

SOP#:010	Date Issued: 8/03/2021	Date Revised: 7/082022
TITLE:	MAGPIX Multiplex Genomics and Proteomics Analyzer	
SCOPE:	Research Personnel	
RESPONSIBILITY:	BORC staff	
PURPOSE:	To outline the proper procedures for use and maintenance of the MAGPIX Multiplex Genomics and Proteomics Analyzer.	

1 PURPOSE

This SOP explains how to use MAGPIX Multiplex Genomics and Proteomics Analyzer to perform high-throughput genomics and proteomics analysis.

2 RESPONSIBILITY

It is the responsibility of the BORC staff to ensure that equipment is appropriately cleaned, maintained in good working order, and available for research personnel as requested.

3 BEFORE CONDUCTING YOUR EXPERIMENT

Luminex recommends daily **performance verification** and weekly **calibration** of MAGPIX system.

4 PROCEDURES

4.1 Power on the System

- 4.1.1. Turn on the hard power switch, which is located at the lower right back corner of the MAGPIX.
- 4.1.2 When you are ready to begin testing, turn on the soft power switch on the front of the MAGPIX. The blue LED in the hexagonal window lights up as confirmation that the power is on. The MAGPIX requires approximately 45 seconds to start up.

4.2 Log into the Software

- 4.2.1 On the PC desktop, double-click the Luminex xPONENT icon. If this is the first time you have started the software, read the User License Agreement. Select I accept the terms of this license agreement, then click OK.
- 4.2.2. Enter your User ID on the System Login tab.
- 4.2.3. Enter your password if you are using a secure version of the software.
- 4.2.4. Click Log In..

4.3 Adjust the Sample Probe Height

Ensure that there is no liquid in the wells or reservoirs before adjusting the sample probe height. Adjust the sample probe height to ensure that the sample probe drops far enough

in the well to acquire sample. When you adjust and save the probe height settings for all three areas under a plate name, all areas retain the adjustment.

- 4.3.1. From the Home page, under Daily Activities, click Probe and Heater.
- 4.3.2. On the Probe and Heater tab select well D6 (this is the center of a standard 96-well plate) on the plate image. A green pin marks the selected well.
- 4.3.3. Based on the type of plate you are using, place alignment disks or an alignment sphere in the well.
 - for a standard 96-well plate - None
 - for a filter-bottom plate - two 5.08 mm disks
 - for Mylar-bottom plate - two 5.08 mm disks
 - for a conical (v-bottom) plate - one sphere
- 4.3.4. Click Eject.
- 4.3.5. Place the off-plate reagent block on the plate carrier. Make sure the plate is well seated so that it clips into place.
- 4.3.6. Place a strip well (provided with the Calibration and Performance Verification kit) in the off-plate reagent block.
- 4.3.7. In the Strip Wells section, select SD1.
- 4.3.8. Verify that the reservoir is empty.
- 4.3.9. In the Reservoir section, select well RB1.
 - Verify that the plate is not warped. Warped plates can lead to incorrect probe height adjustment
- 4.3.10. Place the plate on the plate carrier with well A1 positioned as indicated on the plate carrier.
- 4.3.11. Click Retract.
- 4.3.12. Enter a name for the plate in the Plate Name box.
- 4.3.13. Click Auto Adjust Height. The sample probe automatically adjusts itself to the locations you chose. The sample probe height is automatically set to 0.98 mm. The sample probe automatically adjusts this distance from the bottom of the plate, or calibration disks or spheres.
- 4.3.14. Click Eject. If you used alignment disks or spheres, remove them from the plate.

4.4 Revive After Storage routine:

The Revive After Storage routine is necessary when the system runs for the first time and is recommended when the system has been idle for more than a week. After you have adjusted the sample probe height, run the Revive After Storage (Luminex) routine.

- 4.4.1 Navigate to the **Maintenance** page > **Cmds & Routines** tab. From the **Routine Name** drop-down menu, choose **Revive After Storage** (Luminex). The Revive After Storage routine performs the following commands: Prime; Rinse; Alcohol Flush I; Backflush; Wash.
- 4.4.2. Click **Eject**.
- 4.4.3. Fill reservoir RB1 3/4 full of 70% isopropanol or 70% ethanol. NOTE: The rinse reservoir (RD1) should be empty.
- 4.4.4. Click **Retract**.

4.4.5. Click **Run**.

4.5 Calibrate the system

Calibration normalizes the settings for the system and ensures optimal and consistent microsphere classification.

- 4.5.1. From the Home page, click System Initialization. The Auto Maint tab displays.
- 4.5.2. Select Calibration Verification option under Automated Maintenance Options.
- 4.5.3. Choose the appropriate calibration kit from the drop-down menu.
- 4.5.4. Vortex the xMAP® calibrator and fluidics bottles at a medium speed for approximately 10 seconds to ensure homo-geneity. Do not dilute the xMAP calibrator or fluidics agents.
- 4.5.5. Click **Eject**. NOTE: The plate layout in the software indicates reagent locations.
- 4.5.6. Fill the appropriate reservoirs 3/4 full of DI water and 3/4 full of 70% isopropanol or 70% ethanol. NOTE: The plate layout in the software indicates reagent locations.
- 4.5.7. Invert the calibrator vial perpendicular to the strip well to ensure you get the necessary bead count.
- 4.5.8. Add 6 drops of the reagent into the designated well
- 4.5.9. Fill reservoir RB1 3/4 full of 70% isopropanol or 70% ethanol. The rinse reservoir (RD1) should be empty.
- 4.5.10. Click **Retract**.
- 4.5.11. Click **Run**. Once complete, click **OK**.

4.6 Verify the System

The MAGPIX® Performance Verification Kit includes reagents to verify the calibration and optical integrity for the MAGPIX system as well as reagents to verify the fluidics channels using observations of pressure, flow rate, bead count and well-to-well carryover. Verification uses system controls to ensure that the instrument is functioning properly with current calibration settings.

Run the Performance Verification routine as part of your daily startup routine. Refer to your assay kit instructions for additional calibration frequency requirements.

- 4.6.1. From the Home page, click **System Initialization**. The **Auto Maint** tab displays.
- 4.6.2. Select the **Performance Verification** option under **Automated Maintenance Options**.
- 4.6.3. Choose the appropriate performance verification kit from the drop-down menu.
- 4.6.4. Vortex the verification reagents and fluidics bottles at a medium speed for approximately 10 seconds to ensure homogeneity. Do not dilute the xMAP verification or fluidics agents

- 4.6.5. Click **Eject**. NOTE: The plate layout in the software indicates reagent locations.
- 4.6.6. Add 6 drops of each reagent into the designated well.
- 4.6.7. Fill reservoir RB1 3/4 full of 70% isopropanol or 70% ethanol. The rinse reservoir (RD1) should be empty.
- 4.6.8. Click **Retract**.
- 4.6.9. Click **Run**.

4.7 Import Calibration or Performance Verification Kits

- 4.7.1. Load the CAL/VER CD (provided with the kit) on the computer.
- 4.7.2. From the Home page, click **System Initialization**.
- 4.7.3. Click Import Kit at the bottom right side of the window. The Import Calibration or Performance Kit dialog box opens.
- 4.7.4. Choose the MPX folder and click Open.
- 4.7.5. Choose the *.lxl file and click Open.
- 4.7.6. Click OK.

4.8 Delete Calibration or Performance Verification Kits

- 4.8.1. Navigate to the Maintenance page > Lot Management tab.
- 4.8.2. In the **Active Reagents** section, choose the kit you want to delete from the Calibration Kit or Performance Verification Kit drop-down menus.
- 4.8.3. Click Delete Kit.
- 4.8.4. Click OK in the Delete Kit dialog box to confirm you want to delete the kit.

4.9. Create a New Protocol

NOTE: When running a kit with a provided protocol, the protocol for the assay must be run as instructed in the assay's package insert.

- 4.9.1. Navigate to the Protocols page > Protocols tab > click Create New Protocol.
- 4.9.2. On the Settings subtab, fill in the details of the assay for proper analysis.
 - a. Enter the Name of the protocol.
 - b. The Version field defaults to 1.
 - c. Enter the Manufacturer.
 - d. Enter a Description.
 - e. Enter the Volume for the instrument to aspirate into the system.
 - f. Select Enabled to enable the XY Heater and then enter the value in degrees C.
 - g. Choose the Plate Name that was assigned to the plate during probe height adjustment.
 - h. Select Sample Wash to wash the samples.
 - i. For Analysis Type, choose the type of protocol you want - None, Qualitative, or Quantitative.

- j. If you chose quantitative analysis type, enter the **Number of Standards** that apply to the protocol. If you chose qualitative analysis type, the field defaults to 1 and is un-editable.
- k. If you chose qualitative or quantitative analysis type, enter the Number of Controls that apply to the protocol.
- l. If you chose quantitative analysis type, select the option of Fit of All Standards or Mean of Replicates to apply to the protocol.
- m. Select Analyze results while acquiring samples to view the results while the samples are being analyzed.
- n. Select Use External Analysis Program, if you plan to use an external analysis program to analyze the results. If you chose to use an external analysis program, the Analysis Program drop-down menu enables for you to choose a program.
- o. Once all the settings have been chosen on the Settings subtab, click Next.

4.9.3 On the Analytes subtab, fill in the details of the assay for proper analysis.

- a. Select the analytes in the analytes grid.
- b. For Default Analysis, click Change to change the default analysis.
- c. For Units, enter the desired units for the analytes. If the units applies to all analytes, click Apply All.
- d. For Count, enter the desired bead count the instrument will analyze from the sample until it has reached the count chosen for each bead region. If the bead count applies to all analytes, click Apply All.
- e. Click in the Name field of each analyte, and enter a new name if you choose.
- f. Once you are done setting up the Analytes tab, click Next.

4.9.4 On the Plate Layout subtab, fill in the details of the assay for proper analysis, or click Save if you chose None for the analysis type.

- a. Select the wells in the plate image, assign well commands to the selected wells, and then choose the Replicate Count and Grouping.
- b. If you have more than one plate, click Add Plate to add another plate.
- c. Choose the Direction to run the plate commands.
- d. Click Import List to import an existing command sequence list.
- e. Click Save.

4.10 Create a New Batch from an Existing Protocol

When running a kit with a provided protocol, the protocol for the assay must be run as instructed in the assay's package insert.

4.10.1. Navigate to the Batches page > Batches tab > click Create a New Batch from an existing Protocol

4.10.2. Enter the batch name in the Batch Name field.

4.10.3. Enter a description about the batch in the Enter Optional Description field.

4.10.4. Choose a protocol in the Select a Protocol list.

4.10.5. Click Next. If the protocol uses standards, controls, or both, the Stds & Ctrl's subtab displays the details of the active reagents. Click Next. If the chosen protocol does not use standards or controls, the Plate Layout subtab displays.

- 4.10.6. Assign standards, controls, samples, or well commands for this batch on the Plate Layout subtab.
 - a. If you need to define a replicate count, choose the Replicate Count before adding a well command.
 - i. Choose the Grouping - 123123123 OR 111222333 - to define how the replicate count is laid out in the plate wells. Grouping selection must be made before adding a well command.
 - b. In the plate image, click and drag to highlight a series of wells, click a column or row header to highlight the entire column or row, or click and highlight different wells and then click a command to assign that command to the highlighted wells. Each command is associated with a color.
 - i. Before adding well commands, delete all standards from the plate layout if any of the standards need to be rearranged. Delete all controls from the plate layout if any of the controls need to be rearranged.
 - ii. If you need to change the acquisition order of a command in the plate, select the command in the Command Sequence list, and click the Move Command arrows, up or down.
 - iii. To begin acquisition at a well other than A1, select the well you want to begin acquisition, and click Start at Well
 - c. Select a well and then choose Add, Delete, Pre-Batch Routine, or Post-Batch Routine, as applicable. NOTE: Wells and commands you assign to the protocol plate layout are saved into the protocol settings and execute each time you use the protocol to run a batch. Standards and controls associated with a given pro-tocol typically remain constant, while the number of unknown wells often varies. You can assign a specific number of unknown wells to the plate when setting up a batch. NOTE: If you need to add multiple plates to the batch, click Add Plate to add another plate.
- 4.10.7. Specify the direction to run the plate commands by selecting either vertically or horizontally. The selected direction also dictates how wells are added to the plate when assigning multiple unknowns, standards, and controls at one time.
- 4.10.8. Click **Run** Batch to begin batch acquisition, or click Save to save batch information to the Pending Batch list to be run at a later time. If the batch spans more than one plate, the tray ejects automatically when all defined wells have been acquired. A dialog box displays, prompting you to insert the next plate.

4.11 Analyzing the results

- 4.11.1 View the Results
 1. Navigate to the Results page > Current Batch tab.
 2. On the Current Batch tab you can view results, statistics, and log information related to the current batch, and per-form statistical analysis on the batch results.
- 4.11.2 View Sample Details
 1. Navigate to the Results page > Saved Batches tab.

2. Choose the desired batch from the Completed Batches list and click Open.
 3. Click the Sample Details subtab.
 4. If you are using an LIS-licensed package of the software, click transmit to transmit sample details to the LIS data-base. You can transmit either a single analyte per sample or the entire sample.
- 4.11.3 Generate Reports
1. Navigate to the Results page>Reports tab
 2. From the Report drop-down menu, choose the category of report: Batch, Protocol, Calibration and Verification, Performance Verification, System Log, or Advanced. Depending on what you choose in the Report list, the content of the Type list changes and other features will display in the window.
 3. From the Type drop-down menu, choose the specific report type.
 - a. If you choose either a Batch report or a Protocol report, select the specific batch or protocol from the list.
 - b. If the report you chose requires a date range (Calibration and Verification, Performance Verification, and Sys-tem Log), use the calendars available to establish the date range.
 4. Batch reports require a choice of analytes; select them from the Select Analytes section. Select them all using the All button; clear your selections using the Clear button.
 5. Click Generate. If the report includes multiple analytes, use the arrows above the report to move through the list of analytes.
 6. Use the Zoom drop-down menu to increase the size of the report.
- 4.11.4 Export the Batch Results
1. Navigate to the Results page > Saved Batches tab.
 2. Choose the completed batch to export and click Exp Results.
 3. In the Save As dialog box, choose an export destination for the .csv file containing your results. NOTE: The CSV files are the only human readable files. These files can be opened with Excel or similar program to analyze/view data.
 4. Click Save.
 5. In the Export Complete dialog box, click OK.

4.12 Shut Down the System

System shutdown is a standardized procedure in xPONENT® for MAGPIX® software. It includes sanitize, clean (with 0.1N NaOH), wash, and soak routines. Run the Daily Shutdown routine to prevent clogs and crystallization of salt in the sample probe. Clogs and crystallization of salt in the sample probe can cause problems with calibration, verification, and data acquisition; they can also cause sample splashing. Shut down the system properly to ensure system integrity.

- 4.12.1. From the Home page, click Shutdown. The Auto Maint tab displays.
- 4.12.2. Click Eject.
- 4.12.3. Fill reservoir RA1 3/4 full of DI water.
- 4.12.4. Fill reservoir RC1 3/4 full of 10% to 20% household bleach.
- 4.12.5. Verify that reservoir RD1 is empty.
- 4.12.6. Click Retract.

4.12.7. Click Run.

5 MAINTENANCE

Observe the following general maintenance precautions. Personnel who use, maintain, or clean the MAGPIX® should be trained in standard laboratory safety practices and should follow those practices when handling the instrument.

Samples and waste fluid can contain biohazardous material. Where exposure to biohazardous material, including in an aerosol form, exists, follow appropriate biosafety procedures, use personal protective equipment, and use ventilation devices.

Avoid contact with moving parts. Disconnect the instrument from the power source when the procedure instructs you to do so.

Do not remove the cover of MAGPIX®. All maintenance can be performed from the outside of the instrument, within the fluid compartment, or within the compartment that is accessible by opening the side access door.

5.1 Weekly Maintenance

5.1.1 Perform a Visual Inspection

Inspect the MAGPIX® weekly. Make sure the instrument is idle, so there are no moving parts. Open the MAGPIX side access door and fluid compartment door. Visually inspect for leaks, corrosion, and other signs of improper function. Check all visible tubing connections.

5.1.2 Run the Clean Routine

1. Navigate to the Maintenance page > Cmds & Routines tab.
2. Choose Clean from the Routine drop-down menu and use 0.1N sodium hydroxide (NaOH) solution.

5.1.3 Clean the Sample Probe

Avoid contact with moving parts. If a plate is running, use the software to execute Stop to avoid the possibility of exposure to moving parts. The system must not be performing any operations while you carry out this maintenance procedure.

To clean the sample probe:

1. Click STOP if a plate is running.
2. Turn off the MAGPIX® and unplug the power cord.
3. Remove the sample probe.
 - a. Open the side access door of the MAGPIX. Insert the tool in the side access door latch and turn it one quarter turn clockwise. Slide the door to the right.
 - b. Lower the sample probe assembly.
 - c. Unscrew the sample probe fitting on top of the probe completely.
 - d. Grasp the sample probe gently and push up.
 - e. Lift the sample probe out of the top of the sample probe holder.
4. Clean the sample probe using a bath sonicator or a 10 mL syringe. If you are using a bath sonicator, place the tip of the sample probe in the bath sonicator for 2 to 5 minutes of water flowing through the probe syringe or place the sample probe in a clean tube containing water which will then be placed in a bath sonicator . If

you are using a syringe, force deionized water through the tip of the sample probe and out the large end. This dislodges any debris clogging the tip.

5. Replace the sample probe and tightly screw in the sample probe fitting until it clicks.
6. Perform an automatic probe height adjustment.
NOTE: Perform an automatic probe height adjustment any time the probe is reinstalled after removal.

5.1.4 Remove Clogs

If you frequently use the MAGPIX® to test concentrated serum or other debris-ridden samples, Luminex recommends that you perform a clog removal weekly. Otherwise, perform this procedure as needed. To remove clogs:

1. Navigate to the Maintenance page > Cmds & Routines tab.
2. Choose Clean from the Routine Name drop-down menu.
3. Click Eject.
4. Fill reservoir Clean 3/4 full of sodium hydroxide (0.1N NaOH) in the of the off-plate reagent block.
5. Click Retract.
6. Click Run.

5.2 Clean the exterior surfaces monthly

1. Turn off the MAGPIX® and unplug the power cord.
2. Clean all exterior surfaces with mild detergent, followed by a 10% to 20% household bleach, followed by distilled water.
 - a. Insert the tool in the side access door latch and turn it one quarter turn clockwise. Slide the door to the right.
3. Clean all accessible surfaces with detergent, followed by a 10% to 20% household bleach, followed by distilled water.
Avoid contact with the tubing and electronic parts of the instrument.
4. Dry any unpainted metal surfaces to prevent corrosion and then close the side access door.
5. Plug in the power cord and turn on the MAGPIX.

5.3 Semi-annual maintenance

Clean the Air Filters
Replace the Syringe Seal

5.4 Annual Maintenance

Replace the Drive Fluid Filter
Replace the Sample Probe Tube

6 REFERENCES

Refer to the manufacturer's manual for additional information.

END OF DOCUMENT