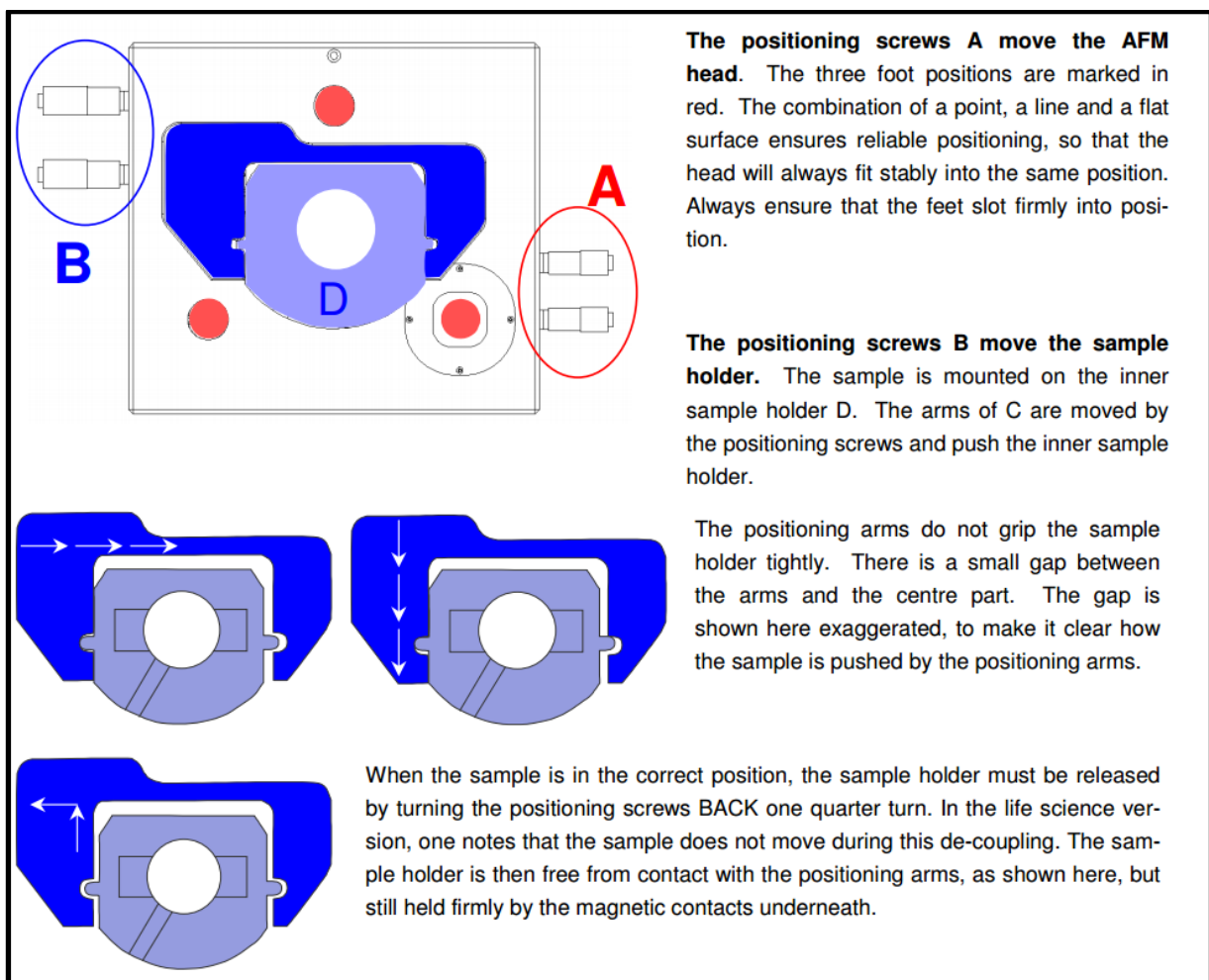


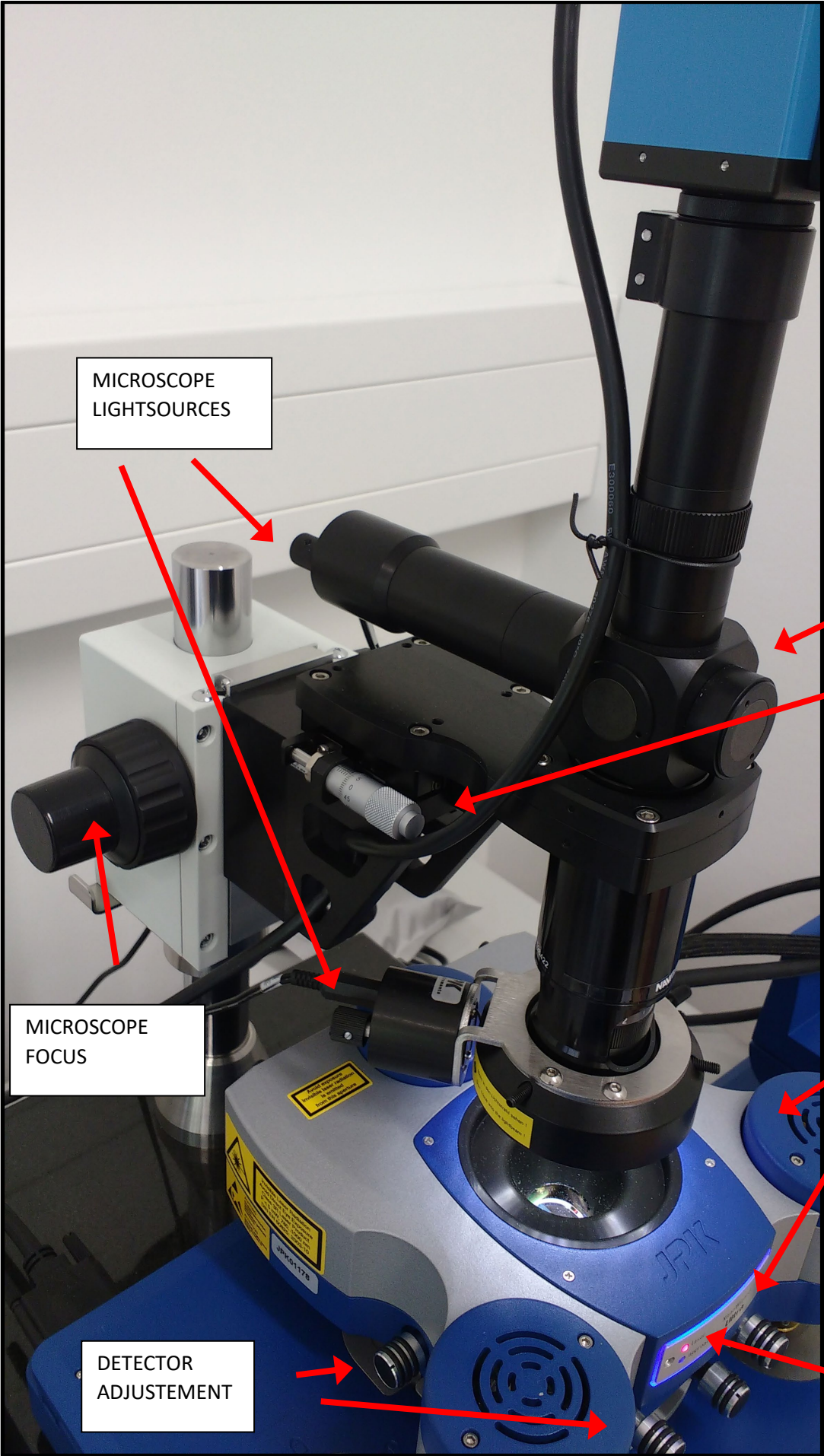
FOR MORE DETAILED INFORMATION CONSULT THE OFFICIAL MANUAL

Placing the Sample

1. Situation: AFM head is horizontally placed on table.
2. Elevate the AFM head and place it in the holder to the right. A sensor will deactivate the IR laser if the AFM head becomes tilted (Note: RED LED).
3. Place your sample horizontally on the sample holder.
4. Ensure, that there will be sufficient space between sample to be measured and AFM head.
5. Place the AFM head over the sample.
6. After Usage, Place the AFM head on the table and not on the holder to the right. This will avoid dust on the cantilever



B is electronically driven in our setup by the controller on the table!



MICROSCOPE LIGHTSOURCES

MICROSCOPE POSITION (silver screws)

MICROSCOPE FOCUS

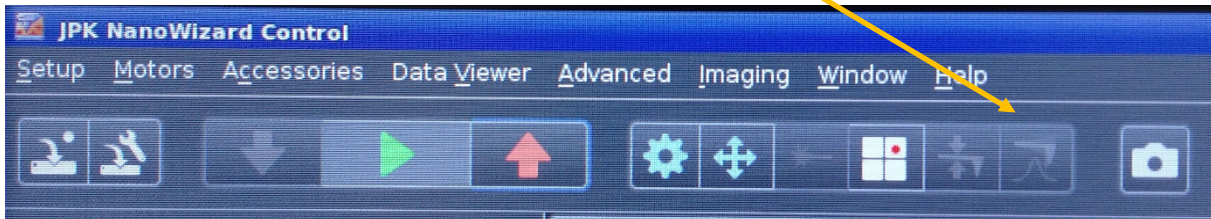
LASER ADJUSTMENT

DETECTOR ADJUSTMENT

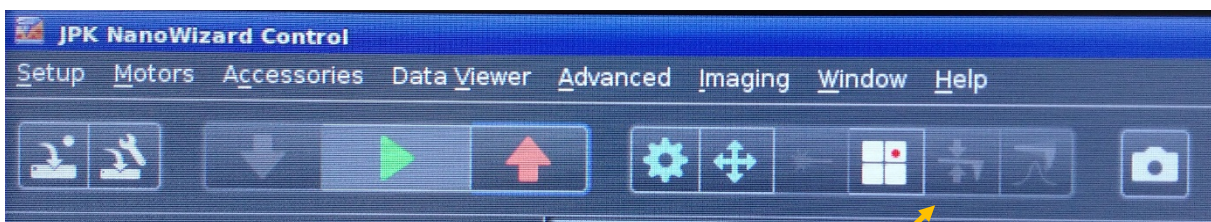
LASER LED APPROACH LED

Before Measurement

- 1.) Choose the measurement mode (e. g. *QI* or AC = intermittent mode)
- 2.) Focus the spot of the IR laser with the corresponding wheels on the AFM head onto the cantilever after each exchange.
- 3.) Center the laser reflection on the detector as good as possible. The sum of the signal should be high (~ 2.20 V), the horizontal and vertical deflection almost zero.
- 4.) Find the resonance of the cantilever tip:



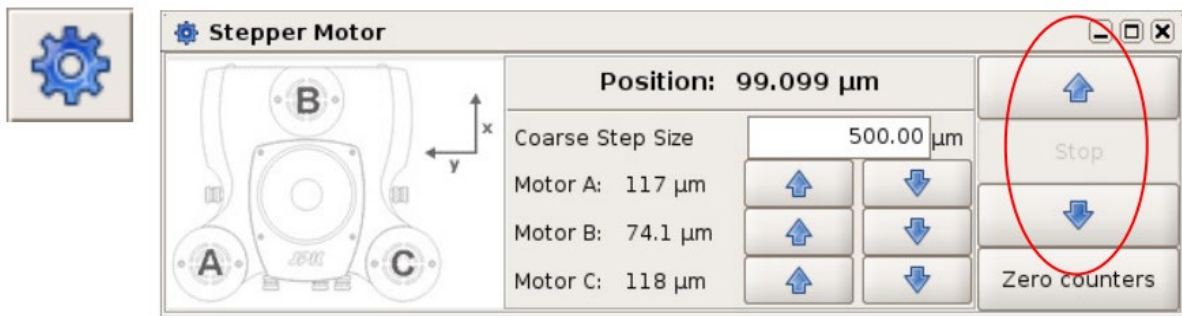
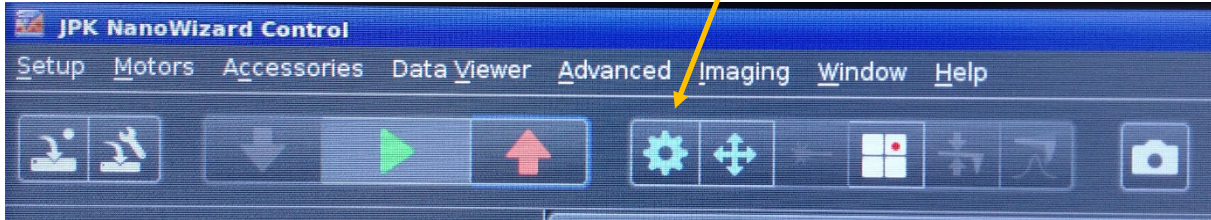
- a. START and END FREQUENCY are set differently for AC mode in air (0-400 kHz) or fluid (0-50 kHz)
- b. Automatic tuning: Click RUN to try and achieve the TARGET AMPLITUDE (default is 1V) that is set. One resulting curve shows the PHASE, the other one the FREQUENCY
- c. Click SELECT FREQUENCY RANGE to zoom in around the resonance peak. FREQUENCY and SETPOINT SELECTION: Click inside the amplitude/frequency plot to get a crosshair of dotted lines. Chose suitable frequency and setpoint. DRIVE FREQUENCY is usually chosen on the left upper rising edge of the peak. The value of the SETPOINT must be lower than the chosen LOCK-IN-AMPLITUDE in the cantilever tuning window. Setpoint is usually 70-80% of the lock-in amplitude at that frequency
- d. Signal-to-Noise-Ratio: Resonance curve must be well-shaped (6:1 or better). Try to keep the peak of the resonance curve below 2V lock-in amplitude



- 5.) Go to the CALIBRATION MANAGER and click on Calibrate.
- 6.) Re-open the window you used for finding the resonance and select 100 nm as the target Amplitude. Find frequency and finish.

Moving, Approaching and Measurement

The AFM head has 3 stepper motors, which allow a wide range of sample heights to be measured. Automatic approach routine can take a long time, if the cantilever is far from the sample surface. Initially, the Cantilever is approached by hand to 1-2 mm.



Automatic Approach: The automatic approach makes small steps, and checks at each step to see if the sample surface is within range. Choose a suitable SETPOINT in the FEEDBACK CONTROL/CANTILEVER TUNING panel. During the approach, the z-piezo extension and retraction can be observed on the left side. It should oscillate from right to left continuously until contact.

Approach with Feedback and approach with constant velocity: Same approach routine, but different ways in adjusting the approach. GAINS must be adjusted if you use Approach with feedback

To make a slower approach, reduce the GAINS, or do the opposite for a faster approach. GAINS only affect the approach. Change the values in the FEEDBACK CONTROL panel to adjust the gains used for scanning and waiting.

The APPROACH TARGET HEIGHT sets the z-piezo height on the surface at the end of the approach. Default: middle position.

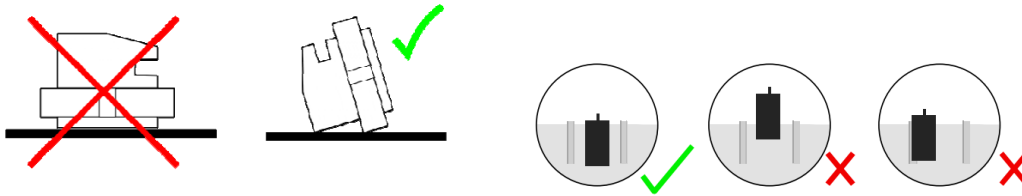
You can move the table by hitting the following button:



To move the table, you must engage the table. Take care the cantilever is not in contact to the surface (retract it before twice). **You can measure only if the table is disengaged!!!**

Exchange of the Cantilever

1. Open the grey lock
2. Turn the glass head 90° and remove it. Use the special holder for changing the cantilever. Place it never on the polished sides, but - if necessary - on the side on a clean towel.
3. Loosen the screw, exchange the tip and tighten the screw again.
4. Place it back in the AFM head.
5. **VERTICAL: unused tip, HORIZONTAL: used, but good tip. REMOVE defective tips (waste) !!!**



The cantilever chip should be placed in the grooves, with the cantilever as close to the inclined edge. The chip should be placed close to the centre of the glass block; do not place the chip too far forwards.

