VISO SYSTEMS LabRail

User Manual

Revision: June 2025

Congratulations on purchasing your new Viso Systems LabRail. 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

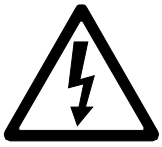
Contents

Safety Information

Warning! This product is not for household use.

Read this manual before installing and operating LabRail, 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.

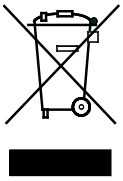
Use a source of AC power that complies with the local building and electrical codes, that has both overload and ground-fault protection.

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 LabRail and distance calibratio procedure.

About the LabRail

The LabRail is a revolutionary new automatic sensor positioning system, which includes fully motorized sensor positioning include data over power elliminating all cables.

Shipping Dimensions

Rails	21 kg	1670 mm x 300 mm x 300 mm
Assembly box incl. dolly	24 kg	800 mm x 400 mm x 260 mm

LabRail Introduction

Suspension principle

The standard rail consists of eight 1.5-m rail pieces. Not all pieces need to be installed for the system to work – just choose your own preferred length. The rail can also be prolonged with more rail pieces from Viso Systems.

Gravity and symmetry hold the assembly in place.

The LabRail system needs to be firmly attached to the building structure (not to suspended ceiling parts or the like).

If you use a wire suspension, it is also important that the suspension wires are symmetrical around the rail. This is to avoid skewing of the rail and to secure balance. The rail suspension is very flexible when it comes to ceiling heights. The suspension wires can be as long or as short as desired.

The rail is intended to be assembled as a whole on the floor. When this is completed, the whole rail is lifted manually (about 5 people needed) to its permanent position and rail can be attached to wires or ceiling plates.

The dolly, end stop, injector, monopod and cables are installed. Your LabSensor fits directly onto the monopod.

LabTarget is in the kit as well and as its own user manual.

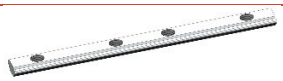
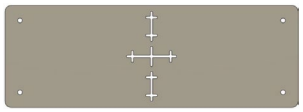
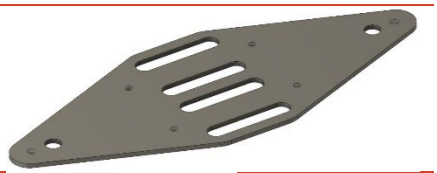
Finally, you need to go through a distance calibration procedure.

Standard pliers and a screwing machine with Allen key bits are the tools needed.

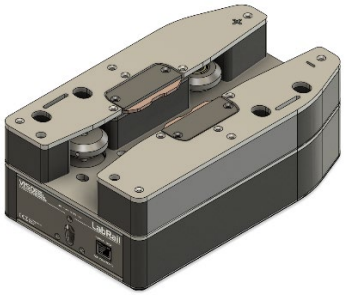
LABRAIL COMPONENTS

The standard rail consists of 8 rail sections each being 1.5 m long. The rail sections are interconnected using suspension plates on top and bottom.

The LabRail suspension contains:

Qty	Rail parts	Image
8	1.5-m pieces of aluminum rail	
34	Conductor rail	
34	Connector Profiles	
1	Drilling template	
9	LabRail Suspension Plate top	
9	LabRail Suspension Plate Bottom	

Qty	Rail parts	Image
18	LabRail Suspension Ceiling Plate	
120	Screw M5x6	
60	M6 Serrated Flange Lock Nut	
70	Grub Screw M5x6	
20	Grub Screw M6x80	

Qty	System parts	Image
1	Dolly	
1	End Stop	
1	Injector	

Qty	System parts	Image
1	Laser target (temporary)	
1	Cable IEC 5m Extension	
1	Cable Power 2m	
1	Cable RJ45 3m	
1	LabTarget*	
1	Telescopic arm (monopod)	

*Separate user manual
https://data.visosystems.com/content/manuals/labtarget_user_manual.pdf

Before installation

Contact Viso Systems

Before attempting in installation, please contact Viso System (info@visosystems.com) to devise the best possible solution for your specific laboratory space. The standard solution is a wire suspension system, but in some cases other solutions are needed, or the ceiling needs to be fitted with new structures to allow installation. Please provide photos sketches and other information to make this assessment possible.

Room height

The photometrical axis for LabSpion is normally 155 cm ±1 cm (extended version: 180 cm ±1 cm).

The **minimum** suspension height for LabRail measured from the photometrical axis to the top side of the LabRail is 80 cm.

The **maximum** suspension height for LabRail measured from the photometrical axis to the top side of the LabRail is 180 cm.

	LabSpion Standard Height (Ø1,5 m)	LabSpion Extended Height (Ø2,0 m)
Min. LabRail Height	235 cm	260 cm
Max. LabRail Height	335 cm	360 cm

Two installation methods

LabRail can be mounted on the ceiling with two methods:

- Recommended: Directly onto the ceiling structure – this is the easiest method.
- With wires – this is the most versatile system

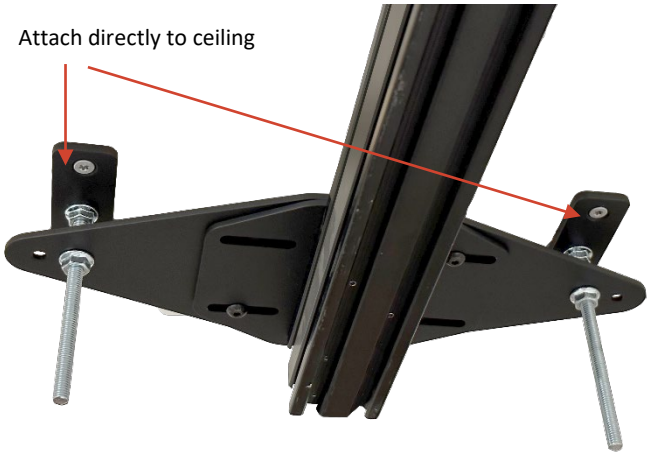
Both methods include freedom to adjust as it is very important that the LabRail section form a straight line, and that everything is level.

A prerequisite for both methods is that there needs to be a firm building structure to attach to.

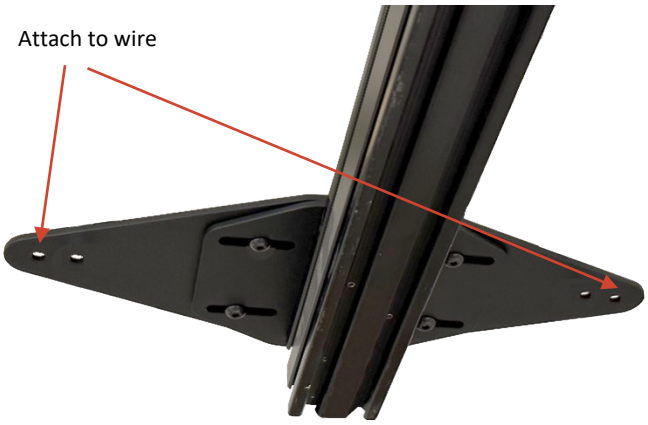
Attachment to structures

The LabRail must be firmly attached to the building structure – not to suspended ceilings or the like.

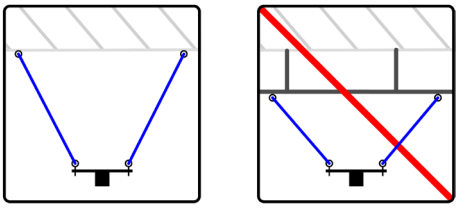
Direct attachment method



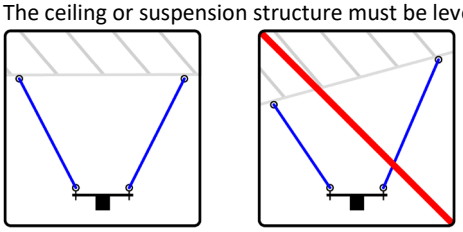
Wire suspension method



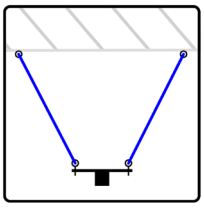
No suspended ceilings:

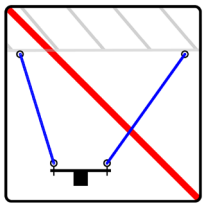


The ceiling or suspension structure must be level



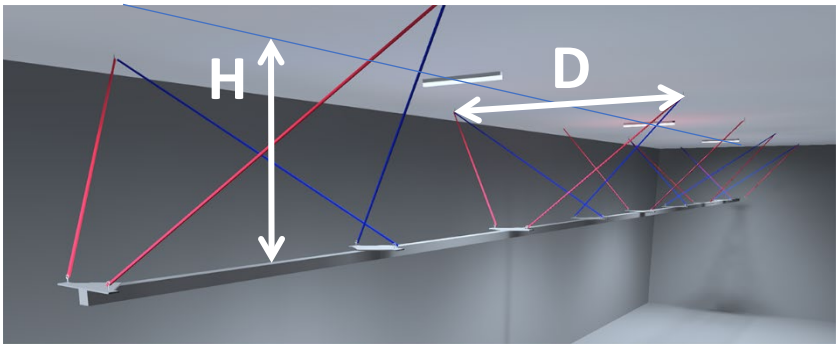
Place the eyebolts symmetrically around the intended rail position - this is to avoid skewing of the rail.





Wires must be angled vertically about 30-60 degrees to the ceiling to improve stability.

Recommended distances between suspension points:



Height*	100	200	300	400	500	600	700	800	900	1000
Distance**	400	500	600	800	900	1000	500	800	1200	1600
Qty***	2	2	2	2	2	2	1	1	1	1

* Height from LabRail suspension bolts to suspension eyebolts in the ceiling

** Distance between ceiling suspension points

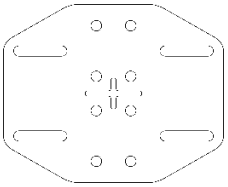
*** Quantity of suspension point between LabRail suspension bolts – see more details in *Appendix – Wire suspension distances.*

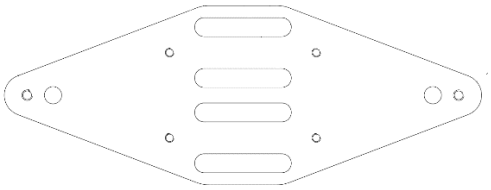
Installation procedure

Assembling the rail

The whole rail is assembled on the floor. The 1.5-m pieces are attached to one another with suspension plates for firm alignment and electrical connection.

1. Unpack all parts – and take special care not to damage the rails ends that are essential for correct alignment for the rail pieces.
2. Align the aluminium rail pieces on the floor. Put the rail piece with the end stop closest to the goniometer. Put the rail piece with the injector module farthest away from the goniometer.
3. Push the connector profiles into the grooves in the rail – 4 at each of each rail pieces: 2 on the top and two in the bottom grooves.
4. Start by joining the rail pieces on the bottom side of the rail: Use the grub screws M5x6 to fasten the connector profiles into the rail grooves. Push the rail pieces tightly together.
5. Turn the rail up-side-up.
6. Assemble the intermediate plates and the big ceiling plates in pairs.

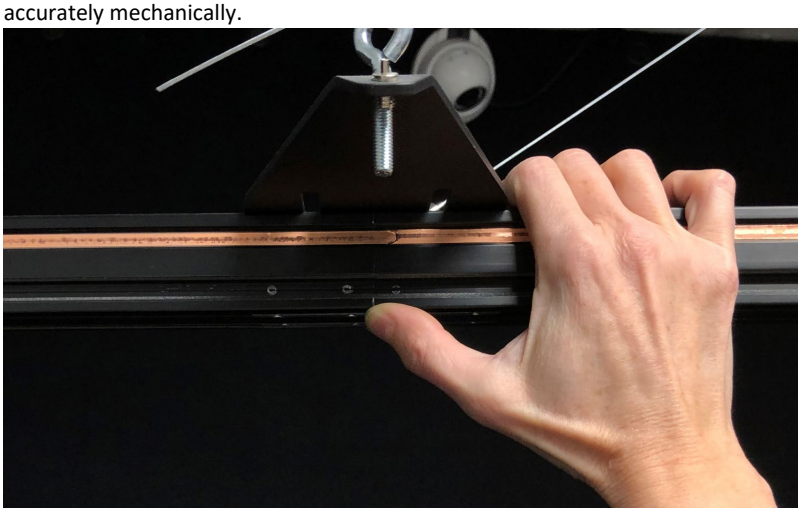




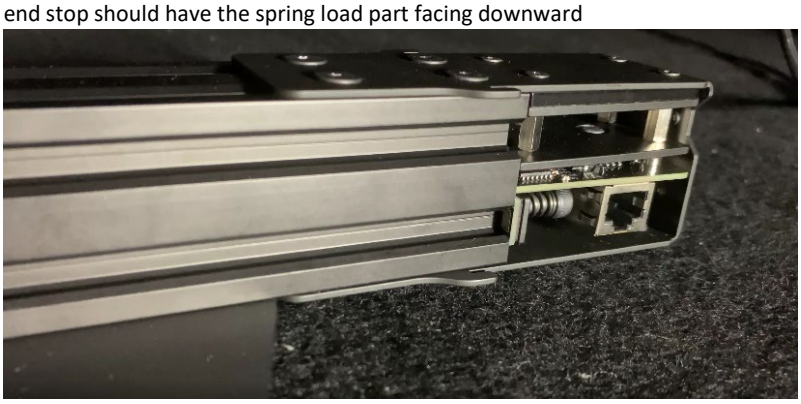
7. Attach these pairs (intermediate plates + big ceiling plates to the rail). Use the round headed screws M5x6 to fasten the intermediate plates through the oblong holes to the connector profiles into the rail grooves. – 2x4 screws into every suspension plate.

Important: Please check that rail pieces are indeed accurately aligned by running your finger across the assembly lines. If needed, loosen the screws and re-align. Even small misalignments may prevent the dolly from travelling

accurately mechanically.

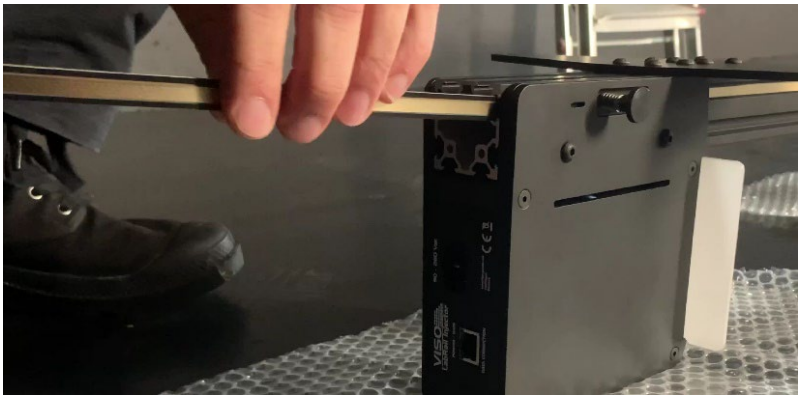


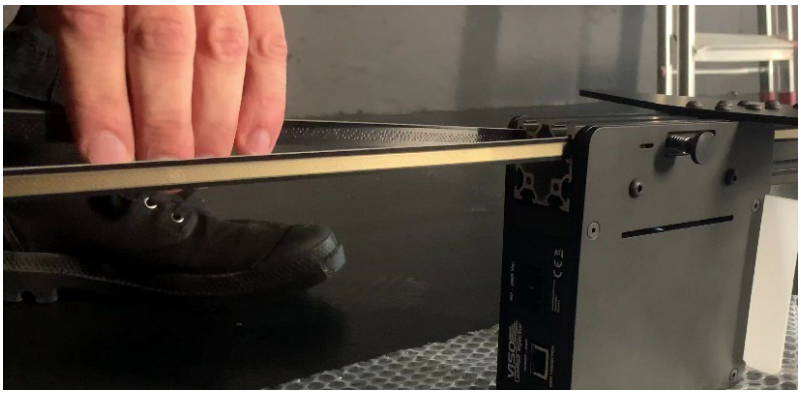
8. Remove the end stop cover and attach the end stop to the rail with 8 grub screw and 4 connector profiles inside the upper and lower grooves. Note: The end stop should have the spring load part facing downward



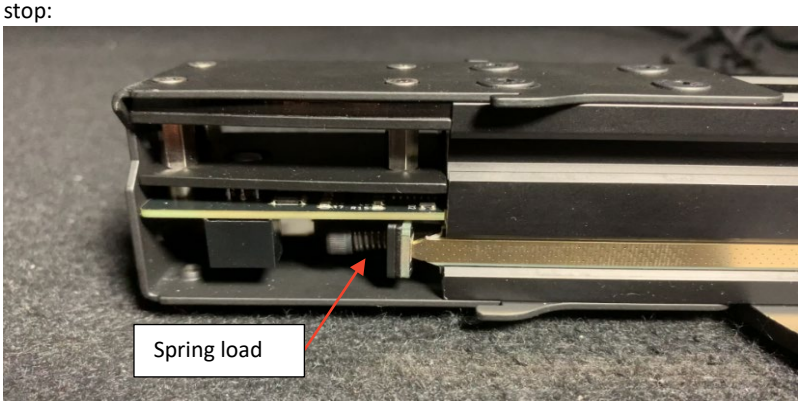
9. Turn the rail up-side-up.
10. Go to the injector unit on the rail end farthest from the goniometer

11. Push the rail conductor pieces into the top groove in both sides of the rail. Fill each groove.





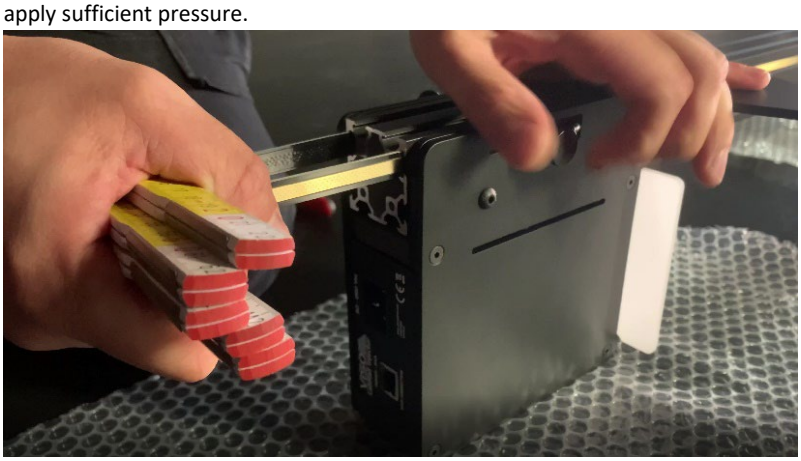
Push all pieces in and check that the first piece meets the spring load in the end stop:



Also check that the rail conductor pieces all slide freely and that to can activate the spring load by pushing that all conductor pieces from the opposite end of the rail.

12. The last conductor pieces will be too long. Cut the last conductor pieces to length + 5-10 cm with standard pliers:

13. Then push both conductor lines firmly in (thus activating the spring load at the other end) and tighten the finger screws on each side of the injector. Use e.g., a ruler in between your hand and the conductor to make it more comfortable to apply sufficient pressure.



14. Cut the remaining conductor pieces off if needed.

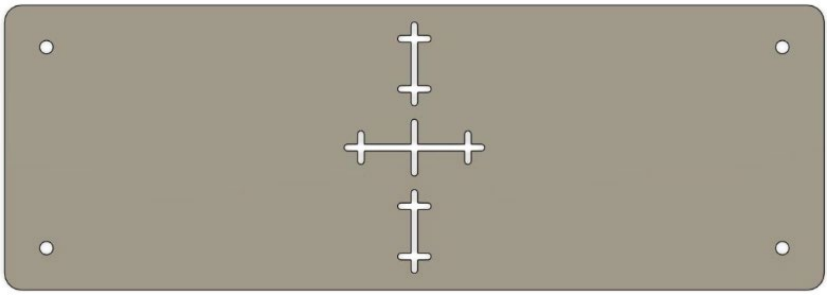
NO WIRE SYSTEM:

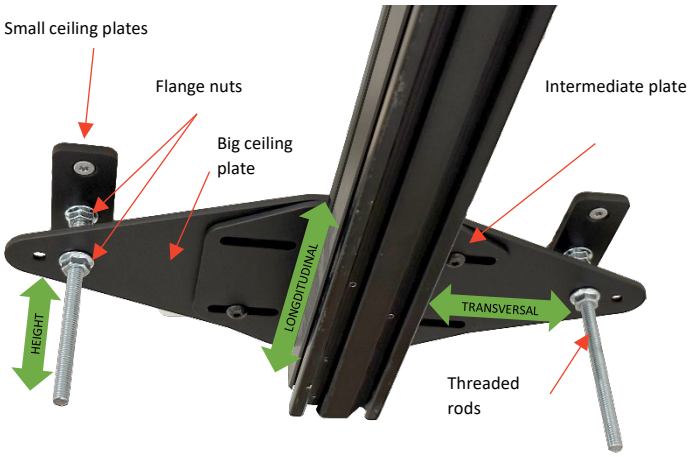
Attaching the rail with brackets directly on ceiling

In a dark room, extra lighting is need for installation: Establish good directing lighting in the space.

Put up a laser to draw a straight line to indicate the final middle position of the LabRail. A chalk line can also be a great tool. Make marking for every 1.5 m. The mark closest to the goniometer should be about 1 m from the gonio center.

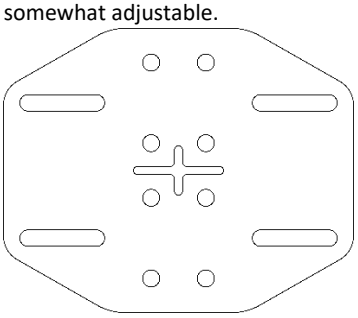
Use the drilling template to mark up the four holes for the ‘small ceiling plates’.



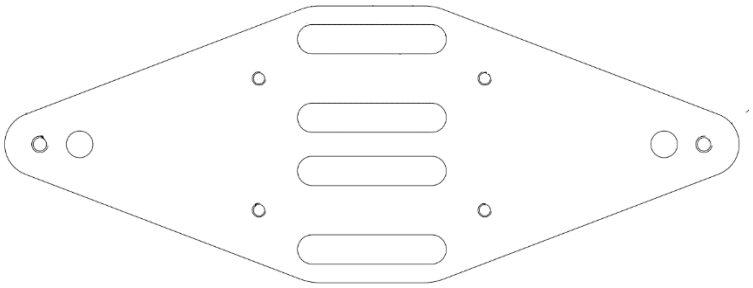


1. Mount the small suspension ceiling plates – if you have 8 rail sections, you need to mount 9 couples each distanced 1.5 m from one another. Use the plastic tool to get correct distances between the plates. Take measures to make sure that the ceiling plates are mounted precisely on a line orthogonal to the rail direction.

2. Attach threaded rods as shown in the image above, while securing each of them with a flange nut on each.
3. Attach the intermediate plates to the rail. The actual position along the rail is somewhat adjustable.



4. Attach the big ceiling plate to the intermediate plates.



The transversal movement is somewhat adjustable. Do not tighten the screws at this point.

5. Gather a group of 4-5 people to lift the whole rail assembly in place. Once the big ceiling place are on the threaded rods, mount a flange nut on each.
6. Since all metal parts are black, it is helpful to put intermediate pieces of white tape on the lower side of the rail and on one side so that the laser level beam is visible in the next steps.
7. Place the laser to indicate the longitudinal direction of the rail and use and screws that combine the big and intermediate plates level to adjust the transversal position of the rail pieces. Secure each plate with the screws.
8. Place the laser to indicate the level of the rail. Use the lower set of the flange nuts to adjust the height of the rail section by section.

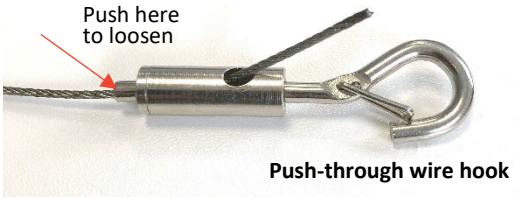
WIRE SYSTEM: Suspending the rail from the ceiling

In advance: Let Viso know if you want include a wire suspension set in he delivery.

In a dark room, extra lighting is need for installation: Establish good directing lighting in the space.

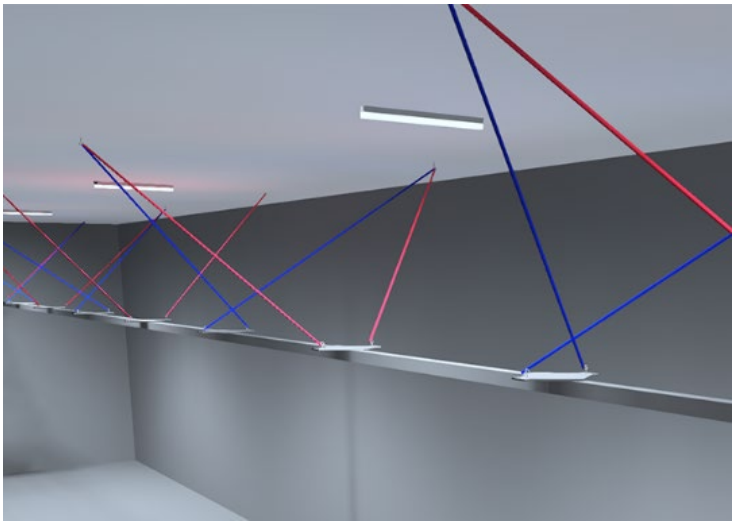
1. Screw two eye bolts into every suspension plate (for wire attachment)

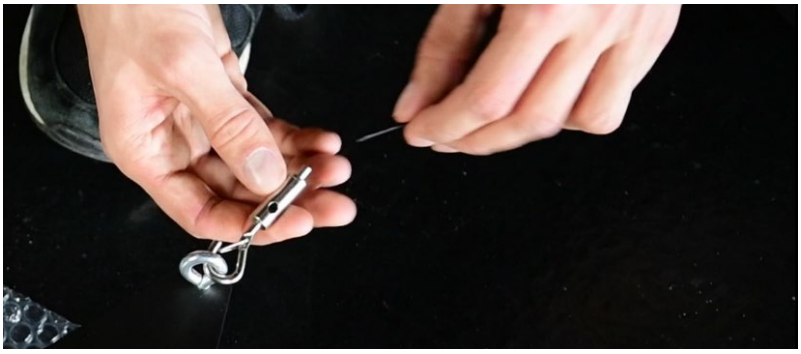
2. Please firmly attach your own eyebolts or the like to the building structure. The suspension hooks in LabRail kit accommodates can open and close around up 5.5 mm. Important: Each building eyebolt carries two wires and should be placed between two rail connectors (except maybe the last set). As gravity and symmetry holds the construction in place, wires must be angled vertically about 30-60 degrees to the ceiling to improve stability. Place the eyebolts in the same height and symmetrically around the intended rail position – this is to avoid screwing the rail.
3. Prepare the lengths of suitable lengths of wire: The wires should be long enough to reach from the eyebolts in the ceiling to the eyebolt on the rail connectors. Attach the supplied push-through wire hooks to one end off all wire ends
   Then attach the upper hooks of all wires to the eyebolts in the building structure – the other end hanging loosely down.



Push-through wire hook

Attach the other end of all wires hanging from the ceiling to the lower hooks. Important: Every other wire pair is crossed to prevent movement sideways. Illustration: All blue wires are crossed:
Height





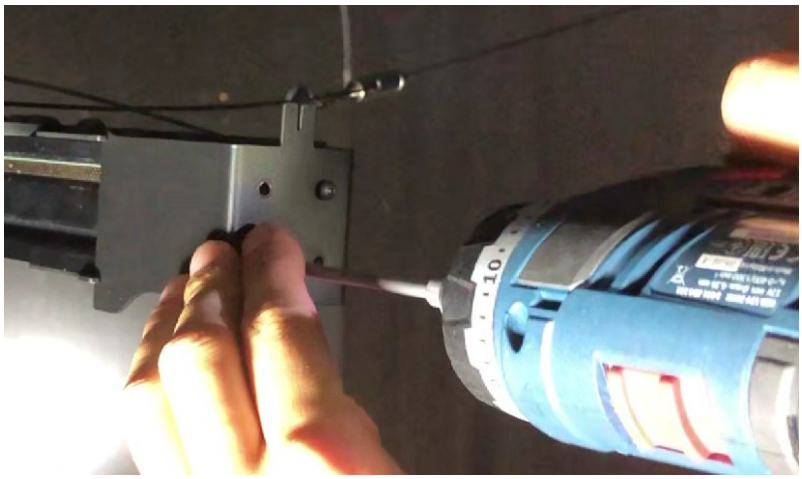
4. It is time to lift the rail to the desired position – minimum 2.3 m over floor level (for standard LabSpion goniometer med 1.5 m standard tower). For LabSpions with 2.0 m tower, the minimum height is 2.55 m over floor level.
5. A small group of people is needed, and each person needs a ladder. The group simultaneously lifts the rail approximately the desired height while securing the steel wires with the push-though hook to the eye bolts on the rail connectors. Then, adjust every wire set to make sure that the whole rail in the desired height and perfectly levelled. When everything is aligned (this may take some time), be sure to tighten the small finger nuts on the push-though hooks with a tool, so that sliding is effectively prevented.

Installing the dolly, monopod and sensor

1. Again, test the connections between the rail pieces with your finger to ascertain smooth transitions:

2. Slide the LabRail dolly onto the rail over the end stop (end stop cover still detached). The rear end of the dolly must (with labels) face the injector in the far end

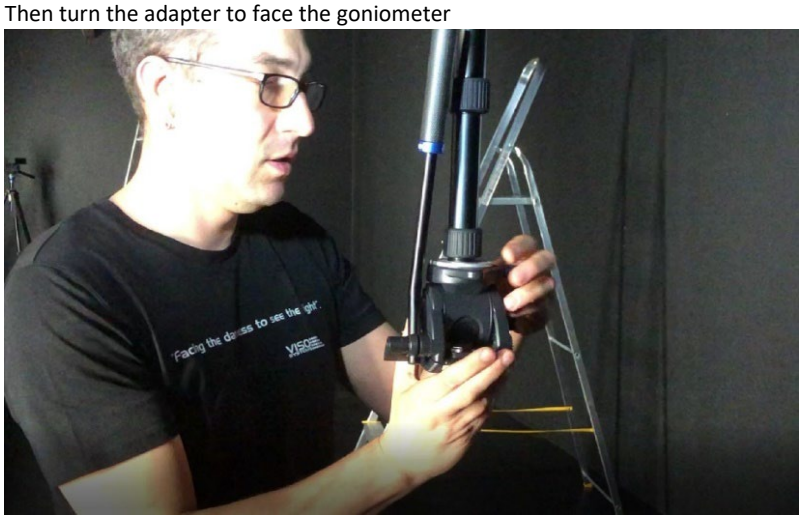
3. Attach the cover to the end stop.



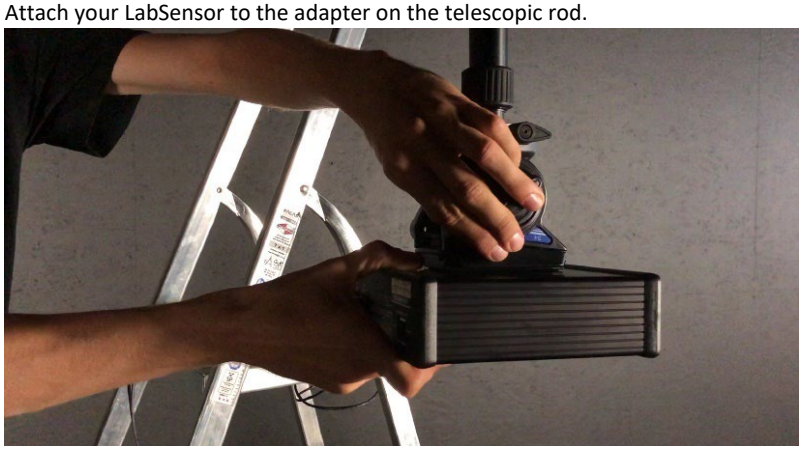
4.

5. Now, screw in the telescopic arm (monopod) to the dolly by turning clockwise until firmly attached

Then turn the adapter to face the goniometer



6. Attach your LabSensor to the adapter on the telescopic rod.



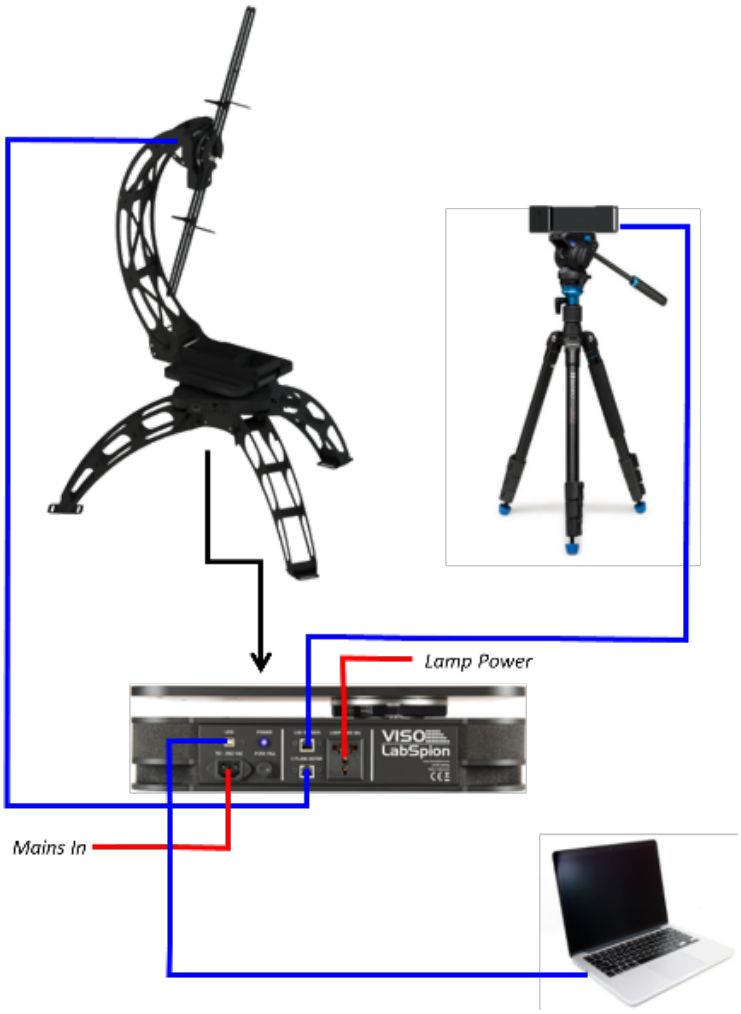
Roughly set the sensor to the same height as the middle of the goniometer c-plane motor (the sensor height will be adjusted accurately during calibration.

7. Make a physical mark over the assembly line between the sensor head and the telescopic rod connector – this is to make sure, that if you remove the sensor (e.g., for calibration) it can be returned to the same position. The mark can be a label or the like.

Power and data connection

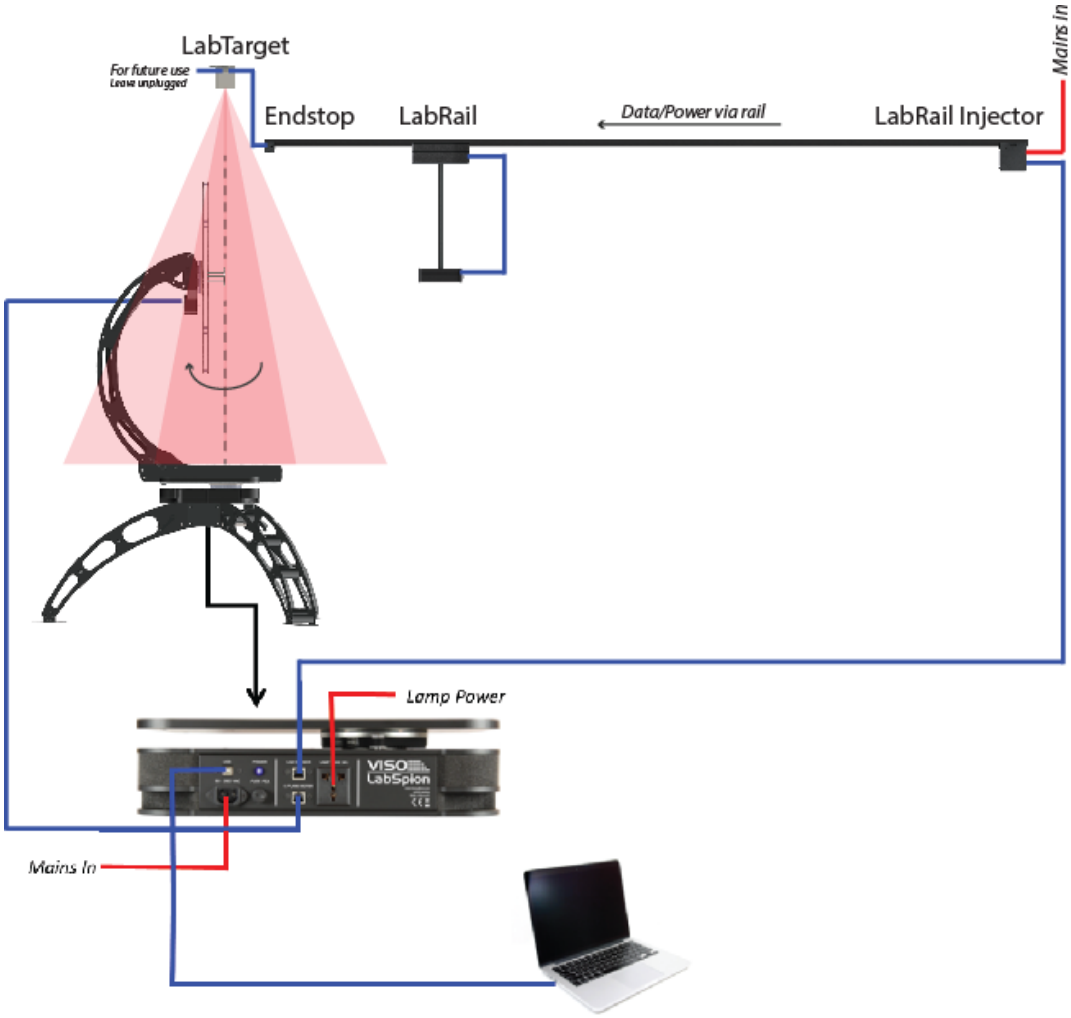
Standard connection when not using LabRail

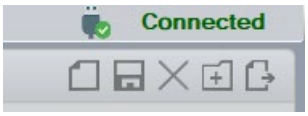
When the LabRail is not used is the sensor connected directly to the base as shown below.



Connection using LabRail

When using the LabRail is the sensor connected to the LabRail Injector (including power) and both data and power are transmitted together via the rail.





Use the standard 25 m RJ45 cable (normally used to connect the sensor to the LabSpion mainboard) to connect the LabRail injector to LabSpion mainboard.

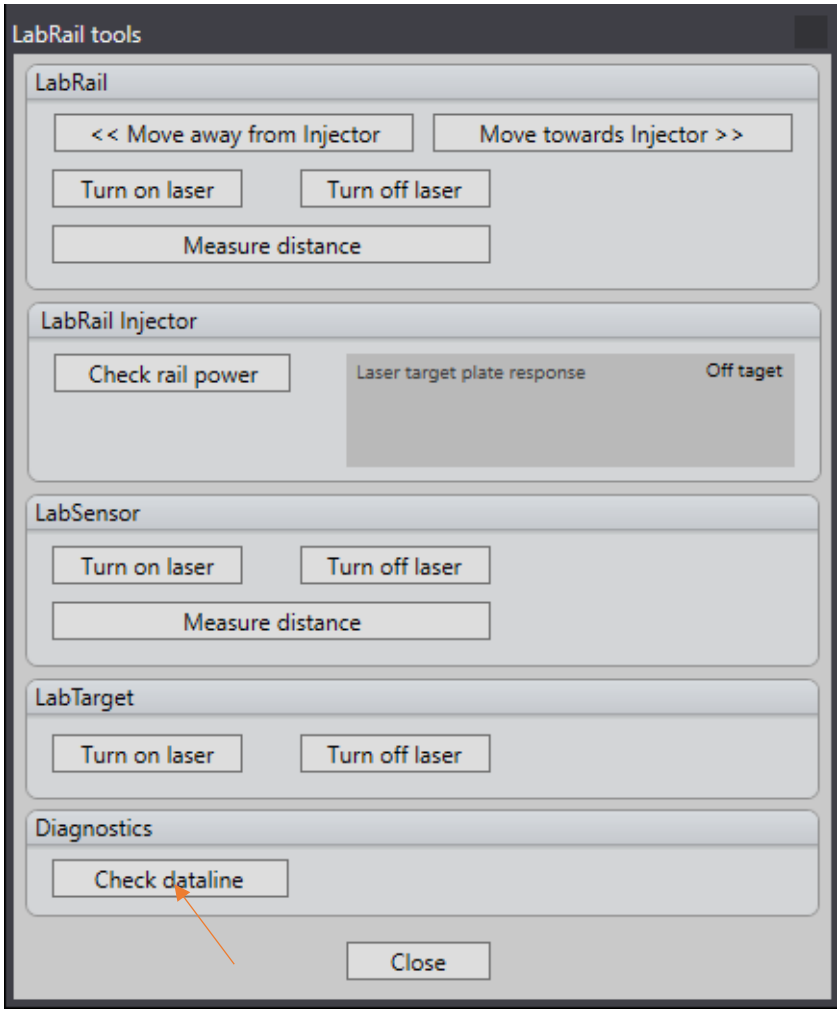
Make sure that the cable is secured so that it does not interfere with the function of the LabRail and out of the way of people working in the laboratory.

Check that the sensor is connected to the system – indicated in the upper right-hand corner of the software dashboard

Checking connection

To check the connection, you can go to the *Help* menu and check that the menu point “LabRail (Firmware) is visible”

You can also click on *Setup → Labrail → Tools:*

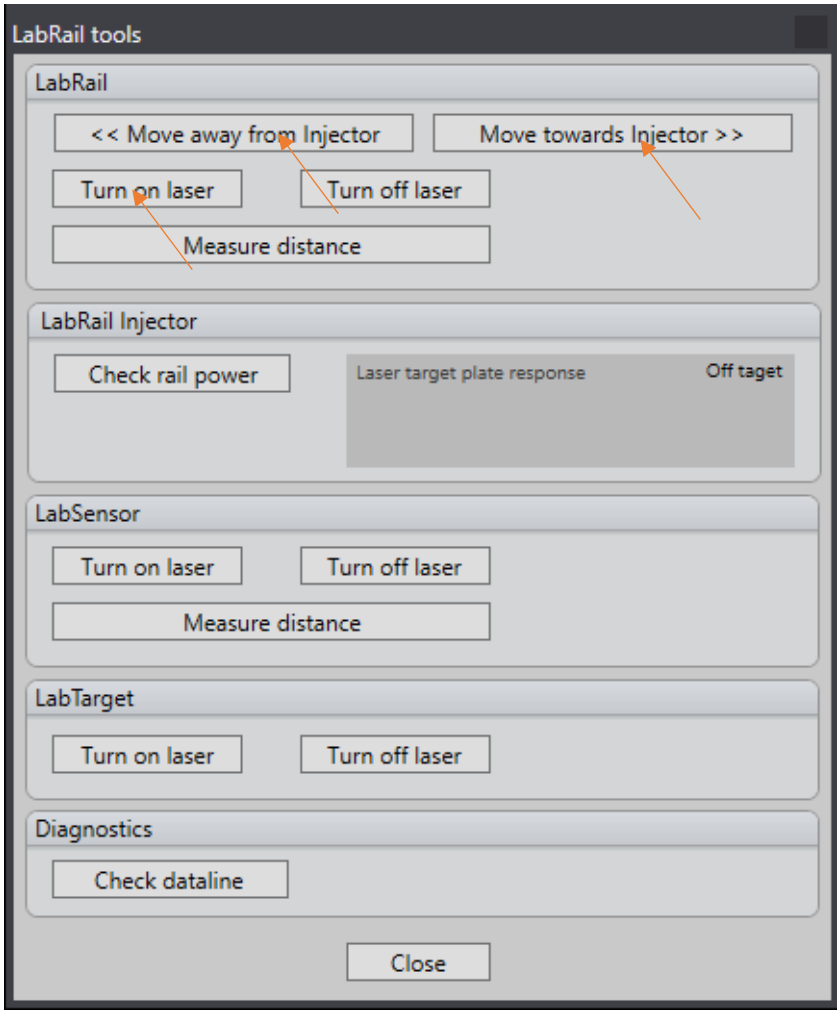


And the click on the “Check dataline” to ensure that the connection is good.

Distance calibration

Before starting distance calibration, is it a good idea to use the LabRail tool to check the laser from the LabRail is aligned all the way along the rail to the LabRail Injector.

The tool window can be opened by clicking *Setup → Labrail → Tool:*



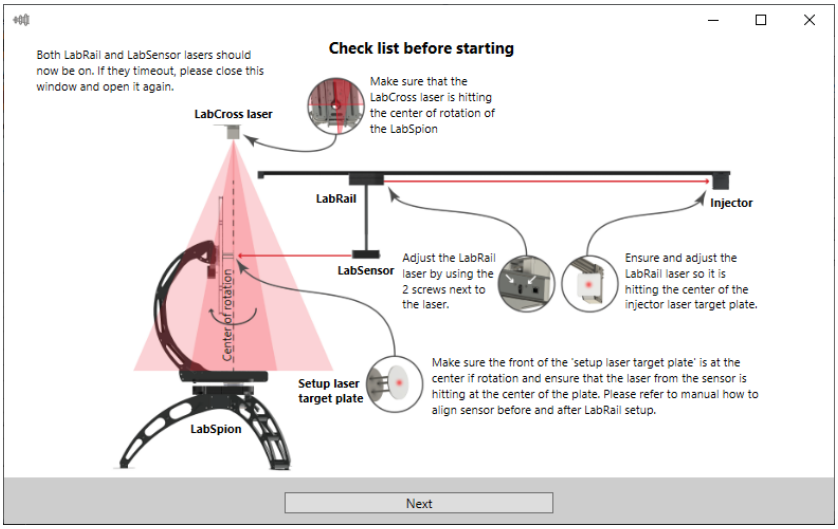
Turn on the laser and use the move buttons to move the LabRail along the rail as shown above.

Before the rail can be used, the distance between the mounted sensor and the LabRail must be calibrated and stored in the memory of the LabRail.

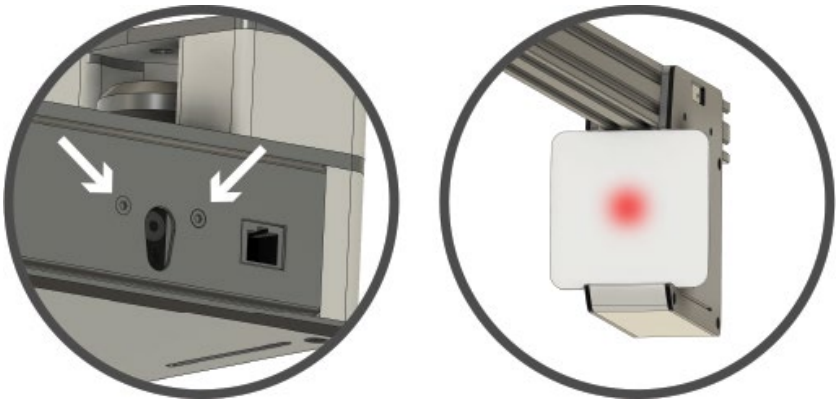
Note: Fix the LabSpion goniometer to the floor so that the position does not change. Make sure that the goniometer is absolutely level, and the lamp bracket Is vertical. If the LabRail or the LabSpion are moved, all distance calibration procedures must be repeated.

To make the calibration please make sure you have installed Viso Light Inspector version 6.05.2 or later.

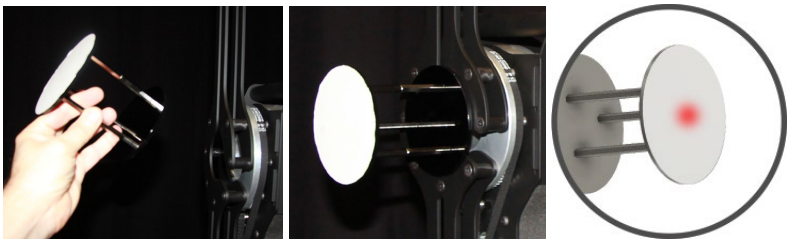
Go to menu *Setup → LabRail* and the following dialog will appear



Please ensure that the laser hits the center of the target plate on the injector by adjusting the screws next to laser measurement device as shown below.

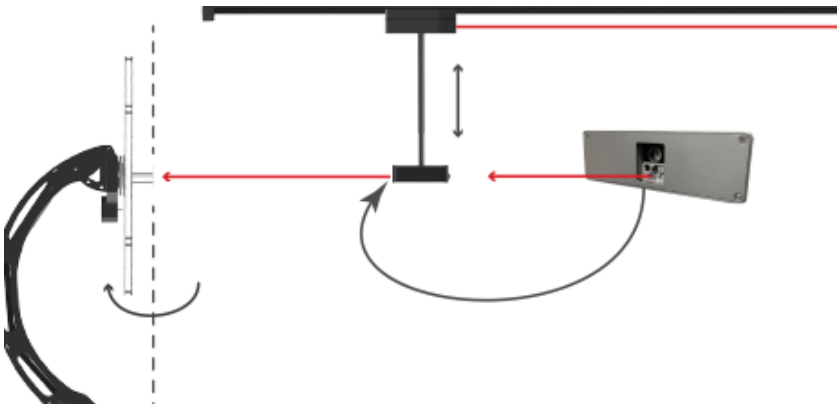


Also make sure that the “Setup laser target plate” is mounted on the LabSpion with the front being at the center of rotation of the LabSpion.



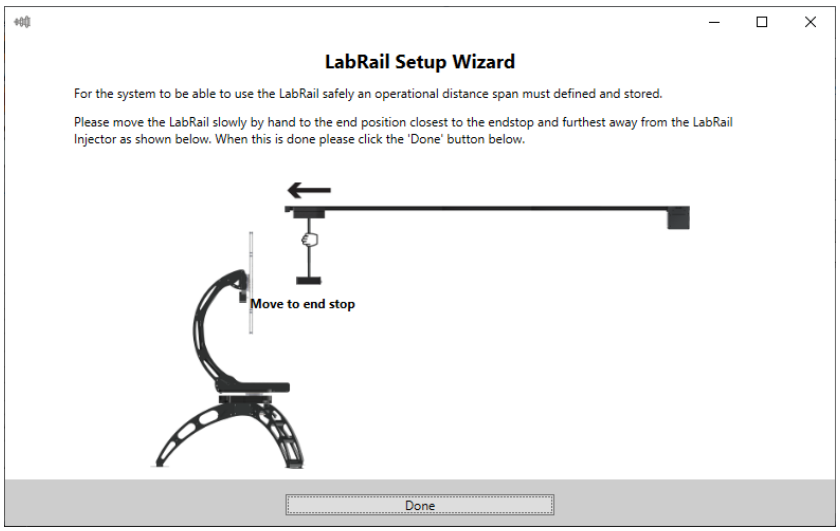
The reason for the “Setup laser target plate” being extended outwards by 10 cm is so the software can easily ensure that the laser always hits the plate during the setup process. Otherwise, a significant error of at least 10 cm would be detected by the software. The “Setup laser target plate” is only used during the setup and is not needed again after the setup procedure is completed, unless the system is moved.

The sensor must be adjusted in height so that the laser beam is completely horizontal and points to the center of the “Setup laser target plate” as shown below.



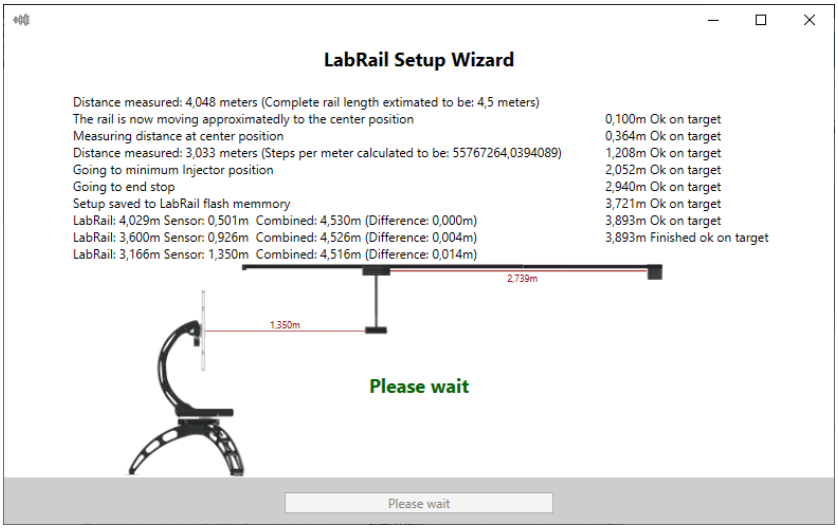
Another laser leveler can be used to ensure the sensor laser is in horizontal level such as the below shown Bosch laser included with the LabSpion.

After the steps above have been completed, please click “Next”.



The system will now ask you to move the sensor to the end-stop. Just use your hand to gently push the sensor until it touches the end-stop and click “Done”.

Please make sure there are no obstacles in the room as the sensor will now start moving down the complete traveling range of the rail.

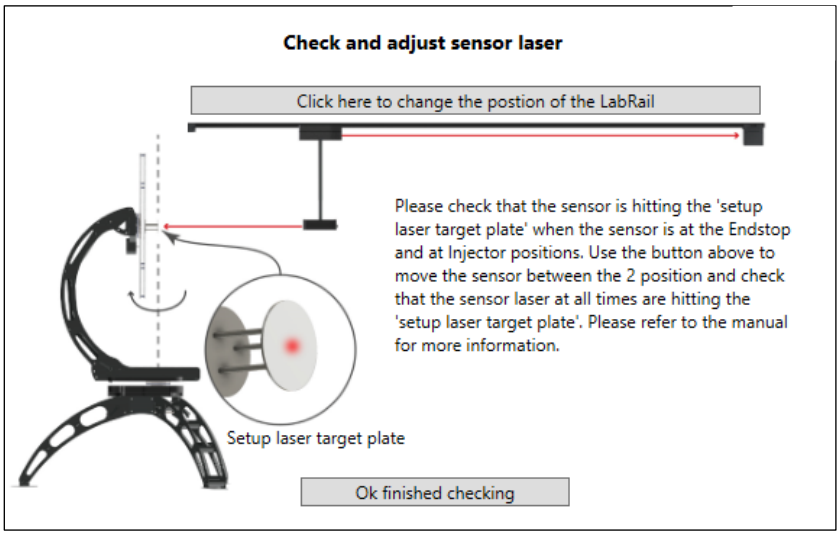


The system will now measure the complete length of the rail and it will hit the laser target plate at different positions.

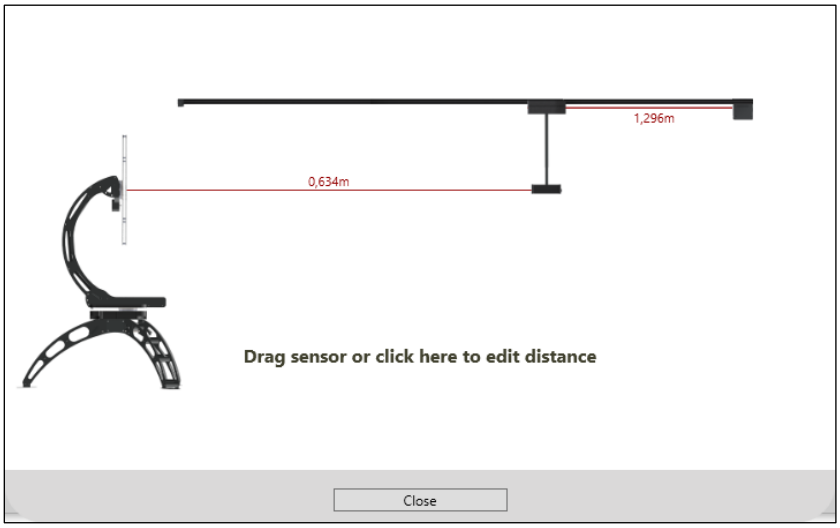
If you get errors saying the laser target plate was not hit, please check you rail is straight and that there is no direct strong light hitting the target plate. A sensor is located inside the target plate ensuring the laser always hits the plate, this too ensure that correct distance is always measured from the end of the rail.

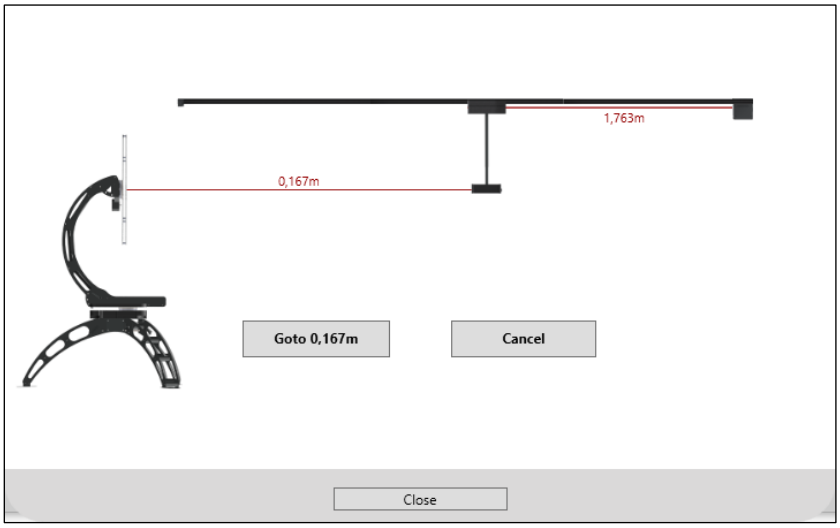
Strong light on the laser target plate (e.g., from general lighting), must be blocked with a plate or a dark curtain.

When the rail distance setup is completed, the system will get ready to measure the sensor laser distance in combination with the rail laser distance to be stored in the finished calibration. The window below will ask you if you would like to make a manual pre-check that sensor laser hits the “Setup laser target plate” as shown below.



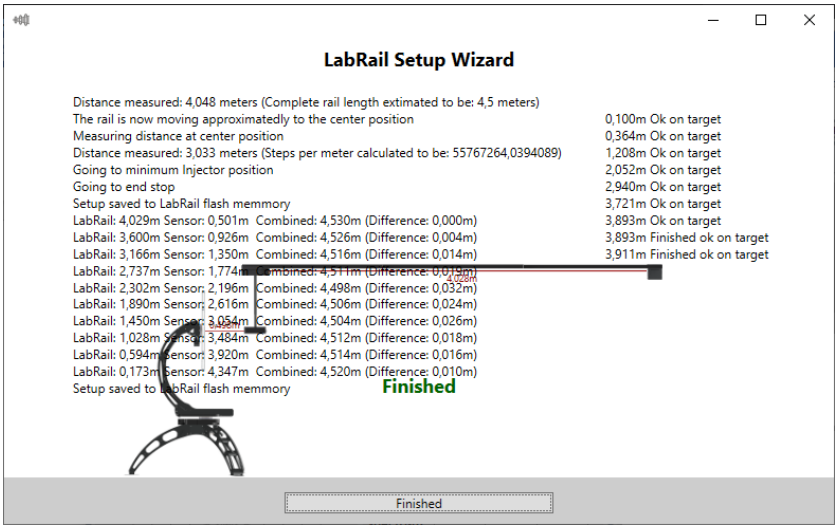
If you click the large button on top of the rail image will you be able to move the sensor manually using the window shown below.





While the LabRail is moving are you able to observe that the laser from the sensor hits the center of the “Setup laser target plate” at all positions. If this is not the case, please adjust the sensor height and tilt until it does.

When finished, close the window and click “Finished checking”, the system will now start the last part of the calibration.

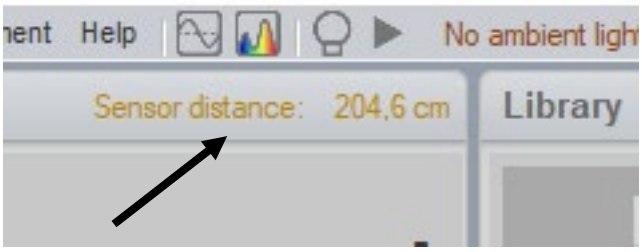


The LabRail calibration is now finished and have been stored in the flash memory of the LabRail so no future calibration is necessary unless the system is moved.

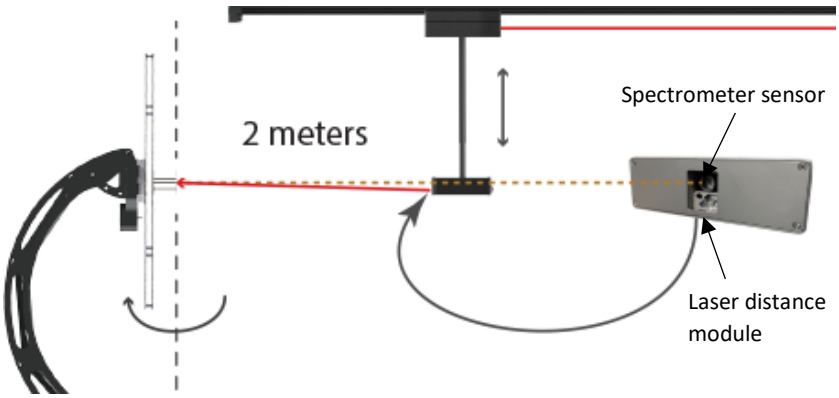
You can now click ‘Finished’.

From this point on, whenever you want to set a new measurement distance just click on the “Sensor distance” label in Viso Light Inspector software as shown below.

Type the desired distance and the sensor will move to this position.



Finally, you should set the sensor distance to 2 m and re-adjust the sensor height, so the spectrometer sensor is in the vertical center of the goniometer as shown below.

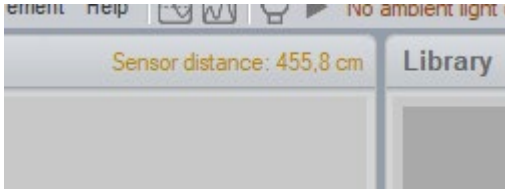


For mechanical reasons, the laser module in the sensor is slightly offset vertically in comparison with the actual spectrometer sensor position. During factory sensor calibration, all spectrometer sensors are aligned to the laser beam at a 2 m distance. This will give some sensor positioning errors when measuring above or below 2 m

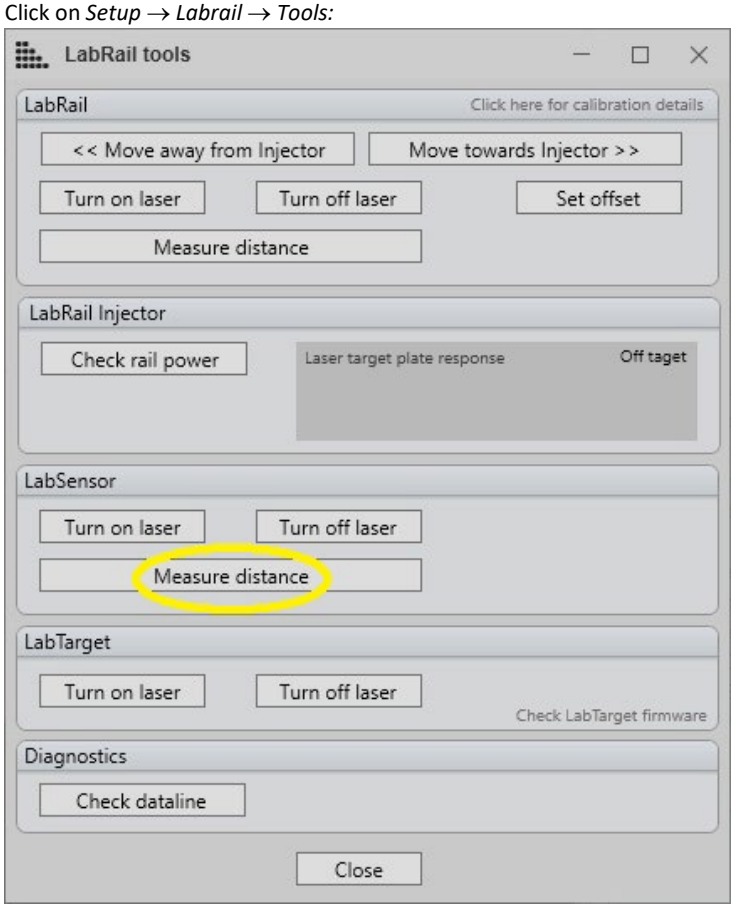
distances in comparison with the laser point, but these errors are of low factor and can be accepted without any problems.

Checking the length calibration

- Make sure you have software version 7.31 (or later) installed
- Put an object on the lamp bracket (any lamp bracket) and make sure the front of the object (a fixture, a post-it note, etc.) is aligned with the photometrical center of the gonio (move tower back or forth)
- Make a note of the auto-distance indication right after start-up:

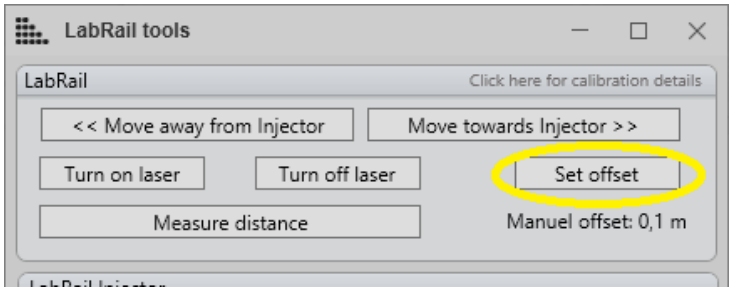


- Click on *Setup* → *Labrail* → *Tools:*

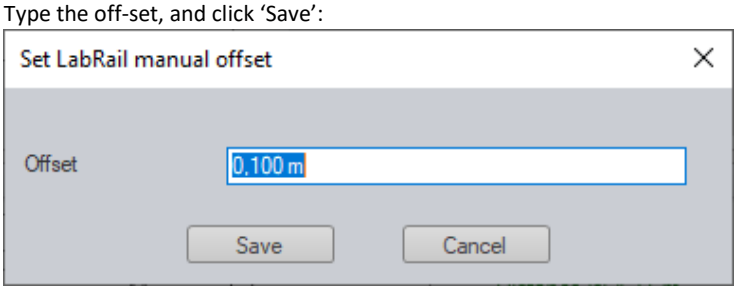


- Under LabSensor: Click measure distance. You will now see the Labrail auto-distance being overwritten with a distance measured with the built-in laser.
- Check if there is a difference between the auto-distance and the laser distance.

- If so, you can correct the LabRail distance calibration with a manual offset:



- Type the off-set, and click 'Save':



- Move the sensor to a new position and check that Labrail auto-distance is identical to the built-in laser distance measurement.
- Note: Laser distance button on the sensor head is disabled, when the LabRail tool window is open.

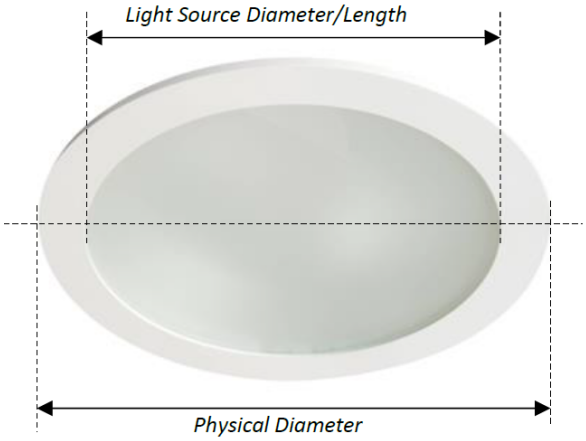
Sensor Distance

The measurement method used in the Viso systems 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):

8. Beam angle ≥90° (in all measurement planes): **≥5xD** (Viso Systems ≥8xD)
9. Beam angle ≥60°: **≥10xD**
10. Narrow angular distribution / steep gradients: **≥15xD**
11. 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!

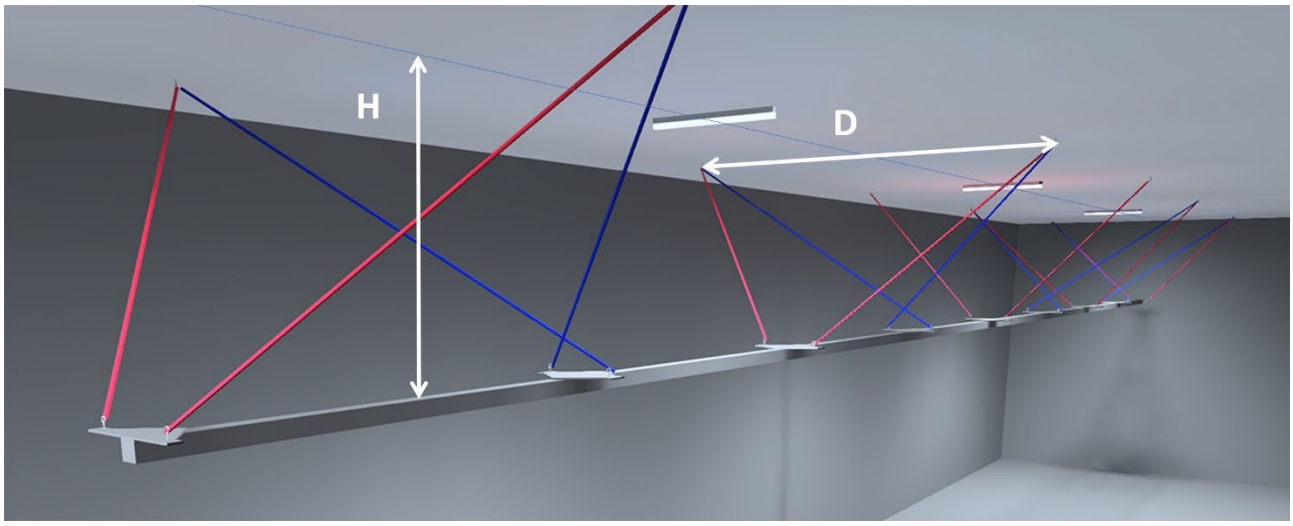

Light Source Diameter/Length
Physical Diameter

Appendix – Wire suspension distances

HEIGH CEILINGS: ONE CEILING SUSPENSION POINT BETWEEN EVERY LABRAIL SUSPENSION PLATE

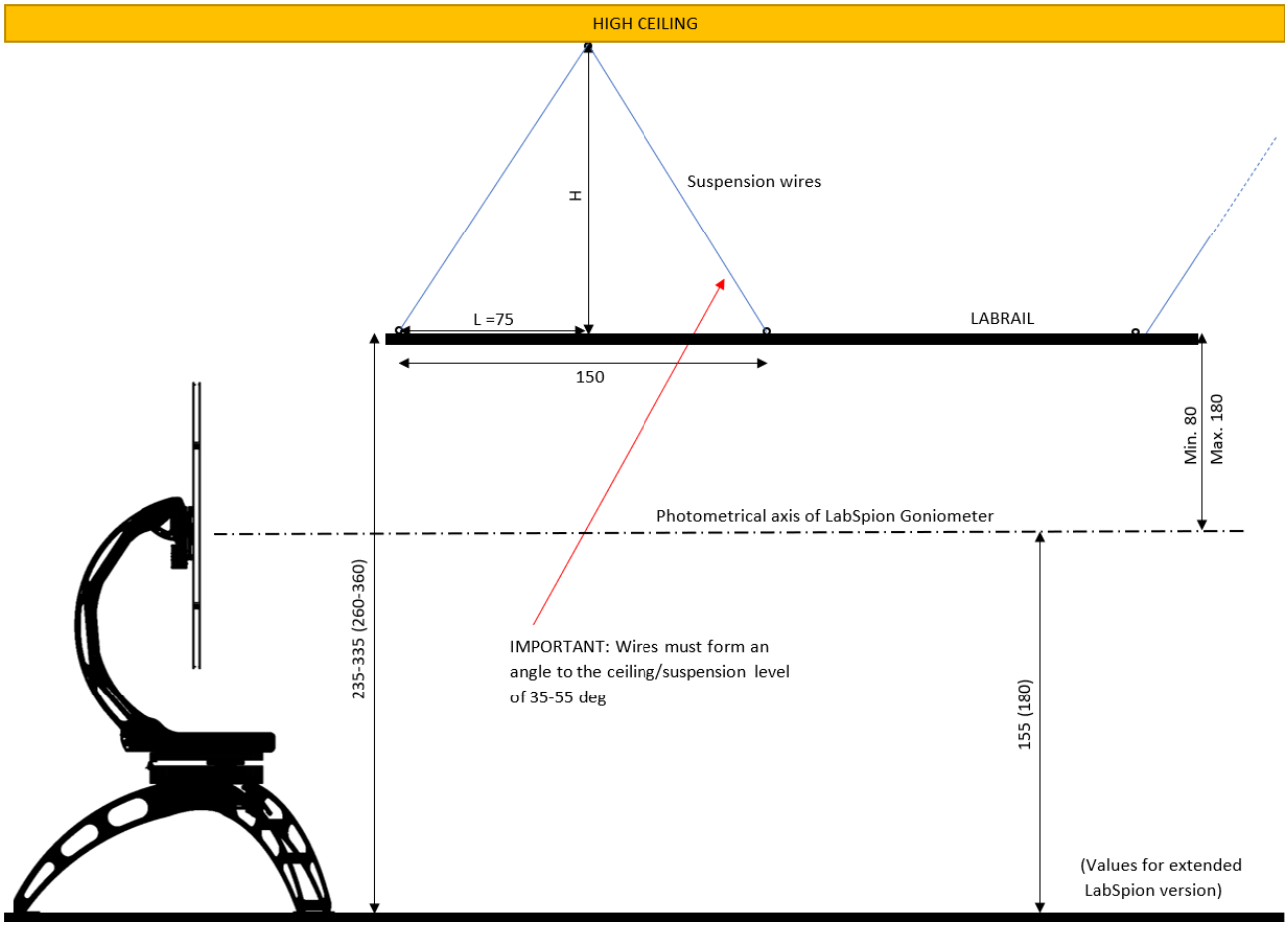
For high ceilings, ceiling suspension point can be shared by couples of suspension plates.

- **OK** (in bold) means the optimal angle around 45 deg.
- OK (not in bold) means angles between 35 and 55 deg.



H = Ceiling height over LabRail [mm]

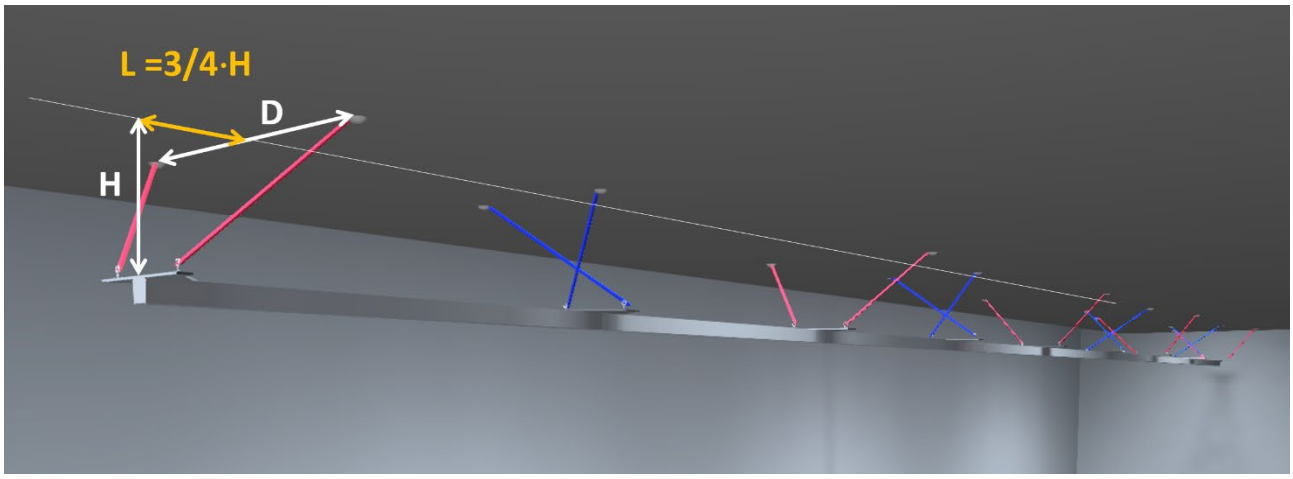
D = Distance between ceiling suspension points [mm]	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
500			OK	OK	OK	**OK**	**OK**	OK	OK	OK	OK	OK	OK									
600			OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK									
700			OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK								
800				OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK								
900				OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK							
1000				OK	OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK							
1100					OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK						
1200					OK	OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK	OK					
1300					OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK				
1400						OK	OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK	OK				
1500						OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK			
1600							OK	OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK	OK	OK		
1700							OK	OK	OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK	OK	OK	
1800								OK	OK	OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK	OK	OK
1900								OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2000									OK	OK	OK	OK	OK	OK	**OK**	OK	OK	OK	OK	OK	OK	OK


HIGH CEILING
H
Suspension wires
L =75
LABRAIL
150
Min. 80
Max. 180
Photometrical axis of LabSpion Goniometer
235-335 (260-360)
IMPORTANT: Wires must form an angle to the ceiling/suspension level of 35-55 deg
155 (180)
(Values for extended LabSpion version)

LOW CEILINGS: TWO CEILING SUSPENSION POINT BETWEEN EVERY LABRAIL SUSPENSION PLATE

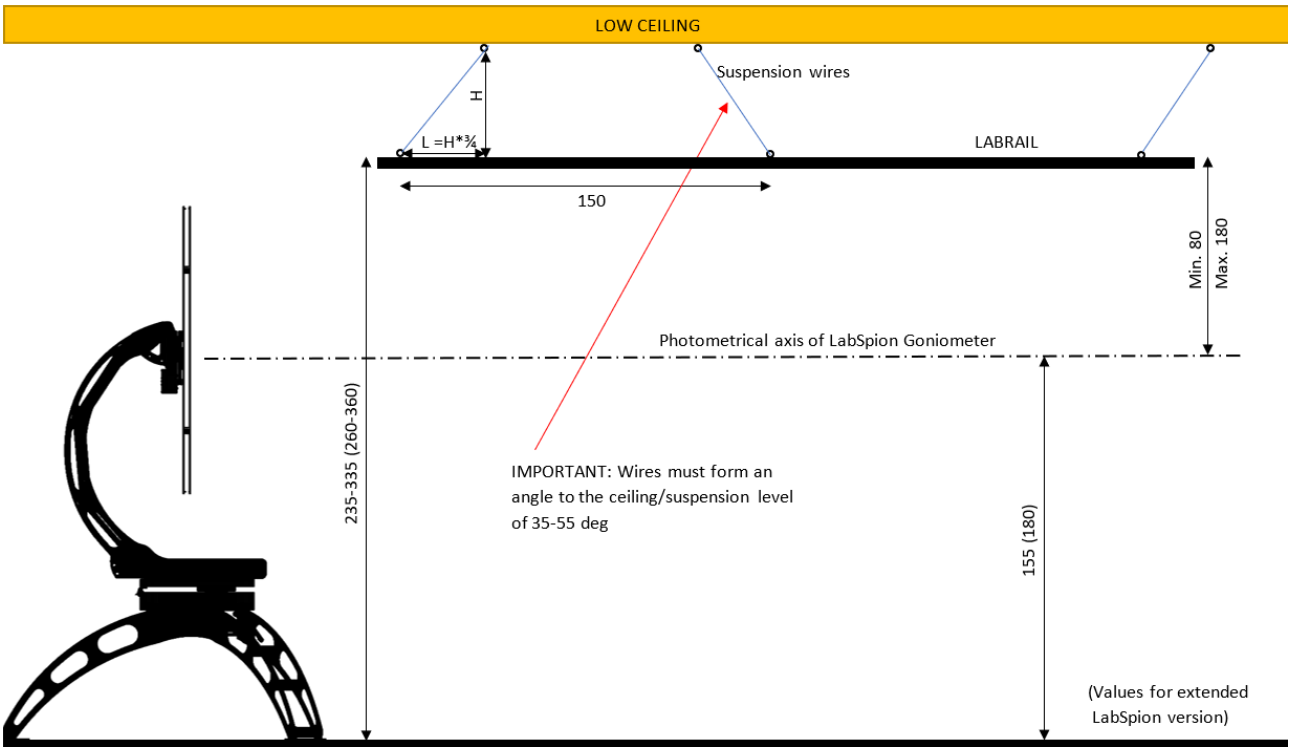
For low ceilings, more suspension point are needed to get suitable angles between the wires and the ceiling.

- **OK** (in bold) means the optimal angle around 45 deg.
- OK (not in bold) means angles between 35 and 55 deg.



H = Ceiling height over LabRail [mm]

D = Distance between ceiling suspension points [mm]	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625
300	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
400	**OK**	**OK**	**OK**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
500		OK	OK	**OK**	**OK**	**OK**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
600			OK	OK	OK	OK	**OK**	**OK**	**OK**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
700					OK	OK	OK	OK	OK	**OK**	**OK**	**OK**	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
800							OK	OK	OK	OK	OK	OK	**OK**	**OK**	**OK**	OK	OK	OK	OK	OK	OK	OK
900								OK	OK	OK	OK	OK	OK	OK	OK	**OK**	**OK**	**OK**	OK	OK	OK	OK
1000										OK	OK	OK	OK	OK	OK	OK	OK	OK	**OK**	**OK**	**OK**	OK
1100											OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	**OK**


LOW CEILING
Suspension wires
H
L =H*¾
LABRAIL
150
Min. 80
Max. 180
Photometrical axis of LabSpion Goniometer
235-335 (260-360)
IMPORTANT: Wires must form an
angle to the ceiling/suspension level
of 35-55 deg
155 (180)
(Values for extended
LabSpion version)