



Lab Setup Assembly Manual

(Halogen)

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I. Introduction

This manual guides you through the assembly of the imec Lab Setup with halogen illumination. It provides an overview of all components in the setup and instructions to assemble it (as shown in Figure I).

If you have purchased imec Lab Setup with LED light source, please check the respective manual for that setup.



Figure I. Fully assembled Lab Setup



2. Assembly steps

Follow the steps below to assemble the lab setup:

2.1.1 Step I - Unpack and crosscheck the contents

Step I.1 Unpack and crosscheck the contents

The system is delivered in two main packages (as shown in Figure 2):



Figure 2. Main packages delivered with the evaluation system. Box 1 (left) contains the camera and cables, and Box 2 (right) contains all evaluation system components.

- Box 1 black explorer case
 - This is the camera box
 - The content depends on the ordered camera.
- Box 2 containing (refer to Table I and Figure 3 for details)
 - Components to build a setup with illumination
 - mounting setup with vibration dampening
 - halogen lamps with diffusers
 - tunable stabilized DC power supply
 - Reflectance targets for calibration
 - reflectance tile 95%, 200 x 200 mm
 - color checkerboard card



Table I provides a list of all the components and the quantity for each component included in the lab setup.

Table I: List of components and quantities in the lab setup

Ref. No	Components	Quantity	Box No.
01	Reflectance standard 95% 200x200mm	1	2
02	Post 300x Ø25.0 mm	1	2
03	Post 300x Ø12.7mm	4	2
04	Post 150x Ø12.7mm	2	2
05	Post 50x Ø12.7mm	5 (4 used)	2
06	Post 50x Ø6mm	4	2
07	Post clamp Ø25.0 mm (camera holder)	1	2
08	Post clamp right-angle Ø25.0 mm to Ø1/2"	2	2
09	Post clamp right angle Ø12.7mm	7 (6 used)	2
10	Feet Ø27mm, female M6	4	2
11	Threaded studs M6, 20mm, black (in the feet's box)	4 (2 used)	2
12	Hex cap screw M6, 16mm, black	4	2
13	Threaded studs 1/4"-20, 20mm, metal	1	2
14	Hex cap screw M6, 40mm, metal	1	2
15	Lens tube with two retaining rings included	4	2
16	Stress-free retaining ring for Ø2" lens tubes and mounts	4	2
17	Base breadboard 300x300 mm	1	2
18	Black scanning background	1	2
19	Color checkerboard card	1	2
20	Tripod ball head with 3/8" to 1/4" adapter	1	2
21	Halogen lamp 20W GU5.3 cool-fit	4	2
22	Diffuser	4	2
23	Assembled lamp holder with banana plug connectors	4	2
24	Tunable stabilized DC power supply	1	2
25	Tunable stabilized DC power supply power cable	1	2
	Assembly tools including:		
26	Screwdriver hex Ø5mm	1	2
27	Spanner Wrench	1	2
28	Hex key L-shape Ø2mm	1	2

- Actual contents of the two boxes may vary depending on the options selected by the customer in the hyperspectral camera selection form during order placement.
- Small items may be placed in the box of another component.



- The reflectance standard (Item 01) and the color checkerboard (Item 19) are optical materials. Do not touch their surface in any way and store them in the dark.



Figure 3. Contents of Box 2. The numbers correspond to the ones in Table I.



2.1.2 Step 2 - Assemble the base plate

Required items (Figure 4a)

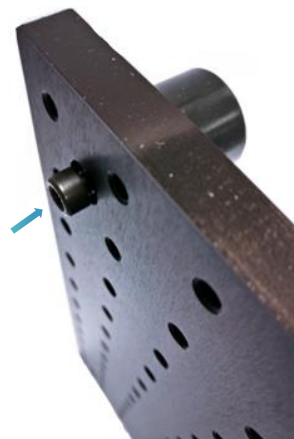
Ref. No	Components	Quantity	Box No.
10	Feet Ø27mm, female M6	4	2
12	Hex cap screw M6, 16mm, black	4	2
17	Base breadboard 300x300 mm	1	2
26	Screwdriver hex Ø5mm	1	2

Procedure:

Attach the 4 feet to the breadboard, through the holes offset from the array's edge (Figure 4b). The screw should sink completely in the hole, creating a flat surface (Figure 4c & d). Tighten well using the hex screwdriver Ø5mm.



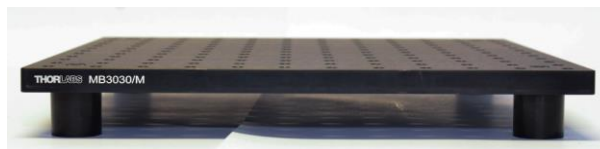
(a)



(b)



(c)



(d)

Figure 4. Assembly of the base plate



2.1.3 Step 3 - Assemble the camera holder posts and tripod mount

Required items

Ref. No	Components	Quantity	Box No.
02	Post 300x Ø25.0 mm	1	2
03	Post 300x Ø12.7mm	2	2
04	Post 150x Ø12.7mm	2	2
07	Post clamp Ø25.0 mm (camera holder)	1	2
08	Post clamp right-angle Ø25.0 mm to Ø1/2"	2	2
09	Post clamp right angle Ø12.7mm	2	2
11	Threaded studs M6, 20mm, black (in the feet's box)	2	2
13	Threaded studs 1/4"-20, 20mm, metal	1	2
14	Hex cap screw M6, 40mm, metal	1	2
20	Tripod ball head with 3/8" to 1/4" adapter	1	2
26	Screwdriver hex Ø5mm	1	2
28	Hex key L-shape Ø2mm	1	2

Procedure

Follow the steps below to assemble the camera holder posts and tripod mount, as shown in Figure 5.



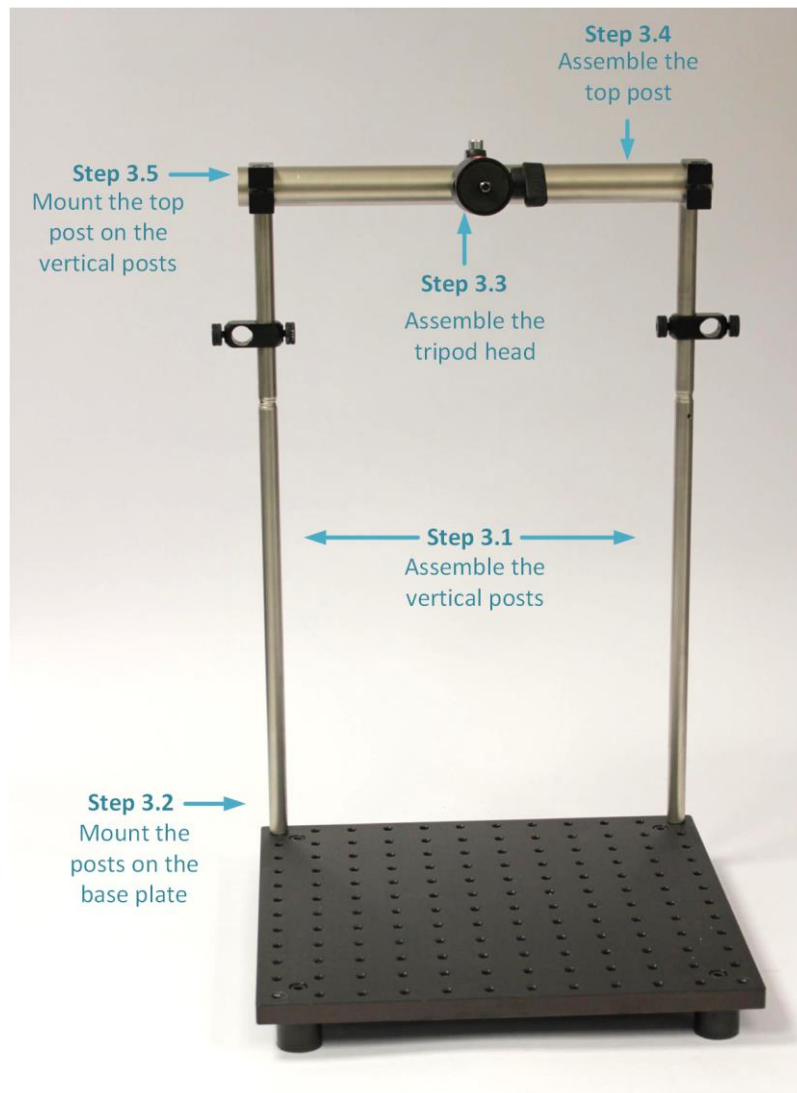


Figure 5. Mounting the camera holder on the assembled base plate (Step 3)

Step 3.1 Assemble the vertical camera holder posts (Figure 6)

- Insert and screw the black threaded stud, with its conical end, in the bottom end of the long post.
- Unscrew the stainless-steel setscrew from the top of the long post (it is not required for this build, use an Allen key size 2 if necessary).
- Screw the top of short post onto the top of the long post, connecting them with a stainless-steel setscrew.
- Slide the right-angle $\varnothing 12.7\text{mm}$ post clamp on to the assembled post and screw it.
- Follow steps a-d to prepare the second post.
 - The position of the right-angle post clamp can be changed later to adjust the height of the lamps with respect to the base plate.*



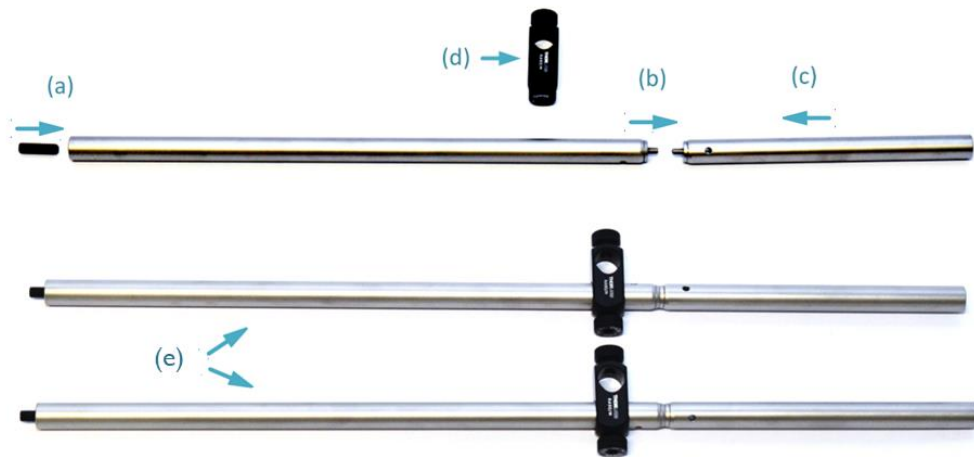
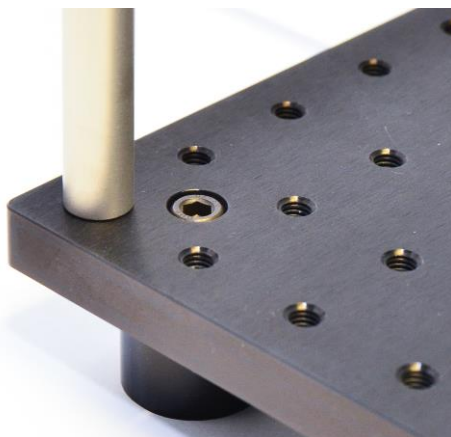


Figure 6. Assembly of the vertical camera holder posts (Step 3.1)

Step 3.2 Mount the camera holder posts on the base plate (Figure 7)

- Mount the post on the base plate such that the end of the post with the black threaded stud is screwed into the base plate. Use the first hole in the corner as shown in Figure 7a.
- Mount the two posts in opposite corners along the same edge of the base plate, as shown in Figure 7b with the right-angle post clamps to the outside.



(a)



(b)

Figure 7. Mounting of the vertical camera holder posts on the base plate (Step 3.2)



Step 3.3 Assemble the tripod head (Figure 8)

- Remove the stainless-steel ring from the top of the tripod ball head (adapter), revealing the black thread on top.
- Mount this removed stainless-steel adapter piece into the bottom of the tripod ball head.
- Screw the 1/4"-20 metal stud into the bottom of the tripod ball head.
- Screw post clamp Ø25.0 mm (camera holder) onto the metal stud.



Figure 8. Assembly of tripod mount (Step 3.3)

Step 3.4 Assemble the top rod with tripod head (Figure 9)

- Slide two Right-Angle Ø25.0 mm to Ø1/2" Post Clamps onto both ends of the 300x Ø25.0mm post and tighten the screws using the screwdriver hex Ø5mm.
- Place the assembled tripod mount over the post in the middle, align the hole of the tripod mount with the hole of the post and tighten the hex screw with the Allen key size 2.
- Slide the M6 screw in the hole to prevent unwanted tilting under camera's weight.



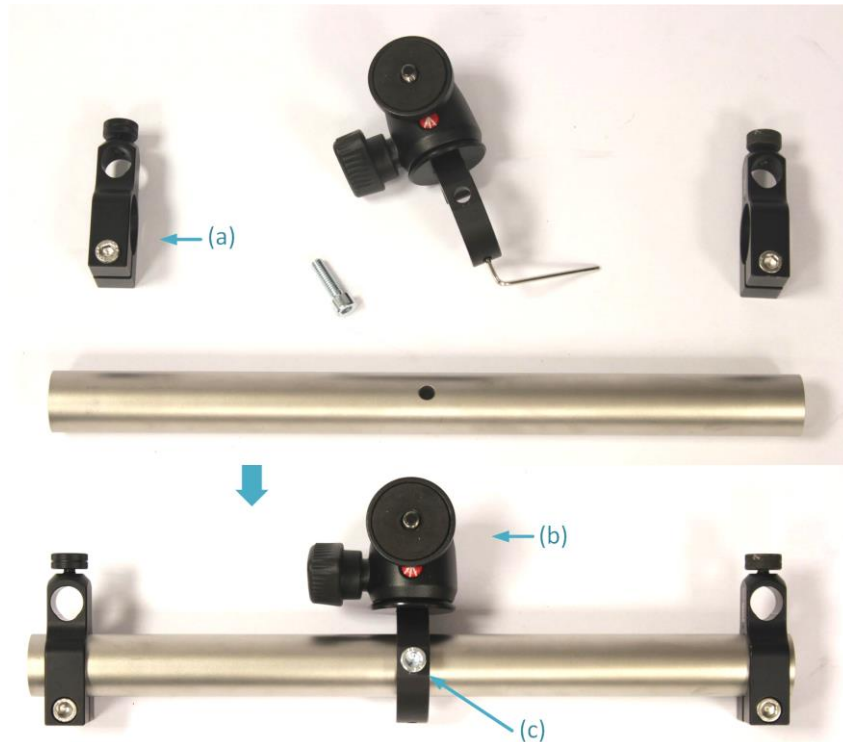


Figure 9. Assembly of the top post for camera mount

Step 3.5 Mount the top horizontal post on the vertical posts (Figure 10)

- a. Slide the assembled top post (from prev. step) on to the vertical posts and fix them on the top edge, as shown in Figure 10.



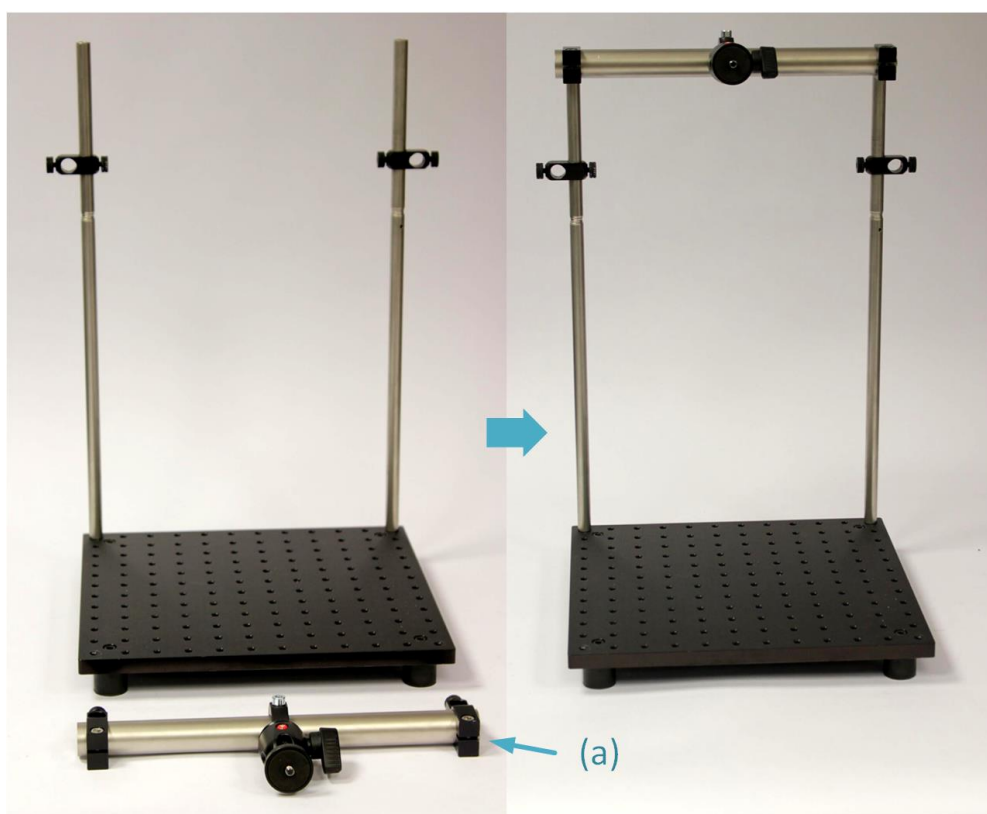


Figure 10. Assembly of top horizontal post with tripod head on the vertical posts (Step 3.5)

2.1.4 Step 4 - Assemble the lamp holder posts and mount the lamps

Required items

Ref. No	Components	Quantity	Box No.
03	Post 300x Ø12.7mm	2	2
05	Post 50x Ø12.7mm	4	2
06	Post 50x Ø6mm	4	2
15	Lens tube with two retaining rings included	4	2
16	Stress-free retaining ring for Ø2" lens tubes and mounts	4	2
18	Black scanning background	1	2
21	Halogen lamp 20W GU5.3 cool-fit	4	2
22	Diffuser	4	2
23	Assembled lamp holder with banana plug connectors	4	2
26	Screwdriver hex Ø5mm	1	2
27	Spanner Wrench	1	2

Procedure



Follow the steps below to assemble the lamps and mount them on to the setup as shown in Figure 11.

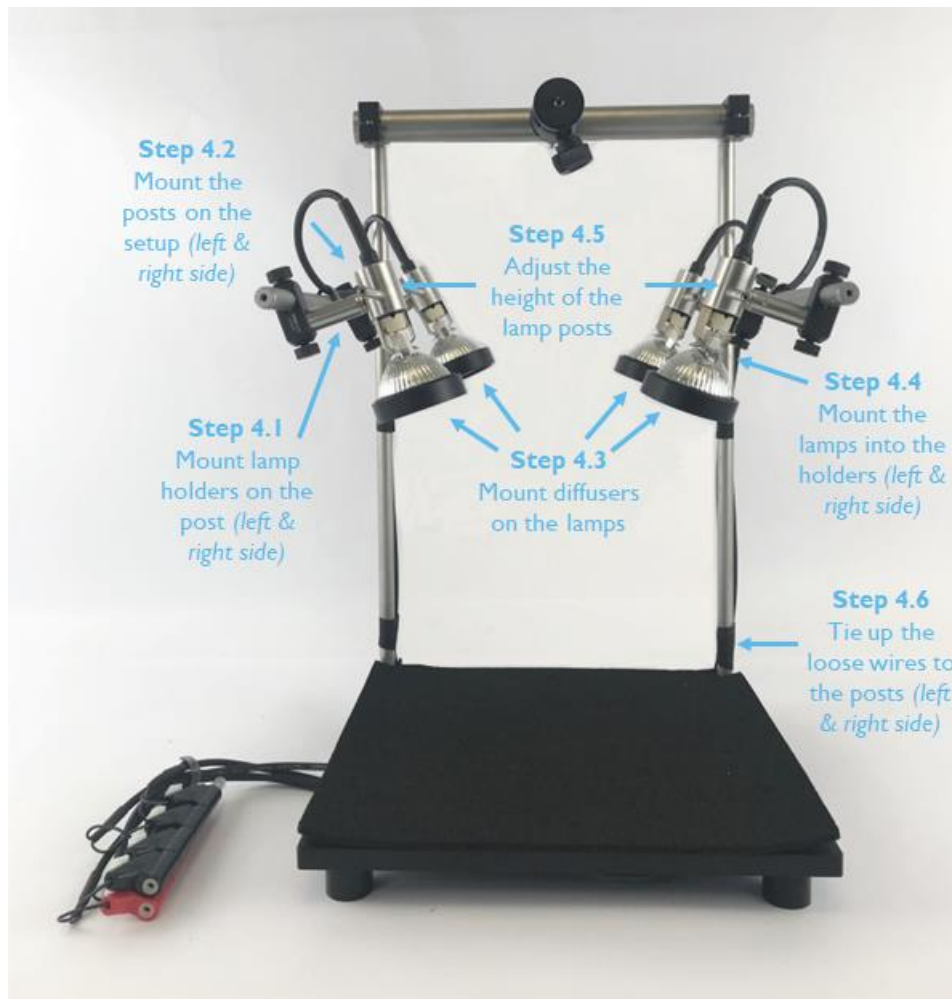


Figure 11. Assembly of lamp holder posts and mounting of lamps (Step 4)

Step 4.1 Mount the lamp holders on the post (Figure 12)

- Unscrew the stainless-steel setscrew from the top of the 300x Ø12.7mm post (it is not required for this build; use an Allen key size 2 if necessary).
- Slide two right-angle post clamps on to the assembled post and tighten using the screwdriver hex Ø5mm.
- Screw 50x Ø12.7mm and 50x Ø6mm posts into the lamp holders.
- Screw the 50x Ø12.7mm posts of the lamp holder to the right-angle post clamps.
- Repeat the steps a-d to assemble the remaining two lamp holders on the second post.



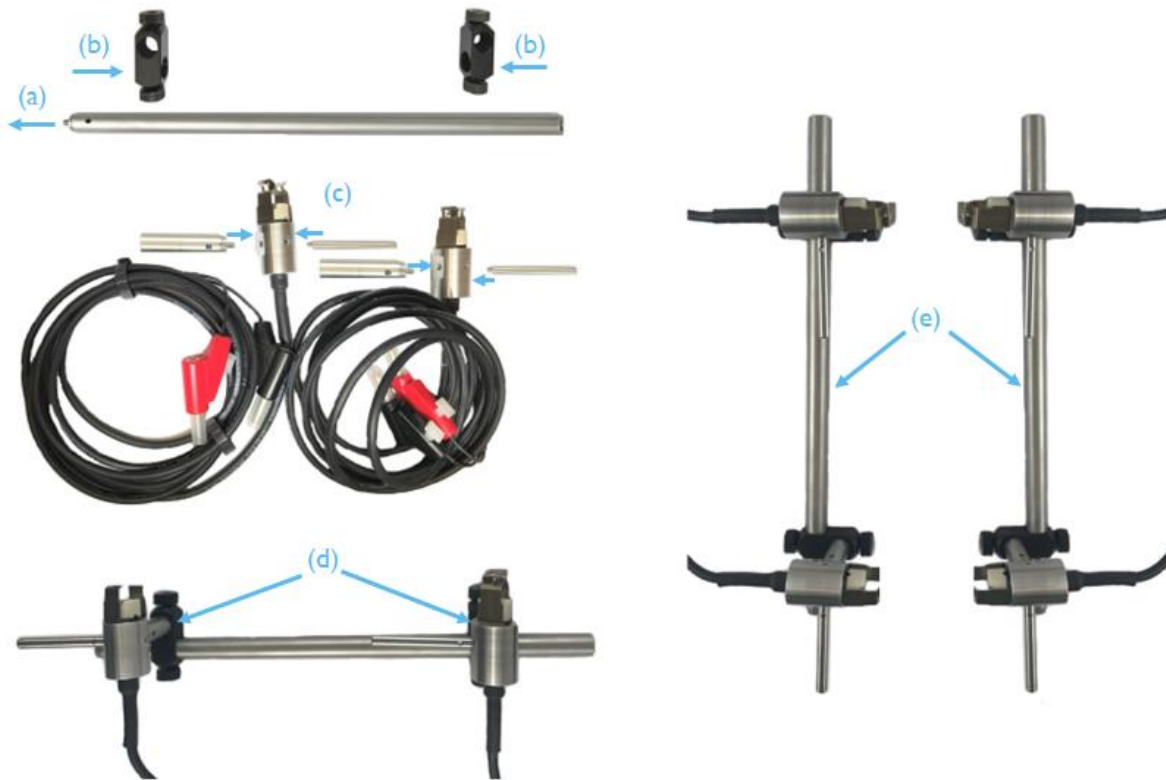


Figure 12. Assembly of lamp holders on the posts (Step 4.1)

Step 4.2 Mount the posts on to the setup (Figure 13)

- a. Slide the assembled post (from Step 4.1) into the right-angle post clamp fixed on the vertical post. Repeat this step for the other assembled post.



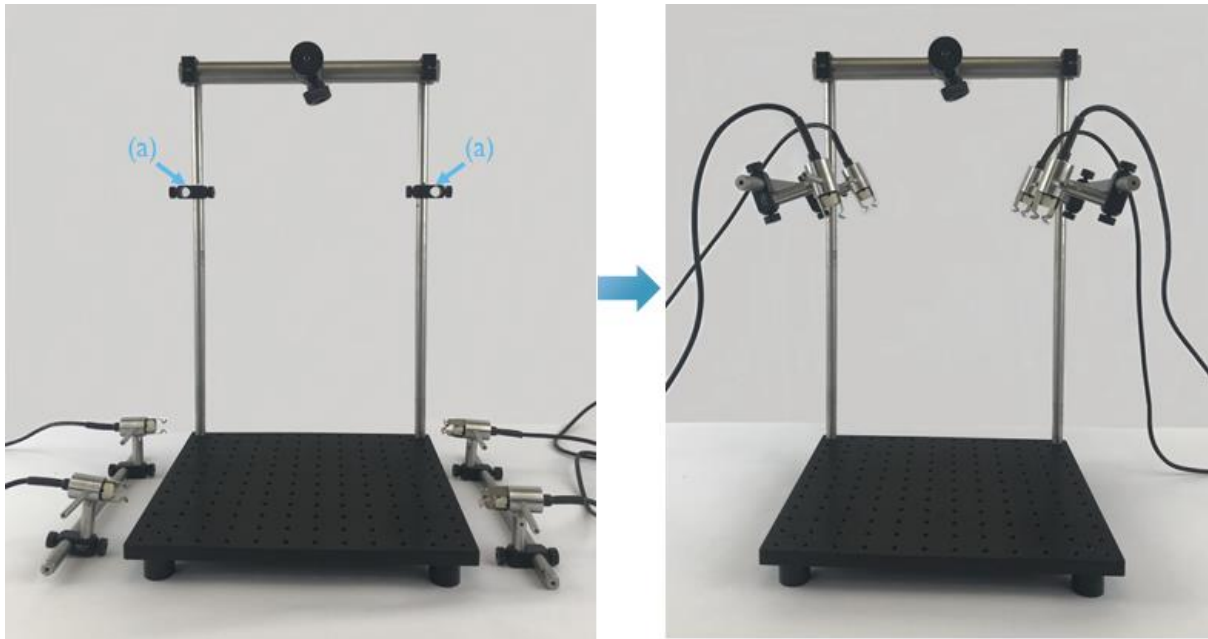


Figure 13. Mounting of lamp holders on to the setup

Step 4.3 Mount diffusers on the lamps (Figure 14)

- a. Two retaining rings have been screwed into the lens tube. Unscrew one of the 2 retaining rings from the lens tube using the spanner wrench tool.
- b. Insert the diffuser into the lens tube from the mat side.
- c. Screw the stress-free retaining ring into the lens tube using the spanner wrench tool until it reaches the diffuser. Please note that the **rubber side** should be mounted on the **diffuser**. **Do not screw too tight**.
 - *This step ensures there is no direct contact between the lamp and the diffuser. Direct contact between the lamp and the diffuser or screwing the ring too tight may damage the glass diffuser.*
- d. Insert the halogen lamp into the lens tube.
 - *Depending on your application, using different types of lamps and/or light shaping filters can improve the SNR of the acquired data. It is strongly recommended to experiment with different types of lamps to tune the total system response. Refer to the manual Hyperspectral Sensors for more information.*
- e. Screw the initially removed retaining ring on the lens tube using the spanner wrench tool to fix the halogen lamp.
- f. Follow steps a-e to prepare the other 3 lamps.





Figure 14. Mount diffuser on the lamp

Step 4.4 Mount the lamps into the holders (Figure 15)

- a. Align the two pins of the lamp to the two holes in the socket and push the lamp into the holder. Repeat this step for the other three lamps.



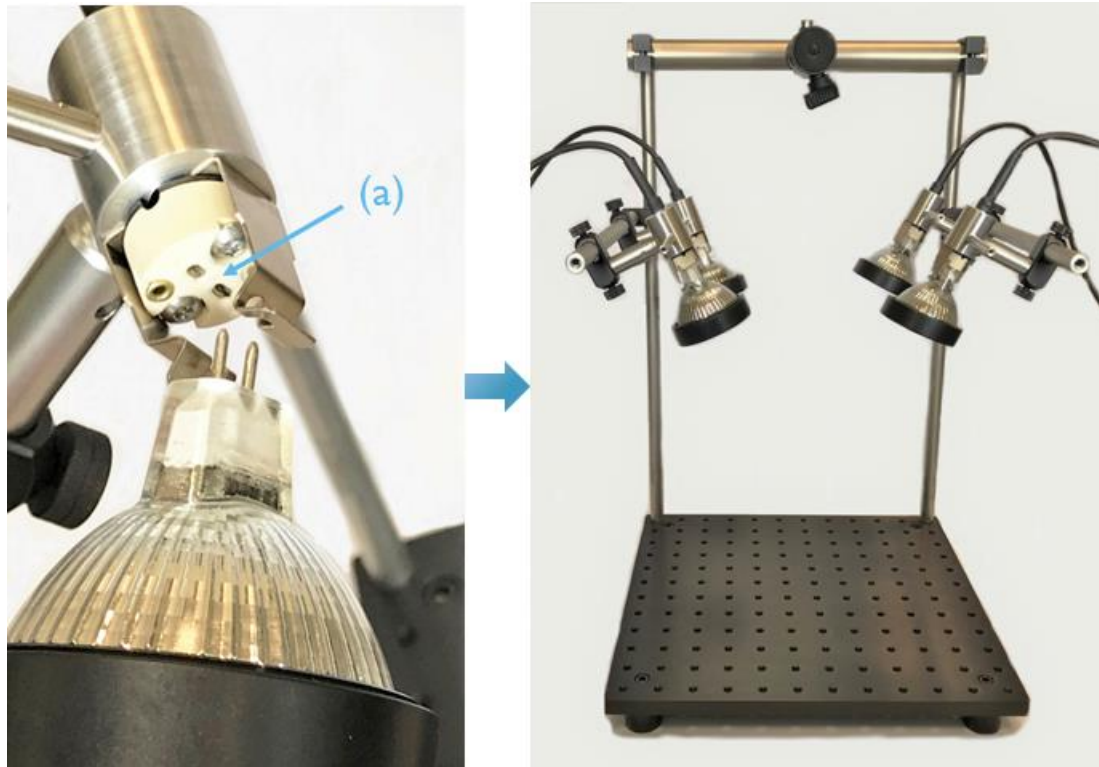


Figure 15. Mounting the lamps into the holders (Step 4.4)

Step 4.5 Adjust the height of the lamp posts (Figure 16)

- a. Depending on the application, the height of the lamps can be adjusted by moving the lamp holding posts up and down along the vertical posts (as indicated by the double-sided arrow in Figure 16).



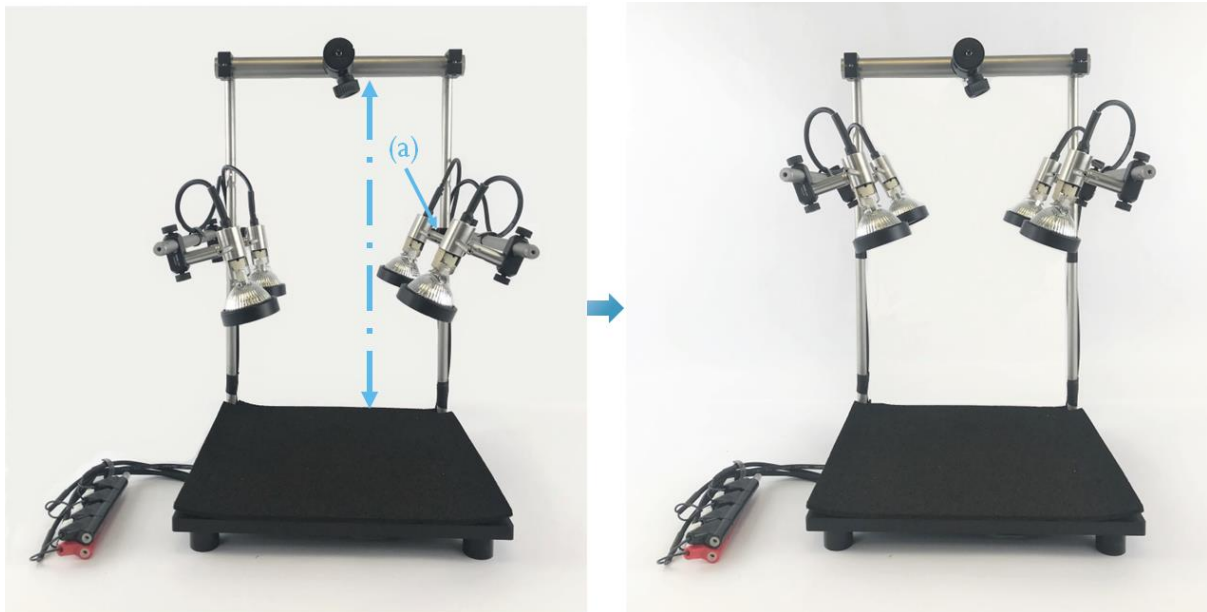


Figure 16. Adjust height of lamps depending on application needs

Step 4.6 Tie up the loose wires to the post (Figure 17)

- a. We recommend users to tie up the loose wires to the mounting posts (as indicated in Figure 17).
- b. Place the black scanning background on the breadboard base.



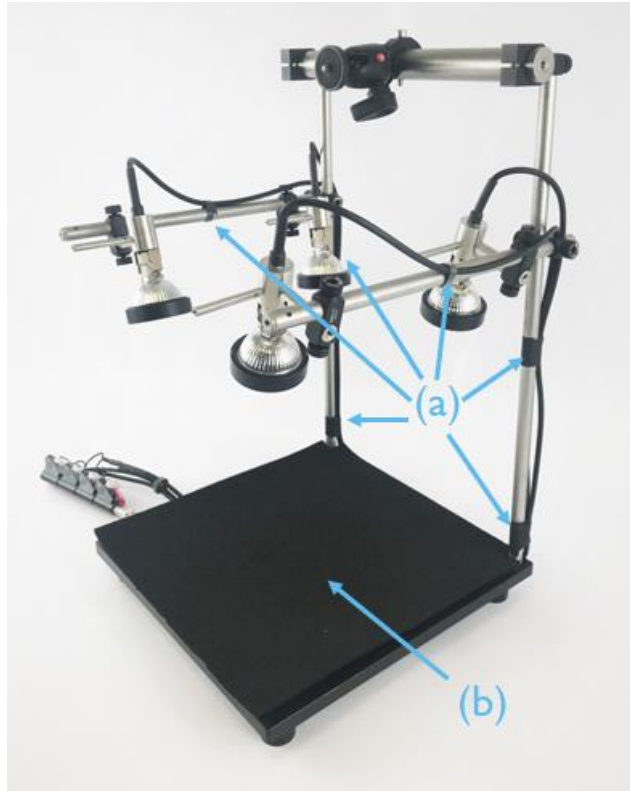


Figure 17. Tying up the loose wires to the mounting posts (Step 4.6)

2.1.5 Step 5 - Connect the lamps to the power supply

Required items

Ref. No	Components	Quantity	Box No.
24	Tunable stabilized DC power supply	1	2
25	Tunable stabilized DC power supply power cable	1	2

Procedure

Follow the steps below to connect the lamps to the power supply and test, as shown in Figure 18.



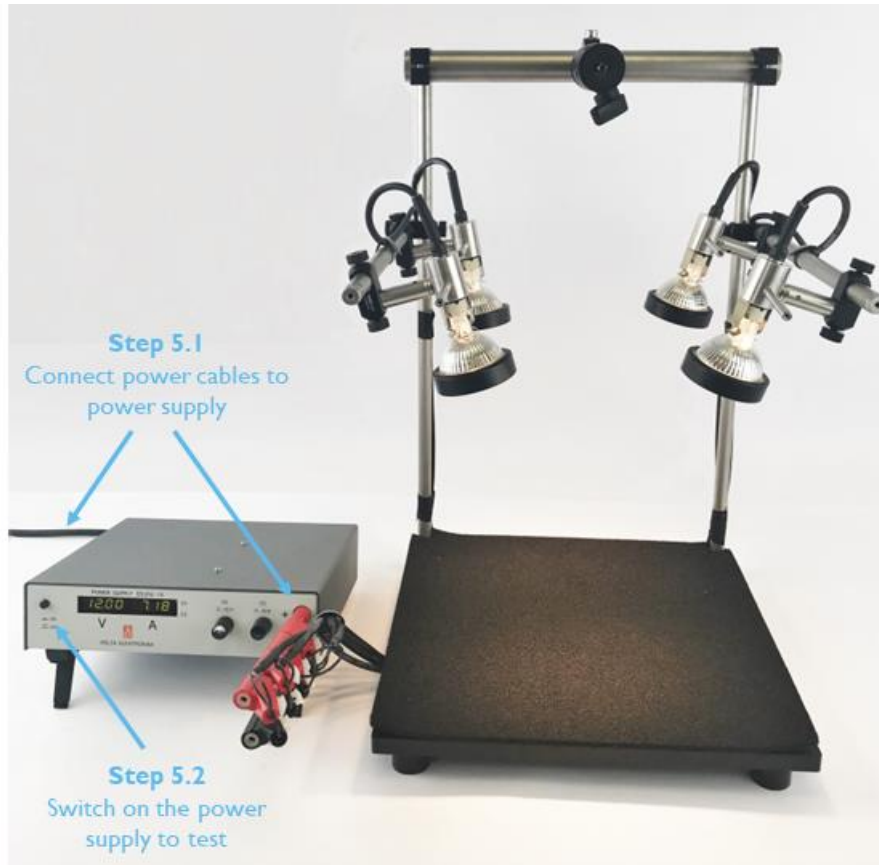


Figure 18. Connecting lamps to power supply and testing (Step 5)

Step 5.1 Connect power cables to power supply (Figure 19)

- Connect the 4 pairs of red and black banana connectors corresponding to the 4 lamps to the output of the power supply, as shown in Figure 19.
- Connect the input of the power supply (located at the back) to a power outlet.



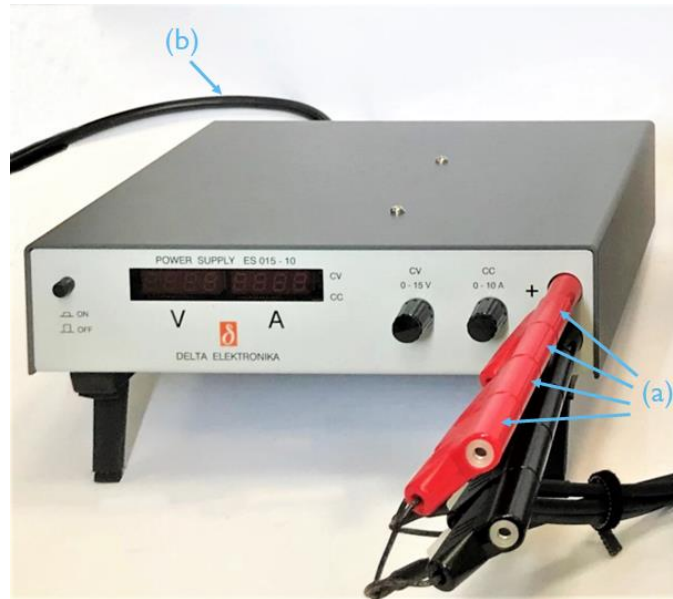


Figure 19. Connecting lamps to the power supply (Step 5.1)

Step 5.2 Test the connection (Figure 20)

- a. Switch on the power supply and set the output voltage at 12V.
- b. If all the connections have been correctly attached, all 4 lamps should illuminate.
 - You can switch off the power supply once the test is done.
 - While using the system for acquiring data, the lamps need to be switched on for at least 15 minutes to allow them to warm up and stabilize.



(a)



(b)

Figure 20. Test the power connection for the lamps





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