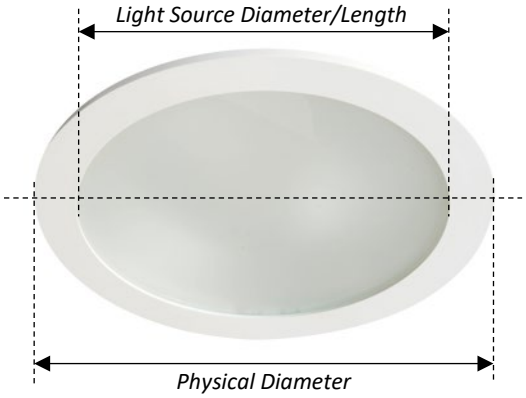
According to CIE S 025/E:2015, minimum measuring distances should be (D is the largest dimension of the luminous area):

- 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!

The minimum sensor distance is 8 times the biggest dimension of the luminous surface (e.g., diameter or diagonal).

Bigger distances are sometimes required.



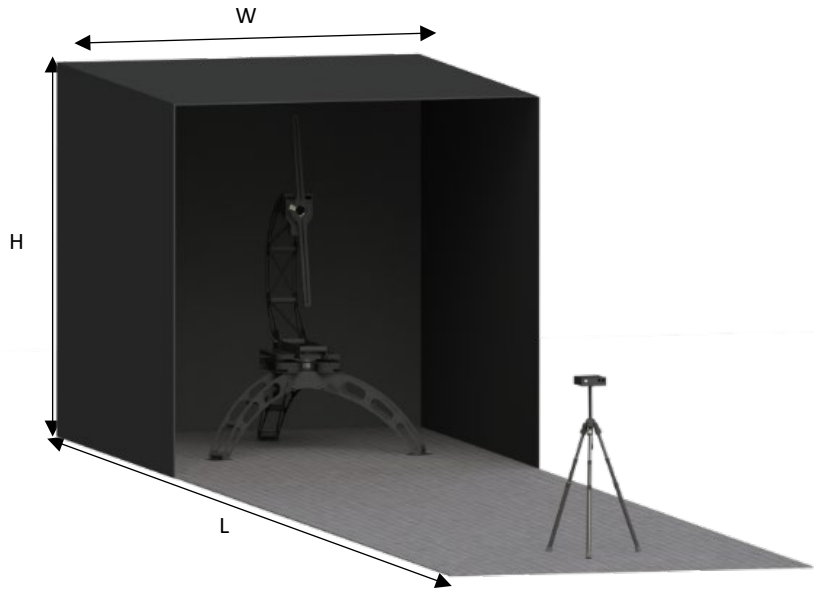
Adapting the distance is important. At too short distances (below 8 times the maximum luminous dimension), the sensor will not be able to “see” the whole light source. Sticking to the recommended distances is important because it

- optimizes the signal-to-noise ratio – see graph in page 31.
- limits stray light especially for directional light sources
- lowers the sensor integration time hence also the total measurement time.

Read more in *Guidelines – practical measurement setup.*

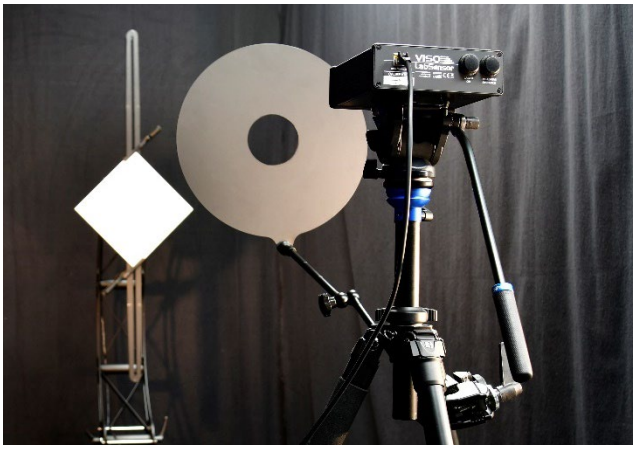
Minimum Room Dimensions

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

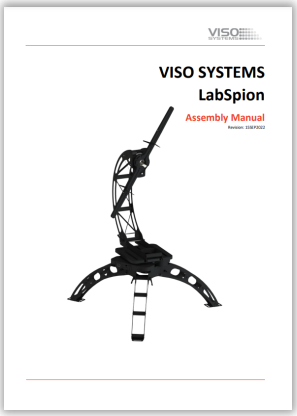
LabDisc standard baffle



You may also consider the standard Viso accessory LabDisc to prevent straylight in your lab. This unit sits permanently on the tripod/LabRail stem and limits the sensor field-of-view to a minimum.

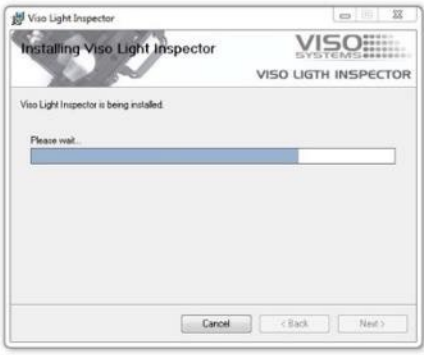
Installation

Hardware assembly



Please see the LabSpion assembly manual:
https://data.visosystems.com/content/manuals/labspion_assembly_manual.pdf

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

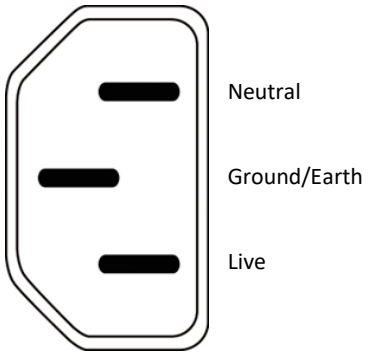
The LabSpion comes with a standard IEC power-in connector and with a standard Euro Power Cable, but any power cable can be used as the LabSpion supports any outlet voltage from 90-260VAC.

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.

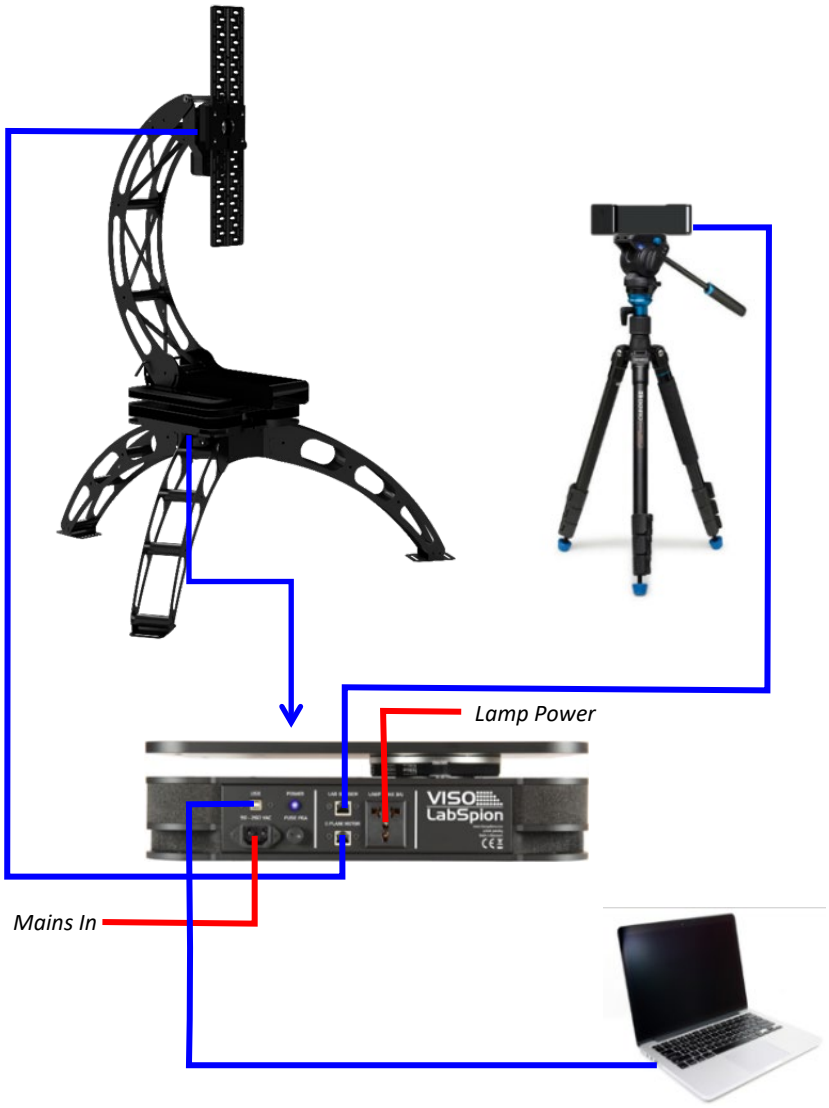
A grounding-type (earthed) power plug that fits the local power outlet must be used. You can acquire an IEC power cable with a suitable grounding-type plug from most of consumer electronics stores.

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.



Checking the fuse

Just under the mains-in connector, there is a fuse and a replacement fuse in a small drawer. If the 'Power on' diode is not clearly blue, the fuse may be broken.

Remove the fuse from the rear pocket and insert the spare fuse from the front pocket. Remember to buy a new spare fuse – a fast-blow 5 A fuse.

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

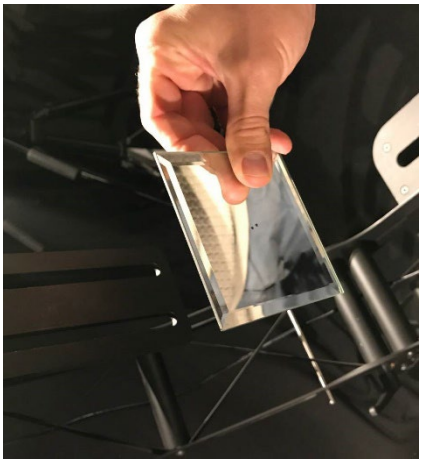
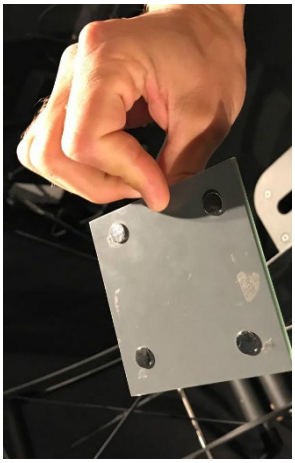
Before making any measurements, it is important to place the sensor at an appropriate distance and to align it accordingly to the goniometer.

Height alignment

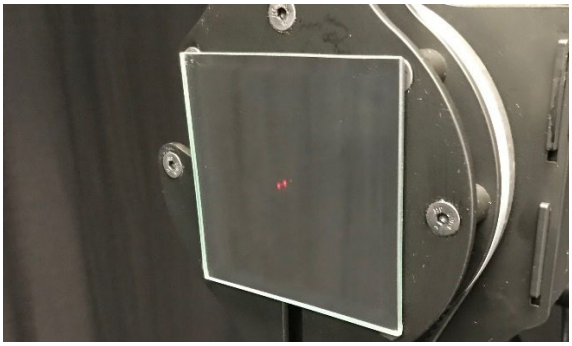
The sensor needs to be levelled in the same height as the center of the goniometer, i.e. the optical axis.

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 the goniometer center with the included mirror. The mirror has magnets on the rear side. Attach the mirror to center of the gonio lamp bracket:

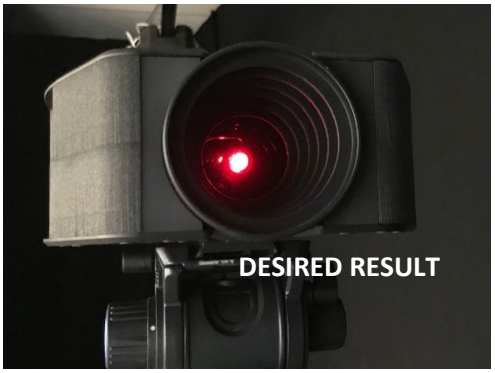



Then turn on the laser on.



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:

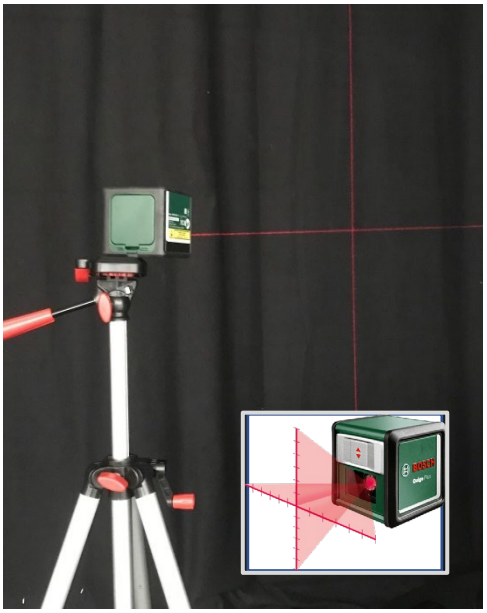


Now, you are sure that your sensor is aligned with the optical axis and being pointed directly to the center of the goniometer, and you can turn the laser off.

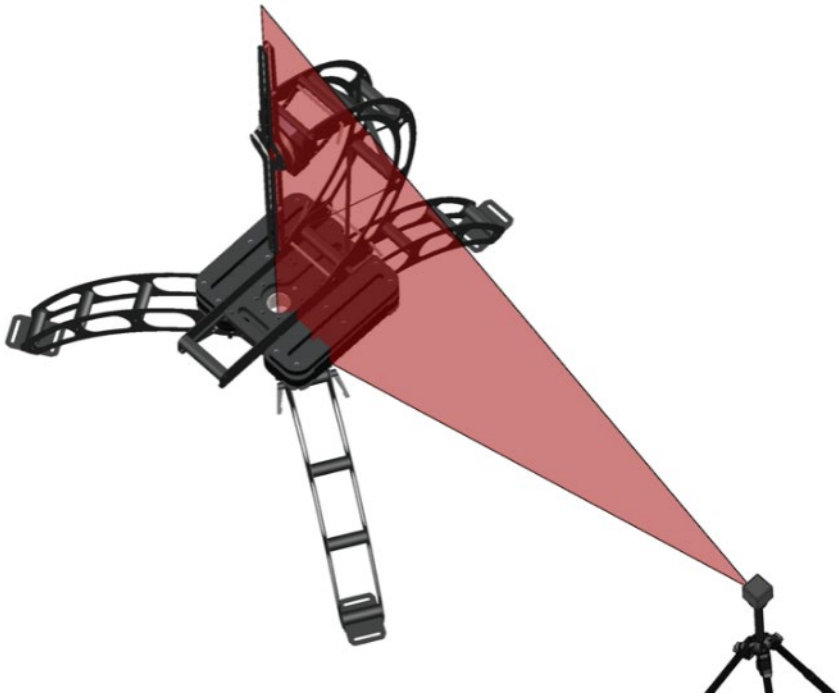
Set distance of the sensor

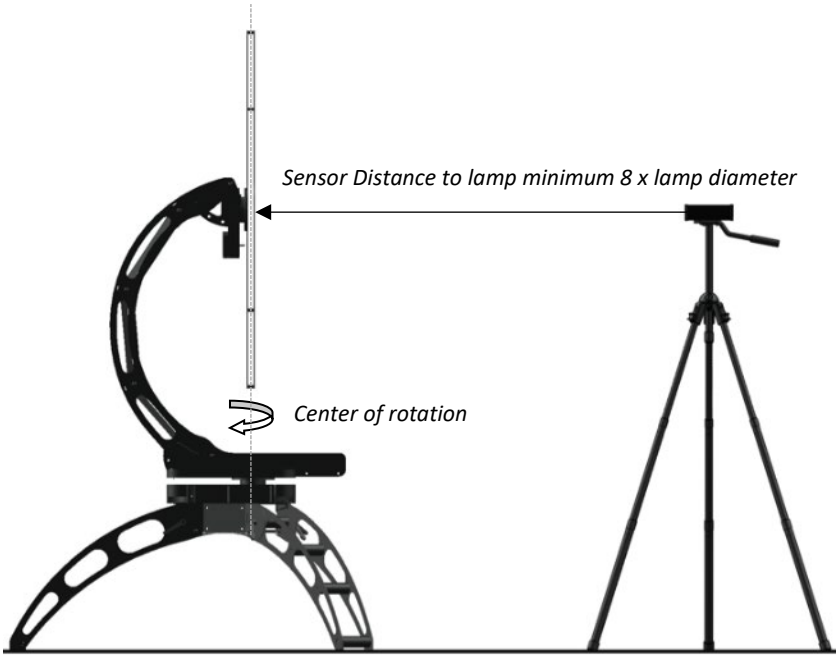
To set the correct distance, align the lamp bracket so the front is in center of rotation of the Base. This can be done with the laser as shown below or simply move the Tower back and forth until you can see it is in the center of rotation.

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 23. Also read more about measuring distances in "Guidelines to building or improving your own lighting lab"

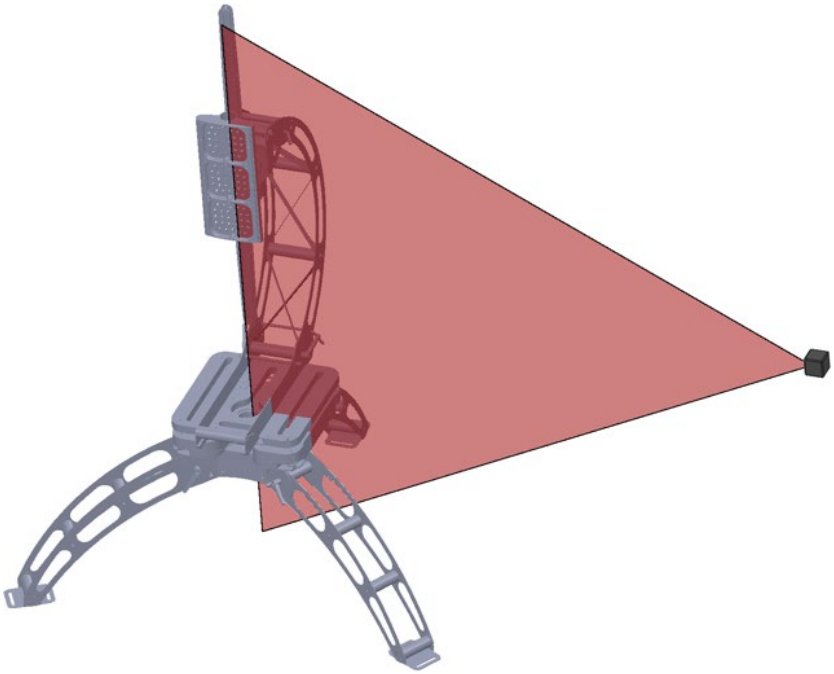
Please note: Some materials reflect the laser beam poorly. If so, temporarily place a small label or a post-it note on the front of the light source where the laser beam meets the luminaire optics.

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

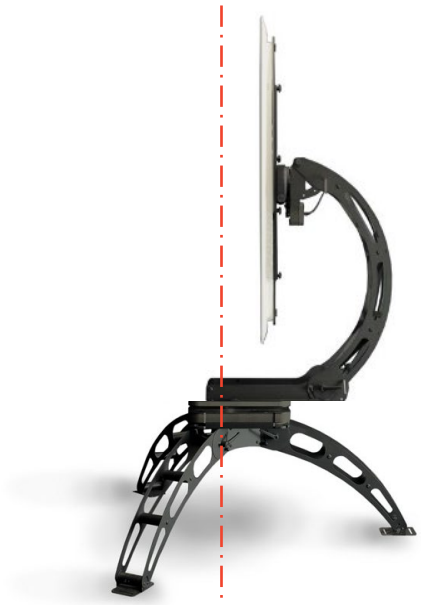
Please note: The laser module inside the laser tool is hanging loosely so the laser beam will be level although the tool is placed on an off-level surface or wall.

Adjust Lamp to Laser

Read more in *Guidelines – practical measurement setup.*

The included Quigo 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 be aligned to this.

Correct



Wrong

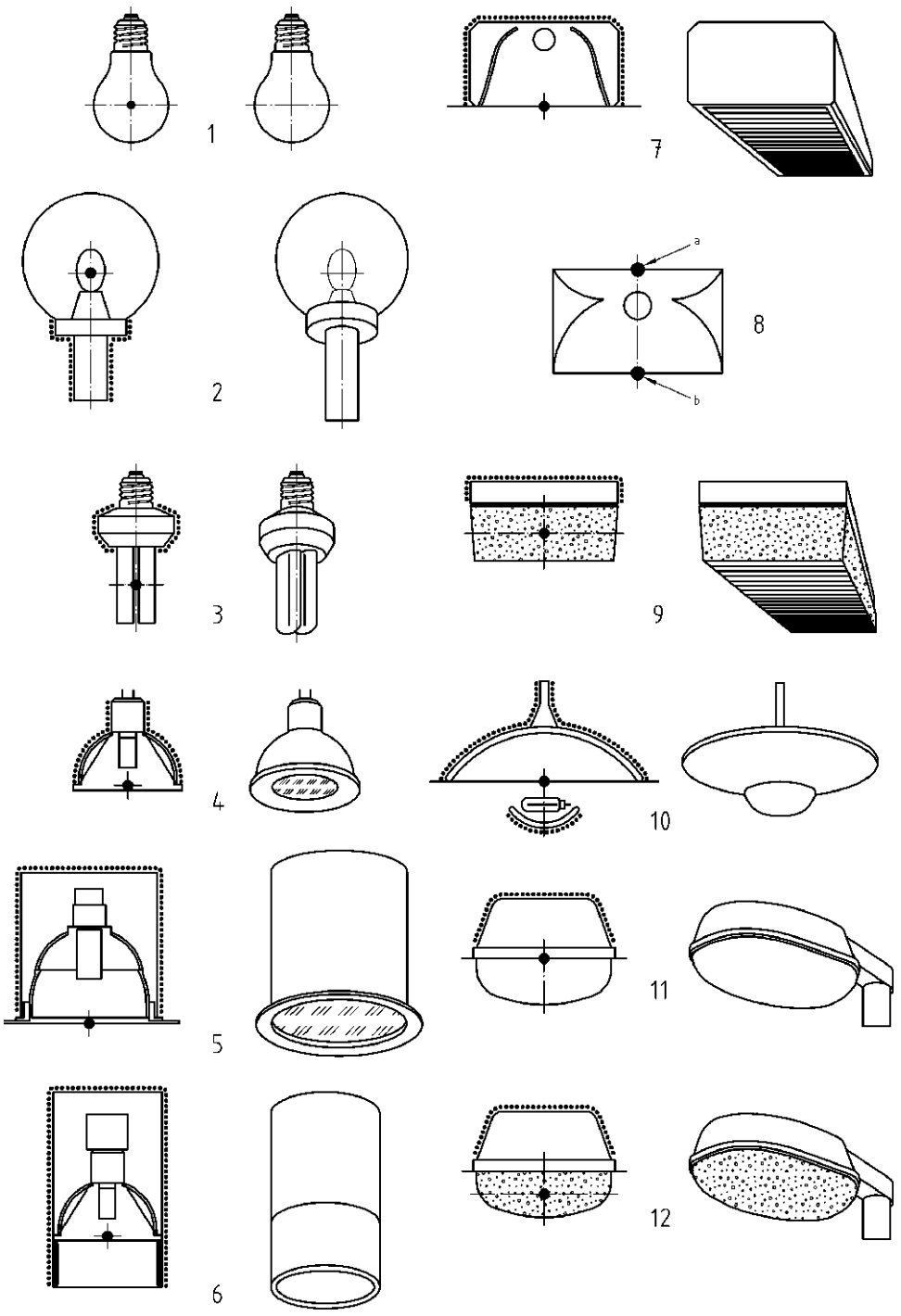
The EU standard (EN 13032-1:2004) states that luminaires with transparent sides or without closed sides should be centered at the lamps photometric center. See photo above.

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

Read more in *Guidelines – practical measurement setup.*


1
2
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a
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9
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11
12

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

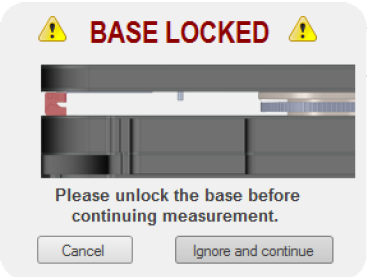
Photometric centre of light sources

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

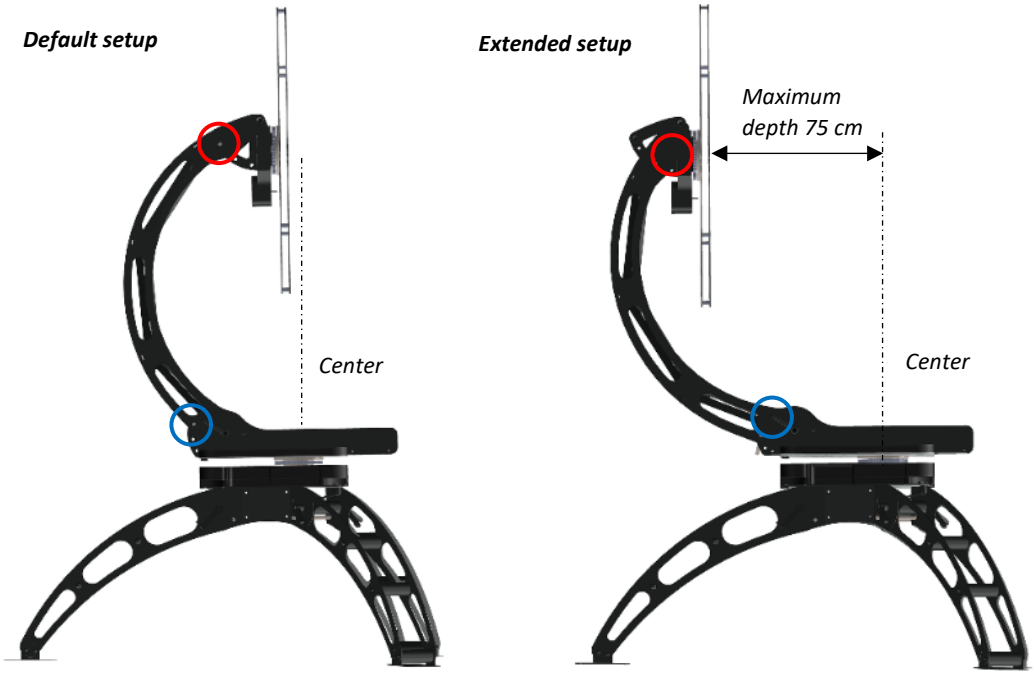
It is convenient to keep the base of the LabSpion still when mounting various light sources for measurement. Therefore, the system comes with a magnetic lock which is located on the back of the LabSpion Base as shown on pictures below:

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 Tower (only 1.5 m Tower)

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:



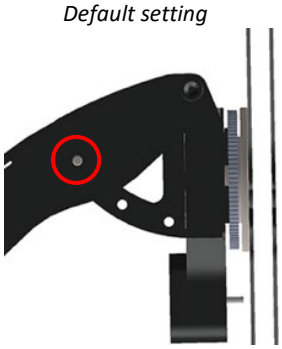
Note: This feature is not available on the 2 m tower. This to secure proper system balance)

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 tower is tilted backwards leaving more room for horizontally expanding luminaires.

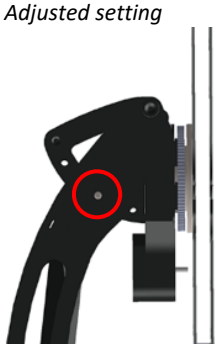
To tilt the Tower backwards:

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:

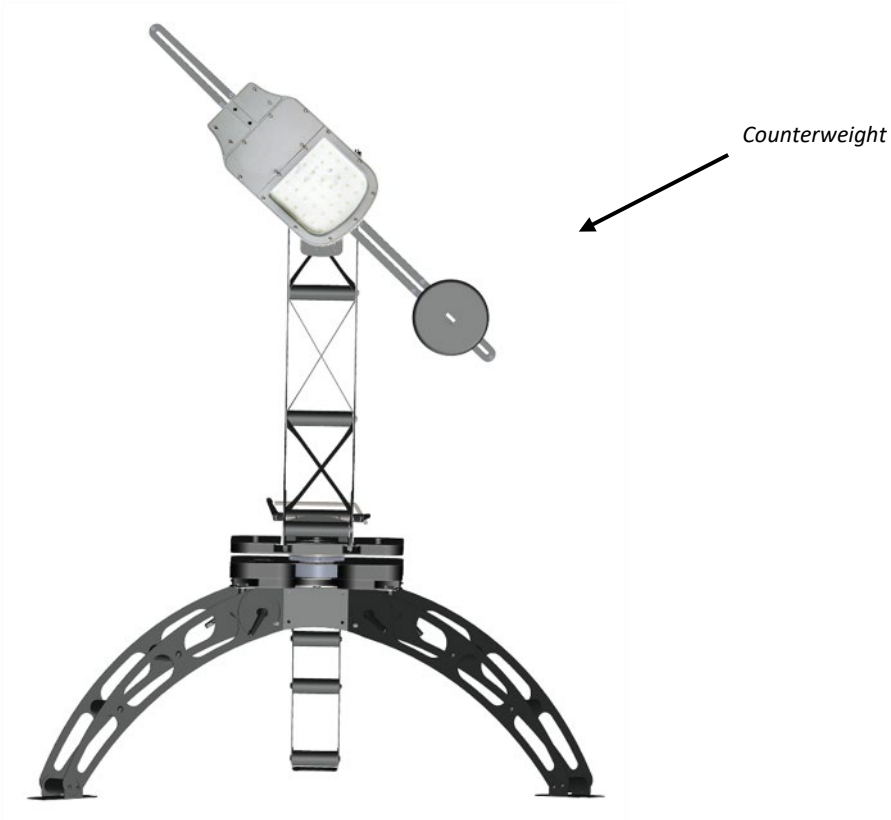
Default setup

Extended setup

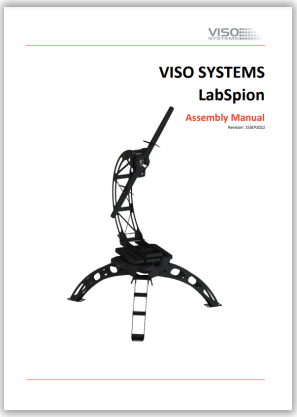
Please note: The tower is designed for a maximum weight of 25 kg in the default upright position. When tilting the tower backward this load will decrease. When tilted to the most extended position the tower will carry up to 10 kg.

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



Please see the Light Inspector user manual:
https://data.visosystems.com/content/manuals/light_inspector_user_manual.pdf

Go to section 3.7 A Normal Measurement Cycle to see a step-by-step explanation of how to make accurate measurements.

Your first measurement – testing the whole setup

Your first measurement should be measuring the included REF-800 reference light source. This source comes with a test certificate from when it was characterized in Viso's laboratory. Your setup should be able to replicate results with the specified accuracy limits.

There is a special manual for REF-800 that should be adhered to:

https://data.visosystems.com/content/manuals/ref800_user_manual.pdf

Maintenance

Cleaning

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). You may also gently clean mechanical parts with damp cloth (mild detergent).
To clean the sensor optic: Sensor optics: Use a spray dust remover, like e.g., this one (chemical-free, pressurized air):

Mechanical Check-up

Once every year, check that are screws are tight. Check that the system base is still level.

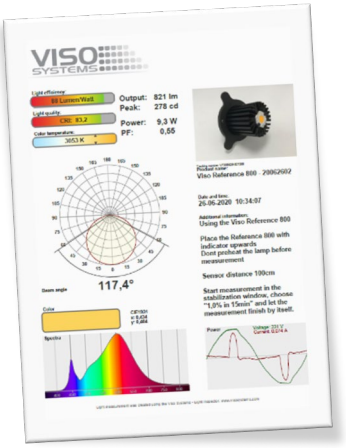
Cables and Plugs

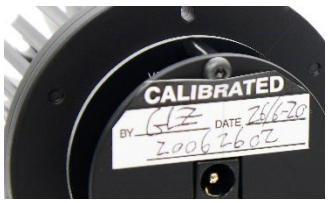
Once every year, check all cables and plugs are intact and not influenced mechanical stress.

Checking the Calibration Status

Once every three months check your calibration status.

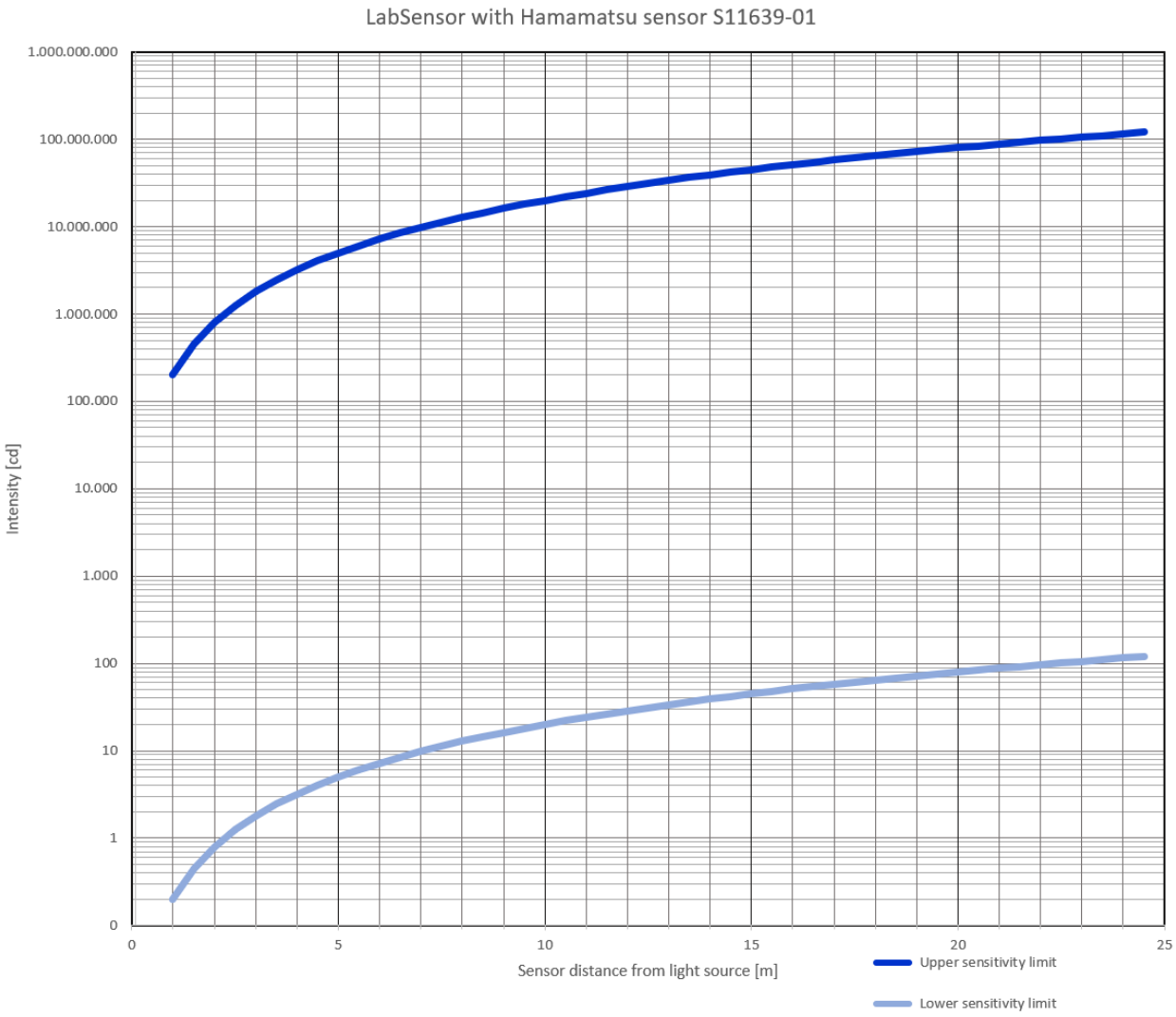
A special Viso reference light source (Reference 800) is included in the package. The light source has its own power supply, and both parts are labelled with identical calibration date and numbers. Never measure without the original power supply.





Follow the detailed check-up procedure described in this manual:
https://data.visosystems.com/content/manuals/ref800_user_manual.pdf

LabSensor sensitivity range



Specifications (LabSpion VIS)

Measurement method	Far Field, Type C Source-rotating

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 (extended: 200) cm
Lamp maximum weight (tower in upright position)	25 (reinforced: 45) kg

Electrical (original)

Power supply input	90 - 260 VAC, 50/60 Hz/5A fuse
Power consumption	60 W (Idle 15 W)
USB current consumption	200 mA
Power analyzer voltage range	90 VAC - 260 VAC <+/- 0.5V
Power analyzer current range	0 – 3 A (Avg: +/- 0.5 mA)
Power analyzer power range	0 – 300 W @110 V / 0 – 600 W @230 V (Avg: +/- 0.1 W)
Power analyzer sample rate	70,000 samples/sec

Electrical (model II)

Power supply input	90 - 260 VAC, 50/60 Hz/5A fuse
Power consumption	60 W (Idle 15 W)
USB current consumption	200 mA
Power analyzer voltage range	90 VAC - 260 VAC <+/- 0.5V
Power analyzer current range	0 – 3 A (Avg: +/- 0.5 mA)
Power analyzer power range	0 – 300 W @110 V / 0 – 600 W @230 V (Avg: +/- 0.1 W)
Power analyzer sample rate	125,000 samples/sec

Photometric

Illuminance, lux at sensor (Equal to candela @ 1m)	0.2 – 200,000 <+/- 2,5%
Flux, lumen @ 0.5 m	0.15 – 150,000 <+/- 4%
Flux, lumen @ 1 m	0.63 – 630,000 <+/- 4%
Flux, lumen @ 5 m	15.7 – 15,700,000 <+/- 4%
Flux, lumen @ 10 m	63 – 63,000,000 <+/- 4%
Flux, lumen @ 20 m	250 – 250,000,000 <+/- 4%
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%
Color temperature	1,000 K-10,000 K <+/- 35 K
Color 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, standard VIS	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 measurement solutions. Products are developed and manufactured in Copenhagen, Denmark.