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| **IMM 1.6 Maintenance Procedures for the ELx50 Automated Strip Washer** |
| **Purpose** | This procedure provides instructions for performing maintenance procedures on the ELx50 Automated Strip Washer.  |
| **Policy Statements** | * This procedure applies to all laboratory technologists who operate the ELx50 Automated Strip Washer, and to the section supervisor.
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| **Materials** | **Supplies** | **Equipment** |
|  | * Distilled water
* Lint free disposable towels
* 70% Isopropyl Alcohol
* 0.5% Bleach Solution
* Dish Soap or other mild cleaner

**•** Wash Buffer Solution:1. PBS: Phosphate-buffered saline powder (0.01M, pH 7.4 + 0.2). Each pouch contains sufficient buffer powder in one liter.2. Wash Buffer Concentrate: Five percent Tween 20 solution to be used in the wash buffer.3. Preparation: Dissolve one pouch of PBS powder in one liter of deionized or distilled water. Add the entire contents of one bottle of Wash Buffer Concentrate to the dissolved PBS. Mix well and store refrigerated between 2-10°C for up to four weeks or until signs of contamination or other visible changes occur. Wash buffer solution must be at room temperature (19-23°C) before use.**•** Tween 20®**•** yellow food coloring | * Stylus

 **•** Rubber Stopper for waste bottle (PN 4072034) **•** Vacuum inline filter (PN 48146) **•** (2) Check valve (PN 68061) **•** Manifold Gasket (PN 4072012)  |
| **Procedure** | Follow the activities in the table below for **PERFORMING ELx50 DAY OF USE MAINTENANCE.** |
|  | **Step** | **Action** | **Related Document** |
|  | 1 | **System Check;**Prepare wash buffer solution for rinsing. For all daily programs the supply bottle must contain at least 400ml of rinse solution. Make sure the waste bottle is empty and tops are secure.**Self-Test and Checksum Test**The Self-Test (**SLFCHK**) and Checksum Test (**CHKSUM**) are performed automatically whenever the instrument is turned on. They can also be performed manually from the ELx50™ Main Menu.• The **Self-Test** checks the vacuum, manifold, and manifold-to-carriermovement. UTIL TESTS SLFCHK• The **Checksum Test** compares the onboard software with internally recorded checksum values to ensure that no corruption has occurred.UTIL TESTS CHKSUM |  |
|  | 2 | **Rinse and Soak;**This program helps prevent the aspirate and dispense tubes from clogging between washes. The Rinse and Soak program rinses the wash manifold and leaves the tubes soaking in the trough for the duration of the soak.To run the RINSE\_AND\_SOAK program, start at the Main Menu and follow the washer menu paths shown below;Select MAINT Press the Option key until RINSE\_AND\_SOAK appears CONNECT RINSE AND PRESS <START> KEY MAINTENANCE RUNNING PRESS<STOP> TO QUIT.**Autoprime;**This program can be programed as an alternative to Rinse and Soak.  | Section 4-4 of the Operators Guide. |
|  | 3 | **Overnight Loop;**This program is used when the instrument is left overnight or for the weekend. The Overnight Loop program would require that the washer was plugged in and turned on.As an alternative, run the RINSE\_AND\_SOAK maintenanceprogram and turn off the instrument after the soak begins. This leaves the tubes soaking in the priming trough until the instrument is turned on again. | Section 4-5 of the Operators Guide. |
|  | 4 | **Check Waste Bottle;**Make sure the waste bottle is emptied and rinsed. |  |
|  |  | Follow the activities in the table below for **PERFORMING ELx50 MONTHLY MAINTENANCE.** |  |
|  | 1 | **Cleaning the Bottles;**Both the waste and rinse bottles should be disinfected and rinsed.This can be done using 70% Isopropyl Alcohol or a solution of 0.5% bleach. |  |
|  | 2 | **Cleaning the Manifold;**Using a lint-free disposable towel moistened with water, or with waterand mild detergent, thoroughly clean the outside of the dispense andaspirate tubes.Run hot water through both the inlet and outlet fittings. Check to see ifwater comes out of all of the dispense and aspirate tubes. If not, soak the manifold in hot soapy water and repeat. | Section 4-6 of the Operators Guide. |
|  | 3 | **Cleaning the Plate Carrier;**Turn the washer on, wait for the self-test to complete, then turn the washer off. Make sure the manifold and tubes are resting above the priming trough (“home” position).Remove the carrier:Carefully lift the carrier *front* off the rail, avoiding contact with themanifold tubes.Carefully lift the carrier *rear* off the rail, avoiding contact with themanifold tubes.Clean the carrier using soap and water or 70% isopropyl alcohol.Replace the carrier:Hold the carrier over the rail so that the trough is to the rear of thewasher.Line up the pin on the underside of the carrier with the slot on the carriertransport.Snap the two carrier clips onto the rail. The pin should sit in the slot. | Section 4-8 of the Operators Guide. |
|  | 4 | **Cleaning the Tubing and Check Valves;**In the event that the check valves become stuck or leak, you can either clean or replace them. To replace a check valve, contact BioTek Customer Service (check valve PN 68061). To clean a check valve:1. Pull the tubing off the valve and pull the valve off the syringe pump port.2. Insert the stylus into the feed end of the valve to hold it open (observe the (arrow on the valve indicating the feed direction).3. Flush with hot water. If necessary, the check valve body twists open to allow disassembly and cleaning of internal components. Note properorientation for re-assembly.4. Replace the valve and the tubing. | Section 4-8 of the Operators Guide |
|  |  | Follow the activities in the table below for **PERFORMING ELx50 Bi-Annual MAINTENANCE.** |  |
|  | 1 | **Dispense Precision Performance Test;**The Dispense Precision Testmeasures the variability of volumes dispensed from tube to tube across the manifold. A test dye solution is dispensed into amicroplate. The optical density of each well is measured at 630 nm and the background at 450 nm is subtracted to account for scratches in the plate orparticulates in the well.The average percent error is calculated, and the amount dispensed for each well is calculated and the %Coefficient of Variation (%CV). It is the %CV, or the ratio expressed in percent, of the standard deviation of the distribution of fluid volumes in the wells, to the mean value of volume per well. The lower the CV, the better the uniformity across the manifold.1. Use a clean, dry 96-well microplate.2. Prepare the washer to dispense test solution to the microplate.• The Test Solution should contain your buffer solution or 0.1% Tween® 20 in deionized water. Add 0.9 mL (12 drops) Tween 20 into 1 liter (1000 mL) of deionized water.• Add enough colored dye to the solution to produce an absorbance ofbetween 0.70 and 1.30 OD when dispensing 200 μl into the microwell. The recipe will vary, depending on dye strength. Commercial food coloring is ideal for this application.3. Prime the washer with the test solution, then run the dispense program accuracy qc test. Use the number keys to enter the number of strips to process (6 for the 8- or 8s-channel manifold and 4 for the 12-channel manifold).4. Read the plate in an absorbance reader (blank on air) using the dual wavelength method (630-450 nm), to reduce the influence of scratches and foreign particles that could be in the well. Print or export the results.**Note:** If you are using one of BioTek’s keypad-based readers, such as the ELx800™ or ELx808™, ensure that the reader is not running in Rapid mode. To check this, select UTIL 􀃎 READ and cycle through the prompts until you see READ IN RAPID MODE? then choose NO for an accurate result.5. Calculate and report the mean absorbance, standard deviation, and% Coefficient of Variation (%CV) for the group of wells that were filled.A %CV greater than 4.0% is a failure. If your result is greater than 3.0%, clean the dispense tubes with a stylus and retest.**Example:****Data:**Mean Absorbance = <OD> = 1.026Standard Deviation = SD = 0.010**Calculation:**% Coefficient of Variation = SD<OD>= 0.0101.026x 100 = 0.98%If this test does not pass on the initial attempt, use the stylus to clean the dispensetubes that have OD reading results lower than average, and then retest. | Section 4-17 of the Operators Guide. |
|  | 2 | **Residual Volume Performance Test;**1. Adjust the wash program for optimal residual. Tare a clean, dry microplate on a scale accurate to 0.005 g.2. Prime the washer with the test solution, then run dispense program accuracy qc test.3. Run the wash program.4. Weigh the microplate containing the residual.5. Calculate and report the average residual by dividing the net weight by the number of wells dispensed.Example; \_\_\_\_\_\_NW\_\_\_\_\_\_\_ = average residual # wells dispensedAverage residual must be <0.004 gms per well.For an entire plate the net weight must be <0.384 grams per 96 wells.6. If this test does not pass on the initial attempt, stylus the aspiration tubes and adjust the aspiration height and horizontal aspiration to minimize residual. Add a crosswise aspiration step if needed and then retest. | Section 4-18 of the Operators Guide. |
| **References** | 1. BIO-TEK ELx50 Automated Strip Washer Operators Guide, March 2001,

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| **Historical Record** | **Version** | **Written/Revised by:** | **Effective Date:** | **Summary of Revisions** |
| 1 | Al Quigley | 10/01/19 | Initial Version |
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