

VISO SYSTEMS CALI-T50 Reference Lamp

User Manual

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Congratulations on purchasing your new Viso Systems product. 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 <u>www.visosystems.com</u>

Other manuals in this series (the latest version can be downloaded from www.visosystem.com):

- LabSpion Assembly Manual
- LabSpion User Manual
- BaseSpion Assembly Manual
- BaseSpion User Manual
- LightSpion User Manual
- LightSpion Extender User Manual
- LabFlicker User Manual
- Light Inspector (software) Manual



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Introduction

About this document

These guidelines describe how to use the CALI-T50 as a reference light source and how to do custom calibrations on Viso Systems goniometer products.

Safety information



Warning! This product is not for household use.

Read this manual before installing and operating the CALI-T50, 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, and 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.

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About Calibration and Light Sources

All Viso systems are delivered pre-calibrated, but it is possible to make a custom calibration of the photo spectrometer if desired. This could be necessary if the system is to be certified by an official agency, which will perform its own calibration and afterwards issue certification documents.

To make custom calibrations a calibration source must be used, and the spectrum and the intensity in a point at a certain distance must be known. Such a spectrum is usually specified as power in μ W/cm2/nm as shown below.



Calibration sources can be obtained from a number of suppliers. This manual describes calibration procedures for 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).

All CALI-T50 light sources are traceable to Viso's calibration lamp (Oriel lamp 7-3110, characterized by PTB, German National Metrology Institute, 40004-23-PTB, ILAC members as NIST).



Important:

Calibrations must be made in a dark environment with non-reflective surfaces.

About the CALI-T50

The CALI-T50 is and irradiance reference lamp which means it is a directional lamp with intensity and spectrum defined in a single point in front of the lamp as shown below.



Dimensions







Outer dimensions of the light source:



Shipping Packages	Shipping Dimensions	Shipping Volume	Weight
1. CALI-T50	400 x 300 x 250 mm	0.03 m ³	4 kg

Total shipping weight: 4 kg

The shipment is done in a total of 1 package.

CALI-T50 Package Contents



- Smart suitcase incl. soft-start driver
- Mains Power Supply Cable
- Light Source supply cable
- Test Certificate

The Test Certificate



The CALI-T50 comes with a test certificate as shown below.

Source lifetime

The source calibration lifetime is about 30 hours. Remember to turn off the light source as soon as possible to preserve the lamp.

If for any reason this time exceeded, the source can be re-traced to Viso's original calibration light source. Please contact your local distributor or Viso Systems product support.



Calibrating a Viso System

Calibration procedures are more or less the same for all Viso systems but mounting and aligning the CALI-T50 is a little different. This section will describe mounting and alignment for the three systems first, and then describe the common procedures.

Turn on your sensor

Start your software and connect everything including the sensor at least one hour in advance. Do not turn on the CALI-50 at this stage. Make sure that the laboratory ambient temperature is 25 deg.

LabSpion: Mounting the CALI-T50 and aligning the sensor

The very first step is to mount the reference lamp into the setup as shown in the pictures.

Initially, make certain that the sensor and the photometrical axis defined by the goniometer are **perfectly** aligned as described in the LabSpion User Manual. The easiest way of doing this is to lock the base on the rear side and follow the mirror alignment procedure described.





The sensor must be placed approximately two meters away from the setup with the reference lamp. Use the same distance as defined on the certificate +/- 5 mm. Make sure that the sensor is aligned with the lamp. Shoot the laser towards the lamp glass and catch the reflected beam in the same area of its origin, or within a 4 cm area. Such a procedure puts both the sensor and the lamp in alignment. The pictures below explain the process:



Measuring the distance

When the sensor is aligned relative to the lamp, you can measure the precise distance between the two components.

Now start the distance measurement

- Press the 'Laser on' button on the back of the sensor
- Slightly lift the laser to target beam towards the little white point above the lamp area





Press the 'Measure distance' as shown below.



The glass surface of the lamp produces a lot of internal reflections of the laser beam, and it complicates the exact distance calculation. The precise distance determination is essential in achieving the best results. That is why a fixed white target point was designed above the lamp luminous area.

• After the distance has been measured, tilt the laser back to point to the center of the glass.

BaseSpion: Mounting the CALI-T50

- The CALI-T50 can be pre-stabilized or warmed up while mounted on the BaseSpion
- Use the Base lock function to ensure that the direction of the lamp is correct
 - Remove the lamp bracket on the C-plane head and mount the CALI-T50



Align the front of the thick plate (assembly line between first and second ring) with the center of rotation.





• Move the sensor to position 150 cm.

The distance to the CALI-T50 will (as always) be detected automatically by the BaseSpion.

LightSpion: Mounting the CALI-T50

Place the calibration lamp at the center 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. Sometimes it is necessary to unplug the RJ45 cable to the motor to enable precise alignment.



Connecting Power to the CALI-T50

To turn on the lamp, simply plug the lamp into the box socket, and then connect the box to the (mains) power supply, as shown in the picture below.



Warm-up and Stabilization

The lamp needs to ramp up, and there is an indicator with a mini-instruction on the box.

- A blue flashing indicator means the lamp is ramping up,
- A constant blue color indicates that the lamp has concluded ramp-up



A red color of the indicator means that there is an error.

Then the lamp needs to stabilize for at least 30 minutes or what is stated on the certificate, after which it is ready for measurement.

Making a quick reference check-up of the sensor

It is easy to make a fast reference measurement where you simply test the if the measured data matches the certificate to verify that sensors calibration is intact.



When the lamp is warmed up simply turn on the spectrometer by clicking on the spectrum icon.

Over saturated click to auto set

If the spectrum is over-saturated just click on the red over-saturation label to make the system to readjust the spectrometer and remove the over-saturation.

The CALI-T50 is an irradiance lamp and does not have a lumen value but only candela and photometric values at one point, so it doesn't make sense to make a complete measurement that rotates the lamp. Just turn on the spectrometer and check if the live values match those of the certificate that came with the Viso CALI-T50. To save a live measurement, simply click the save button and save it as any other light measurement.

Remember, most likely there will be some fluctuation in values and accuracy which can be seen below.

- Candela accuracy +/- 4% (including sensor) for example for 700 cd (672-728)
- Color temperature accuracy +/- 35K

Check that the spectrum is relatively smooth as on the certificate.





Calibrating the sensor

The CALI-T50 can be used to re-calibrate your sensor. All Viso products have two memory areas where calibration data can be stored. The first memory area contains the factory calibration and can only be edited by Viso Systems. The second area contains the custom calibration and can be changed by the user as many times as desired. You can always go back to the latest factory calibration.

Before a calibration can be made you must have a lamp file (.lmp) for the CALI-T50 lamp. The lamp file specifies the CALI-T50 in μ W/cm²/nm (@0.5 m, being recalculated in software to 2 m) for each wavelength, making it possible to make a full spectral and intensity calibration of the sensor.

After the CALI-T50 was originally measured by Viso Systems, all the data were uploaded to the Viso server, so it is always available for download.

Go to <u>https://www.visosystems.com/reflamp/</u>, locate your .lmp file, and store it locally. Use the lamp serial number stated on the certificate and the lamp itself.



Type in the serial number from the CALI-T50 case or lamp, in the reference lamp database and press submit. When your lamp is found you can download the .lmp file by pressing the link. Here you also find the certificate document in pdf for the CALI-T50.



 REFERENCE LAMP DATABASE

 In this page you can download the photometric information for your reference lamp.

 Image: Colspan="2">Image: Colspan="2" Colspan="2

Download calibration lamp file REF LAB 18110601.lmp

Spectrometer Calibration – Step by Step

Calibration	is steps	
Step 0	Make sure the calibration light source (CALI-T50) is stable and has been turned on for the time stated by the manufacturer. Important: Calibrations must be made in a dark environment with non-reflective surfaces.	
Step 1	First, you must locate the lamp file (.lmp) for the calibration lamp of your choice. Go to https://www.visosystems.com/reflamp/ ;, locate your .lmp file, and store it locally.	Spectrometer calibration setup
Step 2	Then the calibration lamp must be mounted aligned as described in this manual, the distance must be measured and the light source warmed up as the manufacturer describes	Viso factory calibration, done 28-03-2012 Custom calibration Not available
Step 3	 Connect the Viso Systems goniometer via USB and open the Viso Light Inspector software. Select: Setup - Spectrometer calibration Select custom calibration Click 'New'. Note: The primary factory calibration will not be lost, and you can always return to it 	New Save Load Selected calibration information Calibration source: Calibration date: Custom: Not available Source data: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Step 4	 Select "Load lamp file" and locate the lamp file to load the calibration source spectrum. The window showed on the right-hand side will now be populated automatically with information (intensity, spectrum etc.) from the lamp file. This information is derived from the original measurement file and form the basis for your calibration procedure. Advanced (normally skip this step): If you use another calibration light source than CALI_T50, then you may enter these values manually. At the top you may enter the intensity value in candela. The system will automatically base the subsequent calculations on the original lamp file referring to a 0.5 m measuring distance. If the calibration light source was measured at another distance, press the "recalculate" button to specify this. 	Calibration wizard

Click next.



- Set the integration time to a maximum possible value to ensure the highest resolution and thereby the best calibration quality.
 - Tip: Use arrow keys or mouse scroll wheel to make fine adjustments
 - Click next



Step 6

Step 5

To make a dark measurement cover the sensor or turn off the calibration source so the dark reference spectrum can be measured.





- Click next and the calibration is finished.
- Step 7
 When you close the calibration dialog box you will be asked if you want to save the calibration to the device. When selecting 'yes' the custom calibration will be saved inside the device. You can switch back to the factory calibration at any time.
- Step 8Restart the Viso Light Inspector software and check the new calibration is
stored correctly by going into Setup Calibration.

Step 9 Optional: Measure a REF800 Viso reference light source to check your calibration result.

Intensity verification using REF800 (optional)

After the spectral calibration has been done and stored to sensor, is it advised to make a verification of the calibration using a third source. The best source for this is the REF800 led source as it gives a very stable intensity. Note: Only newer systems have REF-800 in the standard package.



Before starting, please make sure you have downloaded the calibration paper of the REF800 by going to <u>www.visosystems.com/reflamp</u> and typing in the serial number of the REF800. The serial number can be found on the power supply or on back of the REF800 lamp itself.



Please follow the steps in the REF-800 user Manual very carefully: https://data.visosystems.com/content/manuals/ref800_user_manual.pdf

When the measurement is finished you can compare the measured result with that of the calibration document. Please check that the color temperature is within +/- 35K and then check the lumen value.

To correct a mismatch (up to +/- 2-3%), please adjust the intensity of the new calibration to match the REF800. Remember we are only adjusting the intensity not the spectral distribution so we will not damage the CALI-T50 calibration. If not already done, it is recommended to save the calibration to file as a backup.

Before we can adjust the intensity of our calibration, we first need to calculate the correction in percent. For example, if we measured 780 lm but it should have been 810 lm we can calculate correction where a 100% is no change to: 810/780=103.8%. Click *Setup* \rightarrow *Calibration* and then click "Edit" on our calibration.

If the mismatch is greater than +/- 2-3%, chances are that something else is interfering with your measurement. Please see the troubleshooter in the next section.



Edit calibration \times				
Edit calibration lamp intensity				
Calibration lamp: NIST ref 357 hoiw 3				
Calibration lamp candela 661,273 cd				
Adjust intensity calibration 103.8 🜩 %				
A calibration consists of a spectrum and intensity calibration. The spectra calibration can only be changed by making a new calibration.				
But the intensity calibration can be edited by changing the candela value specified for the calibration lamp. So if the calibration lamp was specified to be 100 cd and you change it to 50cd will all you measurements be 50% lower for example a lamp which was measured to be 300 lm would now be measured to be 150 lm.				
It is recommended that you save your calibration to a file in case you forget the original calibration lamp candela value.				
OK Cancel				

And then click "Ok".

Save changes to device ?	\times
Po you want to save the changes made to the device ?	
<u>Y</u> es <u>N</u> o	

And when closing the calibration window, click 'yes' to saving the changes to sensor.

Please re-start the software and re-measure the REF800 lamp and the values should now match up. If not, the intensity correction process can be repeated until the results match within +/- 1%.

The calibration is now done and stored in the custom calibration memory section of the sensor.

Troubleshooting

- When checking the output with REF-800, there is a big mismatch between my lumen and candela readings compared with the certificate: Have you followed the REF-800 VERY carefully? When making a spectral intensity calibration with CALI-T50, only the spectrally distributed intensity straight forward is used. If there is a small misalignment, the spectral calibration may be right, but the intensity calibration may be slightly off. This is why it makes sense to check the intensity calibration with REF-800 subsequently. If there is a considerable mismatch, it is recommended to redo the custom calibration making sure that all instructions are followed very carefully.
- The mismatch persists, even if I redo the custom calibration.
 If the lumen value and the beam angle both are too high, but the candela

value is ok, chances are that your measurement is affected by straight light: Check the surfaces in your laboratory. If your lumen value is right, and your intensity is high or low, check that your light source is accurately aligned in the photometric axes – horizontally and vertically.



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

VISO SYSTEMS Light measurement made easy