

QATCH
TECHNOLOGIES

USER MANUAL

The nanovisQ™



1. How to use the nanovisQ™
2. Guide to Adding and Managing Users in QATCH Software
3. Guide to Advanced Settings

03/12/2024

How to use QATCH's nanovisQ

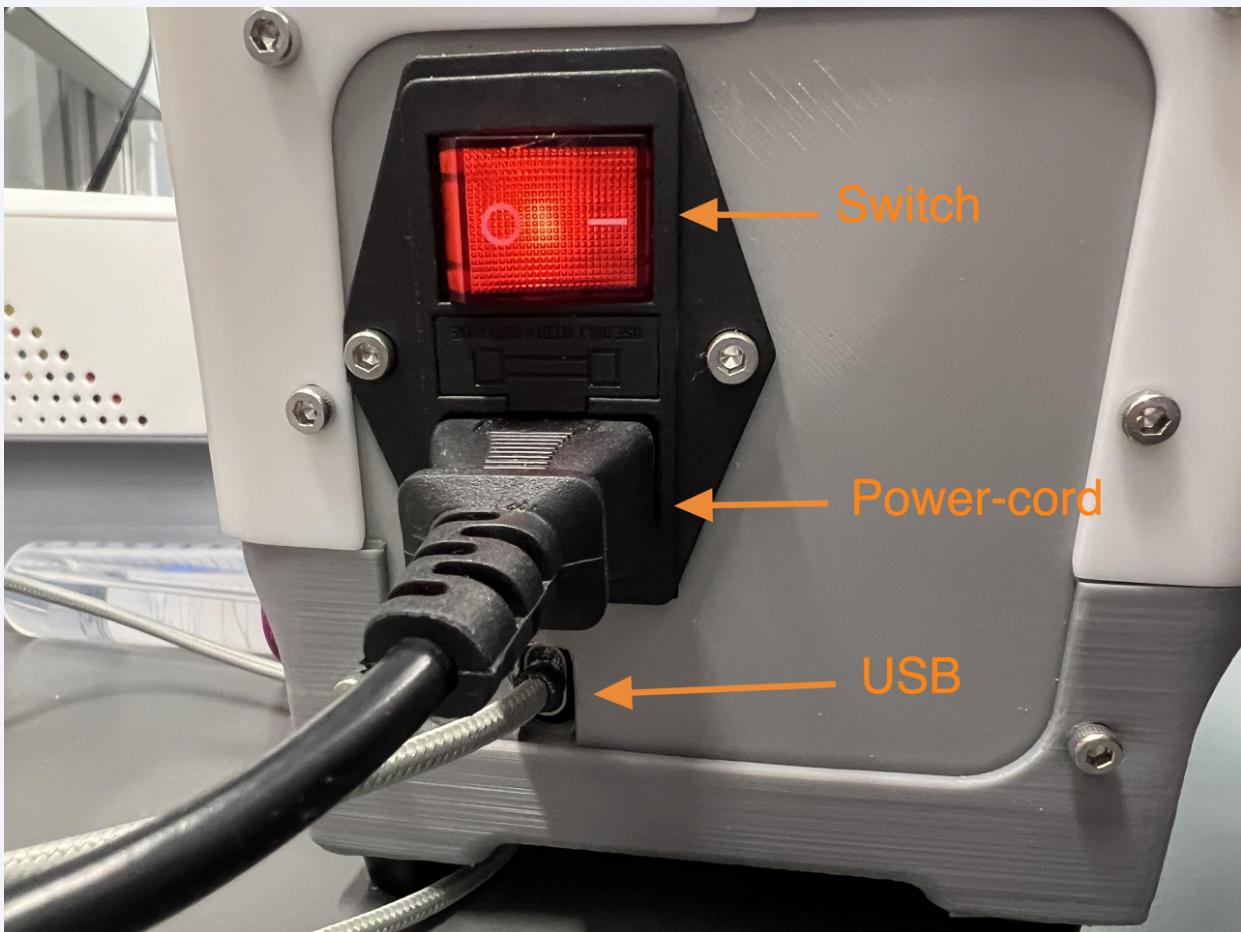
SET-UP

- 1 To start a nanovisQ measurement, you need 1) nanovisQ Instrument, 2) nanovisQ sensor pouches, and 3) a laptop provided by QATCH with the nanovisQ software.



2

First connect the nanovisQ instrument to the laptop using through the USB cable coming from the back of the instrument. Then, connect the power-cord to the wall-outlet, and lastly turn the switch on.



3

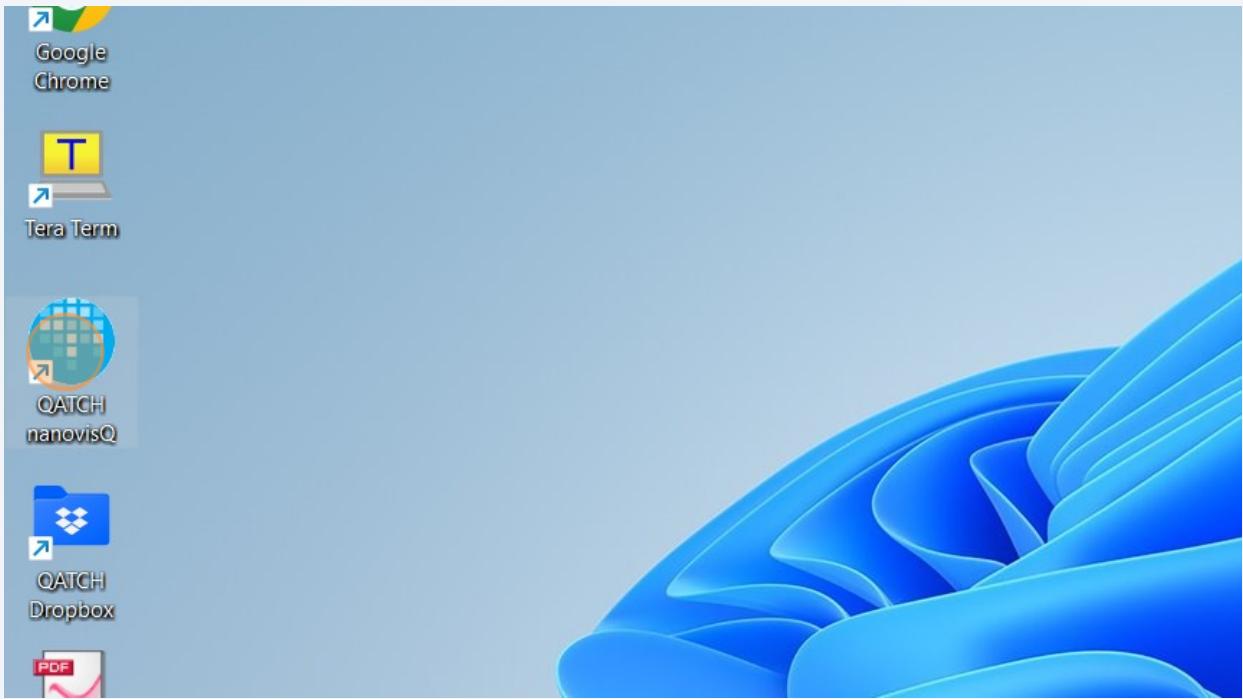
The USB connection powers up the electronics in the nanovisQ instrument and the nanovisQ initiates "Booting".



Attention!

The power-cord connection and the switch on the back of the unit are required to be ON when using the temperature control. If wall power is not connected, there will be no error messages until temperature control is initiated. It is recommended that wall power be connected at all times for improved internal ventilation.

- 4** Double-click "QATCH nanovisQ" on the computer Desktop.

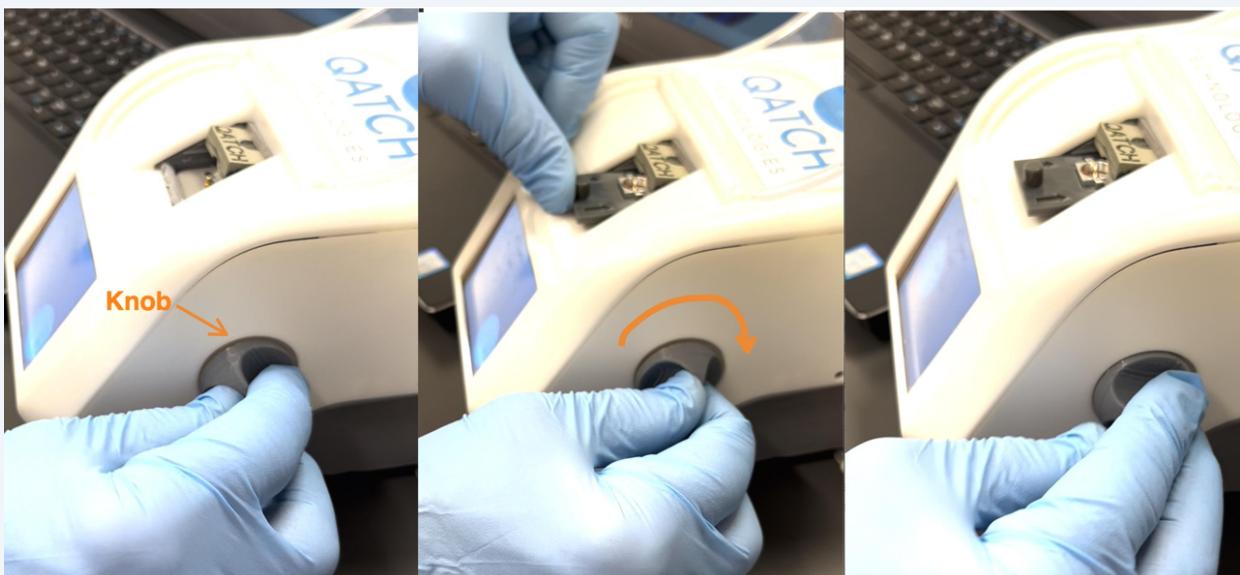


- 5** Enter the username and the password. The user account has to be created by the administrator. How to create and modify an account is explained in the next section.

- 6** Tear a nanovisQ pouch open and do not discard the pouch. The sensor will have some ethanol on it. Allow for ~30 seconds to let it dry.



- 7** Turn one of the knobs on the side (clockwise for the right knob, counter clockwise for the left knob) a quarter of a turn, until you reach a solid stop. This will lower the housing to accept the sensor. Insert the sensor while the knob is turned. Release the knob and allow it to go to the original position to secure the sensor.





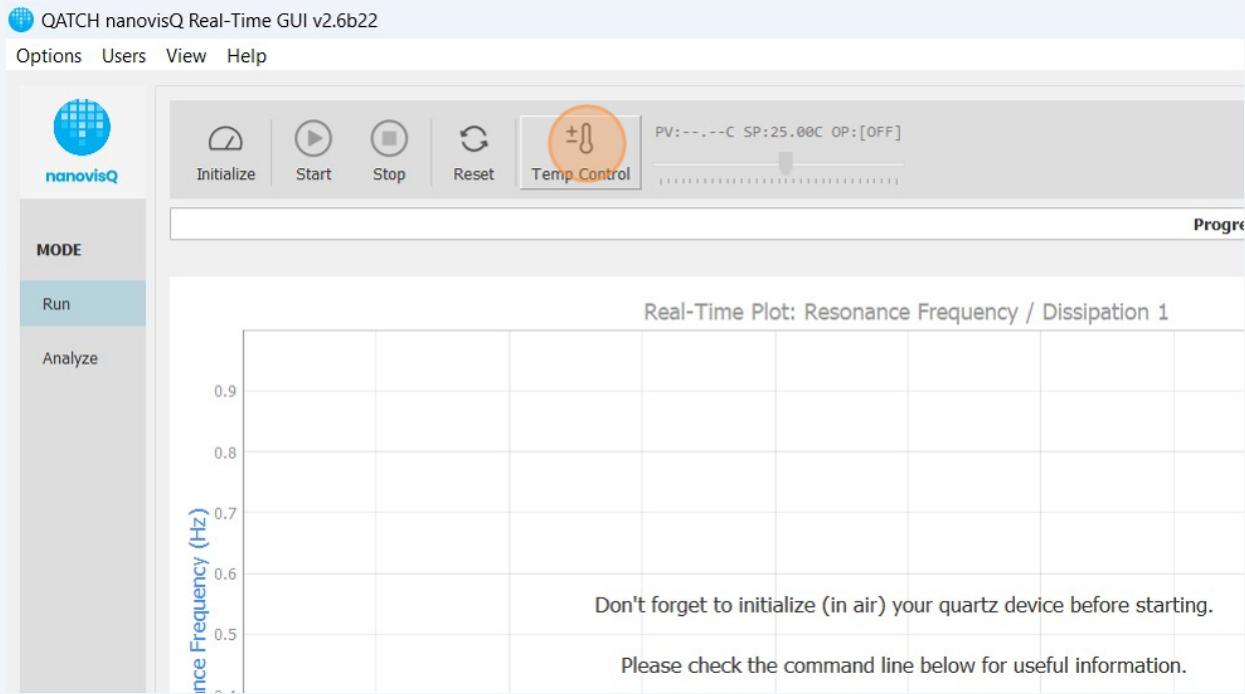
Attention!

Do not force the sensor in or out without turning the knob. This may cause permanent instrument damage.

MEASUREMENT

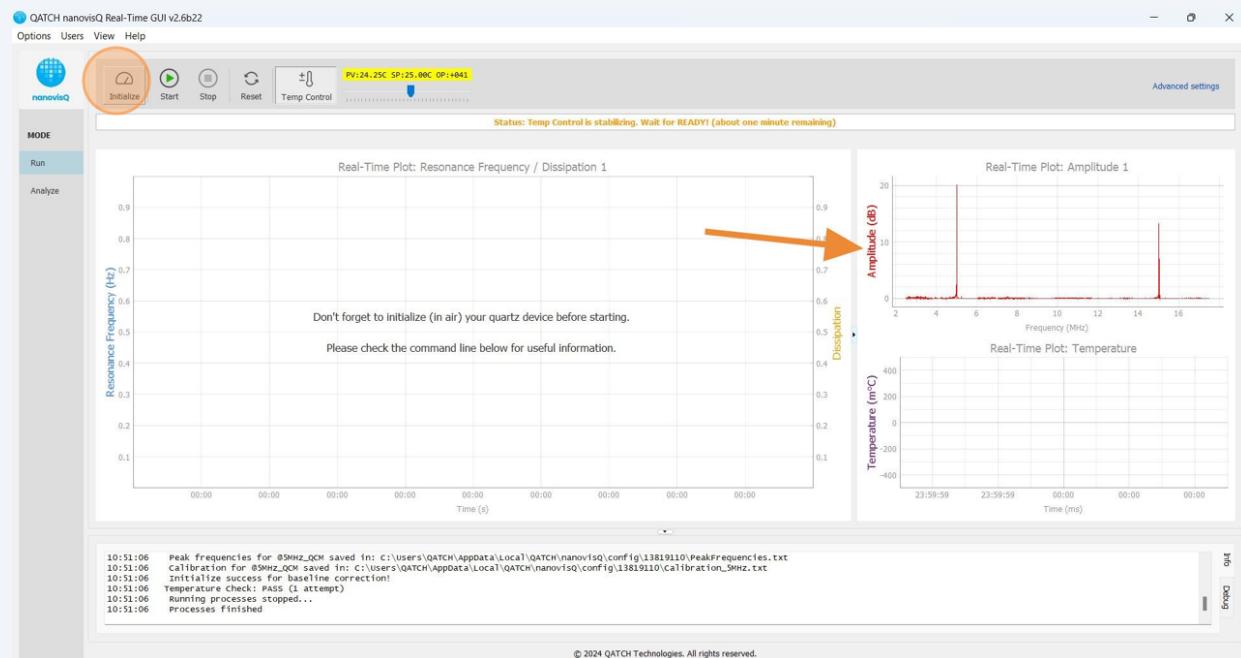
8

Click "Temp Control". Once it is activated, you can move the "slider" to the desired target temperature. There will be temperature updates on the screen and the color above the "slider" will change from yellow to green once the target temperature is reached and stable.



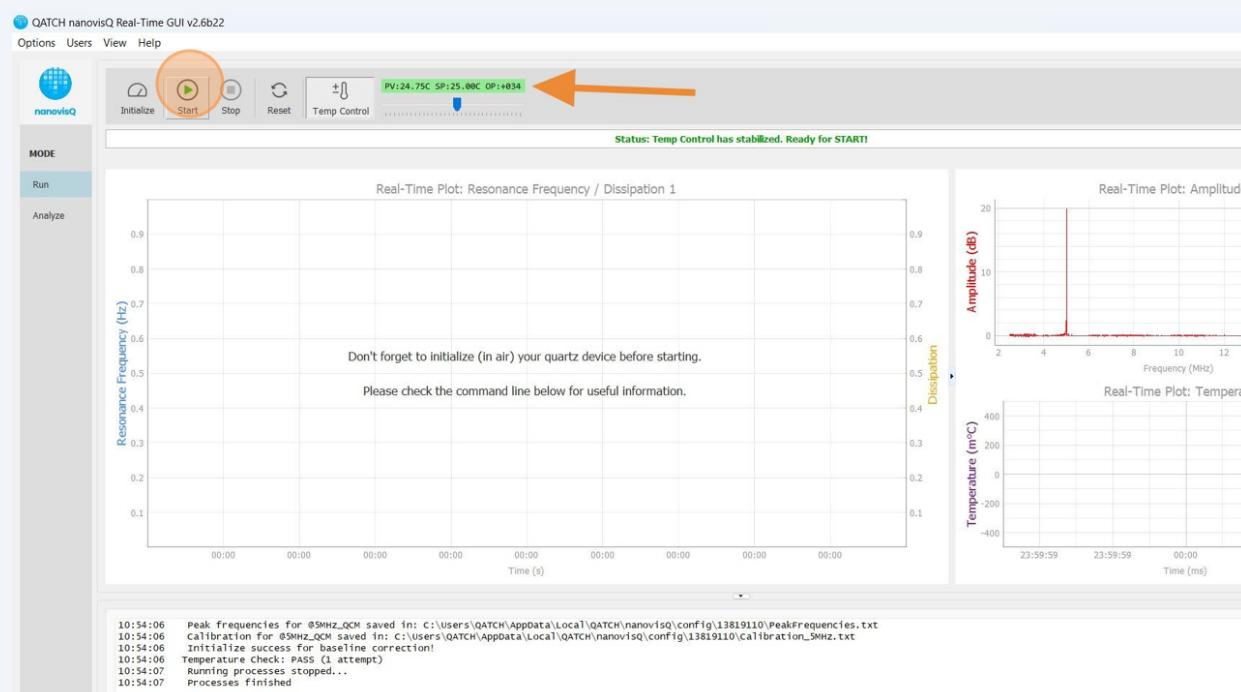
9

Click "Initialize" after the current temperature (PV) is within 0.5C of the set-point temperature (SP). Following the initialization, "Real-Time Plot: Amplitude 1" plot on the right top will show two peaks. The first peak has to be close to 20 and the second peak has to be slightly over 12.



10

After the temperature bar turns green, click "Start". This will start the measurement on the sensor. The dissipation on the screen is expected to be between 18 and 32. If it is out of this range, allow for a few more minutes, then return step 9. The data lines after the "Start" has to be smooth and flat. Noisy or rough data may indicate a contact problem with the sensor. Return to step 7. If the lines drift, click "Stop", wait for a one minute, and then return to step 9.



11

After the measurement is started, wait for at least 3 seconds and apply 3-5 microliters of the drop the inlet of the sensor.



12

If you are testing a biological solution, especially one with high concentration, it is recommended to increase the humidity within the chamber by placing a wet kim-wipe around the sensor and closing the lid. Make sure that the lab-style kim-wipe does only touch the plastic part of the test cartridge.



13

The measurement will start with two flat lines and these lines will change rapidly as the user applies the drop to the sensor. The two lines will appear, one is the Dissipation (orange) and the other is the Frequency (blue) of the sensor, with mirroring behavior. Once you observe 3 steps or 3 obvious inflection points, Click "Stop". If a viscous sample is tested, you may observe only 1 or 2 steps in 5 minutes. It is again recommended to click "Stop" after 5 minutes of measurement time in this case. The temperature may drift one degree around the target temperature during the measurement. This drift will be lower if you wait longer for the temperature to stabilize.



14

The software will ask for a name to record the data. Enter a unique name and then Click "OK".



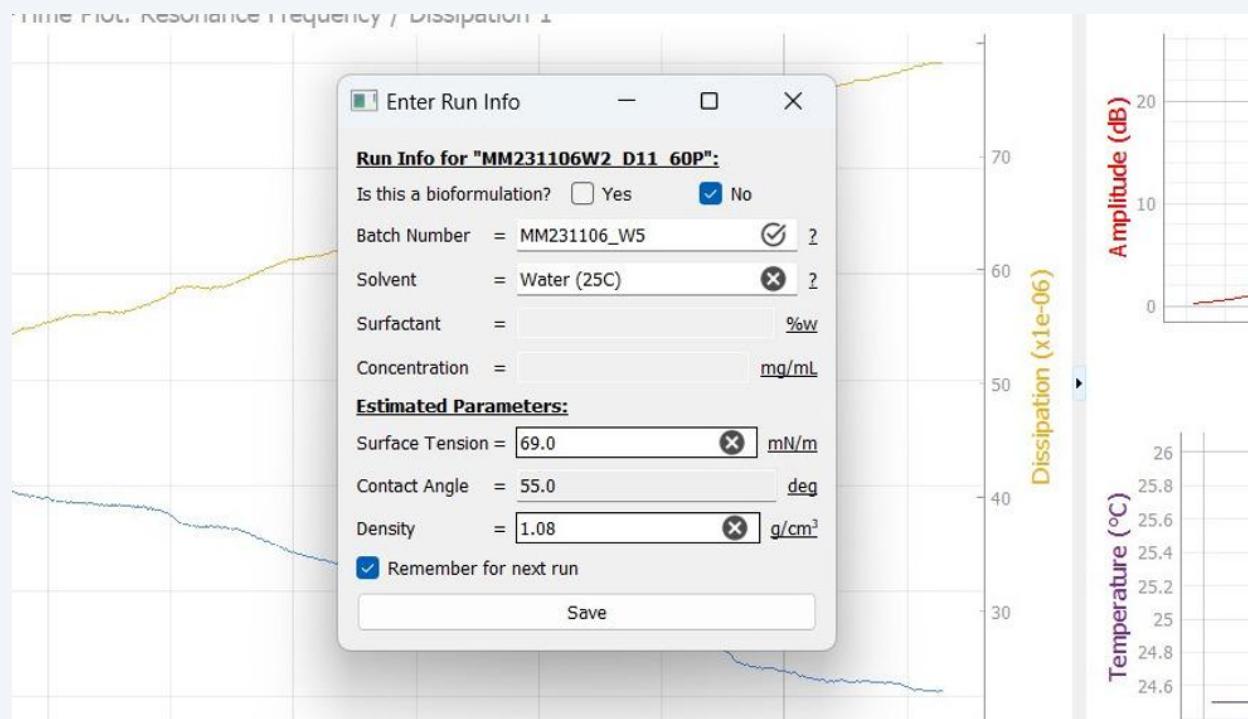
15

A window will appear to enter "Run Info" specific to the sensor and the sample. You will answer the following question first: "Is this a bioformulation?" Protein and viral vector samples are considered bioformulation. If the answer is "No", you need to pick the main solvent of the sample solution. The solvents in data base will appear as you start typing. Upon the solvent selection, "the surface tension", "contact angle", and "density" boxes will update. If the solvent is not provided in the data selection table, you can pick a solvent that is close to your solvent, and then update surface tension and density manually.

It is understandable that with dissolved substance in the solvent, the surface tension and density will shift. You can change the "Surface Tension" and "Density" towards your best guess. Under typical circumstances, "Contact Angle" value should not be updated manually unless it is recommended by the QATCH support staff.

If you had applied "a bioformulation" drop to the sensor and pick "yes" to the first question, "Solvent" box will gray out. You have to enter the "Surfactant" %w and "concentration" of the protein. If viral vector is being tested, the concentration should be the "mg/ml" equivalent of the capsid mass, which is usually less than 2 mg/ml. The surface tension, contact angle, and density values will update after entering these values. Unless you have measured these values by independent methods, it is not recommended to change these values.

Before saving the "Run Info", check the "LOT" number on the sensor pouch and the "Batch Number". These should match. If they are not matching, enter the exact "LOT" number on the pouch to the "Batch Number". If the number is correct, it is in the database and a "Check Mark" will appear. If the check-mark does not appear, and you have entered the number correctly, this is because the "Batch Number" is not listed in the database. You will be prompted to confirm an unknown "Batch Number" when you hit "Save". Try to "Check for Updates" or contact QATCH support to have your "Batch Number" added to the database.



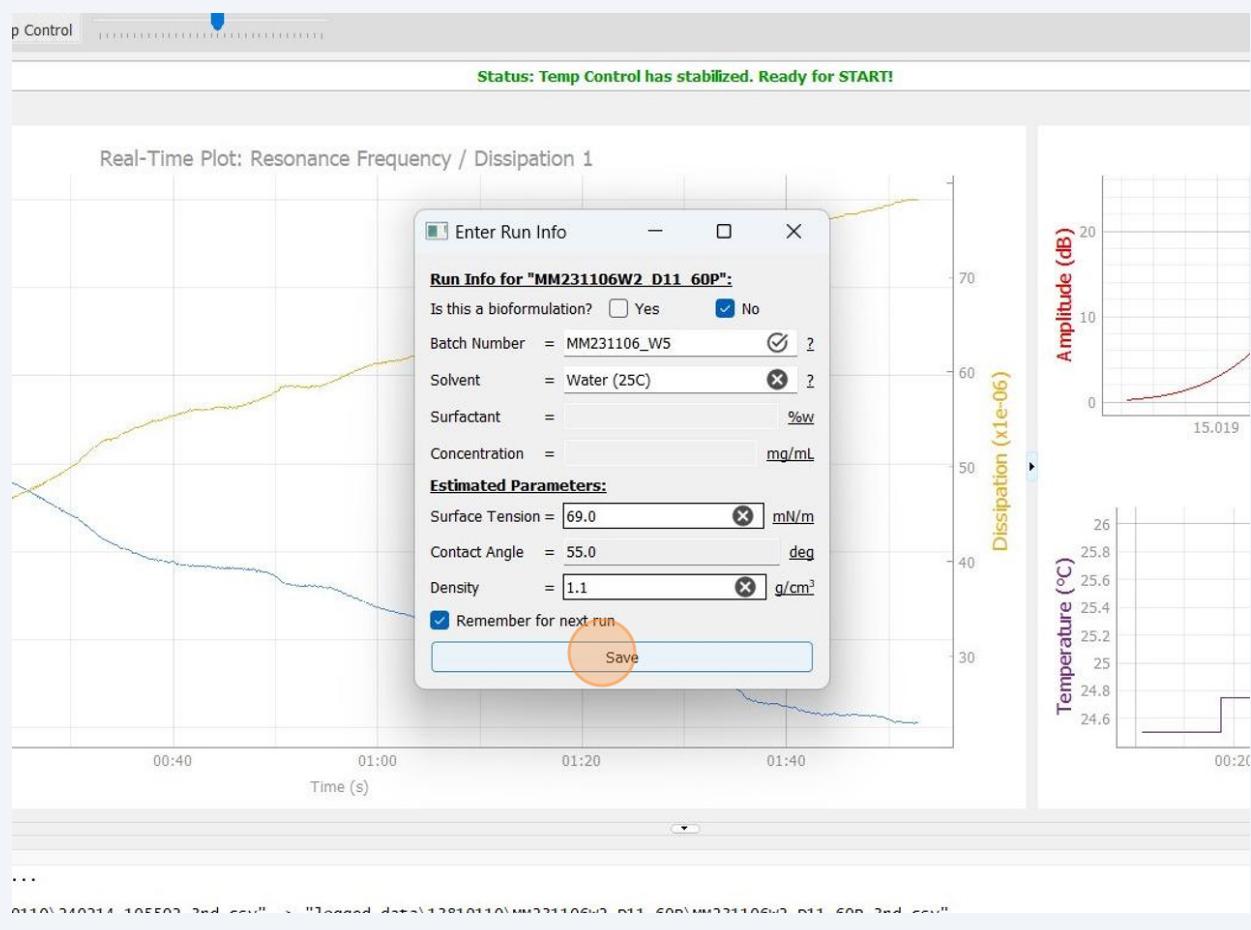


Tip!

Estimated Parameters that have been modified from their recommended values will indicate the grey circular "X" button on the right-side of the text box (see Surface Tension and Density in the above image). You can click an "X" to restore the recommended value for the corresponding parameter to match the given solvent or surfactant/concentration entries.

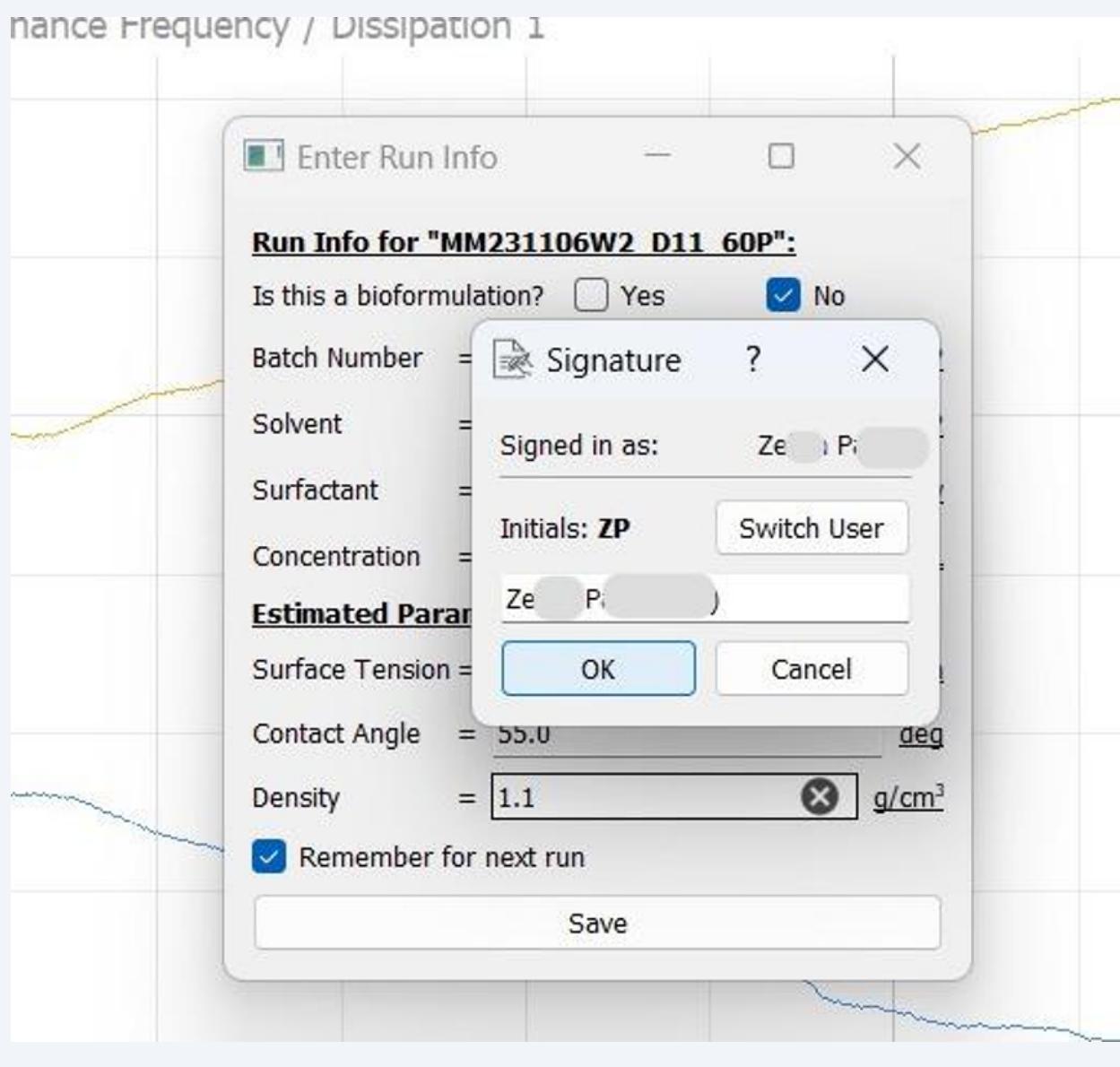
16

Once you are done entering the "Run Info", click "Save".

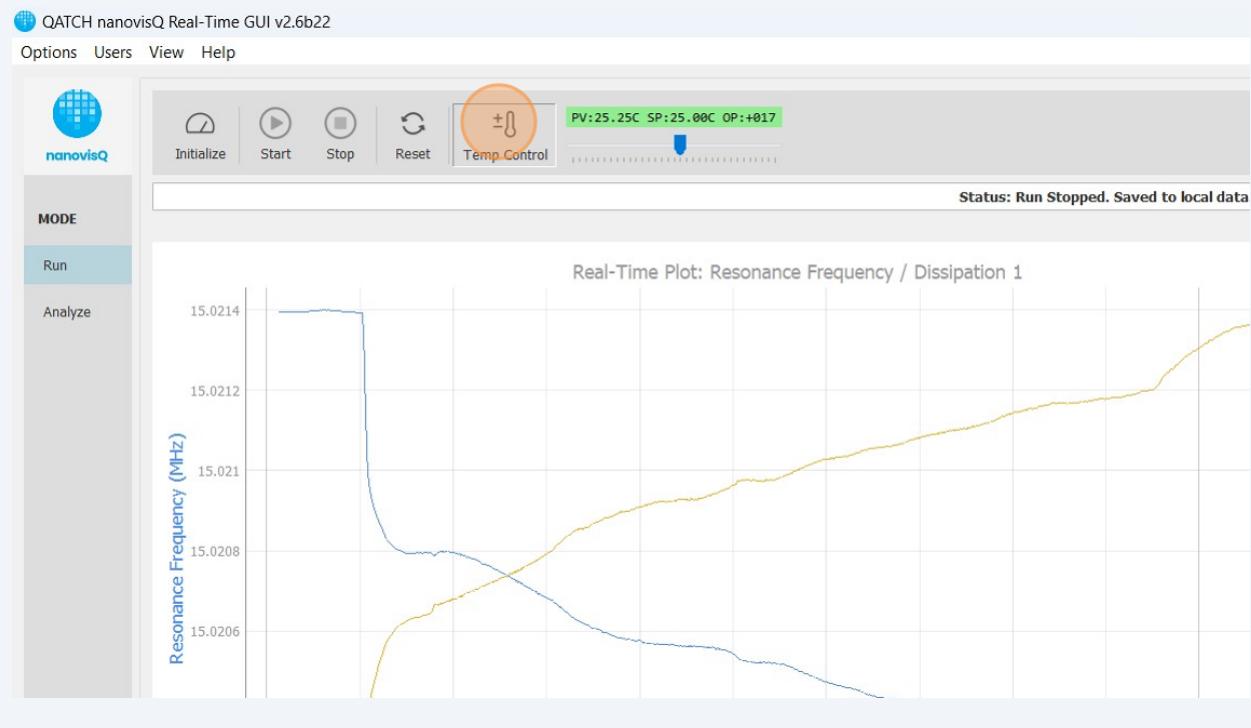


17

Check if the user doing the test is the same as the user shown here. If not, switch user. Then, click "OK".



18 Click "Temp Control" to turn off the temperature control.

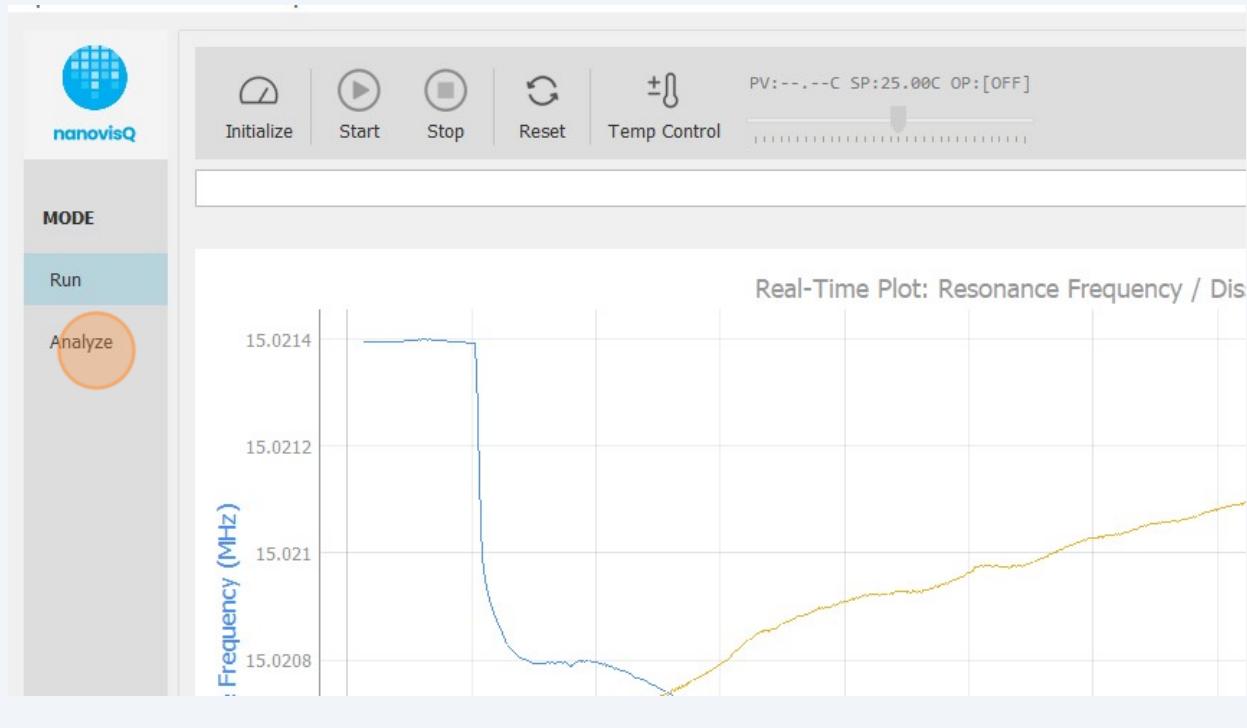


19 If you want to test another sample, remove the nanovisQ cartridge while turning the knob clock-wise as described above. Then, repeat starting from Step 6.

DATA-ANALYSIS

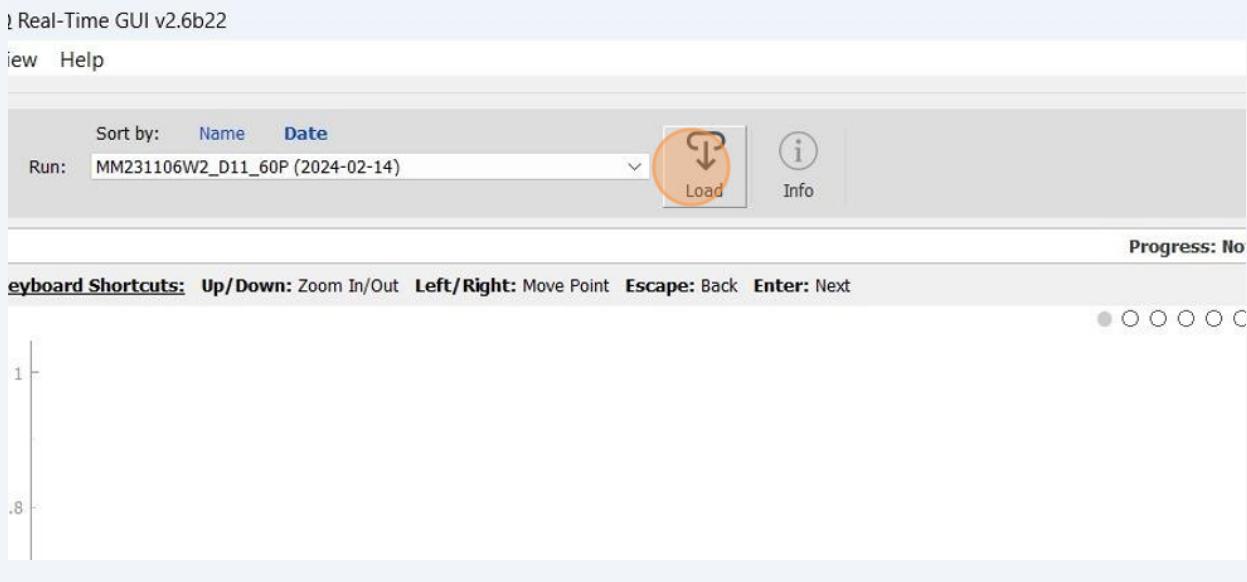
20

When you are ready to obtain viscosity values from data, click "Analyze". Data-analysis can be done any time after test is completed. Acquired data will be saved with file name and date of the data acquisition.



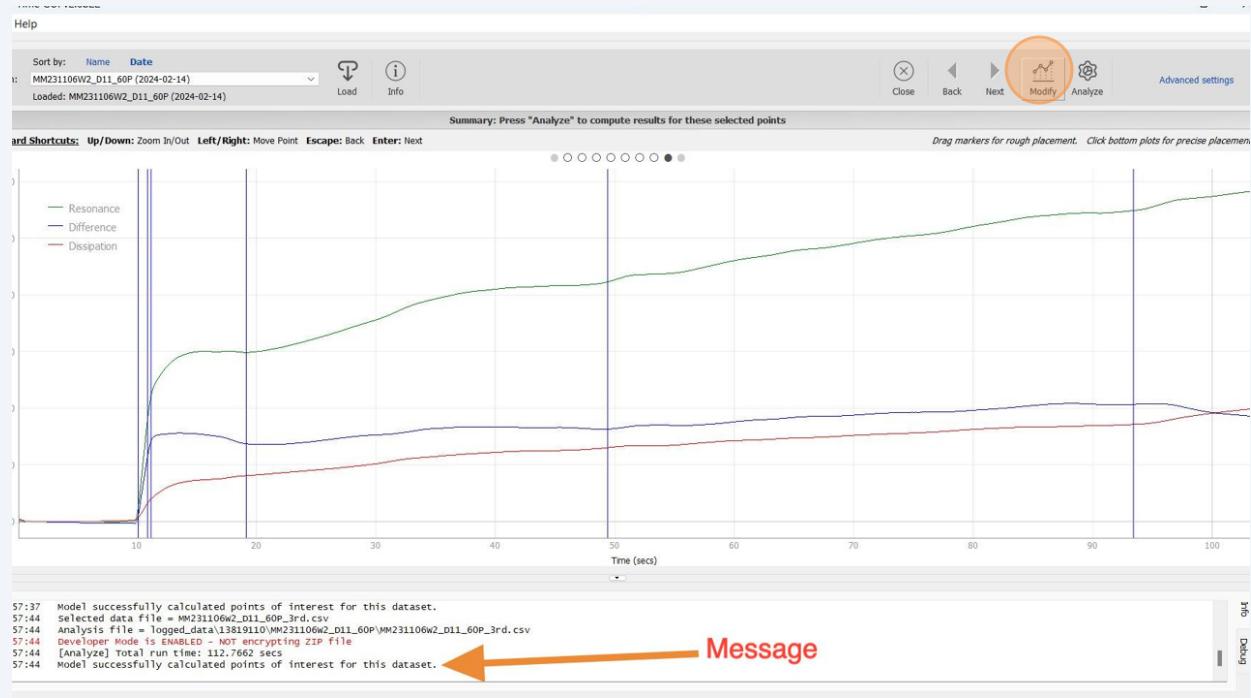
21

Pick the test run to analyze from the "Run:" drop-down menu. If you do not change anything, the last test run will be shown. Click "Load" to load the data.



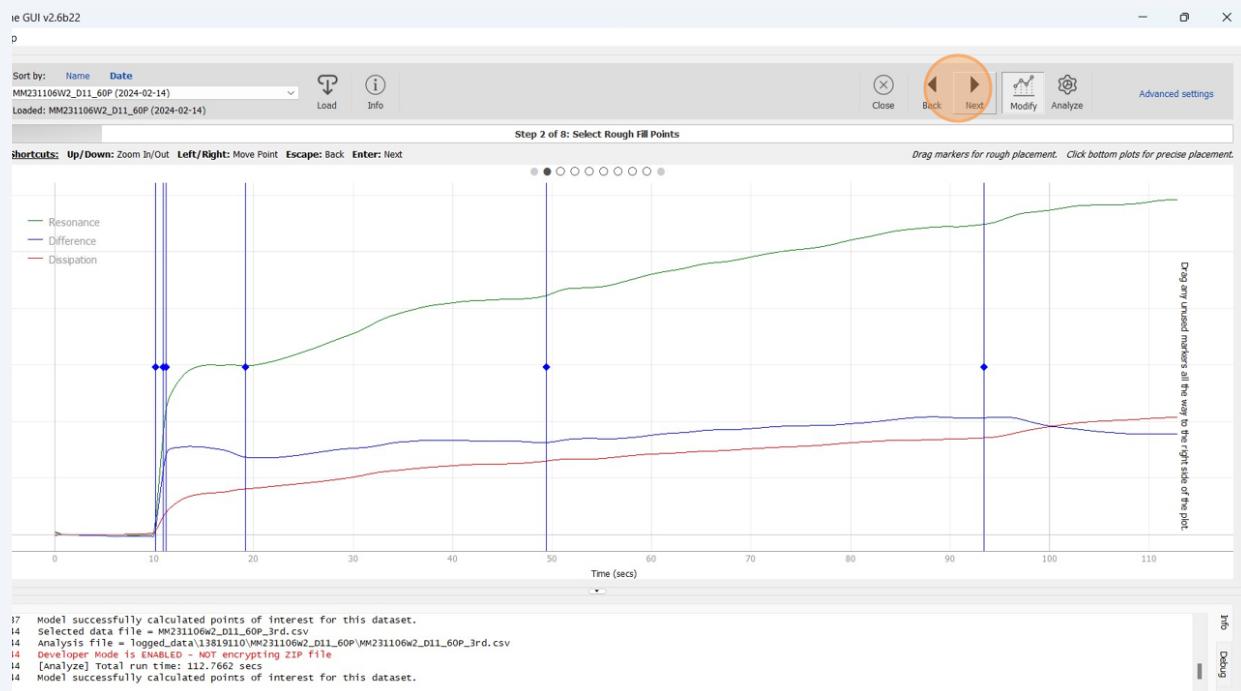
22

Once the data is loaded, the software will automatically select points of interest for the user. When this is completed successfully, 6 blue vertical lines will appear on the data and a message will be printed in the log "Model successfully calculated points of interest". These are rough estimates to guide the user and you should click "Modify" after this.



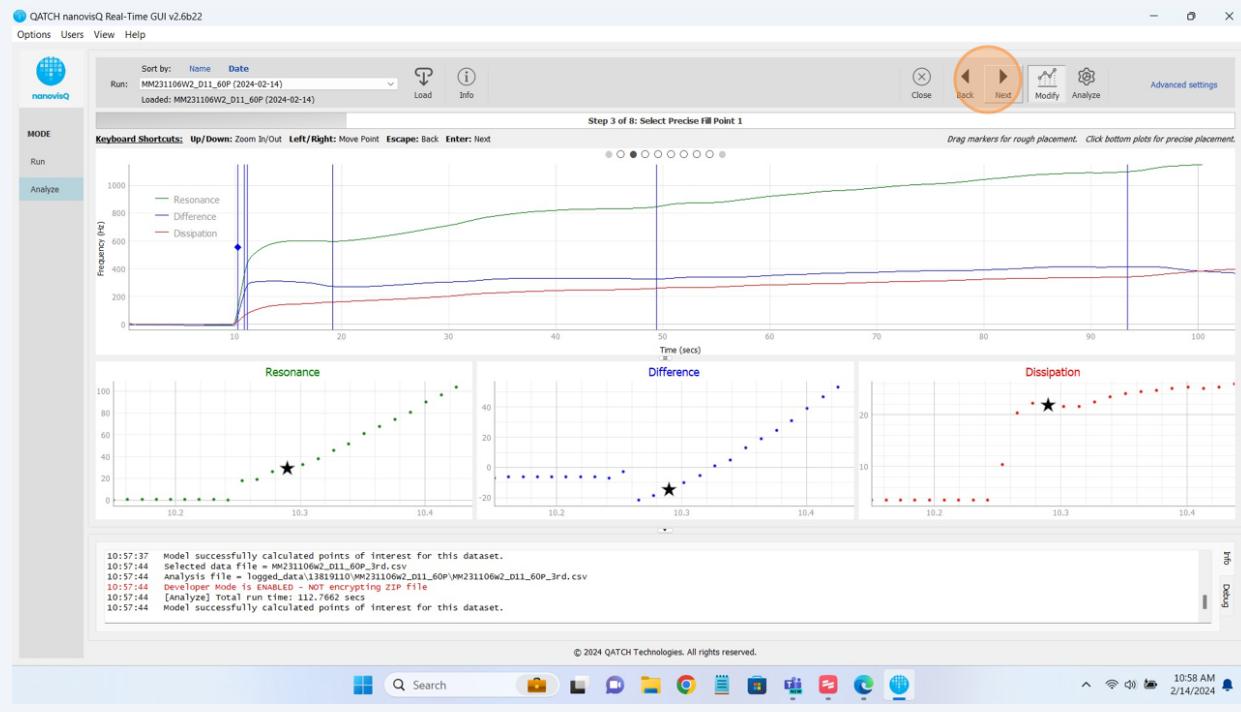
23

Click "Next"



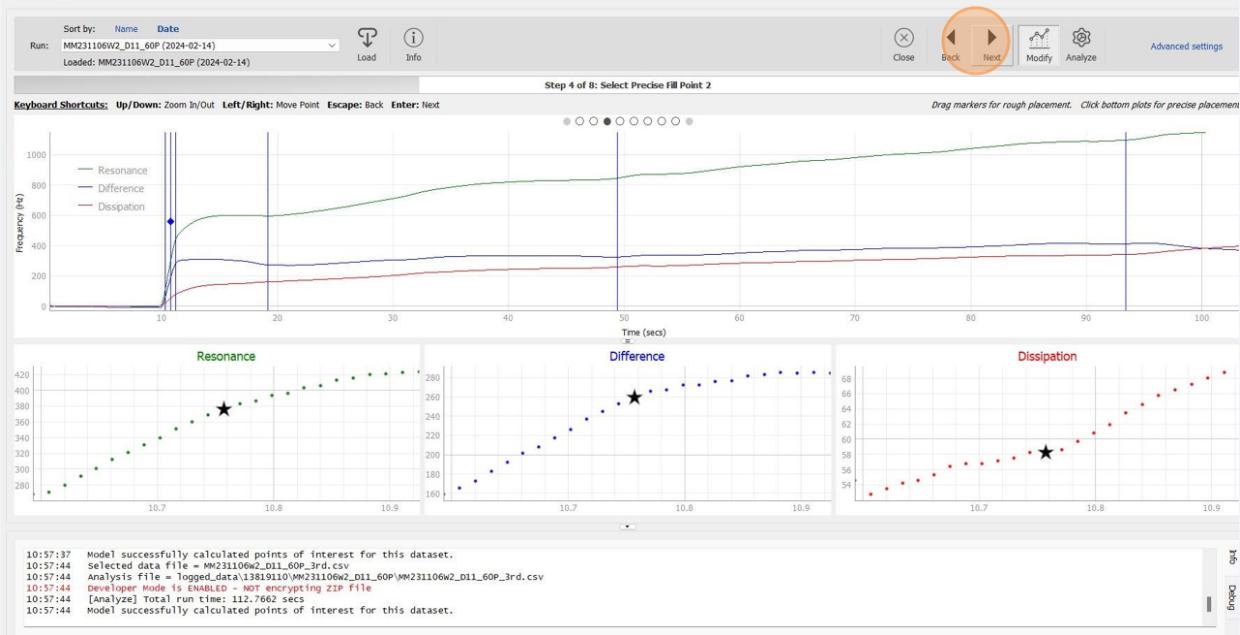
24

You will now be able to modify first point (black star) selected by the software, which marks the exact moment the solution enters the microfluidic channels. This point should be placed after "Dissipation" (the figure most to the right, red dots) is increased and the "Difference" (the figure in the center, blue dots) starts rising above the baseline. Use the right/left arrows on the keyboard or click to the desired point on the screen to pick the right location for the 1st point (black star). When you are done, click "Next".



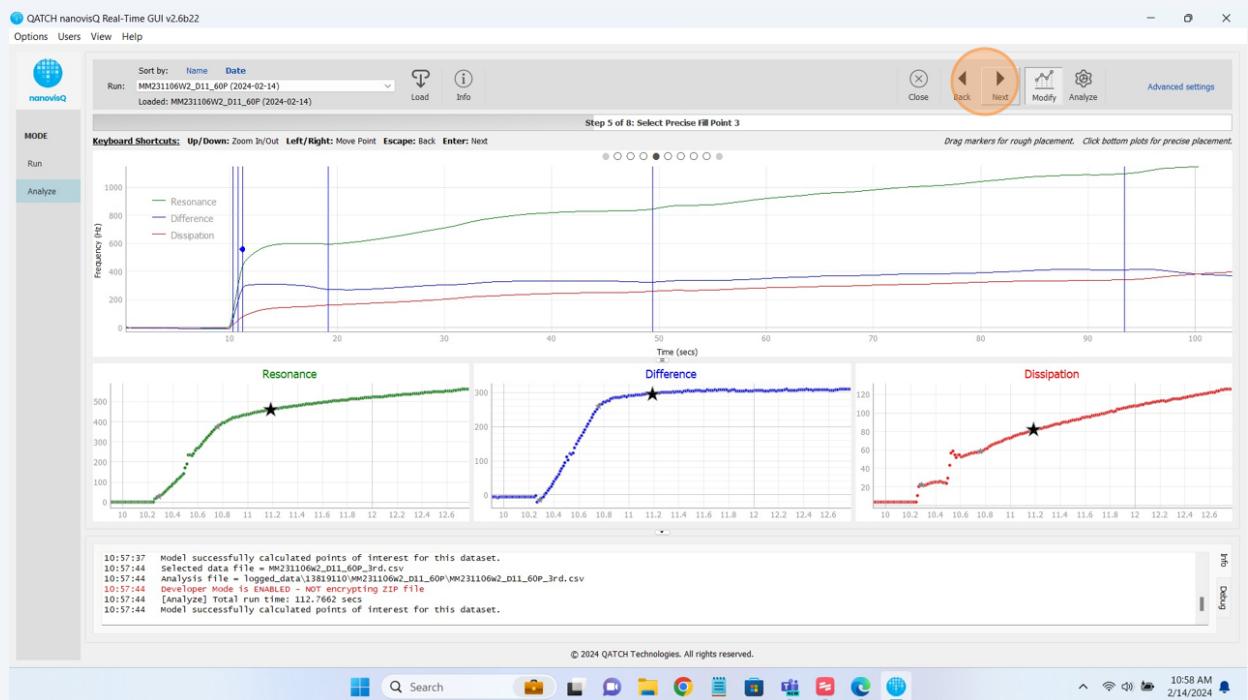
25

The next point shows when the first rapid filling region is reached. The point has to be placed to a location that is before the "Dissipation" starts rising rapidly and before the change in the "Difference" curve slows down. After picking the point (black star) by arrows in the keyboard or clicking the desired point, click "Next".



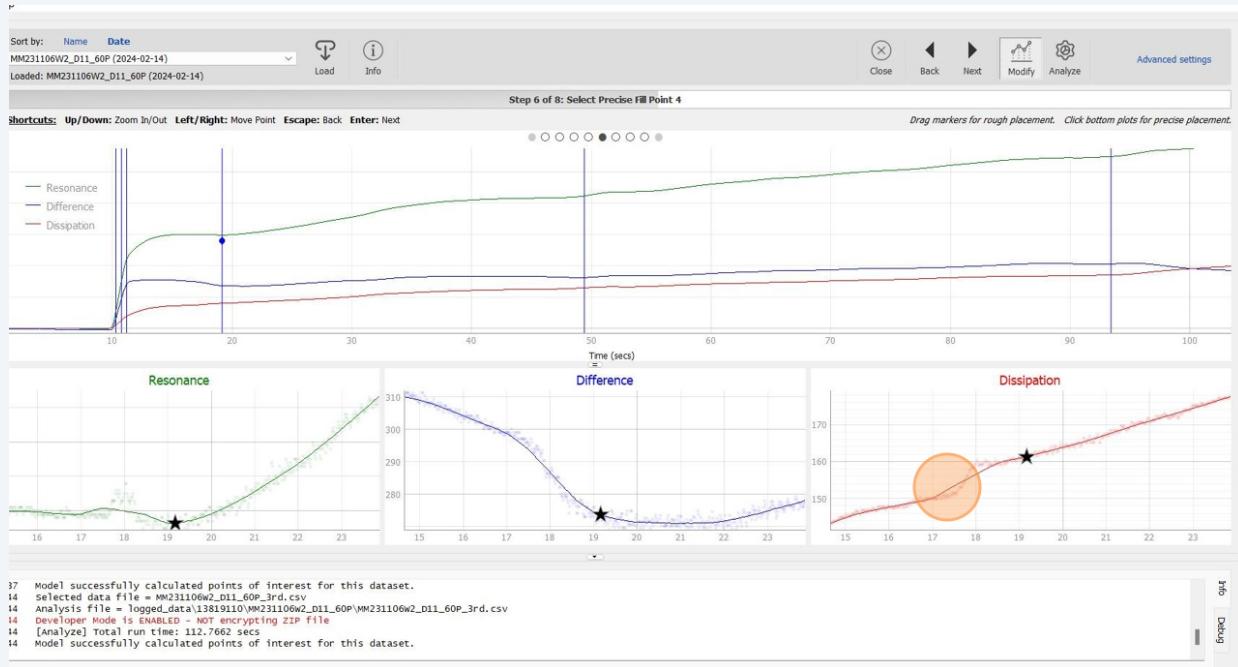
26

3rd point does not need to be modified. Click "Next".



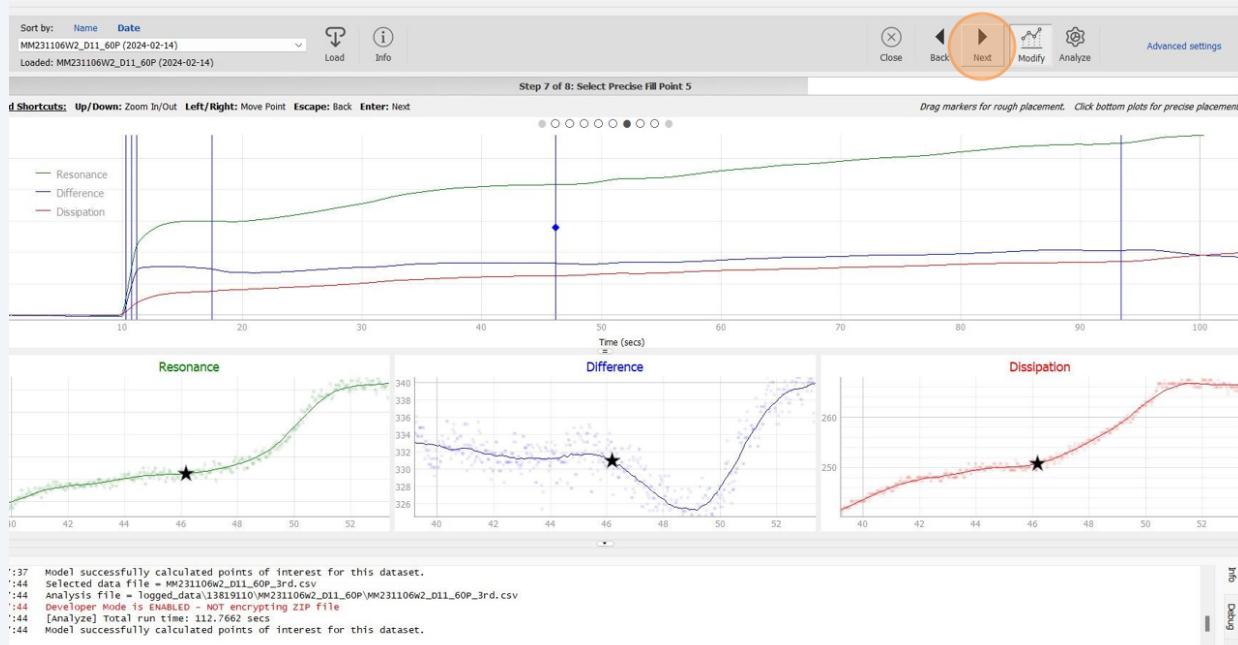
27

Discrete points will not be shown for the 4th point. In the image, the software picked "the black star" location. However, the proper point would be before the dissipation shows an inflection upwards. Note that, for higher viscosity samples this inflection may not appear and the dissipation would rather appear a long plateau. In this case, pick the center of this plateau. After picking the point, click "Next".



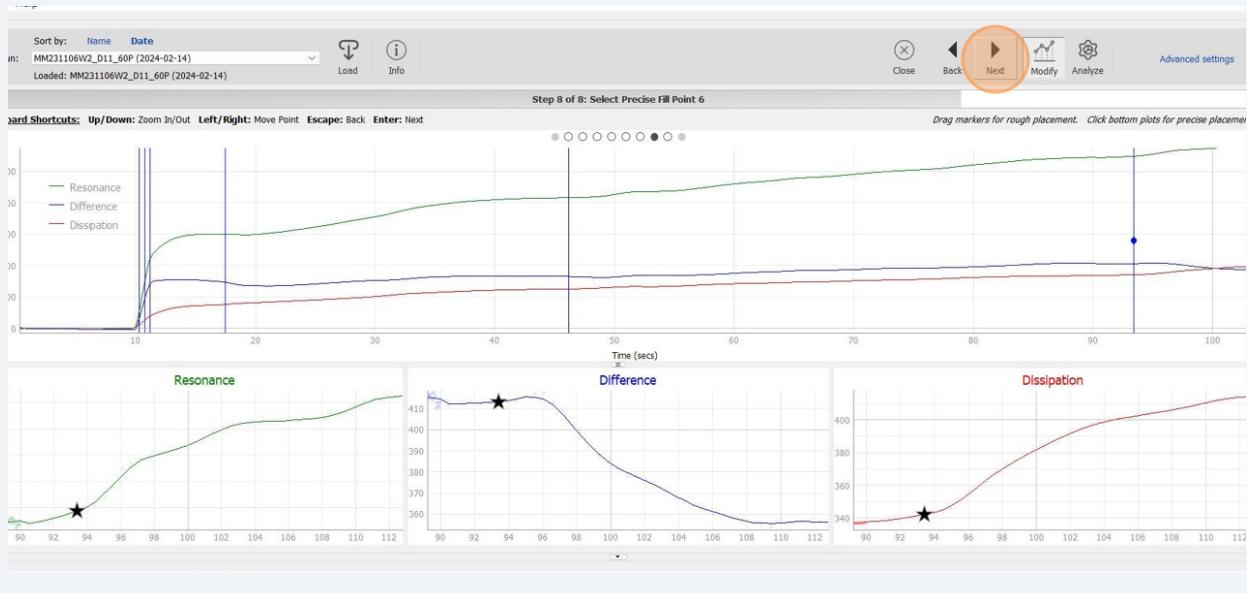
28

The 5th point can be similar to 4th in behavior and if it does not present an obvious inflection in "Dissipation", pick the middle of the 2nd plateau. Click "Next".



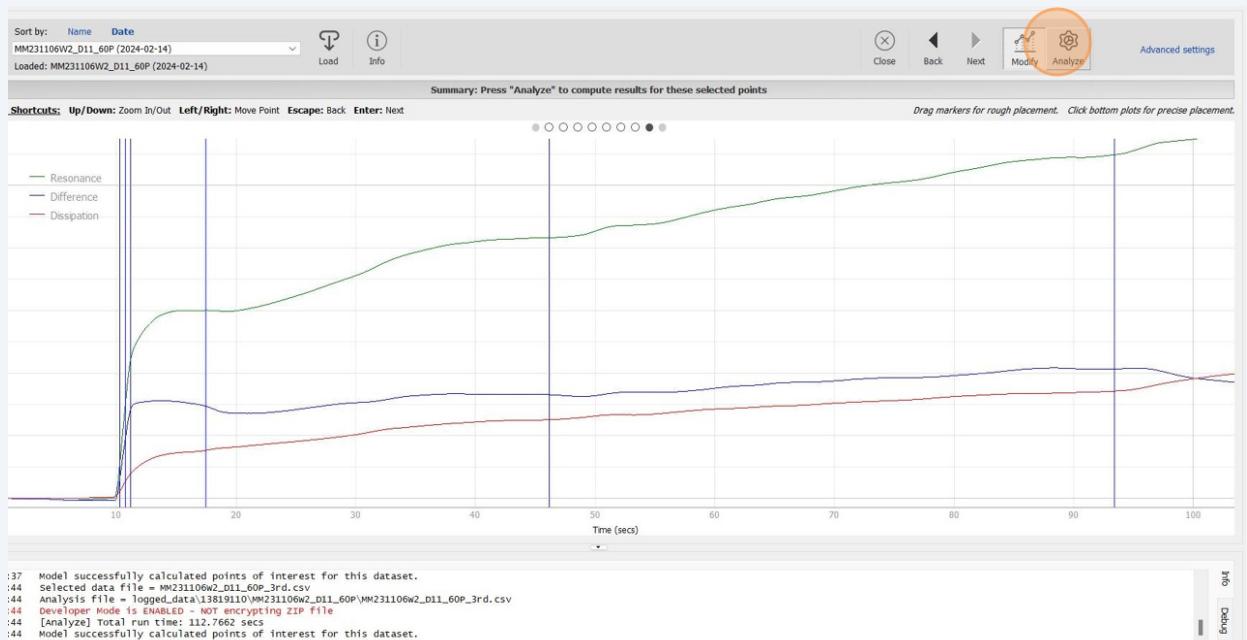
29

The 6th point shows the exit of the sample solution from microfluidics. For some samples, this will be an abrupt change in "Dissipation", "Difference", and/or "Frequency". In this case, the software picked the point accurately. For some samples, it may look like a prolonged plateau and pick the point where the change stops. Click "Next".



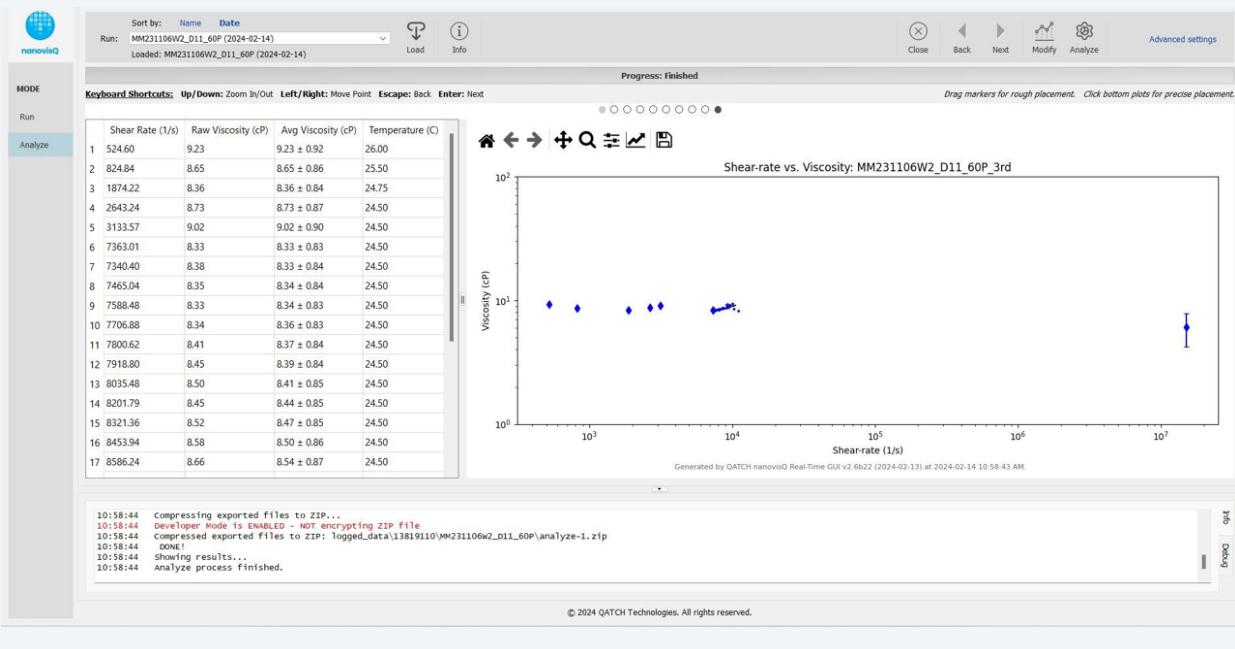
30

All points are edited. Click "Analyze". You will be prompted for another Signature audit if this is a new run or points have been modified from the last run. These new points will be saved automatically to the dataset once you Sign it.



31

A table on left will be displayed. It has shear-rates and viscosity data as well as the temperature the viscosity is measured. On the right side, a logarithmic plot will display viscosity vs shear-rate. The plot and the table are also saved in a folder under the file-name for future use.



32

If you want to go back to doing another measurement, click "Run", remove the sensor from the instrument while turning the knob as above and repeat beginning from Step 6.

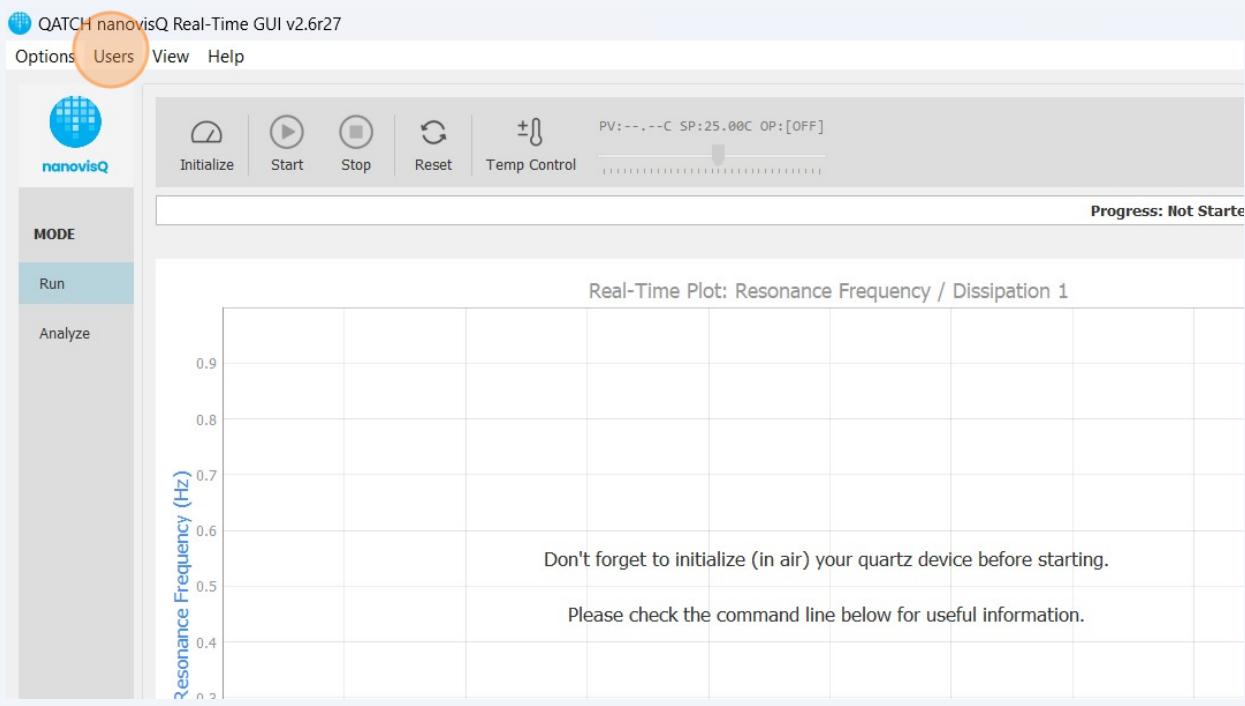
The screenshot shows the nanovisQ software interface. On the left, there's a sidebar with a logo and the word "nanovisQ". Below the logo, there are two buttons: "MODE" and "Analyze". The "Analyze" button is highlighted with a teal background. On the right, there's a main panel with a header that says "Sort by: Name Date". Below this, it shows "Run: MM231106W2_D11_60P (2024-02-14)" and "Loaded: MM231106W2_D11_60P (2024-02-14)". A section titled "Keyboard Shortcuts: Up/Down: Zoom In/Out Left" is also visible. The main area contains a table with the following data:

	Shear Rate (1/s)	Raw Viscosity (cP)	Avg
1	524.60	9.23	9.23
2	824.84	8.65	8.65
3	1874.22	8.36	8.36
4	2643.24	8.73	8.73
5	3133.57	9.02	9.02
6	7363.01	8.33	8.33

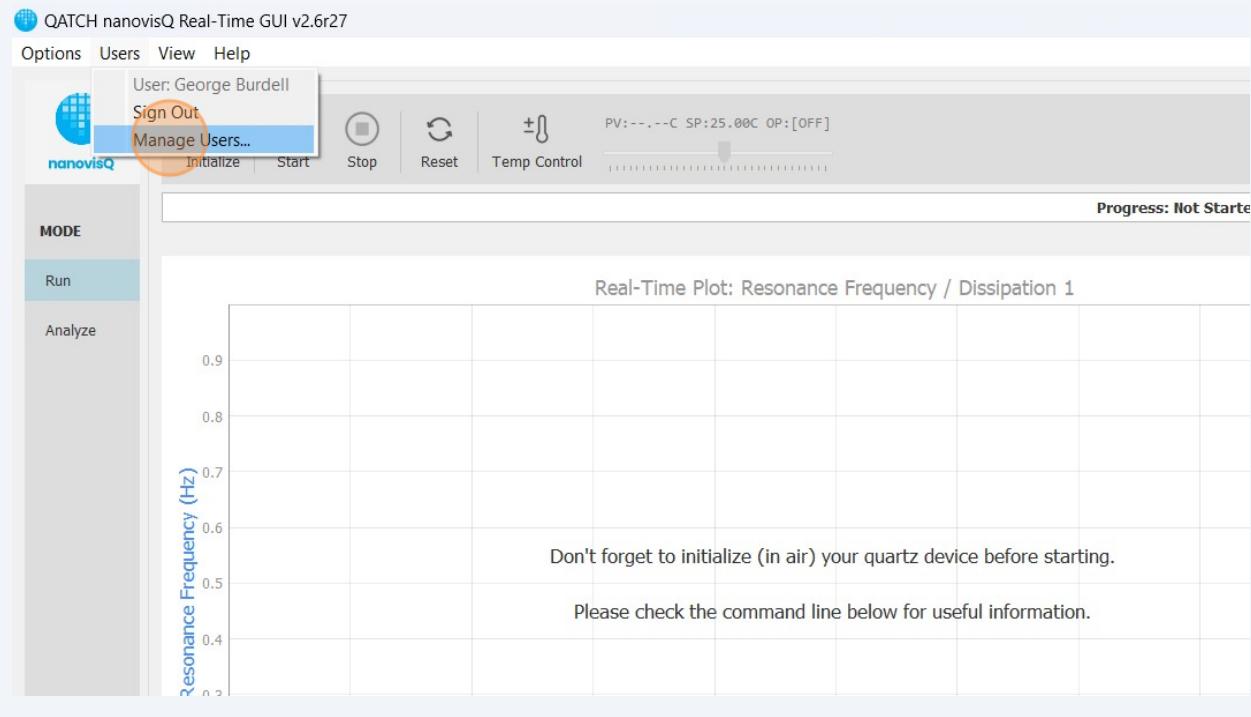
Guide to Adding and Managing Users in QATCH Software

1

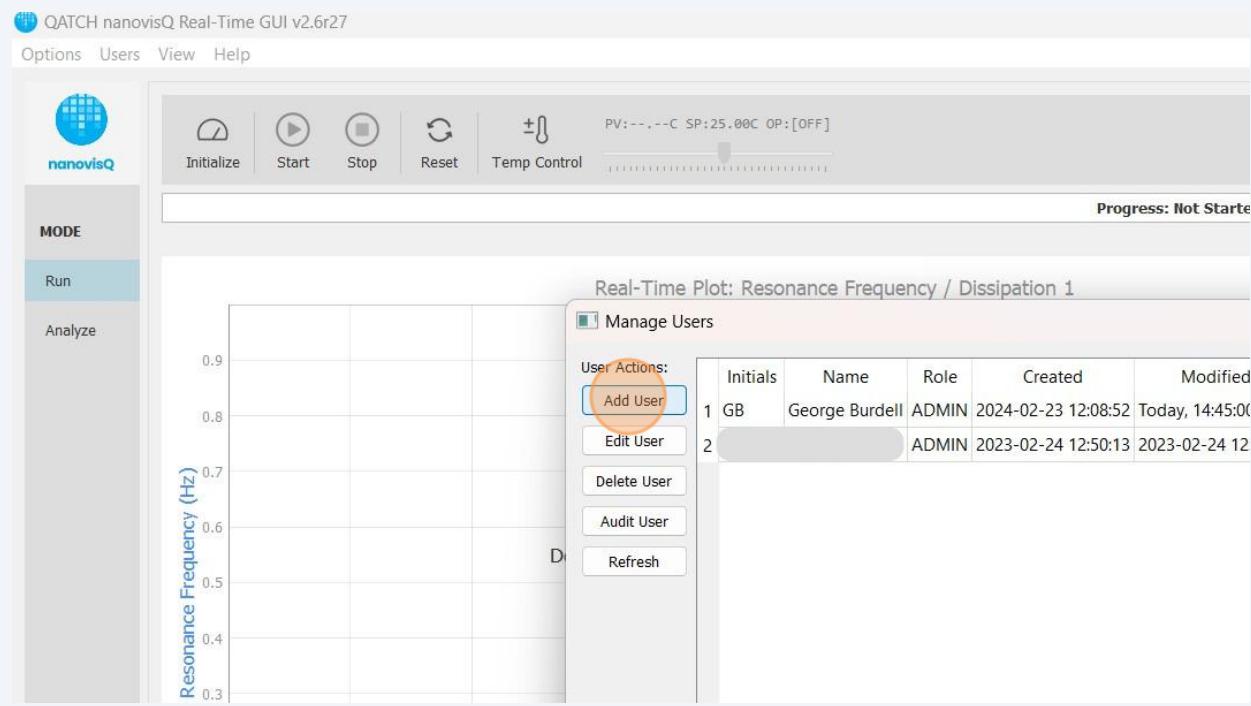
The software will have an administrator user account created by the QATCH Support. In order to create/modify users, click "Users".



2 Click "Manage Users..."



3 To create a new user account, click "Add User"



- 4 Pick what the appropriate role for this new user.

Roles:

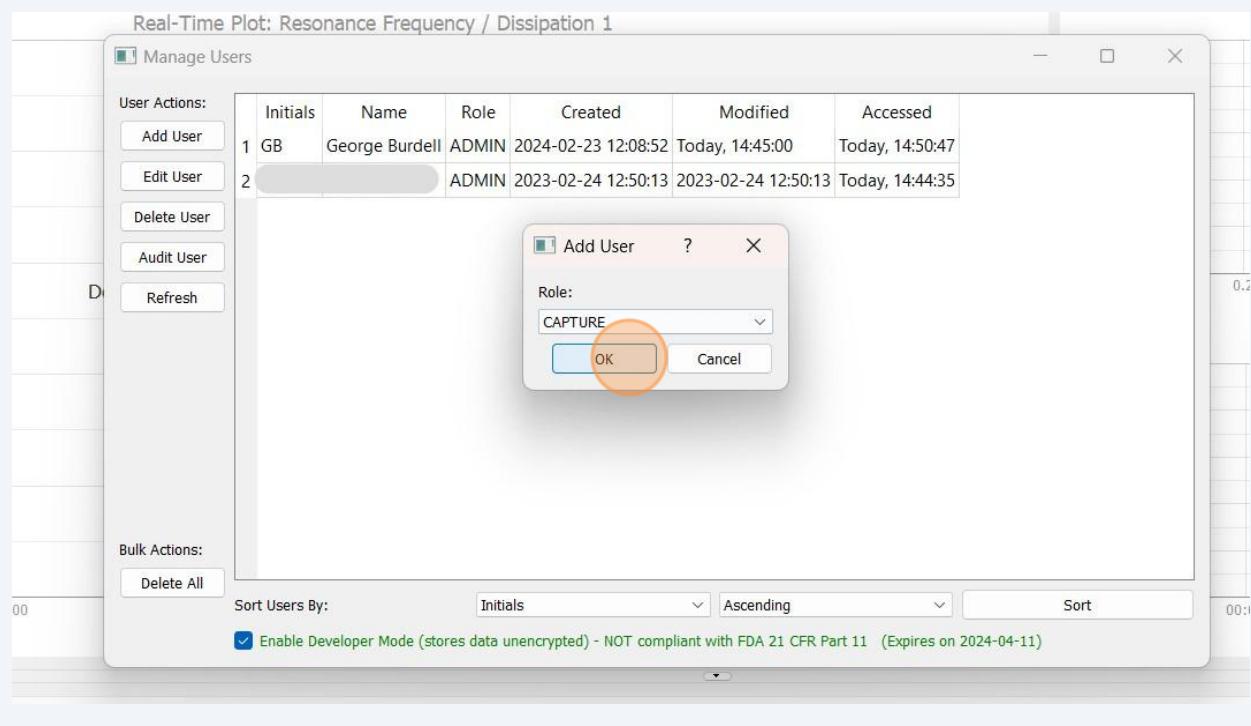
CAPTURE: Can only capture data but is not allowed to analyze.

ANALYZE: Can only analyze data but is not allowed to capture new data.

OPERATE: Can capture and analyze the data.

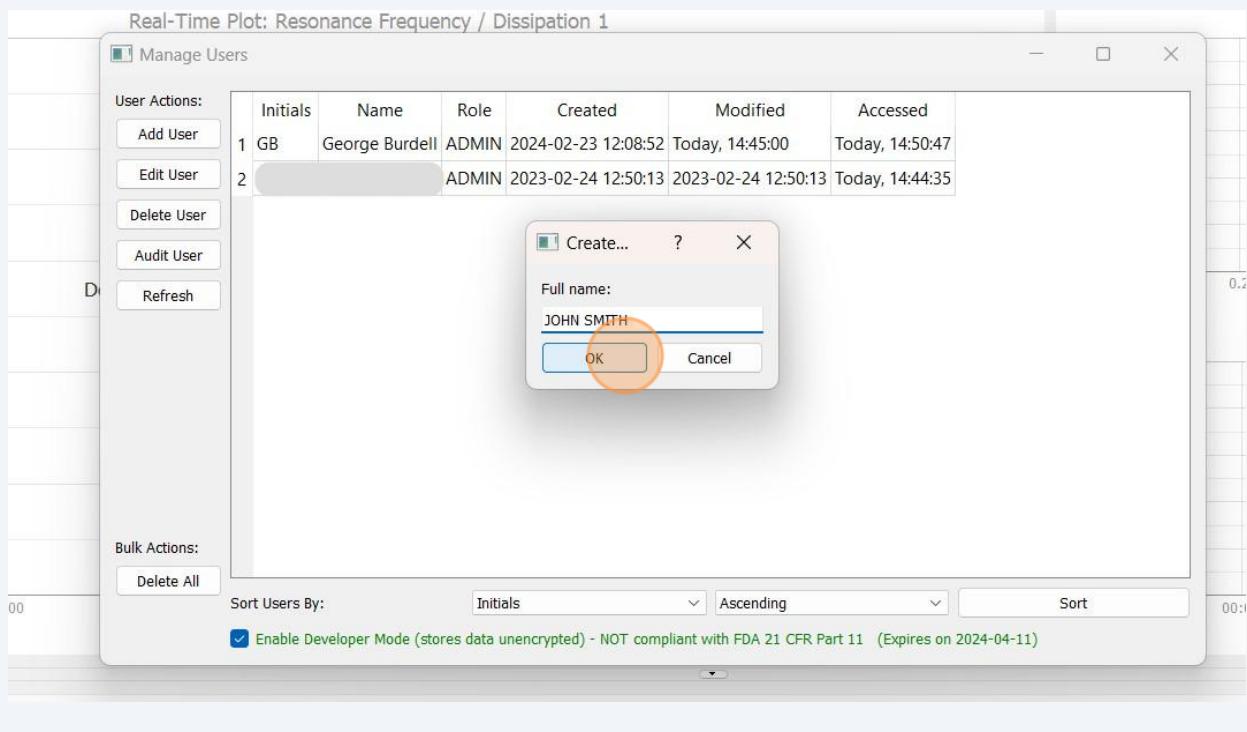
ADMIN: Can operate the system (capture and analyze) and also can add/edit/delete users.

Click "OK"



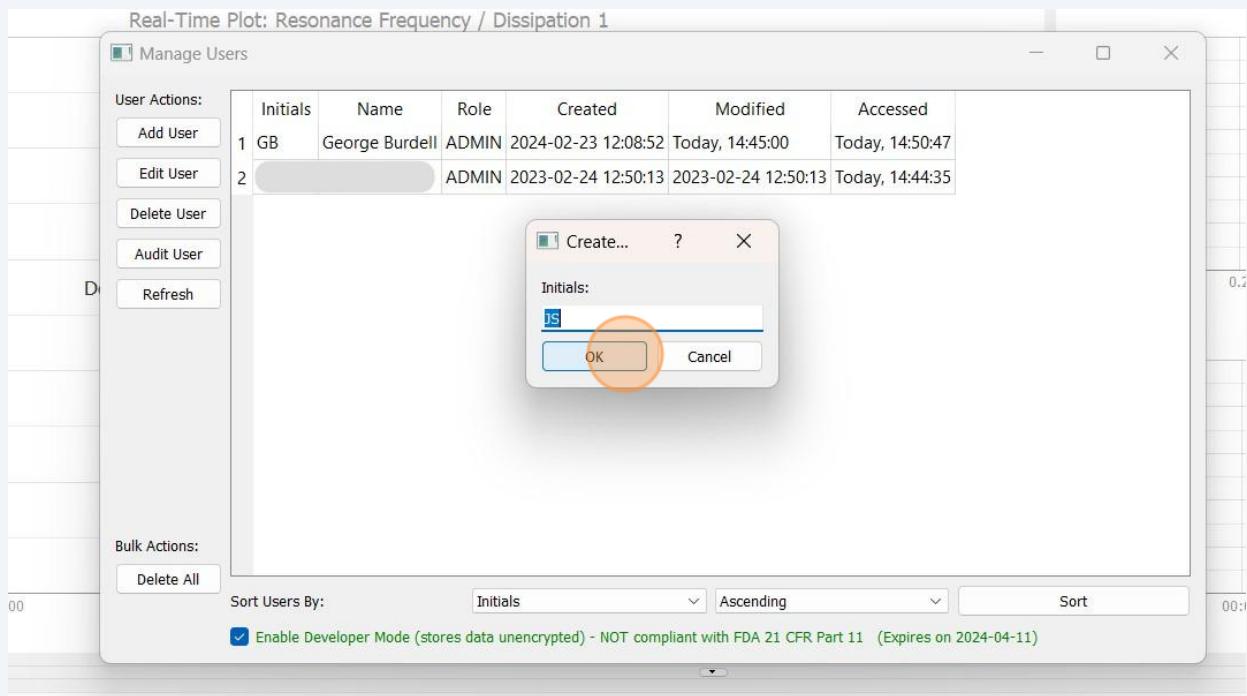
5

A dialog box will ask for the "Full Name" of the user. Enter the name and then Click "OK".



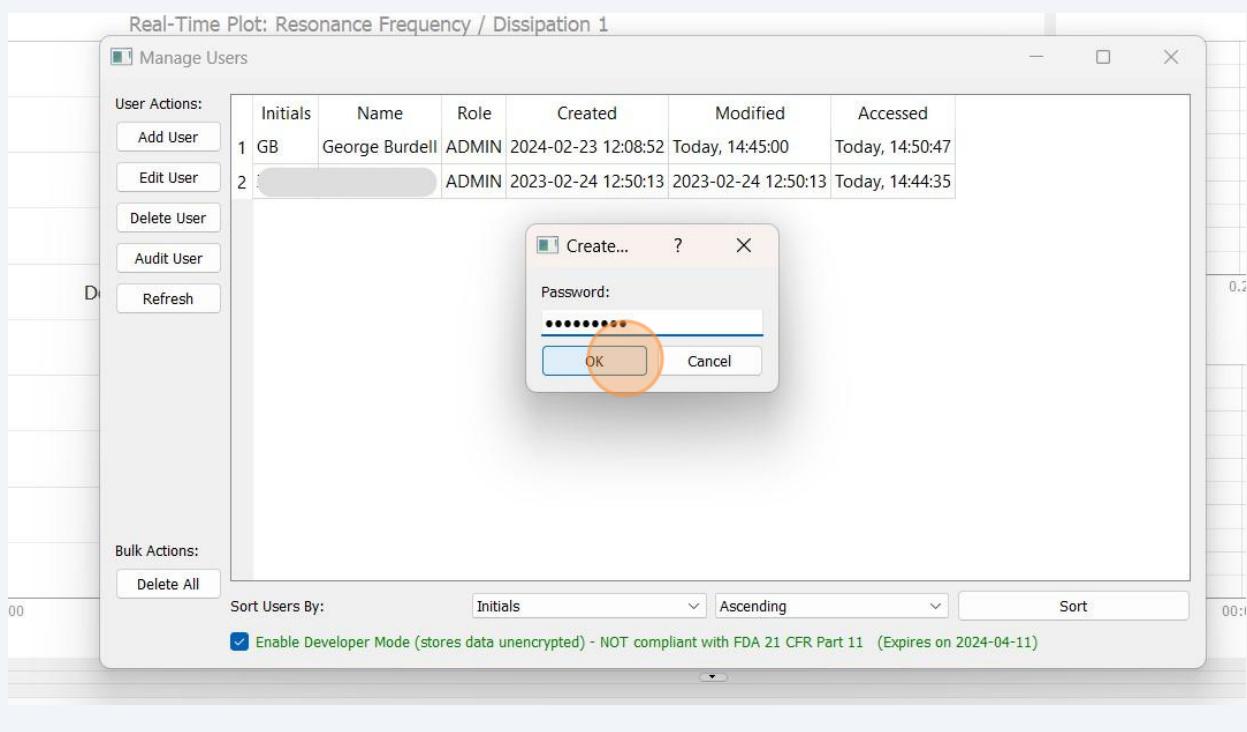
6

A dialog box will suggest initials for this users. You can change the initials or accept as is. Then, click "OK".



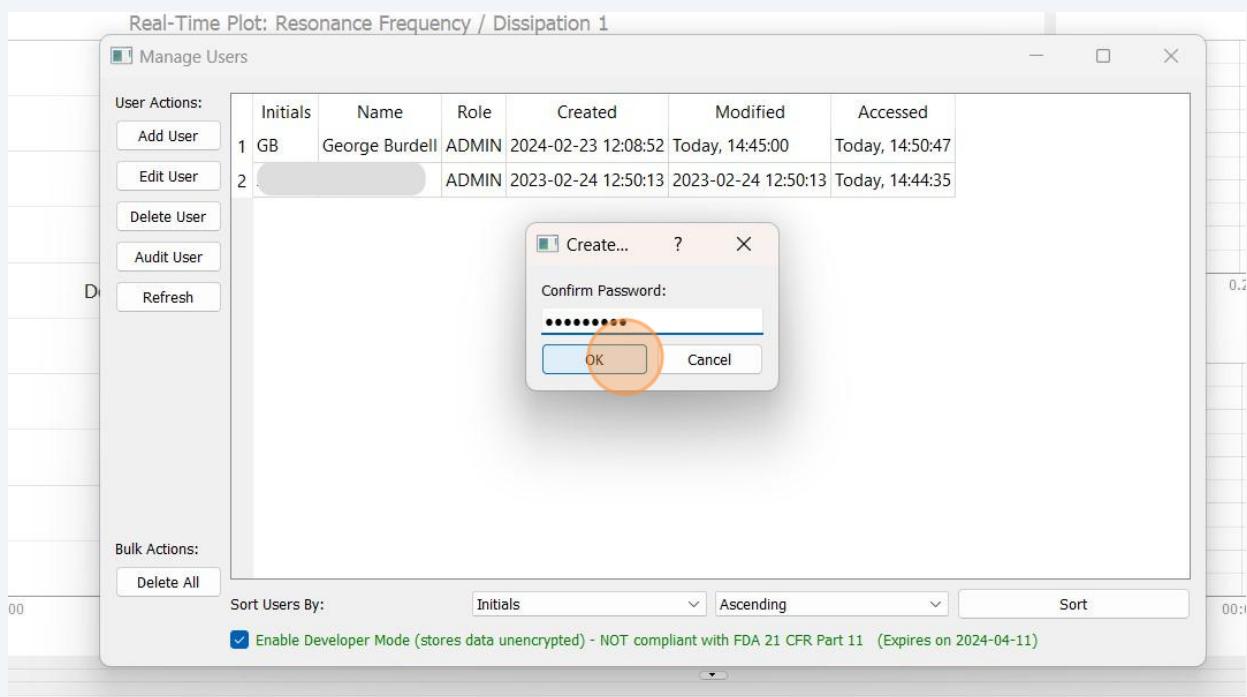
7

A dialog box will ask for a password. Enter a password and then click "OK".



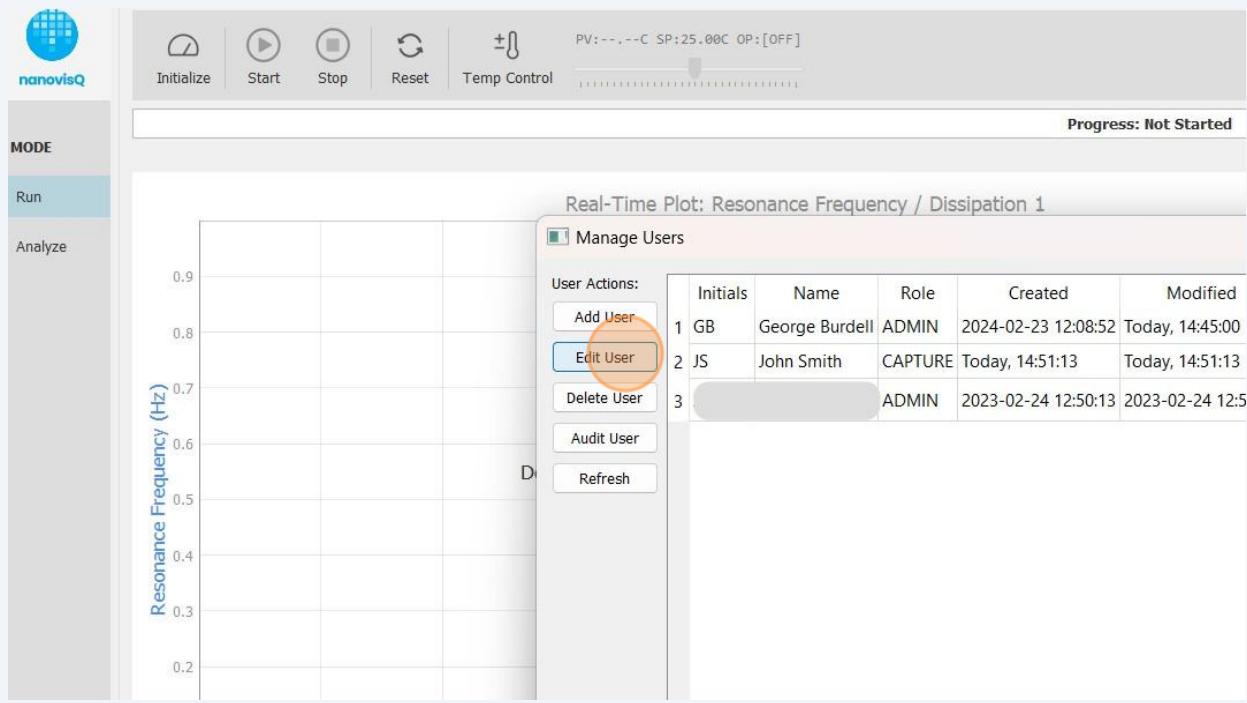
8

A dialog box will ask to confirm the password. Enter the same password. Click "OK"



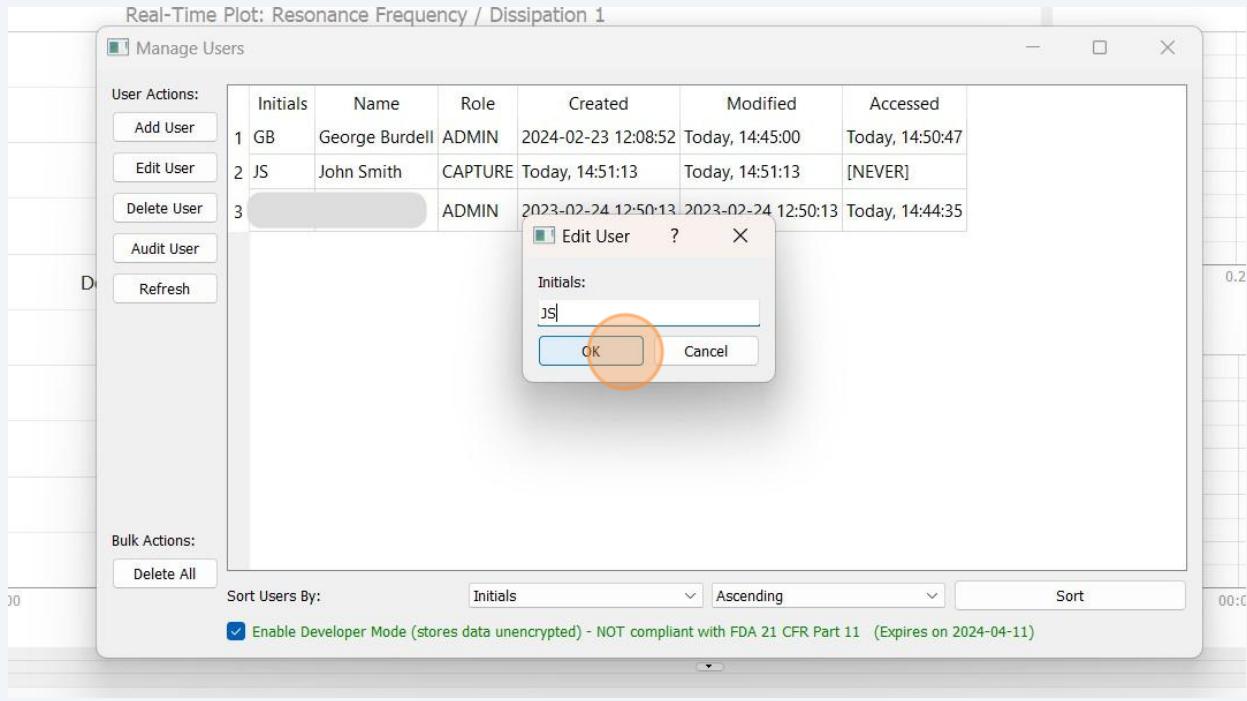
9

If you want to change "Role", "Name", "Initials", or "Password" of an existing user, click "Edit User"

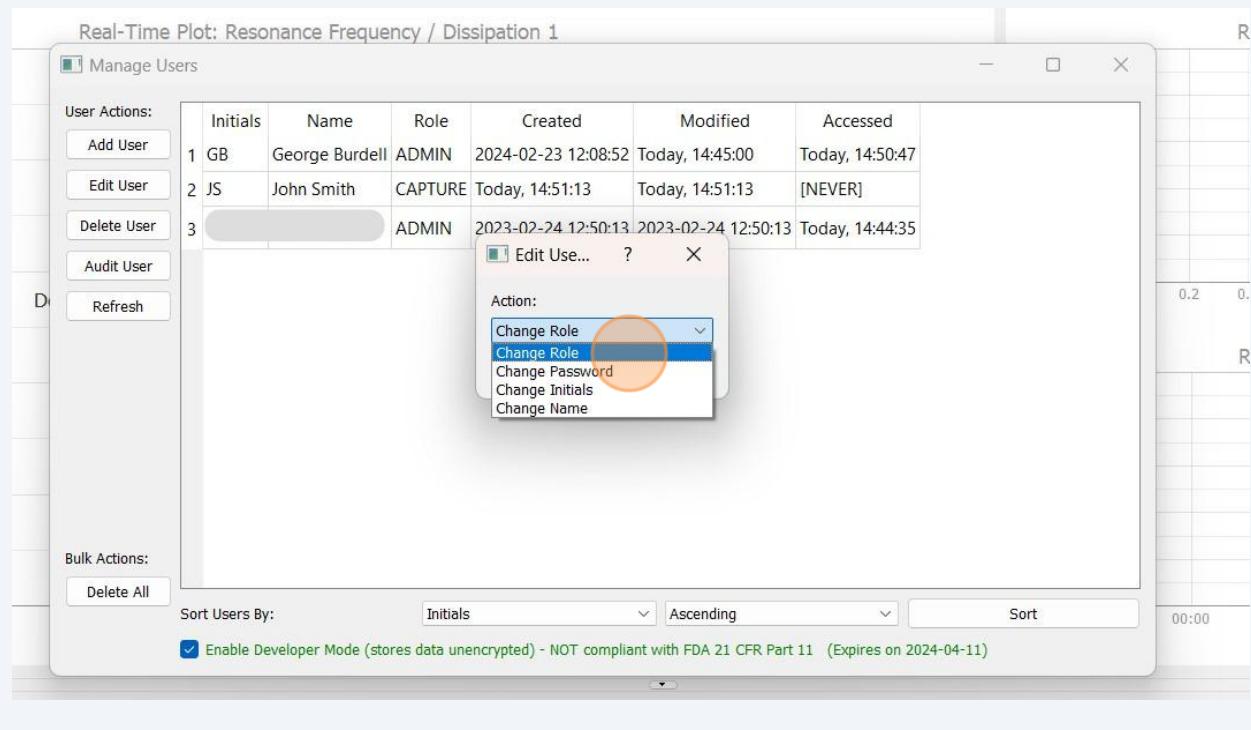


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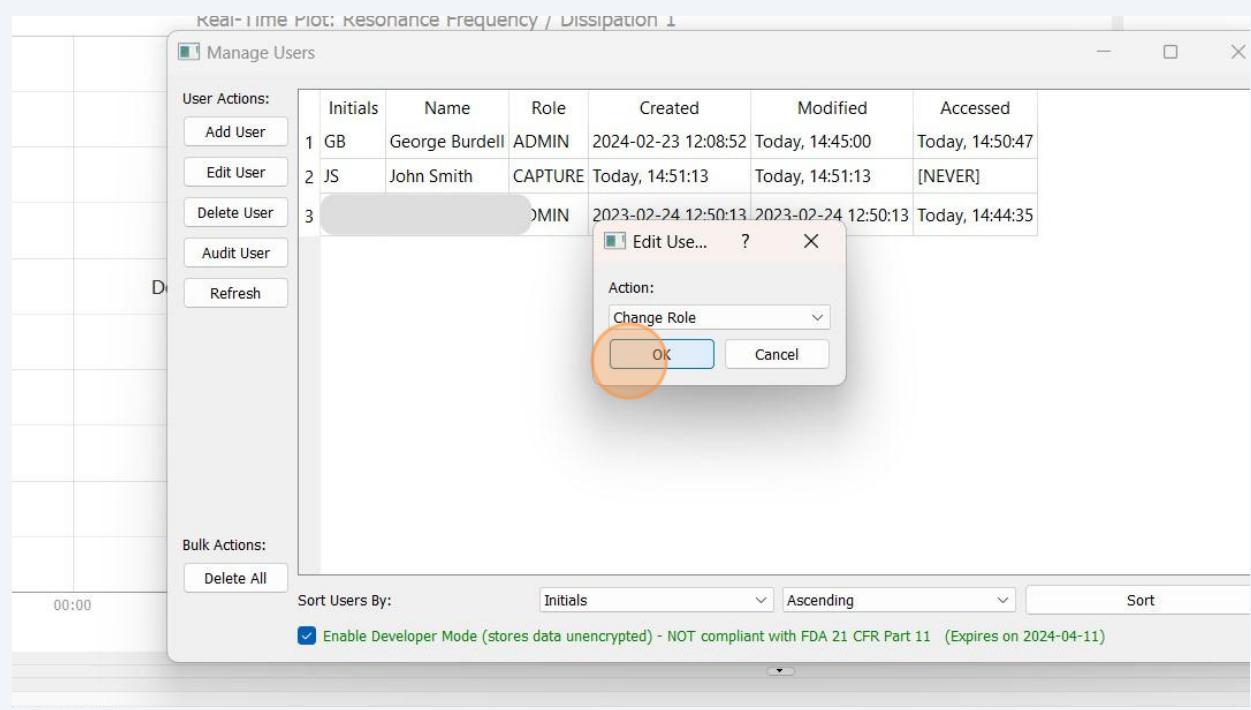
Enter the initials of the user you want to edit and click "OK".



11 From the drop-down list, pick what you want to change about the user.

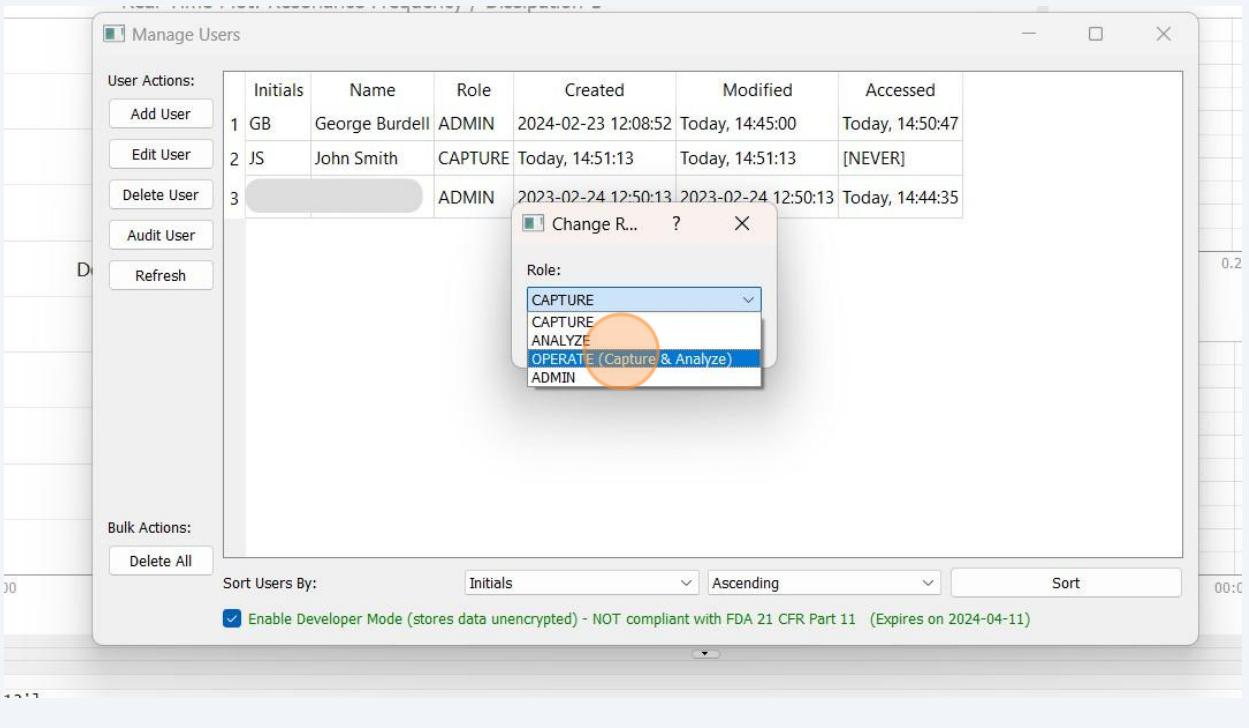


12 Click "OK"



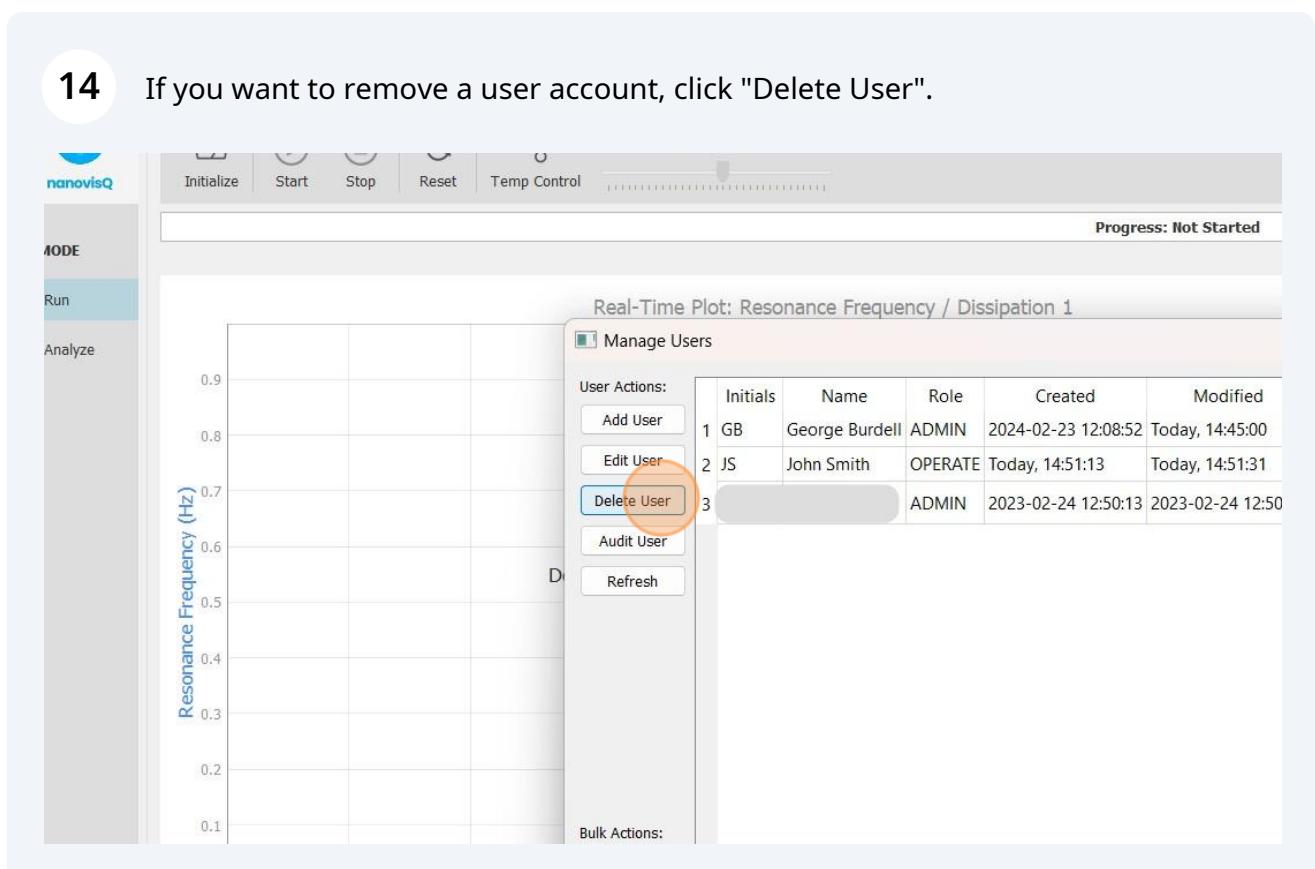
13

If you selected "Change Role", you will encounter a dialog box with drop-down menu. Pick the desired role and then click "OK".

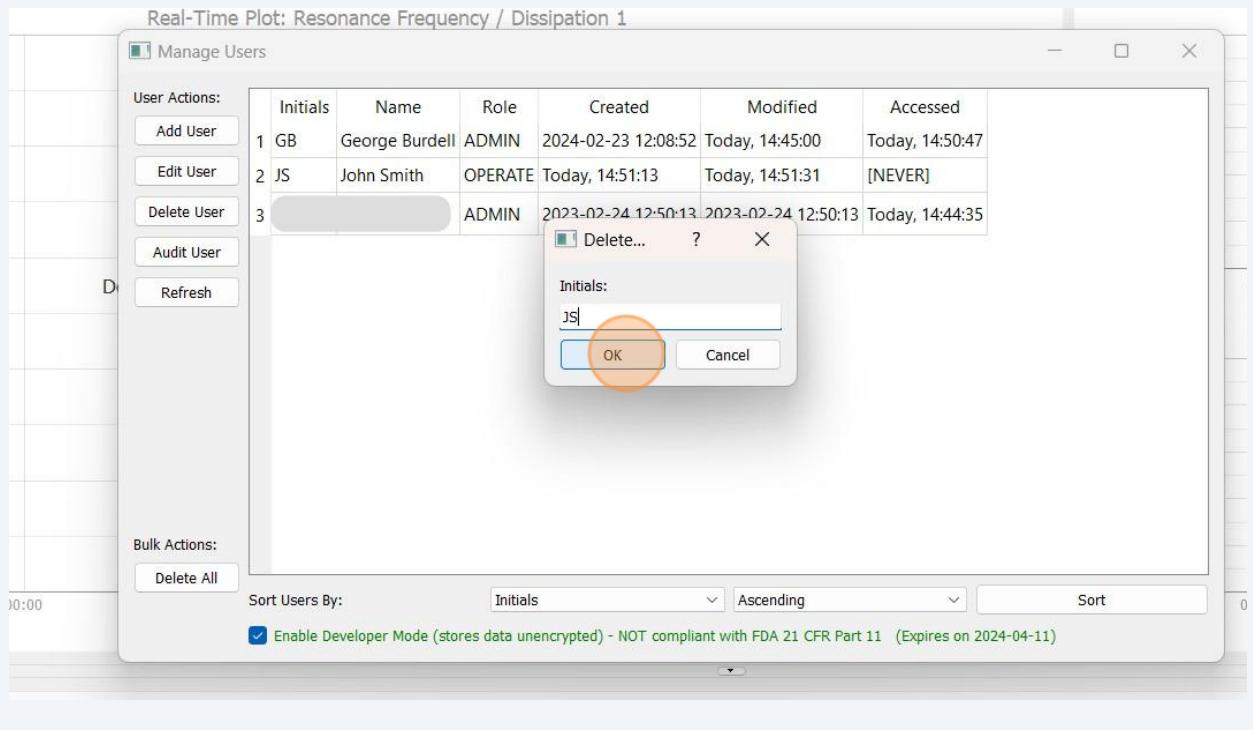


14

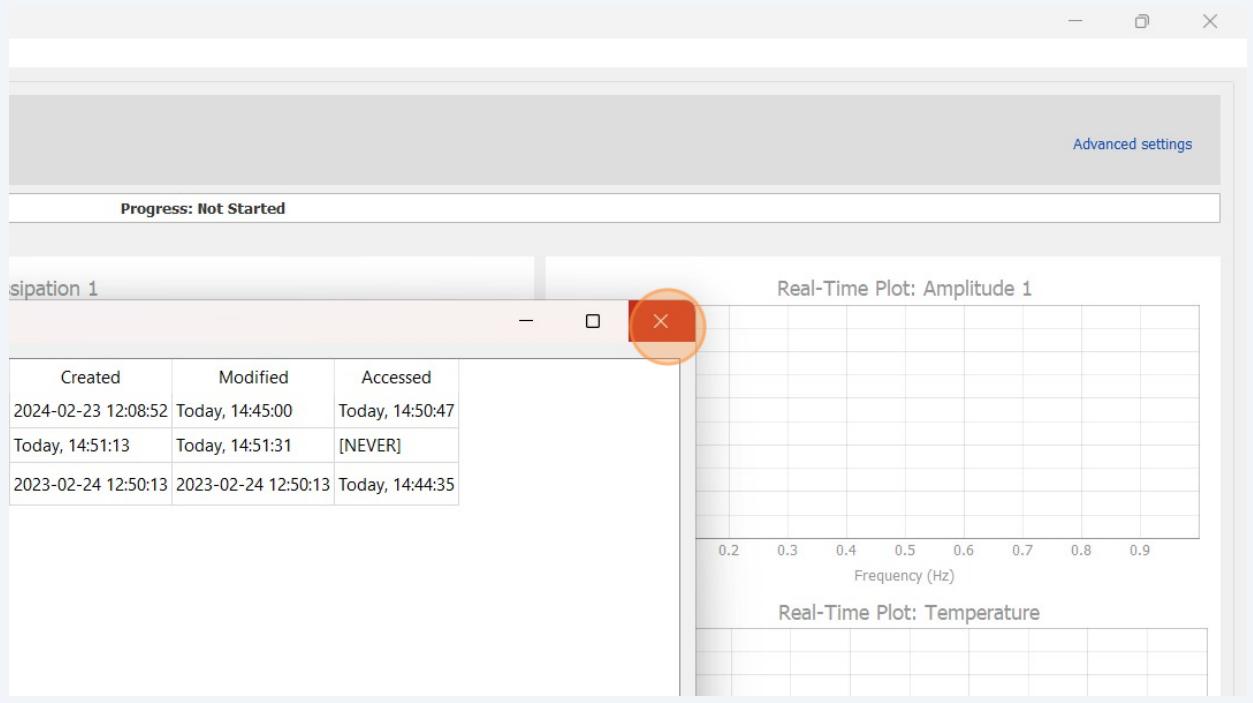
If you want to remove a user account, click "Delete User".



- 15** Enter the initials of the user, that you want to delete and then click "OK".

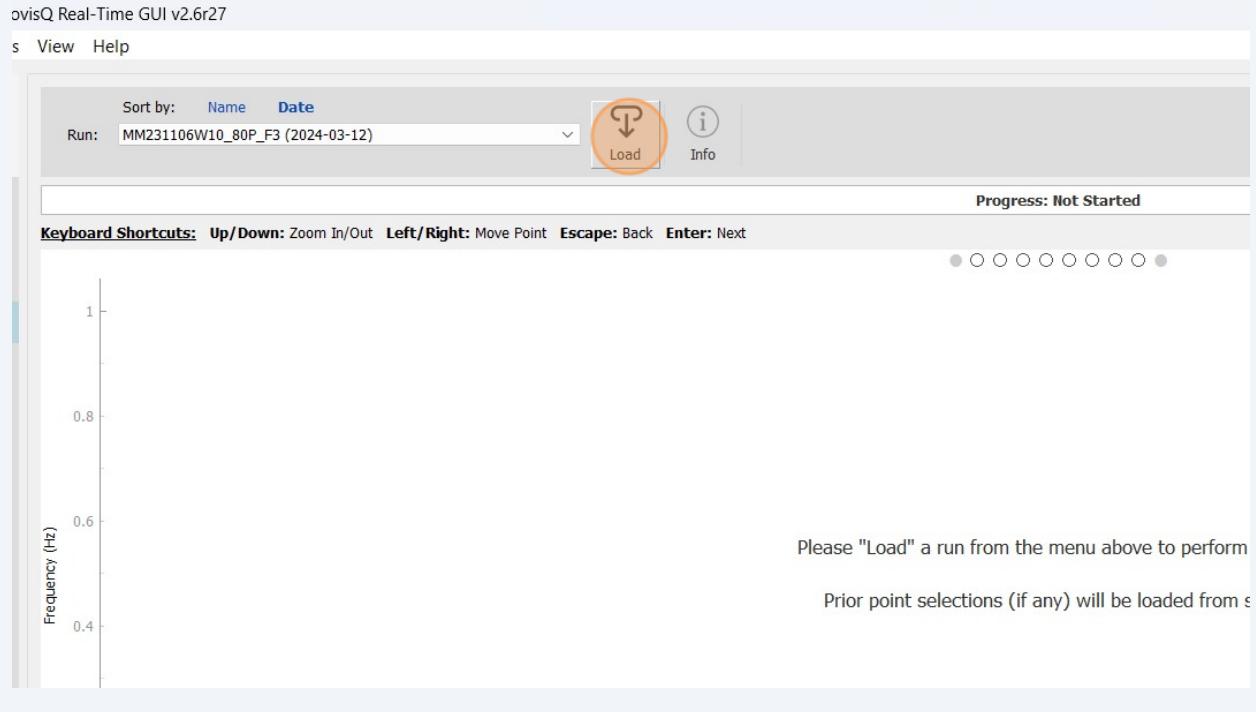


- 16** To return to the main menu, click "X".



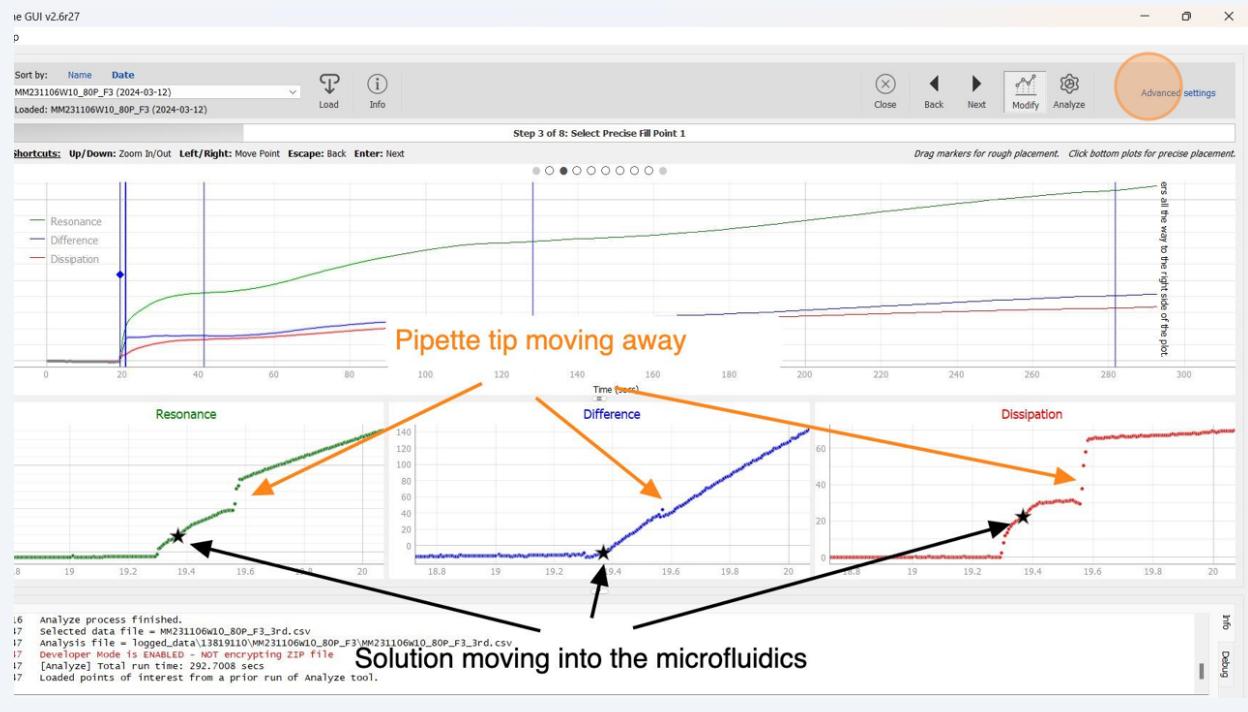
Guide to Advanced Settings

- 1 Advanced settings parameters can only be changed during Analysis after loading a data set. Following is an example of an appropriate situation to modify "Advanced Parameters".



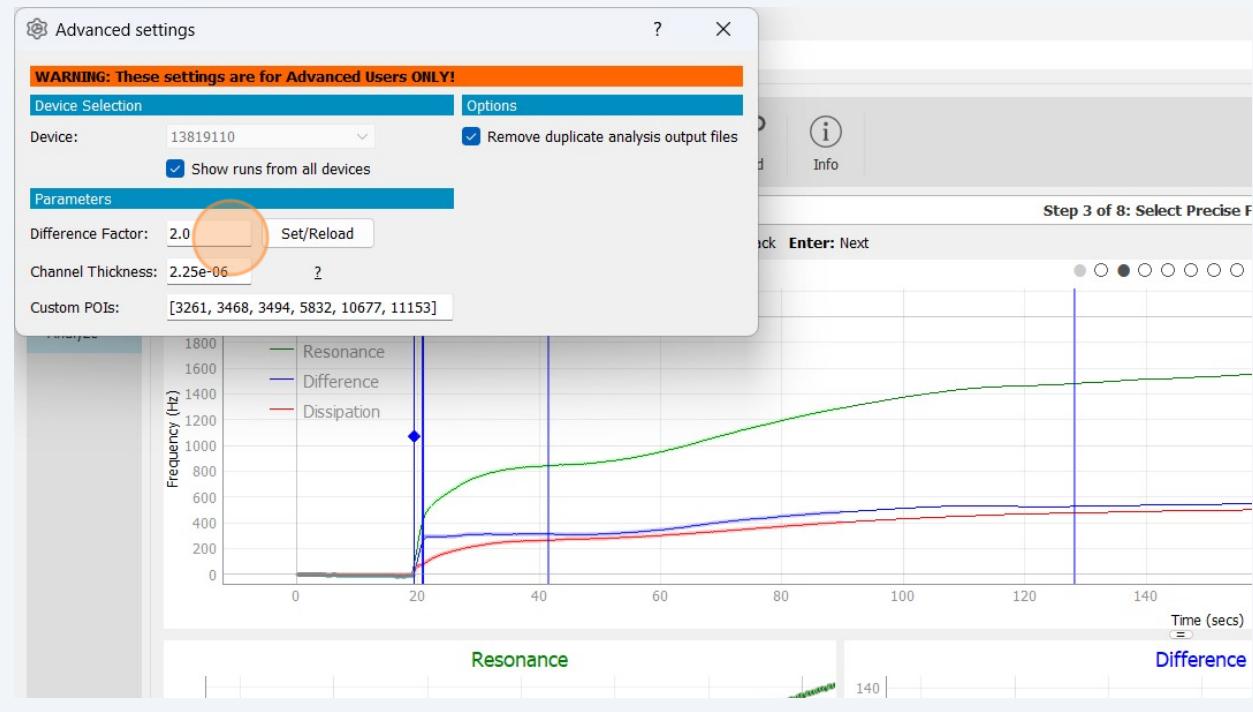
2

In some viscous solution at Step 3 of analysis, a *dimple* may be observed in the "Difference" line after the solution starts moving into the microfluidics. This *dimple* occurs, because sometimes moving the pipette tip away creates an additional dissipation jump. If left like this, this artificial *dimple* will cause viscosity data to appear unsteady. To fix this, click "Advanced settings"

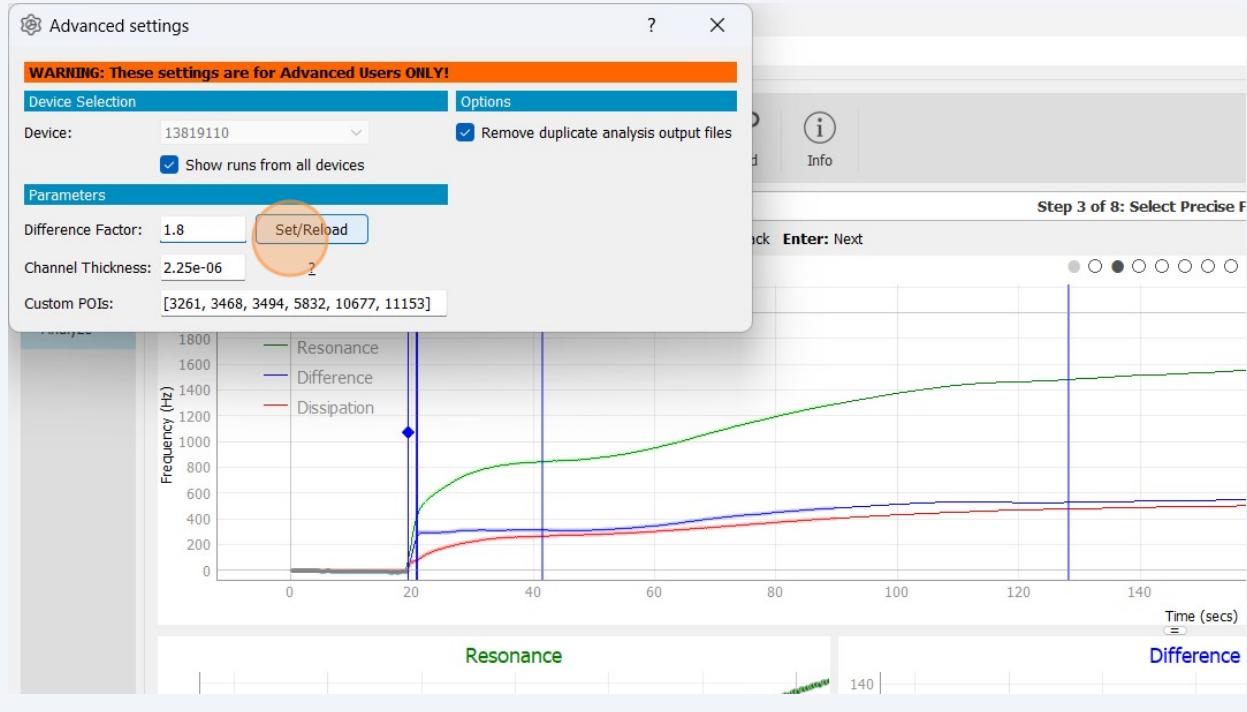


3

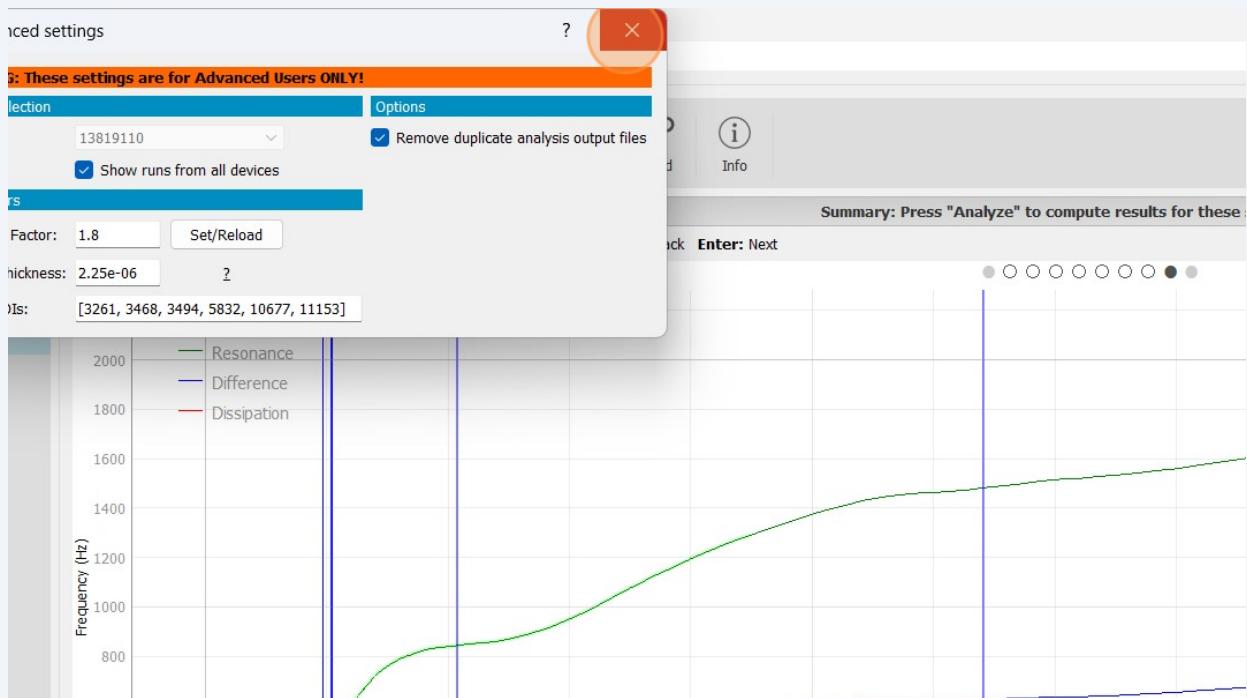
Do not change any parameters in the Advanced settings other than the "Difference Factor". The default value for this is "2.0". To remove the dimple, you can reduce this value slightly.



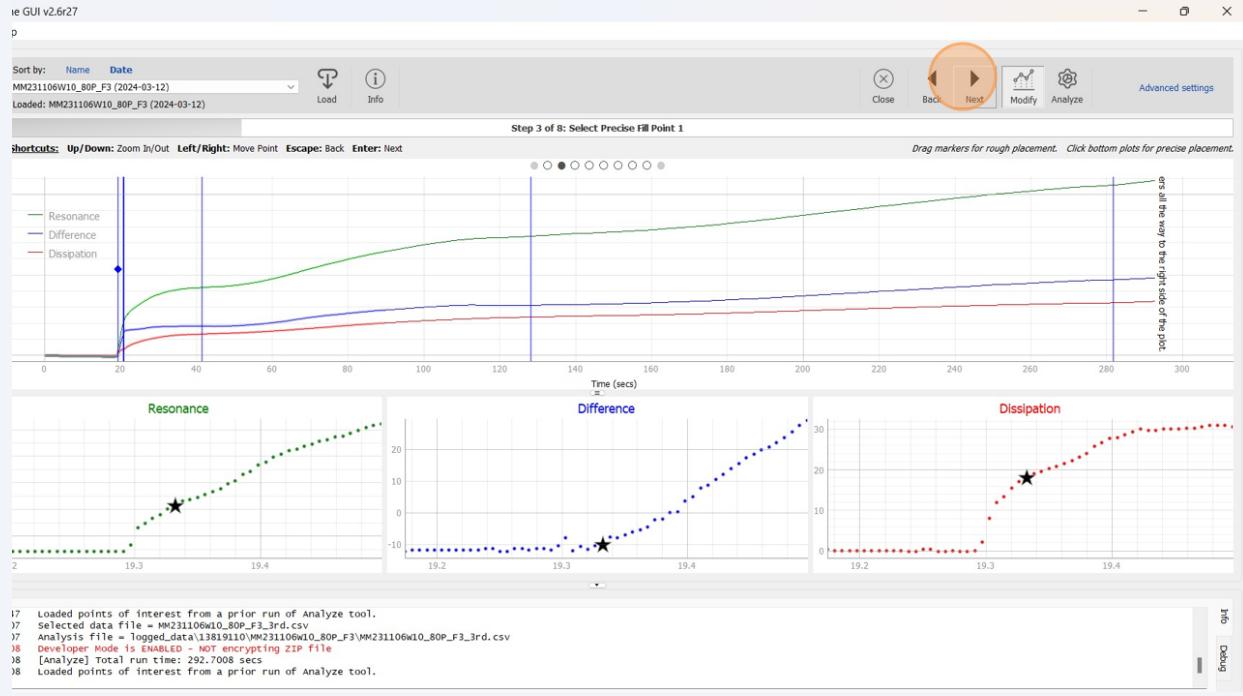
- 4 Once a lower number is entered, click "Set/Reload". This will reload the data set using the new difference factor.



- 5 Close "Advanced Settings"



6 Adjust the points of interest with this new difference factor. Especially, check if the dimple is still there during Step 3 and 4.



7 Click "Analyze" to check the final data analysis results.

