⚠ **CAUTION:** All software modules are compatible to Windows 7 and 10. Network connection is needed to distribute modules on different PCs. Software modules use **unencrypted TCP-based communication**. For security reasons we recommend use in secure local networks. **Software modules can be used to control electrical and/or optical devices and components. Misuse of these devices can cause damage or injuries. The control of these devices requires trained personal.**
If you encounter any issues during the soft- or hardware installation, **DO NOT** continue and contact us immediately under contact@thatec-innovation.com !

For the installation of the DAQ hardware and the TFPDAS5 driver module, carefully follow each step below:

Note: In the following, the term *PC* always refers to the PC which should be running the *thaTEC:driver TFPDAS5*

[1] Carefully read the manuals for all DAQ modules (*NI-9401, NI-9403, NI-9264*) and for the *cDAQ-9174* chassis provided by *National Instruments* (http://www.ni.com).

[2] Referring to the manuals from [1], insert the DAQ modules into the *NI cDAQ-9174 chassis* as shown in Fig. 1.
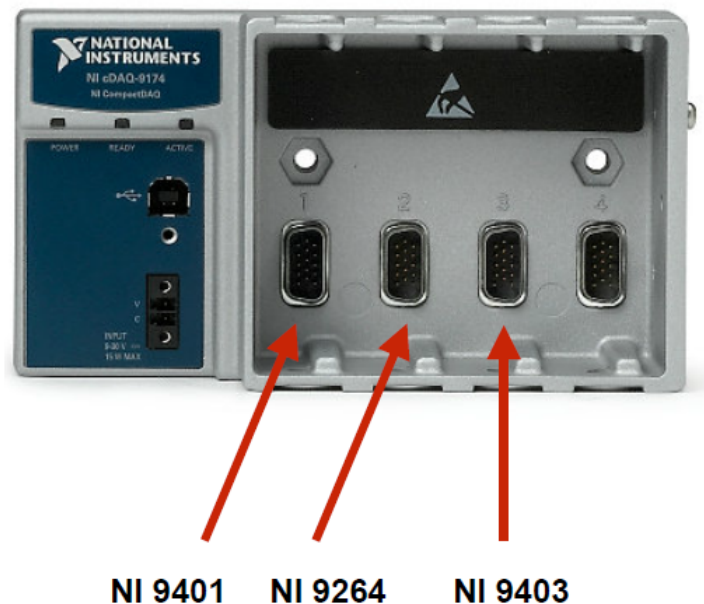

Figure 1: Position for the single DAQ modules in the *NI cDAQ-9174 chassis.*

[3] Referring to the *National Instruments* manuals from [1], plug in the power supply for the *NI cDAQ-9174 chassis* and connect it to the PC using the included USB cable.

[4] Download the *thaTEC-framework installer 64 bit* from the download section on our homepage (www.thatec-innovation.com) and install it on the PC by confirming all dialogues and using the standard settings and installation directories. If you encounter any issues during the installation process, please contact us under contact@thatec-innovation.com.

[5] After the successful installation of the *thaTEC-framework installer 64 bit*, open the installed *NI MAX* software from the Windows start menu. Rename the NI DAQ modules as shown in Fig. 2.
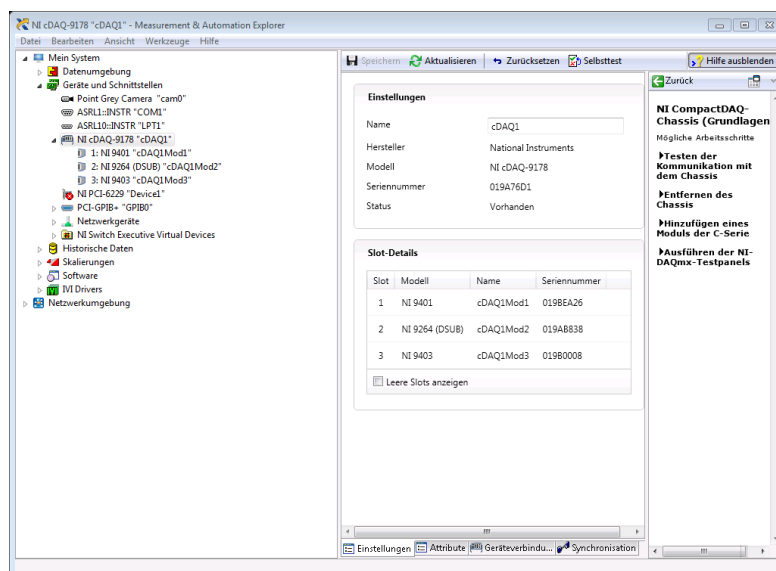

Figure 2: Rename the *NI DAQ modules* in the *NI MAX* software as shown in the image. Attention: the image shows the settings for the *NI cDAQ-9178 chassis*, the settings for the *NI cDAQ-9174 chassis* are analog to the settings shown above, i.e., rename *NI c-DAQ-9174* to "cDAQ1".

[6] ⚠ Before connecting the *THATec Innovation DAQ data cable* to the *JRS control unit TFP-CU*, block any laser light which might enter the TFP through the sample beam path or the reference beam path of the Sandercock interferometer and/or switch off the photodetector to prevent any damage.

[7] Make sure that the mode-switch for the doubleshutter of the TFP on the front of the *JRS control unit TFP-CU* is switched to "*Window*"! You should hear a clicking noise from the doubleshutter!

[8] Connect the delivered *DAQ data cable* to the *NI DAQ modules* according to the labels on the connectors.

[9] ⚠ Connect the 15 pin D-SUB connector to the Remote port at the rear of the *JRS control unit TFP-CU*. Now, the clicking noise of the doubleshutter should stop! If not, DO NOT continue with the following steps and contact us under contact@thatec-innovation.com!

[10] Disconnect the BNC cable from the photodetector of the TFP-interferometer from the rear of the *JRS control unit TFP-CU* and connect it to the BNC plug of the *THATec Innovation DAQ data cable*.

[11] ⚠ Reboot the PC and carefully listen to any clicking noise of the doubleshutter of the *TFP-interferometer*, if the doubleshutter is clicking, DO NOT continue with the following steps and contact us under contact@thatec-innovation.com!

[12] Insert the included *Sentinel HL MAX USB dongle* to the PC. Download and install the latest version of the *thaTEC:driver TFPDAS5* using the link provided in a separate e-mail.

[13] After the successful installation, open the *TFPDAS5 driver module*.

[14] Open the scan parameters from the menu via *PARAMETER → Scan* or by pressing *Ctrl+F7*:
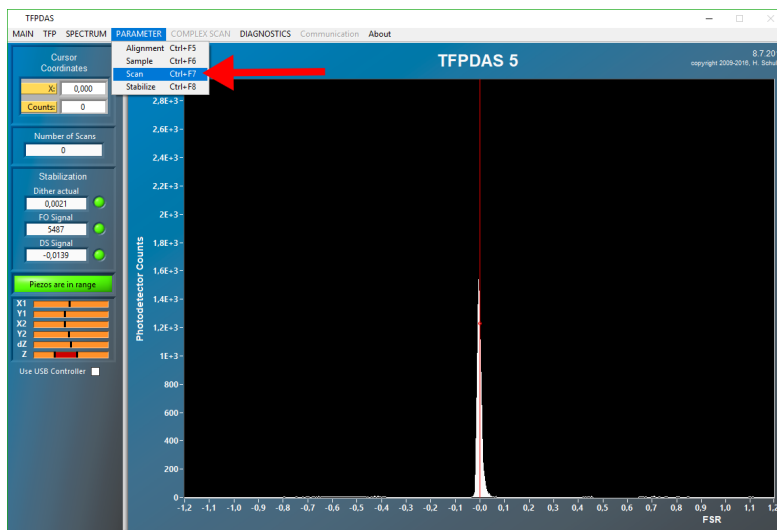
[15] Adjust the *Maximum Counts per millisecond* according to the specifications of the installed detector in the *TFP-interferometer*, and, if necessary, adjust the laser wavelength to the used laser (see also Fig. 3). Confirm the subsequent popup and close the *Scan Parameters* window by clicking the *OK* button:
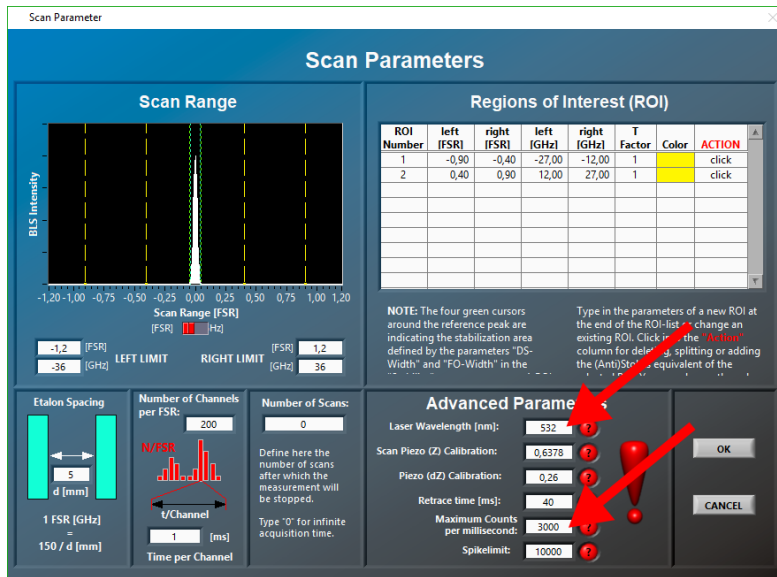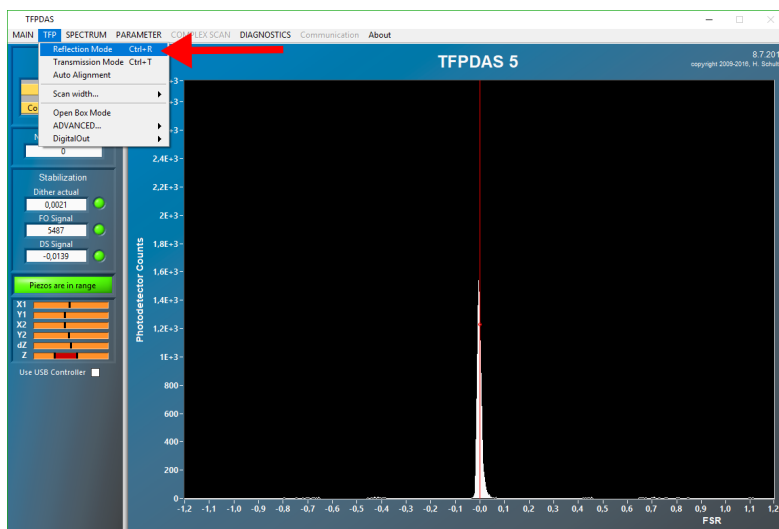

Figure 3: Check and adjust the *Laser wavelength* and the *Maximum Counts per millisecond* parameters.

[16] Bring the TFP into *Reflection Mode (Alignment mode)* via the menu bar *TFP → Reflection Mode* or by pressing *Ctrl+R*:

[17] If you switched off the photodetector in step [6], switch on the detector again while still blocking any laser light going into the *TFP-interferometer*! Scale the intensity of the spectrum in the main window of the *TFPDAS 5 module* using the *arrow-up* (↑) and *arrow-down* (↓) keys on the keyboard until you see the noise of the detector as ewxemplarily shon in Fig. 4:
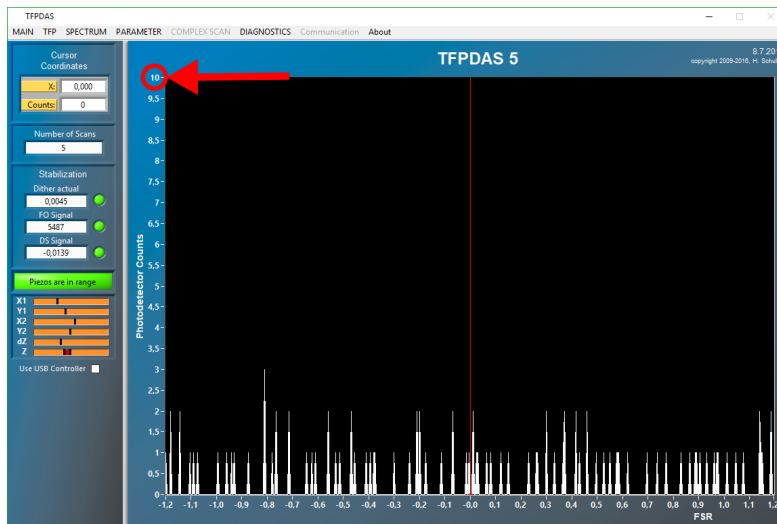

Figure 4: Scale the intensity until you see the noise level of the detector.

For the following steps, please also refer to the according sections in the *TFPDAS5 user manual*!

[18] As described in [17], by using the arrow keys on the keyboard, rescale the y-axis of the spectrum again to a maximum value of ≈ 400 counts. Subsequently, carefully unblock the laser light inciding on the reference beam side of the doubleshutter unit of the *TFP-interferometer* and adjust the overall intensity to 300 to 400 counts as shown in Fig. 5. You should see two - more or less distinct - dips in the spectrum originating from the two FPIs:
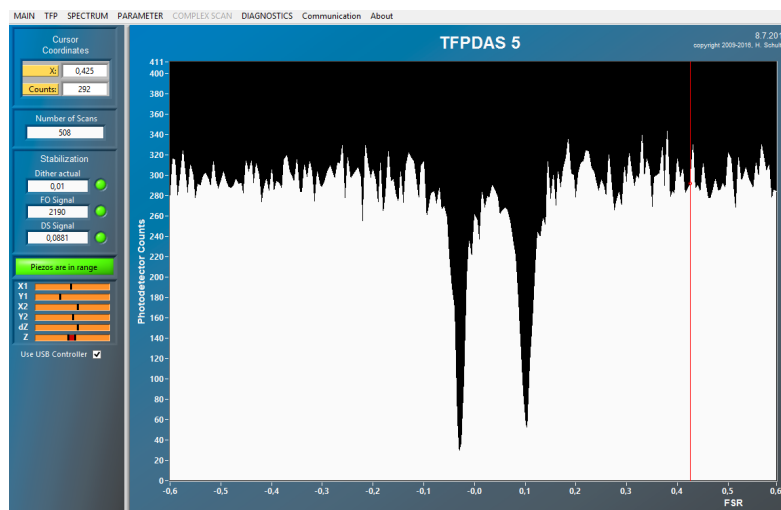

Figure 5: Exemplary signal obtained in *reflection mode*. The two dips originate from the two etalons of the *TFP-interferometer*.

[19] Start the calibration routines for the z- and the dz-Piezo via the menu bar *DIAG-NOSTICS → Piezo Calibration (Z)* and *DIAGNOSTICS → Piezo Calibration (dZ)*. These routines may take some minutes until they are completed and towards the end of each calibration routine, the signal will be accumulated, hence, the indicated signal will drastically increase. Please note that the laser intensity on the detector remains unchanged and no damage will occur!

After each calibration routine, check the acquired signal. **Confirm the new calibration values ONLY IF TWO CLEAR DIPS ARE PRESENT IN THE SPECTRUM AND THE RED LINES COINCIDE WITH THESE DIPS as exemplarily shown in fig. 6!** Otherwise, cancel the dialog and restart the calibration routine.
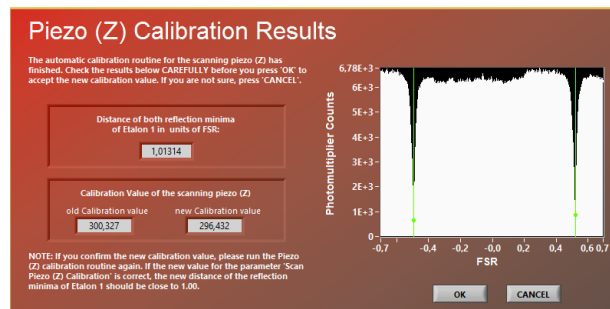
Figure 6: Only confirm the new calibration values if two distinct dips are present in the spectrum an the green cursors coincide with these dips!

[20] After the successful calibration of the z- and dz-Piezo, switch the interferometer back to *reflection mode* as described in step 16 and start the *Auto Alignment* routine via the menu bar *TFP → Auto Alignment*. Again, this process might take some minutes to complete. After this, the *TFP-interferometer* automatically switches to *Transmission Mode* and a clear peak in the center of the spectrum should be visible.

If this is not the case, you might switch back to *Reflection Mode* and manually adjust the dZ-Piezo so that the dips of the two etalons coincide. To do so, place the mouse over the dZ indicator on the left hand side of the main window, press *Ctrl* and use the mouse wheel to adjust the dZ Piezo. Subsequently, switch back to Transmission mode via the menu bar *TFP → Transmission Mode* or by pressing *Ctrl+T*:
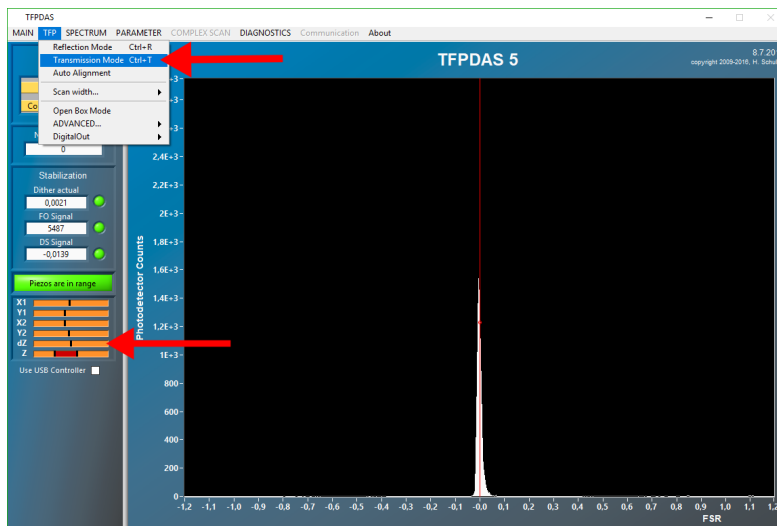
Now, a clear peak should occur in the center of the spectrum and the automatic stabilization routine should continuously increase the intensity of this peak during the stabilization process. With this, the setup of the *DAQ hardware* and the *thaTEC:driver TFPDAS5* software is completed. For further instructions and in order to take spectra, please refer to the *TFPDAS5 user manual*.