



MEX

Motorised laser beam expander

Alignment guide

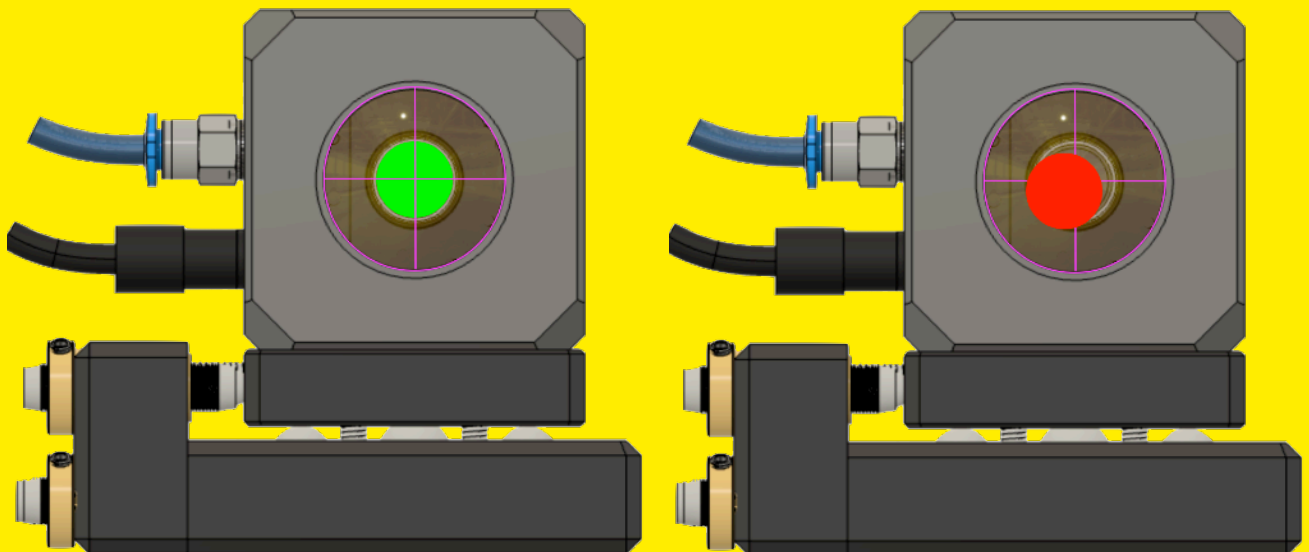


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1. Safety requirements

- All safety instructions must be followed.
- This manual should be read carefully before first intended use.
- All rules and regulations concerning safe operation of lasers must be known and applied while installing and operating motorised beam expander.
- Even when with safety glasses avoid eye contact with direct or scattered laser light while assembling, installing and operating the device.
- The device should never be exposed to dirt, dust or moisture.
- Before any operation make sure the device is installed correctly and well adjusted.
- Protective measures should be considered if necessary.
- Electrical safety requirements must be complied while operating this device.

CAUTION! High laser output power may damage or destroy optical elements.

CAUTION! Make sure laser beam is not converging after passing through the beam expander - it may damage other optical elements along the optical axis.

CAUTION! Device is meant to be used with collimated beam. Users take full responsibility when using the expander with highly converging beam.

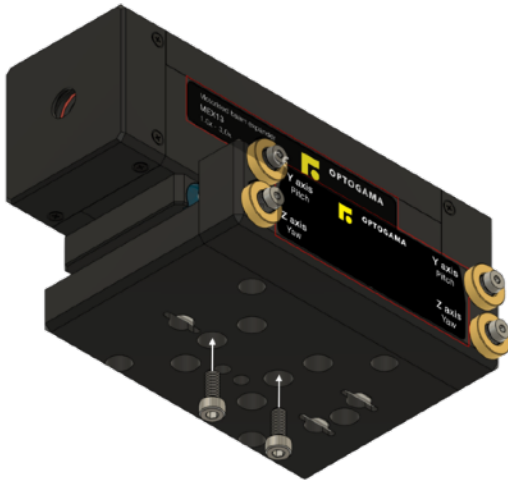
2. Alignment with 4 axis manual stage - MSTAGE / MSTAGE-W

MSTAGE manual stage is suitable for MEX13, MEX18 and MEX18-ACH motorised beam expanders.

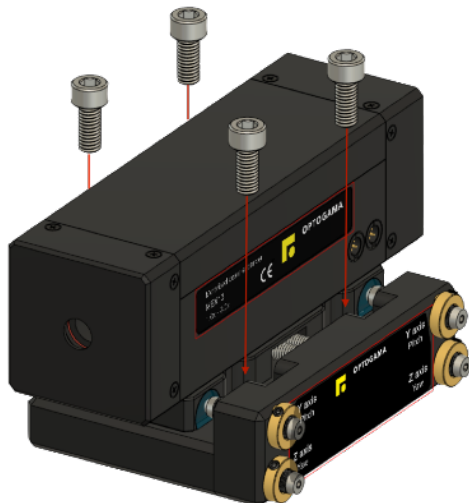
MSTAGE-W wide manual stage is suitable for MEX13HP,

2.1. Mounting the expander

1. Fix the motorised beam expander with M4x0.7 8-10mm long screws from the bottom side of the manual stage:



2. When the expander is properly fixed, place the manual stage (with fixed expander) on the bottom side and fix it with Metric M6x1.0 or Imperial 1/4"-20 screws. It can be fixed on both Metric and Imperial optical breadboards and tables:



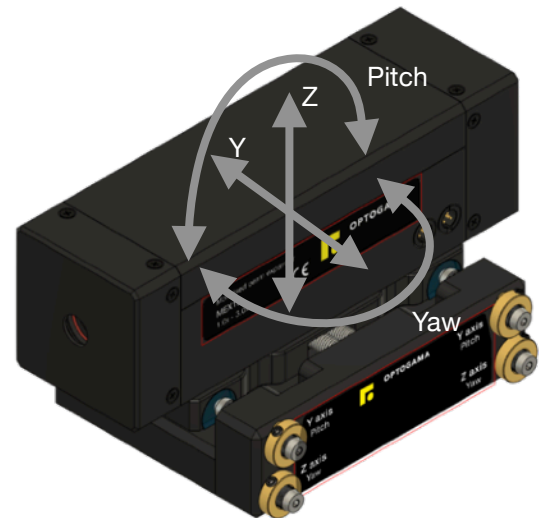
2.2. Positioning the stage

MSTAGE has 4xM6x0.25 microscrews for adjusting platform's pitch, yaw, Y and Z axis. Two microscrews control platform's pitch and Z axis, while another two control yaw and Y axis. All of them can be adjusted with 2 mm HEX screwdriver.

1. Make sure the Microscrew's lock screws are loosen before any adjustment.

NOTE: It is not necessary to unlock all microscrews if only one axis is going to be adjusted.

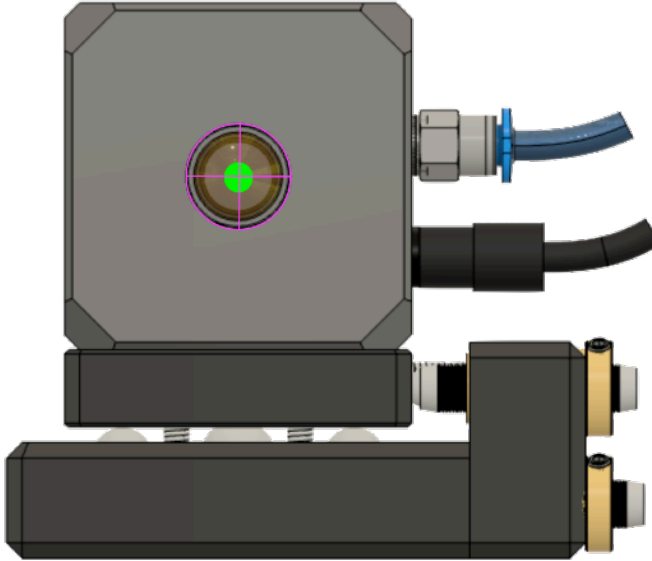
CAUTION! Do not adjust the stage with adjustment microscrews while they are locked.



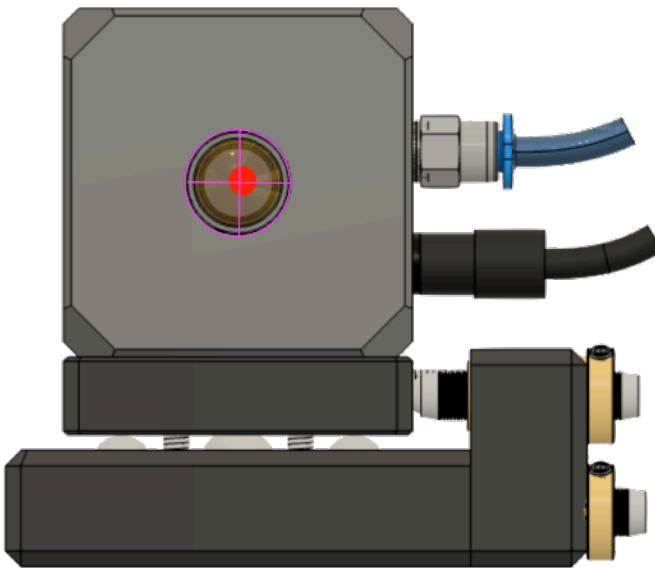
2.3. Pre-aligning the expander

1. Make sure the expander is aligned so the laser beam incidents in the centre of the beam expanders input:

1. Good alignment:

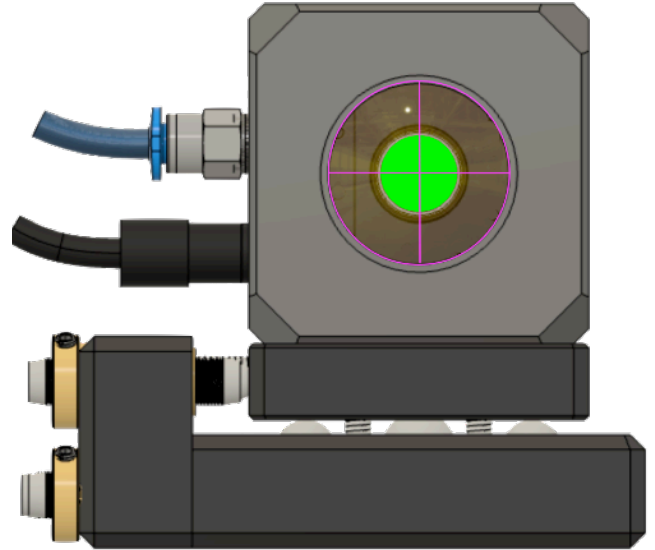


2. Bad alignment:

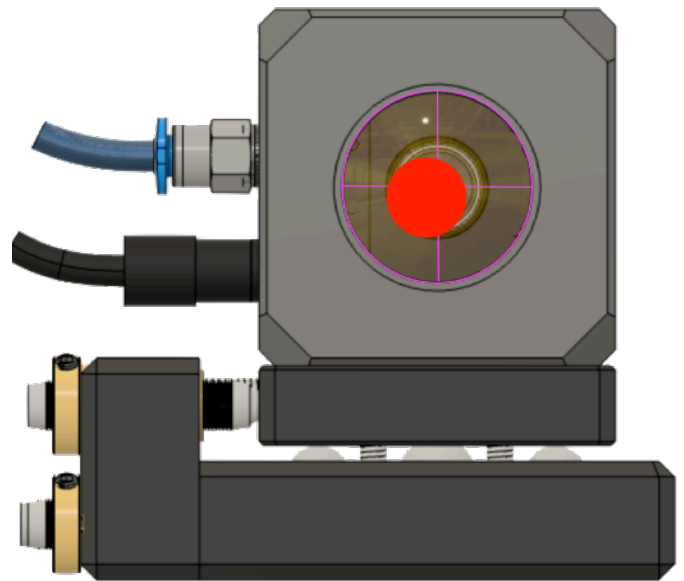


2. Make sure the output beam exits in the centre of the lens as well:

1. Good alignment:



2. Bad alignment:



NOTE: the beam should remain in the centre in all magnification range

2.4. Final alignment

2.4.1. Placing a Target after beam expander

When the beam expander is pre-adjusted, you can use a target (or similar item) to check if any more precise adjustment is necessary.

If the target is in far field (couple of meters) you can see some huge beam shift before precise alignment:

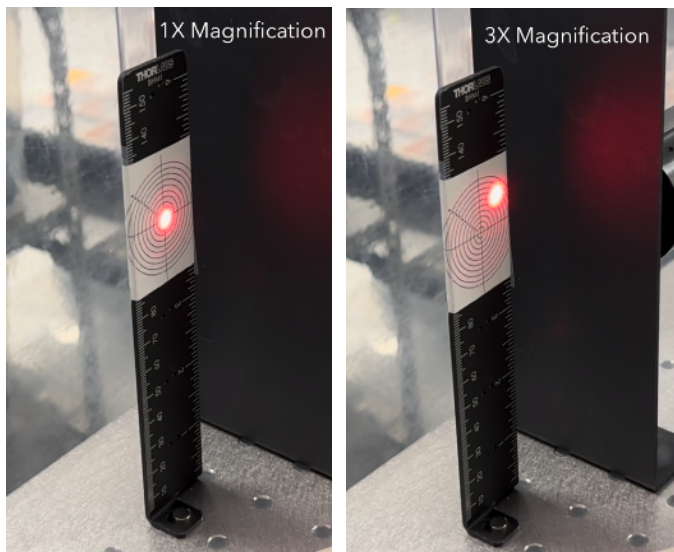


Fig. Laser beam on target which is placed in around 3,5 meters distance from beam expander.

The object is to align the expander so the laser beam remain at the same spot in the centre of the target. The easiest way to do that is to use the BDS software and try to adjust the expander while changing the magnification range from MIN to MAX.

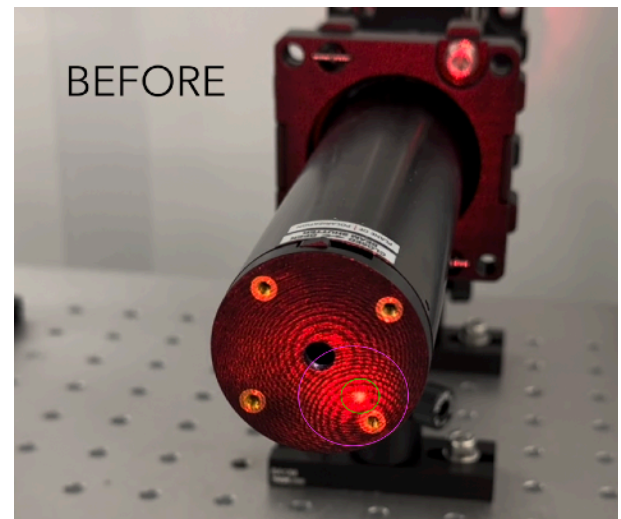
If the laser beam at MIN magnification (in this example 1X) is in the centre of the target, you should adjust the expander's tilt (adjust pitch on MSTAGE) when at MAX magnification and try to move the output beam to the centre of the target (to match the 1X MAG position).

NOTE: MIN magnification configuration is less sensitive to expander's Tilt adjustment. It practically does not have any impact to the output, so the Tilt adjustment should be made while at MAX magnification configuration.

2.4.2. Checking the reflection

One of the best ways to check If expander is tilted and positioned properly is to check the reflections before the beam expander (laser beam is reflected from expander's lenses).

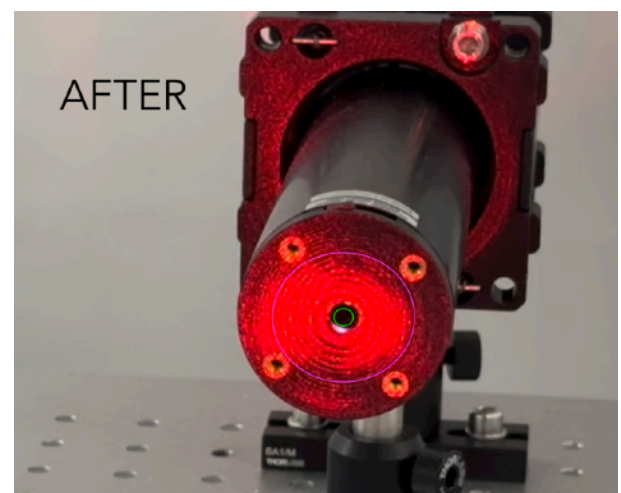
NOTE: In this image the reflected light is intense, because of the coating of the lenses. Typically the reflected beam intensity will be very low because of the AR/AR coatings.



The green circle shows the reflected beam from planar surface of the lens. From this image we can indicate that the expander needs to be tilted. To do that tilt the manual 4 axis stage using micro-screw for pitch (Z axis, pitch).

The purple circle shows reflection from all lenses in the beam expander. This image indicates that the position of the expander is also not in the centre of optical axis. To achieve that X and Y stage positions should be adjusted.

The view after finishing the adjustment should be similar to this:





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