

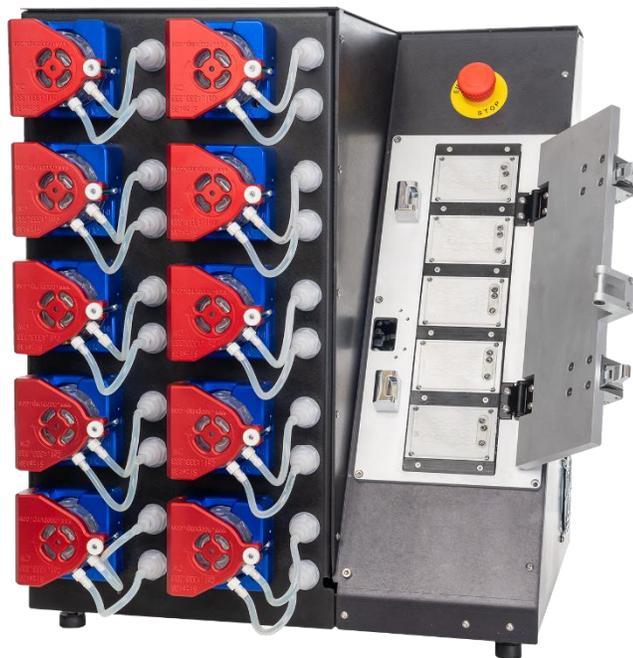


NEOFLUIDICS

NeoNANO_{server}TM

Scalable Microfluidic Nanoparticle Preparation

Operating Instructions



For Research Use Only.

Additional information about our technology, products and applications is available online. Please visit www.neofluidics.com or contact us at info@neofluidics.com to submit your inquiry. NEOFLUIDICS LLC, 6650 Lusk Blvd, Suites B101 &102, San Diego, California 92121, USA.

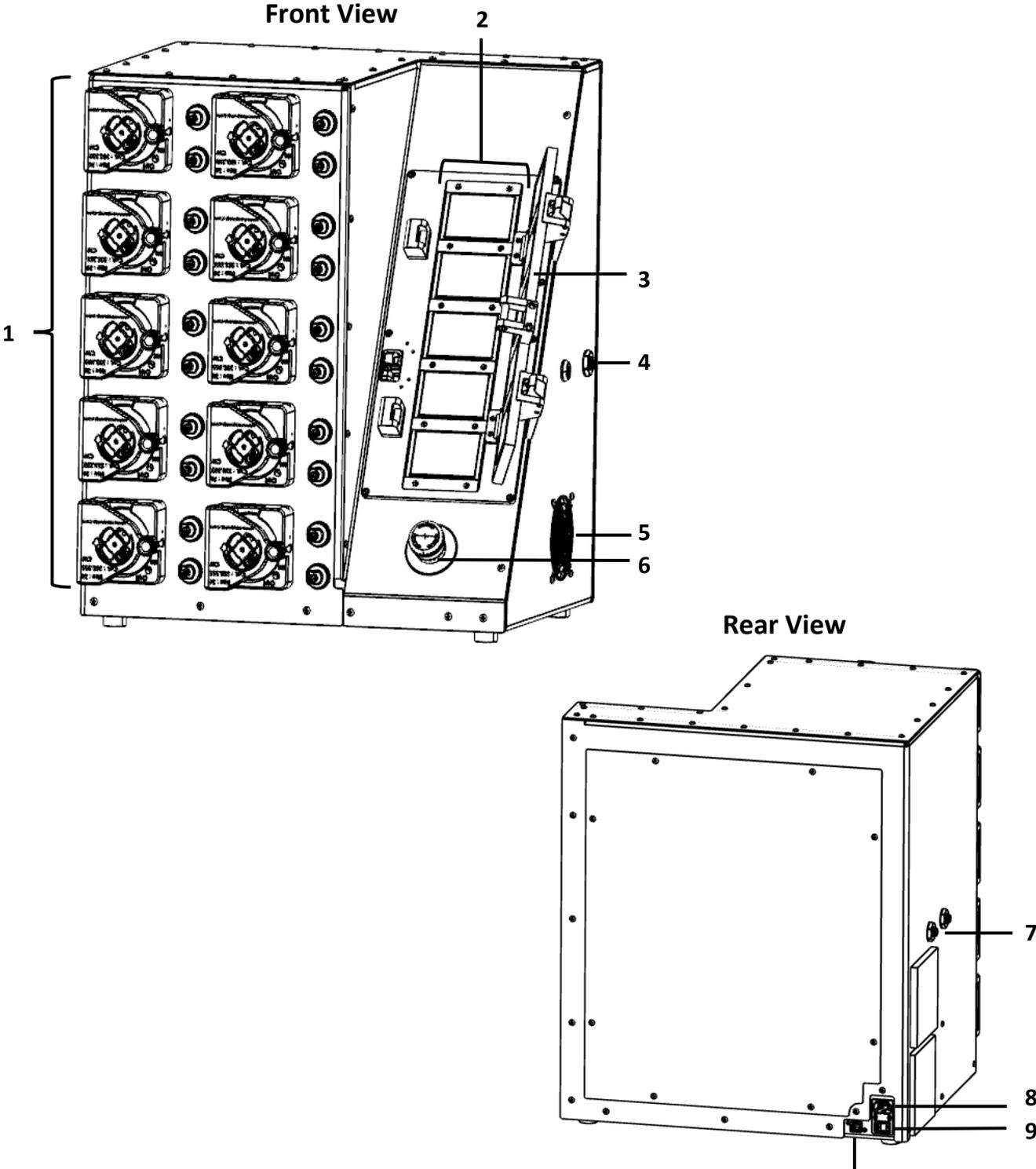
Last Updated April 2020

Table of Contents

NeoNANO _{server} [™] Components.....	3-6
Unit.....	3-4
Software.....	5-6
Operation.....	7-9
Installation.....	7
Setup.....	7
Setting Parameters.....	8
Changing Cartridges.....	8-9
Post-Run Maintenance.....	9

NeoNANO_{server}TM Components

Unit



1. **Fluid Pumps.** Flow-rate-controlled pumps that move reagents through system.
2. **Cartridge Nests.** Alignment fixtures that fasten microfluidic cartridges to reagent fluid lines. Surfaces are temperature controlled.
3. **Door.** Door to seal cartridge inlets to fluid lines. Contains interlock that prevents opening of door until unit is sufficiently cool.
4. **Fluid Outlet.** Push-to-connect fitting for formulation output.
5. **Air Vent.** Vent that allows for heat dissipation.
6. **Emergency Stop.** Button that immediately cuts power to system in case of emergency. Push down firmly to activate and turn clockwise to deactivate.
7. **Fluid Inlets.** Push-to-connect fittings for two starting reagents.
8. **Power Cord Socket.** Socket that accepts an IEC C13 power cord. The IEC C13 power cord can be selected based on the input power supply.
9. **Power Switch.** Switch that powers the system on and off.
10. **Ethernet Port.** Port that connects multiple server units with centralized software control.

NeoNANO_{server}TM Components

Software

The screenshot displays the NeoNANO server software interface. The top navigation bar includes 'Workflow', 'Maintenance', 'Run Profiles', and 'Diagnostics'. The main area is divided into several sections:

- Workflow Status (1-7):** A table showing system metrics:

Connection Status	Connected
Workflow Status	Not Started
Run Profile	Custom
Elapsed Time	00:00:00
Estimated Run Time	112 min
Output Volume	10 litres
System Temperature	25.1 °C
- Server # (8):** A table showing chip status for two servers:

Chips	#1	#2
1	✓	✓
2	✓	✗
3	✓	✗
4	✓	✗
5	✓	✗
- Flow Diagram (10-12):** A schematic showing two input streams (A and B) with flow rates of 7.00 ml/min and 8.00 ml/min respectively, leading to an output of 0.00 litres.
- Required Volumes (13):** A table showing required volumes for two components:

Required Vol A	4.6700 litres	<input type="checkbox"/>
Required Vol B	5.3300 litres	<input type="checkbox"/>
- Start Button (14):** A large blue button labeled 'Start'.
- Unlock Door Buttons (9):** Two buttons labeled 'Unlock Door'.

The screenshot displays the 'Run Profiles' section of the NeoNANO server software. The navigation bar includes 'Workflow', 'Maintenance', 'Run Profiles', and 'Diagnostics'. The main area is divided into several sections:

- Current Profile (16):** A dropdown menu showing 'Custom' as the selected profile.
- Available Profiles (17):** A table listing available profiles:

Name	Modified
Water_Lipid1	02_02_20
Water_Lipid2	02_03_20
- Action Buttons (18):** A vertical stack of three buttons: 'Save', 'Save As', and 'Activate'.

NeoNANO_{server}TM Components

1. **Connection Status.** Displays whether software detects connected units.
2. **Workflow Status.** Displays if workflow is currently running.
3. **Run Profile.** Displays whether system is using saved run profile or custom parameters.
4. **Elapsed Time.** Displays how long system has been running since start.
5. **Estimated Run Time.** Displays how long unit is expected to run based on input flow rate and number of cartridges in use.
6. **Output Volume.** Displays expected output volume based on input flow rate and number of cartridges in use.
7. **System Temperature.** Enter desired run temperature in degrees Celsius with 0.1 °C sensitivity.
8. **Detected Units.** Displays cartridges for each detected unit. Select the box of each cartridge slot that will be used and deselect any cartridge slot that will not be used.
9. **Unlock Door Button.** Door has built-in lock with temperature sensor that restricts opening of door until unit is sufficiently cool. The Unlock Door button can be used to override the automatic lock.
Use button with caution, as insufficiently cooled system can cause burns.
10. **Reagent Name.** Use text boxes to name Reagents A and B (i.e. Water and Lipid).
11. **Current Output Volume.** Displays real-time value for output formulation volume once system has begun running.
12. **Reagent Flow Rate.** Use text boxes to set flow rates for Reagents A and B in units of milliliters per minute with 0.01 mL/min sensitivity.
13. **Required Reagent Volume.** Displays volume required for both reagents to complete the run based on number of cartridges in use and input flow rates. Both boxes must be checked to confirm required volume is available before run can begin.
14. **Start Button.** Once all parameters are set and reagent volume is confirmed, click to begin run.
15. **Run Profiles Tab.** Tab that contains settings for saving and activating previous run settings.
16. **Current Profile.** Displays 'Custom' if using custom settings or profile name if using saved run profile.
17. **Available Profiles.** Displays all saved run profiles and the date they were last modified.
18. **Run Profile Control Buttons.** Use Save button to save run profile after modifying settings. Use Save As button to create and name new run profile. Use Activate button to load settings into workflow after selecting desired profile from Available Profiles.

Operation

Installation

1. Carefully place system on a clean and vibration free surface.
2. Connect IEC C13 power cable to power cord socket on the back of the unit and plug into wall power supply.
3. Plug computer with installed software into wall power supply.
4. Connect system to computer via provided USB cable.
5. If connecting multiple units in series, connect primary unit to subsequent units via ethernet cable using port at the back of the unit.
6. Turn on computer and log in with username *NeoNANO* and password *Neofluidics*.
7. Flip the power switch on the back of the unit to the ON position.
8. Open the system software by double-clicking on the  icon on the Desktop.

Setup

1. Prepare input reagents based on desired formulation. System accepts two independent reagents.
2. Connect tubing to the fluid inlets on the left side of the unit. Feed one set of tubing into the Reagent A container and another set of tubing into the Reagent B container. If formulation requires controlled temperature, minimize tubing length in order to reduce heat transfer.
3. Connect tubing to fluid outlet and feed into sufficiently large collection container.
4. Load microfluidic cartridges into cartridge nests. Up to five cartridges can be loaded into each system. The fifth, lowermost cartridge nest must be used. Cartridges must be loaded so that the two inlet ports are oriented at the upper right of the cartridge, and the single outlet port is oriented at the bottom right (the cartridge will be oriented such that the openings are pointed away from the user).
5. Using the two handles, close the door to seal the cartridges against the nests.

Operation

Setting Parameters

1. Ensure that Connection Status in the user interface reads 'Connected'.
2. If using previously saved parameters, navigate to the Run Profiles tab, select desired run profile from Available Profiles, click Activate, and proceed to Step 8 below. If using custom parameters, proceed to Step 3.
3. Enter desired temperature in System Temperature text box in units of degrees Celsius.
4. In upper right section of user interface, ensure that all connected systems are displayed. Check the box of each cartridge slot that will be in use for each server unit.
5. Enter unique names for Reagents A and B in the associated Reagent Name text boxes.
6. Enter flow rate for Reagents A and B in associated Reagent Flow Rate text boxes in units of milliliters per minute.
7. To save settings for later use, navigate to the Run Profiles tab, click Save As, and enter a unique name for the run profile.
8. Ensure that enough volume of both reagents is available in the containers according to the Required Reagent Volume section and check the box for each reagent to confirm.
9. Click the Start button to begin the formulation run.

Changing Cartridges

1. Once output volume has been reached, the run will automatically be terminated. At this time, the user can either stop the run or replace cartridges and continue. If stopping run, proceed to Post-Run Maintenance section below. If continuing run, proceed to Step 2 below.
2. Wait for system to cool to a temperature that is safe to the touch (<55 °C).
3. Open door and dispose of used microfluidic cartridges.
4. Insert fresh cartridges into the same cartridge nests as were used for the previous run and close the door.

5. Ensure that enough of Reagent A and B remains in the storage containers for the next run and check the Required Reagent Volume boxes to confirm.
6. Click the Start button to continue the formulation run.
7. Repeat process until sufficient formulation volume has been collected.

Post-Run Maintenance

1. Once run has ended, remove Reagent A and B containers and replace with two containers filled with one liter of cleaning solution each.
2. Remove formulation collection container and replace with empty waste container.
3. In the user interface, change Output Volume to 2L, change System Temperature to 60 degrees, and change Reagent A and B flow rates to 5 mL/min each.
4. Click the Start button to begin the cleaning run.
5. After cleaning run has ended, remove cleaning solution containers.
6. Keeping all other settings the same, run the program to purge fluid from the lines.
7. Once run has ended, wait for system to cool to a temperature that is safe to the touch (<55 °C).
8. Open door and dispose of microfluidic cartridges.
9. Disconnect tubing from Fluid Inlets and Fluid Outlet.
10. Close software and power down computer.
11. Flip system power switch to the OFF position.