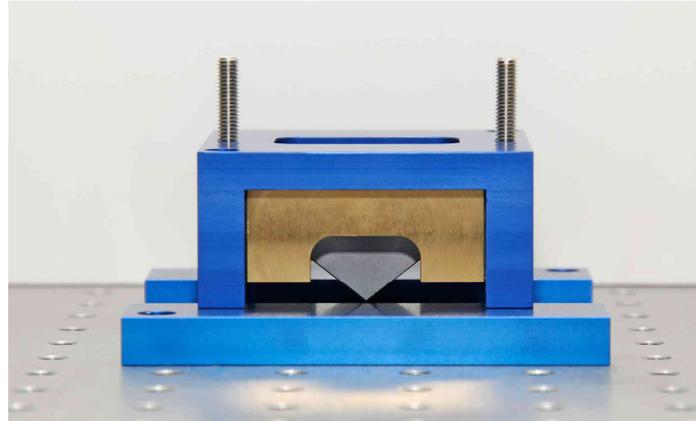


Data sheet SHA

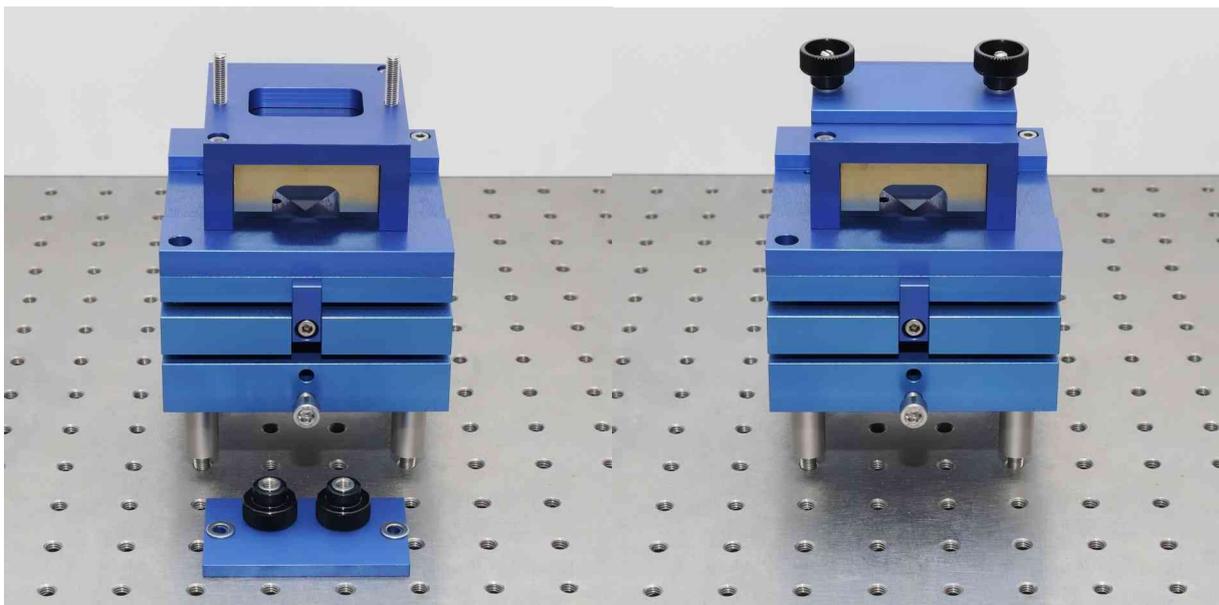
Sample Holder for ATR measurements

ATR – Attenuated Total Reflection



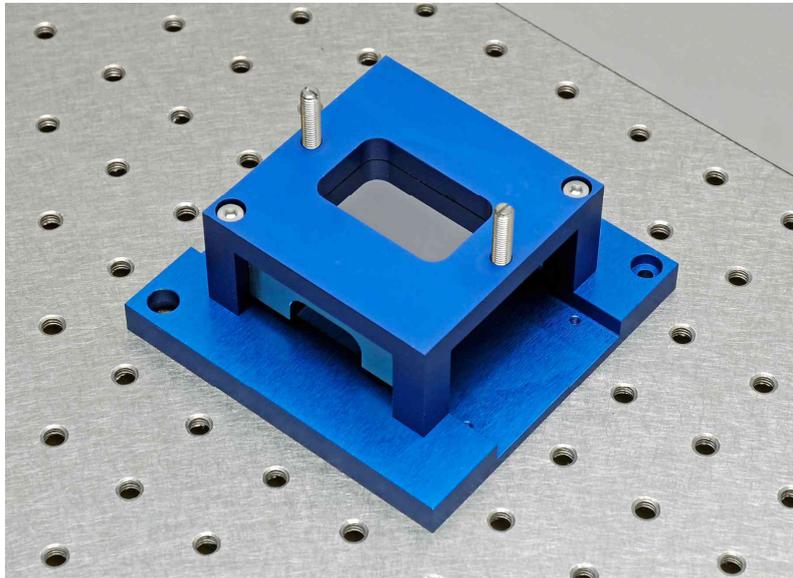
Side view of SHA without lid

The sample holder for Attenuated Total Reflection (ATR) measurements requires the base structure that comes with every TDS system. It is meant for fluids or solids with a high absorption coefficient and a refractive index lower than 2.5. The THz beam is directed by the silicon ATR prism towards its top surface where attenuated total reflection occurs. The THz signal will be altered by the properties of the sample on top surface. The penetration depth of the evanescent wave is proportional to the THz wavelength.



Sample holder for ATR measurements, with and without lid, mounted on base structure

The SHA shall be mounted on base structure that comes with the sample holder transmission (SHT) and every TDS system. The base structure allows a fine adjustment of ATR prism so that the THz beam hits the detector antenna.



Top view of SHA without lid

Parameters

| | |
|------------------------------------|--------------------------------|
| Refractive index of silicon prism: | $n_{\text{Si}} = 3.416$ |
| Free area for sample placement | 25 mm (width) x 40 mm (length) |
| Sample refractive index | $n_{\text{Sample}} < 2.5$ |
| Incidence angle of THz beam | $\alpha = 51.6 \text{ deg}$ |

Important remarks

When working with volatile fluids it is required to close the ATR sample holder using the lid provided in order to reduce fumes to a minimum. It has to be noted that these fumes could be ignited by the short pulse laser used to drive the THz antennas, especially for systems without an enclosure of the laser beam path. Therefore, the customer is required to handle the fluid according to its safety data sheet.

Because of the high refractive index of the silicon there is a significant time shift of the THz pulse compared to the transmission setup. The THz peak is found about 350 ps later. In case you build your own THz spectrometer we recommend setting the THz pulse for transmission at a time delay of about 150 ps. When using a 100 mm delay line you'll have enough room to work with the SHA.

Base structure SHB – not included

All sample holders for the internal sample compartment need the same base structure. This base structure allows you to change the position of the sample holder in two axes, rotate it or change the slope in relation to the THz beam.

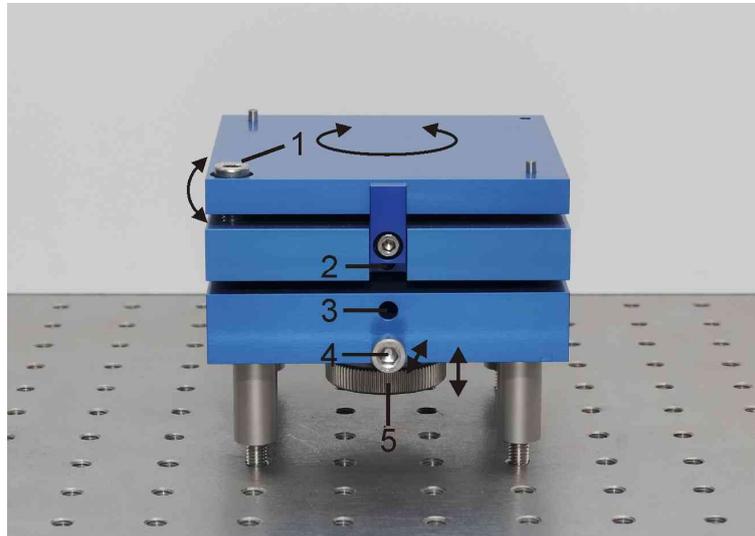


Figure 1: Base structure for internal sample holder.

In order to adjust the position and orientation you have four options:

- Use screw #1 to change the slope of the stage
- Loosen set screw #2 in order to rotate the stage horizontally
- Loosen set screw #3 and use knurled screw #5 to move the stage vertically
- Use screw #4 in order to move the stage horizontally

Please remember to fasten screws #2 and #3 in case you loosened them to adjust the stage.

The base structure is designed for the internal sample compartment of the TDS systems but it may be mounted to any other optical table / breadboard with a 25 mm grid of M6 mounting holes. The center height of the THz beam should be about 100 mm in order for the sample holders to work. However, the base structure rests on four 40 mm 1/2" posts from Thorlabs which may be replaced by longer versions in case your THz beam runs on a higher level.

If you purchased the sample holder for attenuated total reflection with the base structure for a self built THz setup you need to detach the upper half by loosening the set screw #3 (enables the vertical displacement). Then you can detach the posts from the base structure, mount them to the bread board and put the base structure back together.

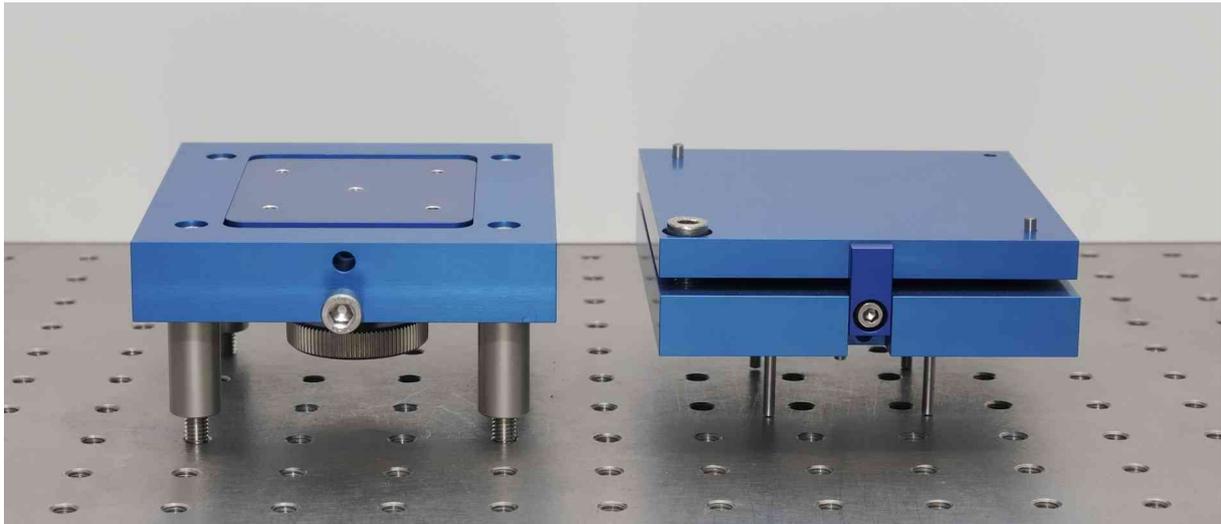


Figure 2: Disassembled base structure for mounting the posts to the breadboard.



Attention:

If you built the THz spectrometer yourself please make sure to align the THz beam at the correct height, parallel to the grid and in the middle between to lines of mounting. Otherwise the sample holders will not line up with the THz beam because the horizontal displacement cannot be compensated. Remember that the base structure and sample holder are designed for a beam height of 100 mm.

Dimensions and weight

Dimensions (LxWxH) 100 mm x 100 mm x 62 mm

Weight 580 g

Contact

If you have any further questions or remarks, please do not hesitate to contact us.

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