



NEOFLUIDICS

NeoVISC™

Multiplexed Rheometer

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.

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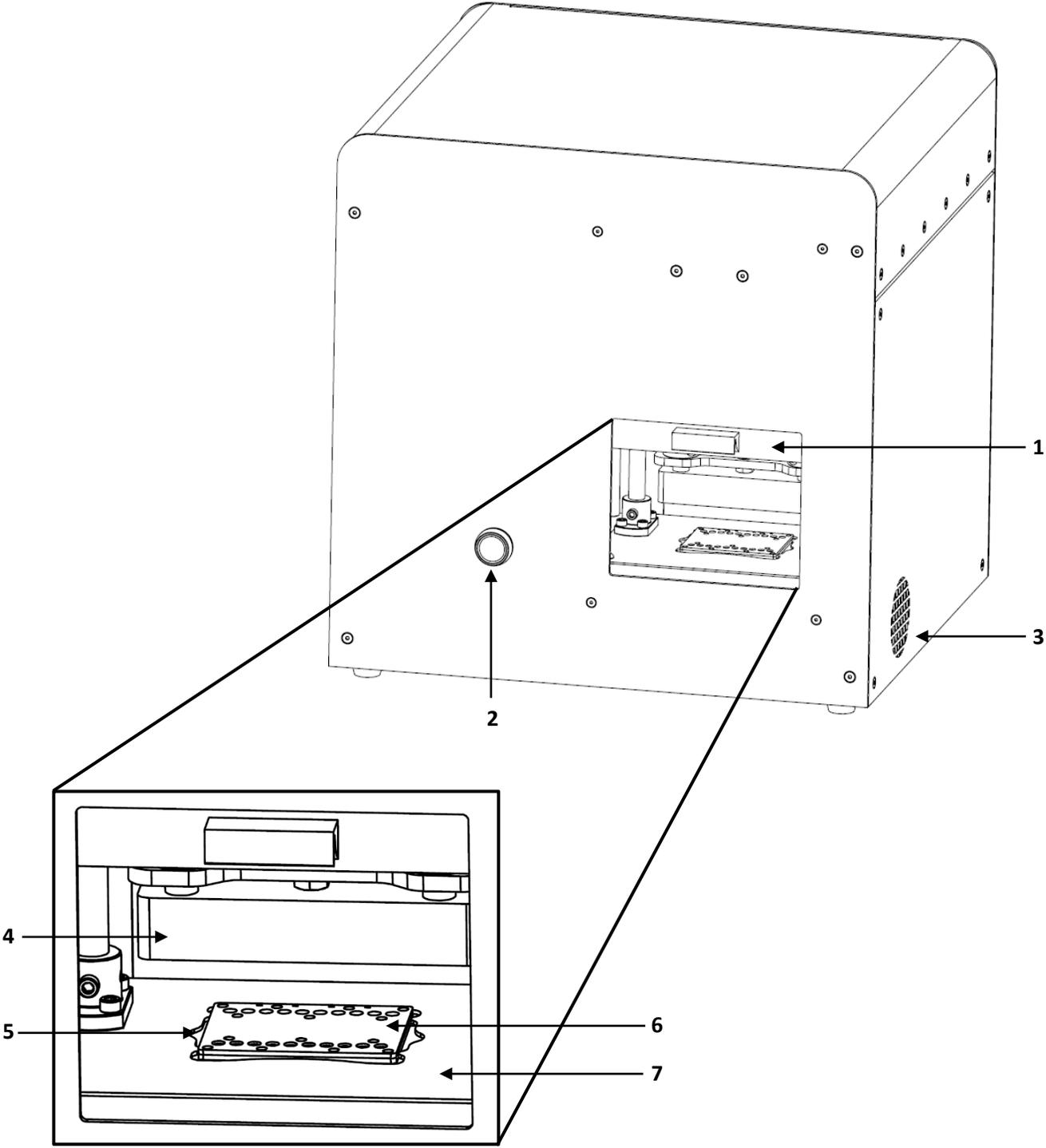
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NeoVISC™ Components

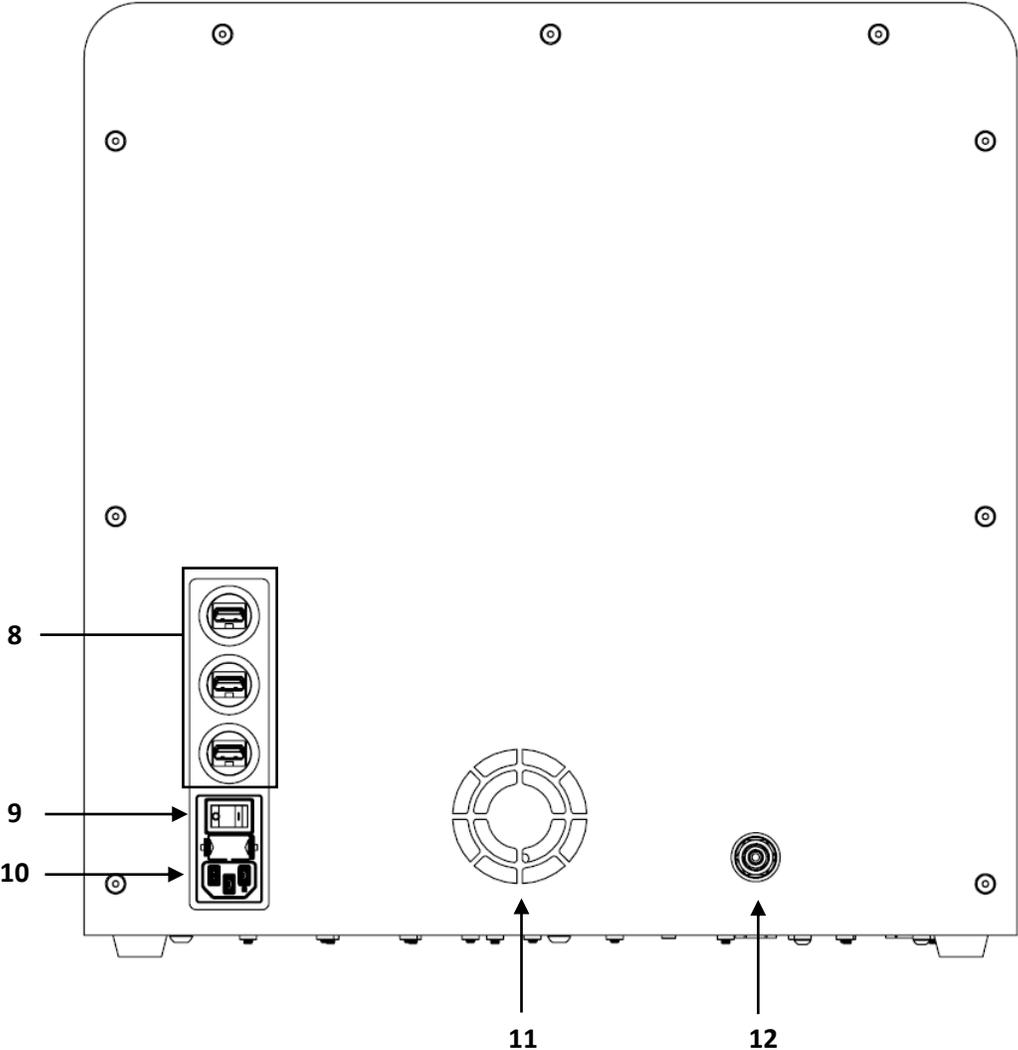
Unit

Front View



NeoVISC™ Components

Rear View

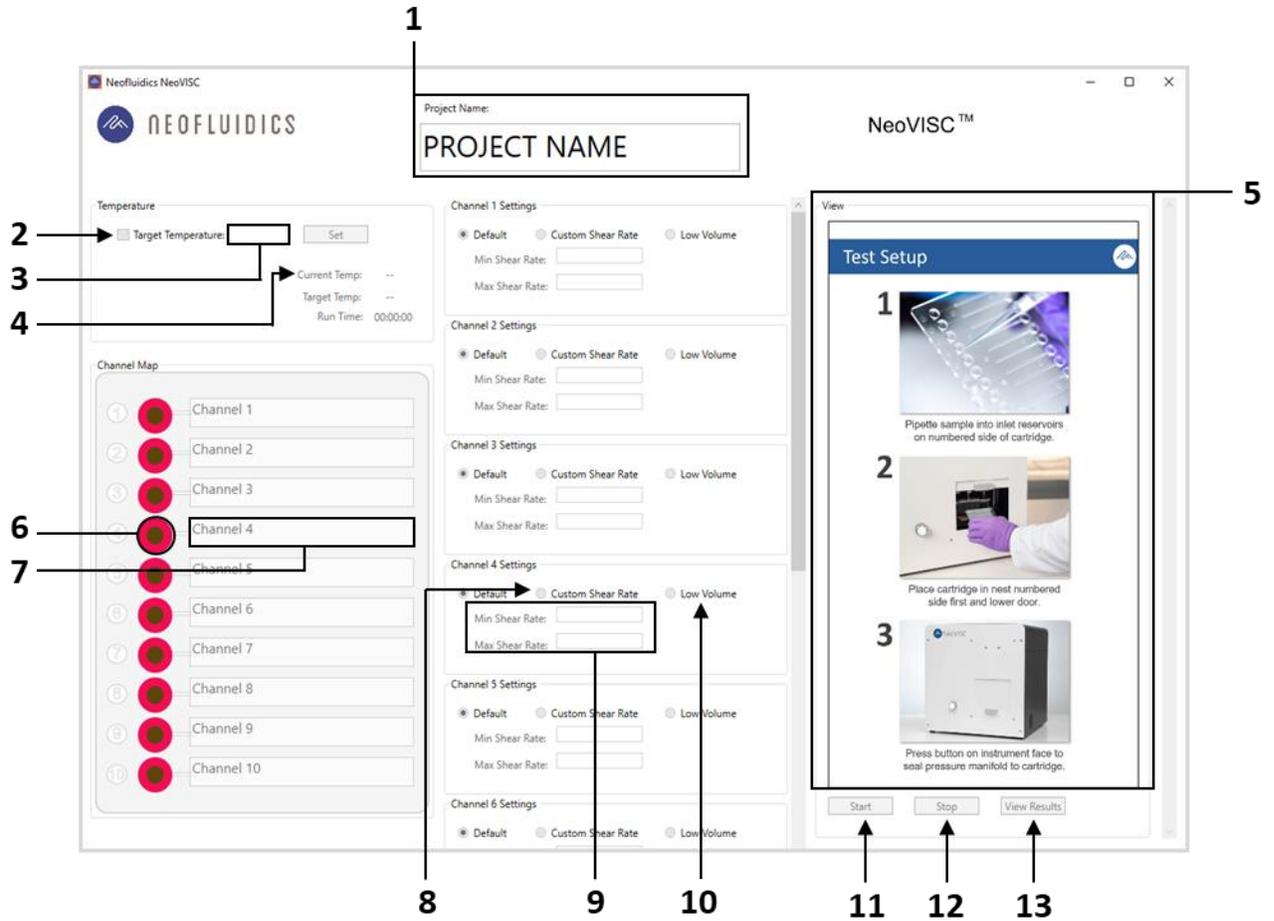


NeoVISC™ Components

- 1. Access Door.** Slides open and closed vertically.
- 2. Push Button.** Controls the position of the manifold that seals and applies pressure to the NeoVISC™ cartridge.
- 3. Air Vent.** Allows heat dissipation from thermal plate.
- 4. Pressure Manifold.** Forms an air-tight seal against the cartridge and applies pressure to each of the microfluidic channels.
- 5. Thermal Plate.** Applies set temperature to the microfluidic cartridge for temperature-controlled viscosity measurements.
- 6. Microfluidic Cartridge.** Fluid samples are loaded into the inlet reservoirs and placed in the cartridge plate to interface with the NeoVISC™ instrument.
- 7. Cartridge Plate.** Maintains the cartridge in a fixed position.
- 8. USB Ports.** Three USB ports for connection of instrument subsystems to external computer.
- 9. Power Switch.** Powers the system on and off.
- 10. 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. Instrument supports AC voltages ranging from 85-264 Volts.
- 11. Fan Vent.** Allows for heat dissipation of the electronics.
- 12. Pressure Fitting.** ¼ in. outer diameter tubing connects from chosen air supply to the pressure fitting to supply pressure to the instrument. See Air Supply section below for more details.

NeoVISC™ Components

Software



NeoVISC™ Components

- 1. Project Name.** Enter a project name in the text box that applies to all samples being tested.
- 2. Target Temperature.** Check this box if specific fluid temperature is desired for the viscosity measurement. Box must be checked to enter a temperature value.
- 3. Set Temperature.** Enter desired temperature in the text box in units of degrees Celsius with 0.1 °C sensitivity. The temperature range of this instrument is 15-65 °C.
- 4. Live Readings.** Real-time readings of the current and set temperatures of the thermal surface and the current run time of the test.
- 5. Test Setup Panel/Live Video.** Displays the protocol for loading a sample, placing the cartridge in the instrument, and lowering the pressure manifold. While the test is running, this window will show a live video of the cartridge.
- 6. Channel Enable.** Click this button to indicate that a channel contains sample fluid. If this button is not clicked and remains red, no viscosity measurement will be taken for the associated channel. Up to ten channels can be enabled for a single test.
- 7. Sample Name.** For all channels that are enabled, enter corresponding sample names in the text boxes.
- 8. Custom Shear Rate.** Click this button if specific shear rate range is desired. If this box is not checked, default shear rate ramp will be used. Each channel can be controlled independently.
- 9. Min and Max Shear Rate.** If 'Custom Shear Rate' button is clicked, use these boxes to enter the desired minimum and maximum shear rate for each corresponding channel.
- 10. Low Volume.** Click this button if low volume measurement is desired. Each channel can be controlled independently.
- 11. Start Button.** Click this button to begin the viscosity measurement.
- 12. Stop Button.** Click this button to terminate the test while a measurement is in progress. If clicked, the resulting viscosity measurement may not be accurate.
- 13. View Results Button.** Click this button to view the viscosity data after the test is complete.

Installation

Air Supply

1. Pressure must be supplied to the system via an appropriate source of inert and bone-dry gas, such as a pressurized nitrogen or argon tank or a laboratory air supply. The pressure into the system should be 4.5 bar.
2. Connect ¼ in. outer diameter tubing from the pressure fitting on the unit to the pressurized gas tank or alternative air supply.

Power Up

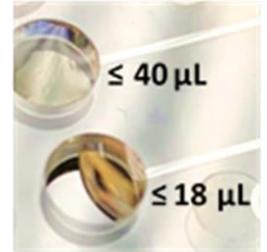
1. Power on the computer, and log in with the username *NeoVISC* and password *Neofluidics*.
2. Ensure that the three USB cables are connected to the provided computer in the appropriate USB ports. The labels on the USB cables correspond to the labels on the computer.
3. Plug the computer power cable into a power supply.
4. Plug the instrument power cable into a power supply, and flip the power switch to the ON position.
5. Open the NeoVISC™ software by double-clicking the  NeoVISC icon on the desktop.

Operation

Sample Loading

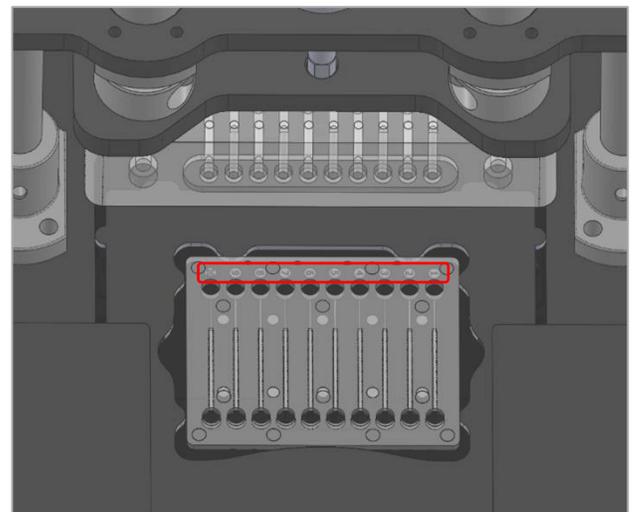
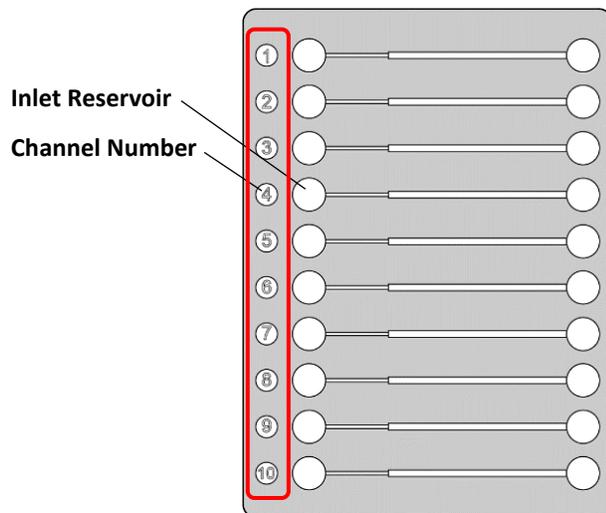
1. Pipette 40 μL of sample fluid into the inlet reservoir. Ensure that the bottom surface of the reservoir is coated with fluid and that no air gaps are present.

If running a Low Volume test, pipette 18 μL of sample fluid into the inlet reservoir. With this volume, the fluid will not coat the entire bottom surface of the reservoir. Instead, pipette the fluid droplet adjacent to the opening of the microfluidic channel.



2. Up to ten fluids can be tested simultaneously by repeating Step 1 in the remaining nine channels.
3. Place the cartridge in the cartridge plate such that the inlet reservoirs are oriented beneath the pressure manifold.
4. Slowly close the door.
5. Lower the manifold by pressing the push button on the front face of the system. Ensure that hands are safely outside of the instrument.

If not running a test, keep manifold raised to avoid unnecessary compression on the pressure manifold seal.



Operation

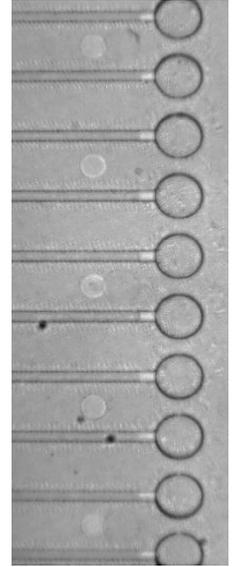
Setting Parameters

1. Enter the desired project name in the text box.
2. If a certain fluid temperature is desired, check the box labelled 'Target Temperature'. Enter the desired temperature in the text box in units of Celsius and click the button. The temperature range of this instrument is 15-65°C. Monitor the live temperature readings and wait until current temperature matches target temperature. Then, wait three minutes for the fluid to reach target temperature. If the 'Target Temperature' box is not checked, the system will run at ambient temperature.
3. Select which channels are in use by clicking the  button next to the associated channel number. The button will turn green, indicating that it is enabled. Once any of the ten channels is enabled, the Test Setup instruction panel will be replaced with a live view of the cartridge in the instrument.
4. For each channel in use, enter a sample name in the associated text box.
5. After naming the samples, navigate to the center panel to adjust settings for each channel.
6. If a custom shear rate range is desired for the viscosity measurement, click the 'Custom Shear Rate' button and enter chosen Min. and Max. shear rate for each channel. All ten channels can be controlled independently. The minimum and maximum achievable shear rate range will depend on fluid viscosity. Instrument will get as close to entered shear rate range as possible but may not achieve exact range.
7. If a low volume measurement is desired, click the 'Low Volume' button for each channel. All ten channels can be controlled independently.

Operation

Running a Test

1. When all the parameters are set, click the button to begin the test. Prior to starting test, ensure that pressure manifold is lowered against cartridge.
2. While the test is running, all inputs will be disabled except for the button. This button can be used to terminate the pressure immediately. If this button is clicked during a test, the resulting viscosity measurement may not be correct. In an emergency, such as the application crashing, the system power switch should be turned to the OFF position.
3. Once all fluids have reached the ends of their respective channels (see image to the right), the test will stop automatically, and the button will become available. For more viscous fluids, the fluid may stop before it reaches the end of the channel. This is expected and will still result in an accurate measurement.



Results

1. Once the test has stopped, click the button.
2. An HTML file will open with a chart containing the raw shear stress, shear rate, and viscosity data and shear rate vs. viscosity plots from the most recent test for each channel. The file will be saved as an HTML file as well as an Excel file in the Reports folder on the supplied computer.

Power Down

1. To power down the NeoVISC™ instrument, flip the power switch on the back panel to the OFF position.
2. To disconnect the instrument from the pressure source (gas tank or lab air supply), shut off the pressure source. Press the button that controls the pressure manifold repeatedly to purge any remaining pressure in the lines until the pressure gauge on the gas tank or air supply reads zero (approximately 10-15 times).