4700 Reader User's Manual

Designed for use with Neogen's Veratox®, BioKits and GeneQuence® microwell test kits

The 4700 Reader is a compact, economical, stand-alone microstrip reader. Its streamlined design offers a touch screen interface, superb optics, onboard curve-fitting software, and built-in printer to meet the requirements of modern laboratories.

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Section 1. Installation

1.1 Unpacking and installation

1. Carefully unpack the instrument, removing it from its plastic bag. Report any damage to the freight carrier at once. **NOTE**: Retain the original packing material for future use in the event that the instrument is shipped to another location or returned for service.

2. Place the instrument on a flat working surface capable of safely supporting the weight of the instrument (approximately 5 lbs. (2.3 kg)). A clearance of at least 3 inches around the instrument is required to ensure optimal ventilation. The instrument should be operated within an ambient temperature range of 18–35°C and at humidity of less than 85%.

3. Ensure the power switch on the back of the unit is in the off (down) position before connecting the power cord to the power supply.

4. With the power switch in the **Off** (down) position, insert the DC connector attached to the end of the power supply module cable to the instrument. Insert the mating end of the AC power cord to the inlet of the power supply module, and plug the other end of the AC power cord into an AC outlet. Use only the power cord and supply module specified for this product and certified for the country of use.

   - For 110–120 V used in the United States, use the supplied UL listed cord set consisting of an 18 AWG, Type SPT-1 two conductor cord maximum 3 meters (10 feet) in length, rated 7 A, 125 V, with a polarized parallel blade type attachment plug.

   - For 220–240 V used inside the United States, use a UL listed cord as above, except rated 250 V.

   - For other locations, use the power cord certified for the country of use.

1.2 Load paper

1. Locate the roll of thermal printer paper (Neogen item 9319).

2. Lift the printer paper compartment lid and open the printer compartment.

3. Place the paper roll in the well so the leading edge of the paper feeds toward the front of the printer from the bottom of the paper roll.

4. Pull up at least 1 inch of paper and then press the compartment cover down until it snaps closed.

Section 2. Set up

2.1 Starting the reader

1. Turn the power switch, which is located on the power supply module, On. The printer will print several lines. If the reader does not print, then the internal printer is disabled. To enable printing, go to **Settings** to turn printer **On**.

2. Refer to the Veratox Software for Windows instruction manual version 3.3 or newer for setting up the USB connection.

2.2 Using the touch screen

The touch screen can be manipulated using the stylus or by touch. Icons also can be selected by tapping the stylus on the screen.

2.3 The home screen

The home screen has several icons:

1. **Run test:** Contains preprogrammed tests used to read samples.

2. **Manage tests**: Contains options for creating, editing, restoring and deleting tests.

3. **Settings**: Contains time and date, printer and strip format settings.

4. **Utilities**: Contains options to erase all tests, change access levels, adjust filter voltages and recall calibration.

5. **Lamp**: Touching this icon will turn the lamp on or off.

6. **FF**: Touching this icon will feed paper through the slot.
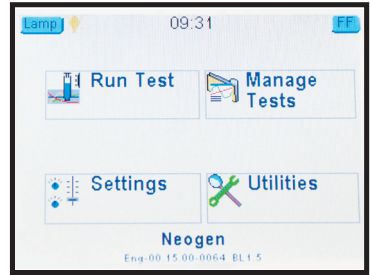
2.4 Utility menu

1. **Change access level:** To change the access level, contact Neogen Technical Services for a passcode.

2. **Show version details**: Touching this icon will display the current firmware version, model, serial number, build date and current time.

3. **Erase all tests**: Touch this icon to erase all tests. The reader will prompt the user to "Please confirm: Erase all tests?" **CAUTION**: Selecting **OK** will delete all tests.

4. **Recall calibration**: Allows user to restore the original factory settings, including calibration.
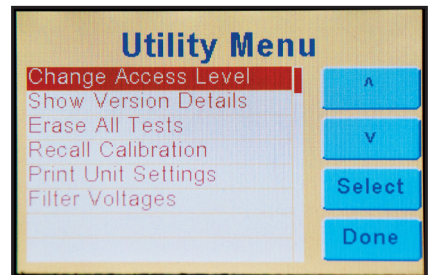
5. **Print unit settings**: Prints all information about an individual instrument's calibration settings and other information.

6. **Filter voltages**: Displays real-time filter wheel voltages with an option to print them.

Section 3. Running the test

1. Run the assay according to the **Directions for use** supplied with the test kit. Results should be processed by the reader within **20 minutes** of completion of the test to ensure accuracy.

Section 4. Reading and calculating results

1. Wipe bottom of microwells clean before reading.

2. Insert wells into the far right slot of the well holder with the zero in the top position. Place any additional strips in positions B and C.

3. Position the carrier to the left so strip A is in the center of the track.

4. Use the **Run Test** key to access the user test menu. The instrument will display the 33 preprogrammed tests. Arrow up "^" or down "v" to scroll, and page forward using">>" or page back using"<<" to move through the list. Or select "**By #,**" and enter the test number and press **Enter**.

5. Confirm the test selection or press **No** to select a different test.

6. To print the test menu select the **Manage Tests** icon then **Print Test List**.

7. One curve may be used to calculate up to 24 wells, but under no circumstances should a curve from one run be used to calculate samples that have not been run at the same time as the standard curve.

8. After selecting a test there will be three options — accept the test selected, limit the number of wells to read, or quit the test.

9. If the correlation coefficient is < 0.980, the message "Invalid! r < 0.98" will be printed at the end of the run. Results should be considered invalid if this message appears.

	Neogen Menu							
	Test name	**Control values**						**Unit of measure**
1	Aflatoxin	0.0	5.0	15.0	50.0	—	—	ppb
2	Aflatoxin HS	0.0	1.0	2.0	4.0	8.0	—	ppb
3	Aflatoxin M1	0.0	5.0	15.0	30.0	60.0	100	ppt
4	Aflatoxin HS MAX	0.0	1.0	3.0	5.0	10.0	—	ppb
5	DON	0.0	0.5	1.0	2.0	6.0	—	ppm
6	DON HS	0.0	25.0	50.0	100.0	250.0	—	ppb
7	DON NE	0.0	0.25	0.5	1.0	2.0	—	ppm
8	Fumonisin 5/10	0.0	0.25	1.0	3.0	6.0	—	ppm
9	Fumonisin 10/10	0.0	1.0	2.0	4.0	6.0	—	ppm
10	Fumonisin HS	0.0	50.0	100.0	300.0	600.0	—	ppb
11	Zearalenone	0.0	25.0	75.0	150.0	500.0	—	ppb
12	T-2/HT-2 Toxins	0.0	25.0	50.0	100.0	250.0	—	ppb
13	Ochratoxin	0.0	2.0	5.0	10.0	25.0	—	ppb
14	Histamine	0.0	2.5	10.0	20.0	50.0	—	ppm
15	Peanut Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
16	Almond Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
17	Egg Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
18	Total Milk Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
19	Casein Allergen	0.0	2.5	5.0	10.0	15.0	—	ppm
20	Gliadin	0.0	5.0	10.0	20.0	50.0	—	ppb
21	Soy Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
22	Hazelnut Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
23	Giladin (2.5–40)	0.0	2.5	5.0	10.0	20.0	40.0	ppm
24	Gliadin (5–40)	0.0	5.0	10.0	20.0	40.0	—	ppm
25	Coconut	0.0	1.0	2.5	5.0	10.0	25.0	ppm
26	Mustard Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
27	Crustacea Allergen	0.0	2.5	5.0	10.0	25.0	—	ppm
28	Veratox Sesame	0.0	2.5	5	10	25	—	ppm
29	BioKits Walnut	0.0	2.4	6.0	12.0	60.0	120.0	ppm
30	GeneQuence	See Section 5						
31	Absorbance 450 nm							
32	Absorbance 650 nm							
33	Dri Dye							

NOTE: Neogen's Veratox format tests have been preprogrammed for convenience. To enter new test parameters or change an existing test, see Sections 8 and 9.

Section 5. Reading and calculating GeneQuence results

1. From the **Home** screen, select **Run Test**. Select GeneQuence and confirm the selection.

2. Press **Accept**. The reader then will prompt the user to "Set the carrier to the first strip, then press OK." Once the carrier is set, press OK.

3. If NC $\geq$ 0.15, the test will be invalid.

4. If PC $\leq$ 1.0, the test will be invalid.

Section 6. Maintenance

It is important to follow the installation instructions carefully, using only a suitable power supply, surge protector and placing the instrument with the proper clearance for good air circulation around it. Excessive vibration should be avoided. During shipments, use the original packing material or other suitable protective foam.

The Neogen 4700 Reader essentially is a maintenance-free instrument. To ensure maximum trouble-free operation, the instrument need only be kept dry. Although the filters are well sealed, their life may be decreased if the instrument is maintained in a very humid environment (greater than 80% humidity). Using the instrument in an air-conditioned room is recommended for humid climates. Extreme temperature shock also is harmful to the filters. Maximum changes of 5°C per minute are recommended especially at the lower limits of -50°C, where permanent damage may occur. The reader is designed for use at 20°C and performs according to specifications in the range of 10–50°C.

Cleaning should be done only when obviously necessary. Use a dry cloth or duster to remove dust and dirt. Use a slightly damp, soft cloth to clean up spills. Water or 70% isopropanol may be used to dampen the cloth. Use of other chemicals or abrasive scrubbing may damage the cover.

Section 7. Settings

7.1 Printer setup

For paper loading instructions, see Section 1.2. If the printer does not print several lines upon turning on the Neogen 4700 Reader, the printer is disabled. To enable the printer, go to **Settings**, followed by **Printer Setup**. The touch screen will present an **On** and **Off** option as well as the current status of the printer. To enable the printer, touch **On** using the provided stylus, followed by **Save**.
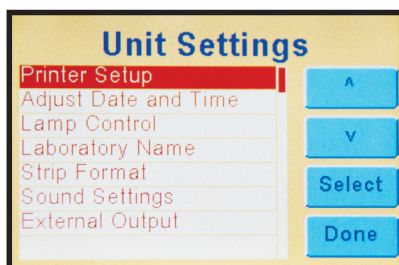
To print a list of test options, touch the **Manage Tests** icon. Press the **Print Test List** icon. The reader will print a list of the programmed tests along with their assigned test number.

7.2 Adjust date and time

To set the correct time and date, touch the **Settings** icon on the home screen. Once in **Settings,** touch the **Adjust Date and Tme** icon and hit **Select**. To edit the hour, minute and seconds fields, touch the stylus to the desired field. The screen will show the selected field. Touch the correct number and hit **Enter**. To erase an existing number use the backspace icon (**<–**) or the **Clear** icon. Once the desired number is in the field, press **Enter**. Do the same to set the month, date and year, which is located below the time settings in the **Set Time** window. Once back in the **Set Time** window, press **Save** to allow changes to take effect.

The **Set Time** window also allows users to switch the format of date between U.S. and European formats. To change the style, touch **Date Style** in the **Set Time** screen. The date will be displayed in the desired format next to the **Date Style** icon. Press **Save** for the changes to take effect.

The **Set Time** window also has a **Set Both** option. This allows users to input the month, day, and year in a MMDDYY format. After entering the numbers in the **Set Both** screen, press **Enter** followed by **Save** on the **Set Time** screen.

The **Edit** icon in the **Set Time** screen also allows users to change time and date settings.

7.3 Lamp control

The length of time the lamp will remain on before it turns off and the minimum warmup time can be adjusted by touching the **Settings** icon, followed by the **Lamp Settings**. Touch the desired fields to edit the time in seconds. Touch **Save** to implement the new settings.

7.4 Laboratory name

Users can change the name of the laboratory, which is printed upon startup. From the **Home screen**, touch **Settings**, followed by **Laboratory name**.

Press **Edit** to change the name. Once finished, touch **Enter**. To implement the name, press **Save**. To exit the menu, press **Cancel**.

7.5 Strip format

To change the strip format between 8 wells and 12 wells, touch **Settings**, followed by **Strip Format**. Touch either **8 well** or **12 well**, followed by **Save** to implement the change.

7.6 Sound settings

To access the sound settings, touch **Settings**, followed by **Sound Settings**. From here, users can turn on or off the startup sounds, icon press and release sounds, and other sounds. Users also can change the volume by touching the appropriate field. Press **Save** to implement changes.

7.7 External output

Neogen's Veratox software can be used to store and transmit data from the Neogen 4700 Reader.

To configure external output settings, touch the **Settings** icon, followed by **External Output**. Press **Select**. In the **External Output** menu, select **On**. Press **Save** to implement the changes.

Connect the smaller end (Type B) of USB cable to the type B port on the lower left backside of the reader as shown above.

Turn on the computer. Connect the larger end (Type A) of the USB port to the USB port on the computer.

For instructions on using Veratox software, see the software manual.

Section 8. Cloning tests

The clone function allows users to duplicate an existing test and assigns the next available test slot number, which allows the test to be stored.

1.   From the **Home** screen, touch the **Manage Tests** icon.

2.   Touch the **Clone Test** icon.

3.   Select the test to be cloned from the list and press **Select**. The reader will ask the selection to be confirmed. Touch **Yes** to continue or **No** to return to the list.

4.   The reader will indicate that "Test # was cloned into Test #."

5.   To edit the name of the cloned test and to alter the control values, return to the **Manage Tests** screen and select the **Edit** icon. See Section 9 for additional instructions.

Section 9. Editing preprogrammed tests

To change the settings on an already established test, follow the directions below:

1.   From the **Home** screen, touch the **Manage Tests** icon.

2.   Touch the **Edit** icon.

3. Select which test to edit by touching the test name and then **Select**. The reader will ask for the selection to be confirmed. Touch **Yes** to continue or **No** to return to the selection screen.

4. **On the first screen**, the reader will display the **Test Definition** screen where the test name, mode, filters and blanks can be edited. To edit the fields, either touch the desired field with the stylus or use the **Edit** icon. Once finished editing the fields, touch the double arrow icon to move to the next page. The reader will save any changes that have been made.

   a. Enter the name of the test (e.g., Aflatoxin test). Touch **Enter** to submit the name.

   b. Touch the **Mode** field. Select the desired test mode by touching the appropriate field and then hitting **Select**. (For more information on the different modes, see Section 13).

   c. Select the filters by touching the **Primary Filter** and the **Differential Filter** icons and choosing the appropriate number. Touch **Select** to implement.

   d. Choose whether blanks will be used and the number of replicates by touching the **Blank** field. After choosing the desired settings, touch **Select**.

   On the second screen:

   a. **Standards**: Select the number of standards for the new assay.

   b. **# Std. replicates**: If the assay will run standards in duplicate, select "2". Otherwise, the default "1" will be used.

   c. **Axes**: The default will set absorbance on the Y axis and the concentration on the X axis.

   d. **Normal control, abnormal control and other control**: These functions are parameters set up for control tolerances. It is recommended these functions remain disabled.

   On the third screen:

   a. **Interpretation mode**: This allows the user to input acceptable ranges for optical density. It is recommended these fields are left blank.

   b. **Units**: Select the appropriate unit of measure (ppm or ppb) for the assay.

   c. **Decimals**: Select the desired amount of figures to display after the decimal.

   d. **# sample replicates**: Select the number of sample replicates used in the assay. The default assumes running only one sample per microwell.

5. If using the test setting only once, touch **Run** to activate the test. To save the setting to the list of preprogrammed tests, touch the **Save** icon (a window will pop up indicating the test has been saved under a new test number). To **Print** the test settings, touch the **Print** icon.

6. To return to the **Home** screen, touch **Exit**. **NOTE**: To save test settings, make sure to touch **Save** before exiting.

Section 10. Programming new test parameters

1. For ease of use, Neogen recommends users clone tests rather than programming new parameters. For details on cloning tests, see Section 8.

Section 11. Deleting tests

1. From the Home screen, touch the **Manage tests** icon.

2. Select **Delete test**.

3. Select a test from the list to delete by touching the desired test name.

4. The reader will ask the selection be confirmed. Touch **Yes** to continue or **No** to return to the list.

5. The reader will indicate that "Test # has been deleted."

Section 12. Restore tests

Users can choose to restore one of the preprogrammed tests or to restore all of the preprogrammed tests if they have been deleted. **NOTE**: If a user-programmed test exists in place of preprogrammed test, the restore function will overwrite the user programmed test.

1. From the **Home** screen, touch the **Manage tests** icon.

2. Select **Restore tests**. A message will appear reading, "Warning! Preprogrammed tests will overwrite user tests with the same number. Continue?" Touch **Yes** to continue or **No** to return to the **Manage Tests** screen.

3. The user then will be prompted to, "Restore just one test?" To choose, touch **Yes**. To restore all tests, press **No**. If **No** is chosen, the reader then will restore all preprogrammed tests.

4. If only restoring one test, the reader will ask for the number of the test to be restored. Input the number of the test to restore and press **Enter**.
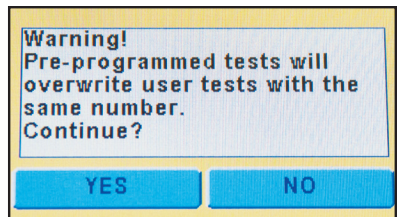
Section 13. Modes

For more detail on using each mode, please reference the additional Neogen 4700 Reader manual that came with the reader.

1. **Absorbance:** This mode reads and prints the monochromatic or bichromatic differential absorbance at the user-selected wavelengths. Blanks are optional. Most assays require a mode other than absorbance mode as no calculations are made in this mode —only absorbance values are reported.

2. **Factor**: In this mode, the endpoint absorbance readings will be multiplied by a user-entered factor to calculate a result.

3. **Single standard**: This mode reads a calibrator and calculates concentrations based on a single point standard curve passing through the point (0,0). A blank is required to determine the (0,0) point. A factor (equal to the concentration of calibrator plus the absorbance of calibrator) is generated in this mode, and then multiplied by subsequent absorbance readings to determine concentrations.

4. **Point-to-point**: The microstrip reader accepts a number of calibrators and calculates concentrations based on the point-to-point calibration curve. Calibrator materials of known concentrations are used to calibrate the reader so concentration of unknown samples may be calculated.

5. **Regression**: In this mode, the instrument accepts a number of calibrators and calculates concentration values based on a best-fit curve (linear regression).

6. **Cubic spline:** Cubic spline mode accepts a number of calibrators and calculates concentrations based on the cubic spline (constrained) calibration curve. Calibrator material of known concentrations are used to calibrate the reader so concentrations of unknown samples are calculated from the generated curve. The resulting curve is a smooth curve connecting the calibrator points, which may be entered in ascending or descending order of absorbance.

Section 14. Troubleshooting

For error message definitions and common questions, see the additional Neogen 4700 Reader owners manual that came with the reader.

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