

Manual for Fast Scan Unit

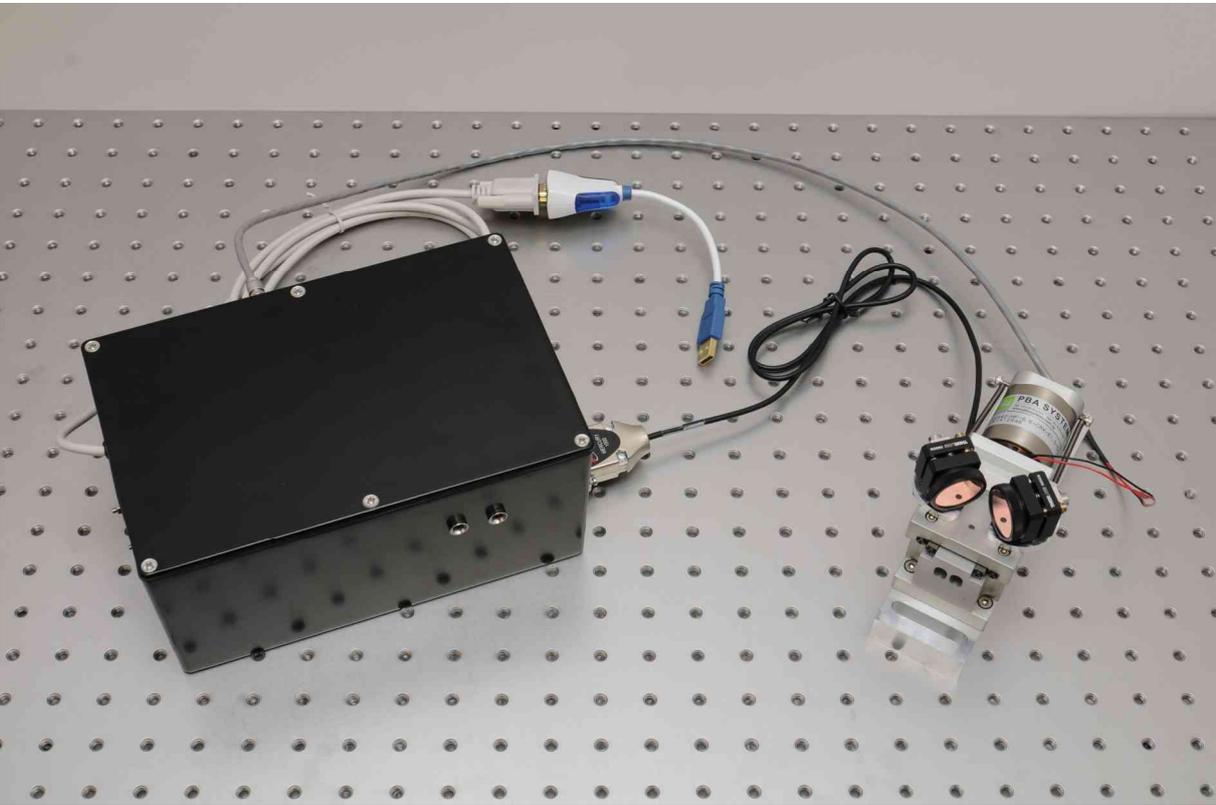


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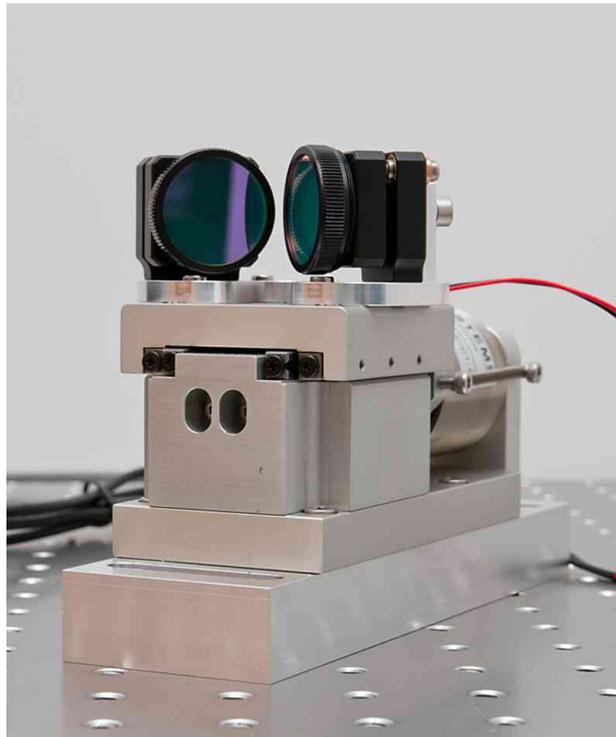
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0 Basics

The Fast Scan Unit is used to change the laser beam path with a frequency of a few Hz in order to get a real time picture of the THz signal. It is typically used as an extension to simplify the signal optimization. Due to the limited scan range and time resolution it cannot be used to collect data at the same quality as with a slow scan measurement. However, the much faster data acquisition allows you to change the optical or THz beam while watching the signal live. In contrast, the static measurement mode only allows you to watch the THz signal at a specific point in time / for a certain timing of the laser pulses.

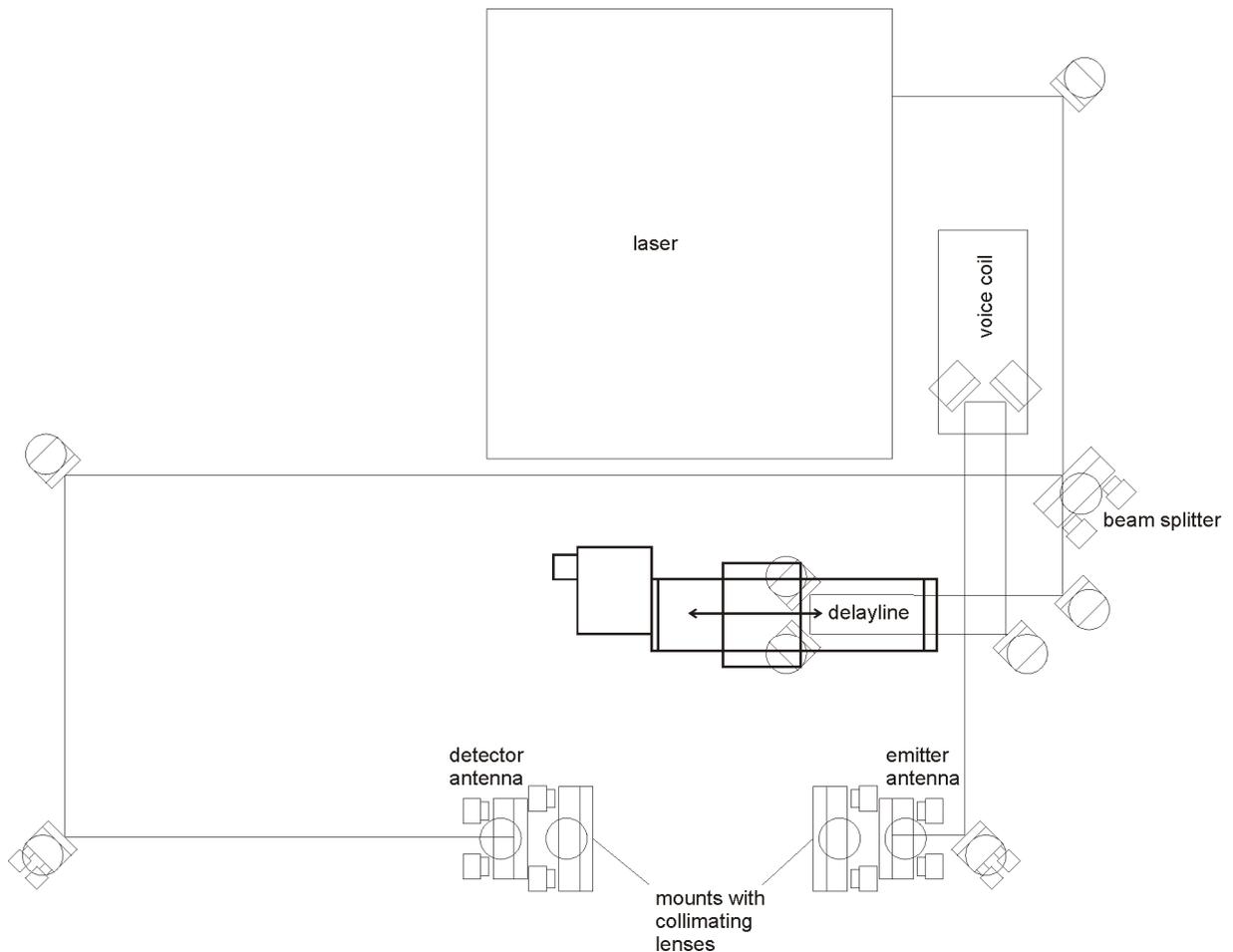


The Fast Scan Unit consists of a voice coil, an electronics box and a few cables to connect them with each other. Additionally, there is one coaxial cable that needs to be connected to the National Instruments Data Acquisition Unit (DAQ). Otherwise, the T3DS software will not be able to display the THz signal correctly.

1 Beam path

The mirrors on the voice coil have been pre-aligned before shipment. In order to incorporate the Fast Scan Unit into your optical setup correctly we recommend the following steps:

1. Make a sketch of your designated laser and THz beam path

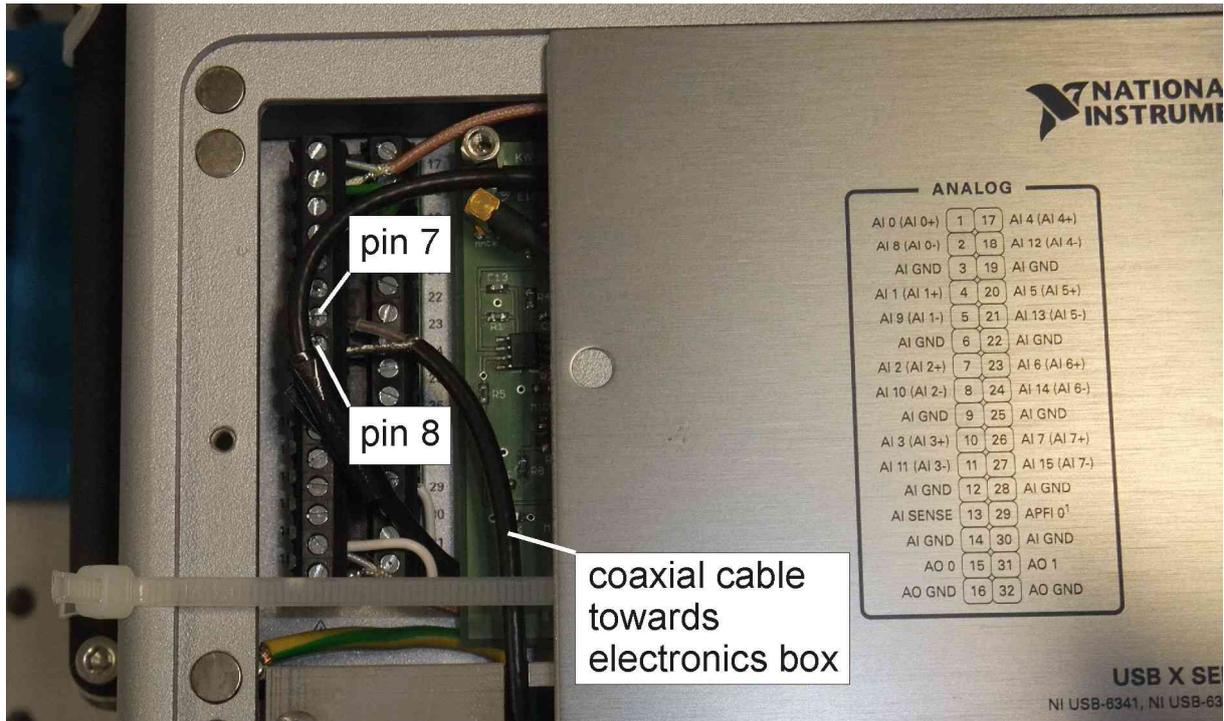


2. Position all elements loosely on the bread board and measure the distances in order to make sure that the path lengths add up (as described in the manual for building your own THz setup)
3. Align the optical path after the delay line parallel to the grid of holes in the optical table and parallel to the table itself
4. Install the voice coil parallel to the grid and make sure to use locking rings for the screws
5. Measure the optical power of the redirected beam using a power meter and an aperture

When checking the optical alignment after the voice coil you should see that the optical power is almost independent of the voice coil position. You can check that by moving the voice coil manually or using the T3DS software. In the latter case we recommend using the slowest scan frequency possible and an interval of 40 ps. In order to keep alignment changes to a minimum we recommend keeping the laser beam path between the delayline and the emitter antenna as short as possible. Furthermore, there should be one mirror before the emitter antenna in order to adjust the antenna illumination freely.

2 Electrical connection

Before you can use the voice coil for fast scans it is required to connect it to the electronics box, the DAQ and the computer. The wiring is self-explaining. However, the coaxial cable has to be connected inside the DAQ unit. The ground wire is to be connected to pin 8, while the signal has to be hooked up to pin 7. Please see the following picture.



After the electronics box is connected to the power supply you should see that both LEDs light up one after the other. Once you connected the USB adapter to your computer it should install the correct driver (assuming you already installed the drivers for the T3DS software package or have a computer that came with the software preinstalled). Otherwise please follow the instructions on how to install the T3DS software.

In order to operate the Fast Scan Unit, just follow the instruction given in the T3DS manual. If the fast scan tab is not activated please check all connections and whether or not there are two active COM-ports (one for the delayline and one for the fast scan unit).

3 Contact details

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

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