

## User Manual

Version 1.0.0, April 2023

This user manual provides detailed instructions on how to use the NACOTS desktop application. The application is designed with a user-friendly interface, which minimizes the training time required for operators to learn how to use the application and the system effectively. The following steps outline the operation of the NACOTS desktop application, guiding users through the various functionalities and features of the software. By following these steps, users can use the NACOTS desktop application for COVID-19 diagnosis.

### 1. Heating Process Procedure

The heating process is crucial in preparing the samples for analysis using the NACOTS desktop application. Follow the steps below to ensure proper sample preparation:

1. Connect the NACOTS device to the laptop using a USB cable.
2. Connect the adaptor to a power source to provide electricity to the device.
3. Ensure that the device screen is turned on, as shown in Figure 1.



Figure 1. NACOTS device status when in idle mode

4. Press the standby button on the NACOTS device, as shown in Figure 2.



Figure 2. NACOTS device status after pressing the STANDBY button

5. Wait until the device reaches a temperature above 65°C, as shown in Figure 3.



Figure 3. NACOTS device standby mode after it reaches above 65°C

6. Open the chamber lid and properly place the samples in it, as shown in Figure 4. Close the lid afterward.



Figure 4. NACOTS device when the chamber is opened

7. Click on the start button on the device screen, as shown in Figure 5, to initiate the incubation process.

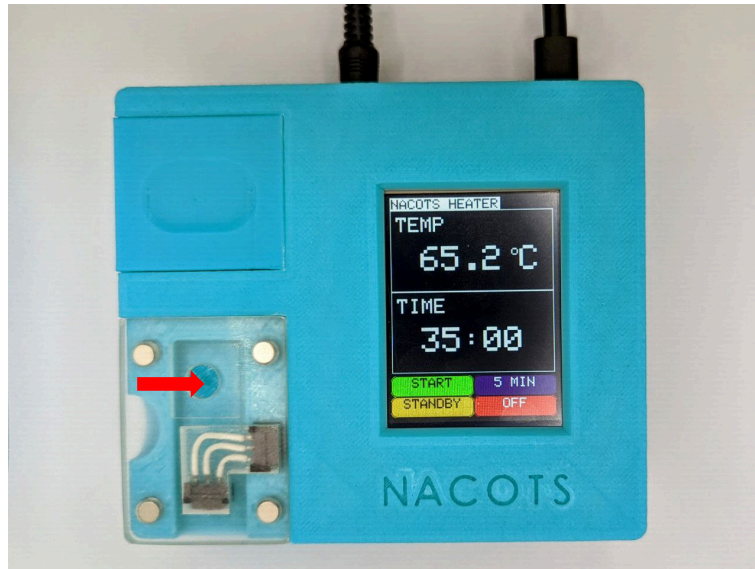


Figure 5. NACOTS device status after pressing the START button

8. Wait until the countdown reaches zero, and you hear a buzzing sound indicating the incubation is complete, as shown in Figure 6.



Figure 6. NACOTS device status after 35 minutes countdown

9. Carefully remove the samples from the chamber.
10. Take five microliters of the sample and place it on the electrode.
11. Take 100 microliters of ferrocyanide and place it on the electrode.
12. Press the '5 MIN' button on the device, as shown in Figure 7.





Figure 7. NACOTS device status after pressing 5 MIN button

13. Wait for the five-minute countdown to complete, as shown in Figure 8, and you hear a buzzing sound, indicating that the analysis is ready for the next step.



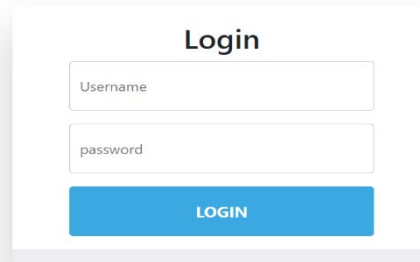
Figure 8. NACOTS device status after 5 minutes countdown

## 2. Software and Operator Initialization

The NACOTS desktop application requires an internet connection to verify the operator's username and password. Therefore, ensuring the computer is connected to the internet before opening the application is vital. Once the application is launched, it will start with a page that

prompts the operator to enter their username and password for verification, as shown in Figure 9.

File Edit View Window Help



**Login**

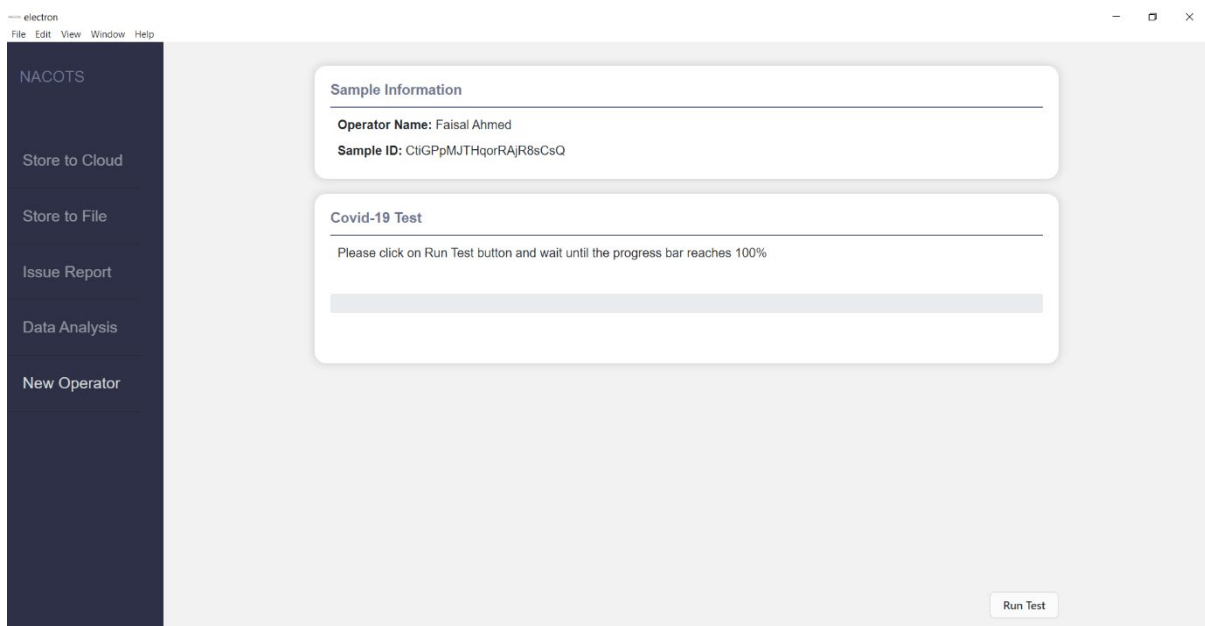
Username

password

**LOGIN**

Figure 9: NACOTS Desktop Application - First Page

After entering the correct username and password, the main test page of the application will open, as shown in Figure 10. This page provides access to the various features and functionalities of the NACOTS application, allowing the operator to perform the desired tests and analyses.



electron  
File Edit View Window Help

NACOTS

Store to Cloud

Store to File

Issue Report

Data Analysis

New Operator

**Sample Information**

**Operator Name:** Faisal Ahmed

**Sample ID:** CtiGPpMJTHqorRAJR8sCsQ

**Covid-19 Test**

Please click on Run Test button and wait until the progress bar reaches 100%

Run Test

Figure 10: NACOTS Desktop Application - Main Test Page

### 3. Run the Test

After placing the sample on the electrode, the operator should connect the NACOTS device to the laptop. The operator can then select the "Run Test" button. Optionally, the application also includes an auto-connection feature that enables the device to be connected, and the test begins with a single click. As shown in Figure 11, after clicking the "Run Test" button, a percentage bar will start to move to indicate the test's progress until it reaches 100 percent. The "Test Detail" box displays detailed information about the test, providing the operator with pertinent information about the ongoing test.

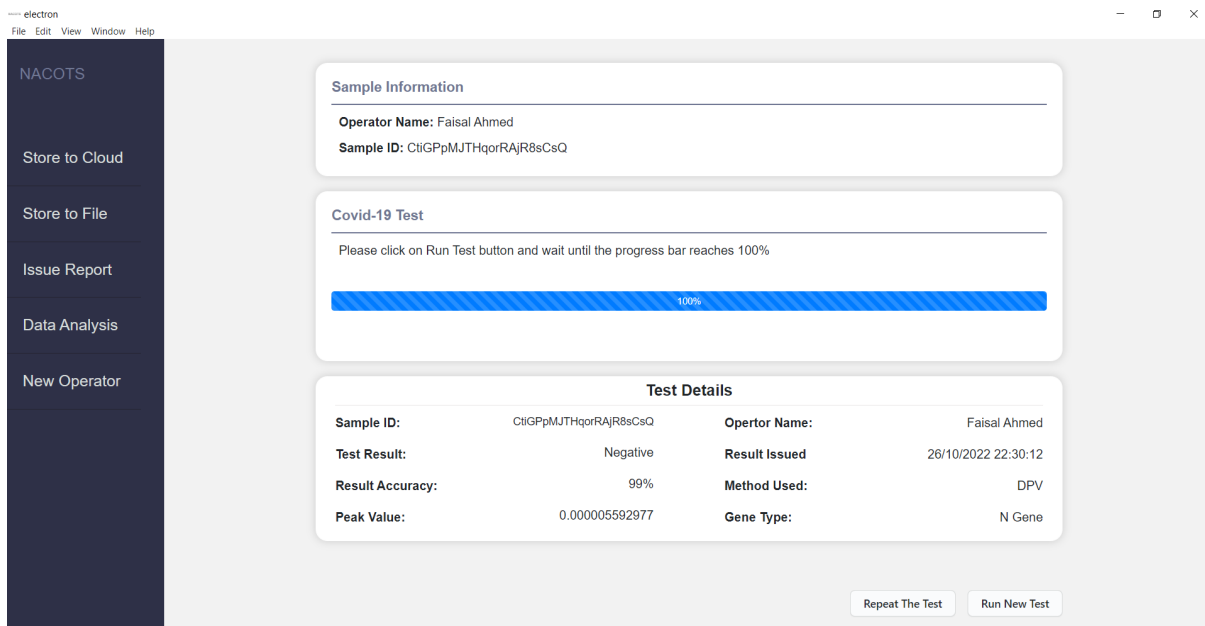


Figure 11: NACOTS Desktop Application - Test Progress and Test Detail Box

## 4. Results Storing to a CSV File Four

The NACOTS desktop application provides a convenient option to save all the data to a file using the "Store to File" button in the sidebar menu. When this button clicks, all the relevant data is saved in a file with the extension ".csv," a common format for storing tabular data. The saved data can then be easily accessed and viewed using spreadsheet software such as Microsoft Excel or similar programs. It allows the operator to easily analyze and manipulate the data for further analysis or reporting purposes.

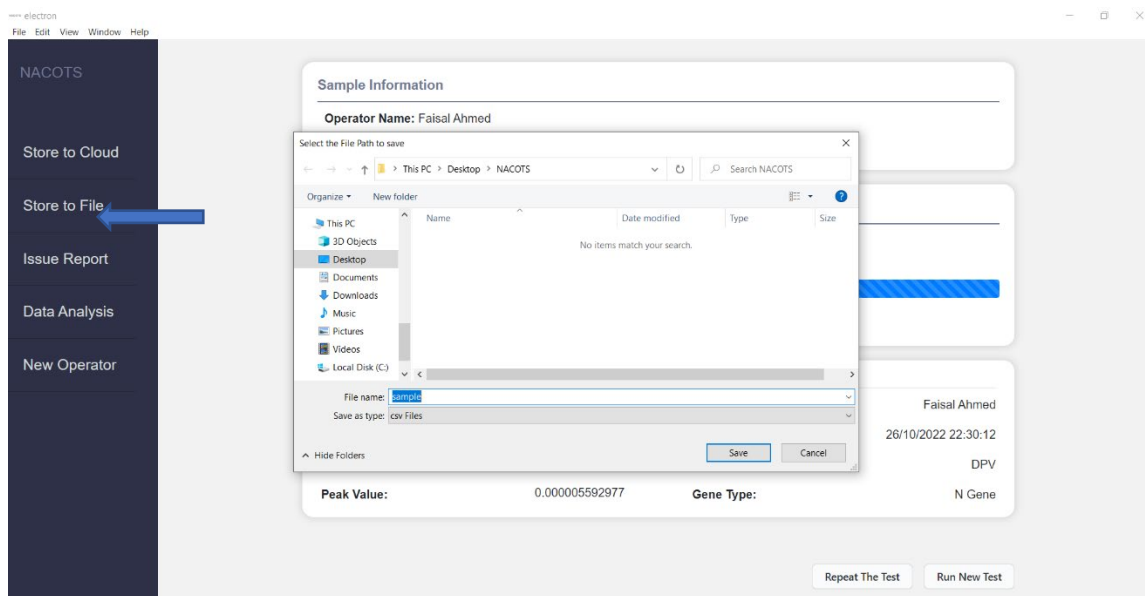
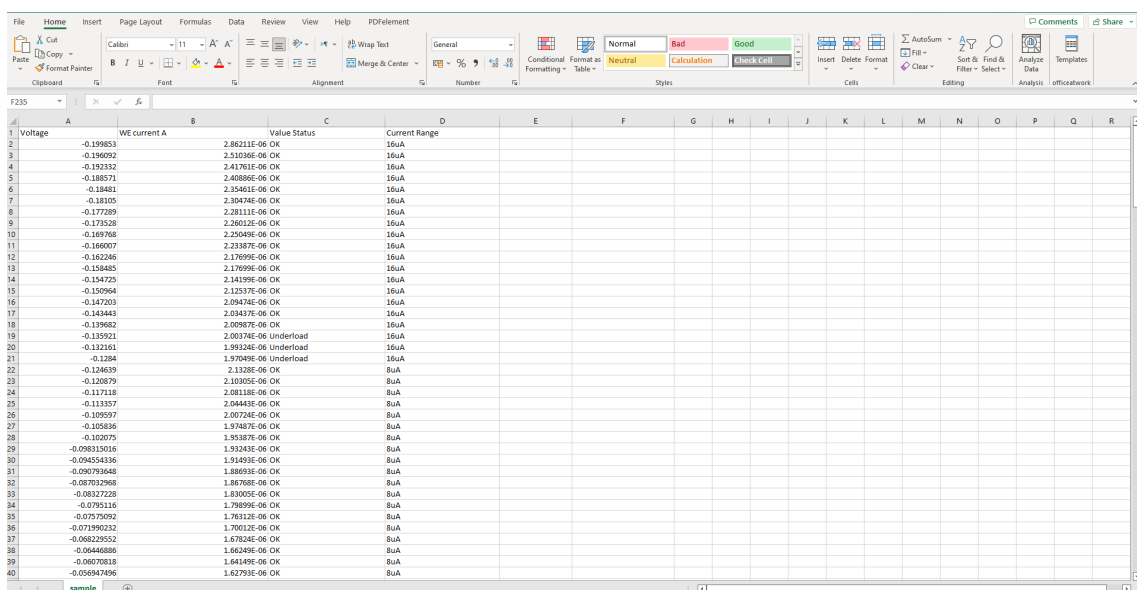


Figure 12: NACOTS Desktop Application - Store to File Button



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Voltage	WE current A	Value Status	Current Range														
2		-0.199853	2.86211E-06 OK	16uA														
3		-0.196092	2.51036E-06 OK	16uA														
4		-0.192332	2.41761E-06 OK	16uA														
5		-0.188571	2.40886E-06 OK	16uA														
6		-0.18481	2.35401E-06 OK	16uA														
7		-0.18105	2.30474E-06 OK	16uA														
8		-0.177289	2.28111E-06 OK	16uA														
9		-0.173528	2.26012E-06 OK	16uA														
10		-0.169768	2.25049E-06 OK	16uA														
11		-0.166007	2.23387E-06 OK	16uA														
12		-0.162246	2.17699E-06 OK	16uA														
13		-0.158485	2.17699E-06 OK	16uA														
14		-0.154725	2.14199E-06 OK	16uA														
15		-0.150964	2.12537E-06 OK	16uA														
16		-0.147203	2.09474E-06 OK	16uA														
17		-0.143443	2.03476E-06 OK	16uA														
18		-0.139682	2.00987E-06 OK	16uA														
19		-0.135921	2.00374E-06 Underload	16uA														
20		-0.132161	1.99324E-06 Underload	16uA														
21		-0.1284	1.97049E-06 Underload	16uA														
22		-0.124639	2.1328E-06 OK	8uA														
23		-0.120879	2.10305E-06 OK	8uA														
24		-0.117118	2.08138E-06 OK	8uA														
25		-0.113357	2.04443E-06 OK	8uA														
26		-0.109597	2.00742E-06 OK	8uA														
27		-0.105836	1.97467E-06 OK	8uA														
28		-0.102075	1.95387E-06 OK	8uA														
29		-0.098315016	1.93243E-06 OK	8uA														
30		-0.094554336	1.91893E-06 OK	8uA														
31		-0.090793648	1.88693E-06 OK	8uA														
32		-0.087032968	1.86768E-06 OK	8uA														
33		-0.08327228	1.83005E-06 OK	8uA														
34		-0.0795116	1.78996E-06 OK	8uA														
35		-0.07575092	1.76312E-06 OK	8uA														
36		-0.071990232	1.70012E-06 OK	8uA														
37		-0.068229552	1.67824E-06 OK	8uA														
38		-0.06446886	1.66249E-06 OK	8uA														
39		-0.06070818	1.64149E-06 OK	8uA														
40		-0.056947496	1.62793E-06 OK	8uA														

Figure 13: Excel Sheet Program Displaying Data from File.csv



## 5. Detailed Data Analysis

The NACOTS desktop application provides a comprehensive data analysis feature accessible through the "Data Analysis" button in the sidebar menu. Clicking on this button opens a dedicated data analysis page, providing the operator with advanced tools for further analyzing the test results and confirming the patient's status. The data analysis page, as shown in Figure 14, offers various options and functionalities, such as graphical representations of test results, statistical analysis, data filtering, and export options. It empowers the operator to perform in-depth analysis and interpretation of the test data, facilitating accurate and reliable patient result confirmation.

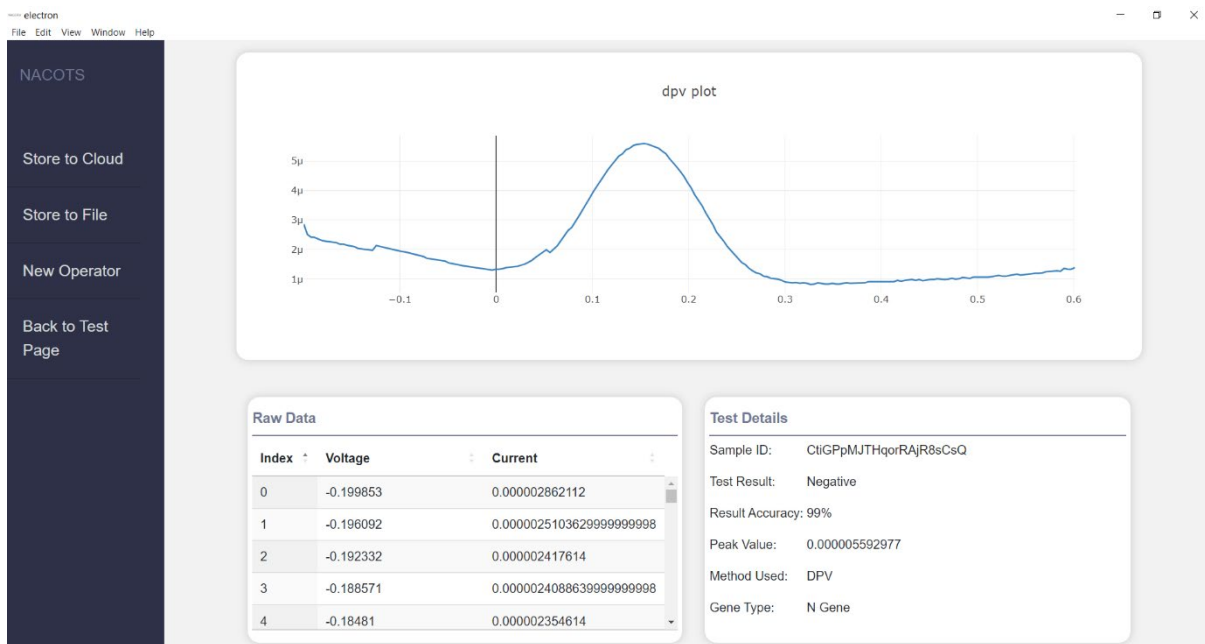


Figure 14. Data Analysis Page