DropArray™ LT-210 MX Washing Station User Manual

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DropArray DA-Bead LT-210 MX User Manual

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General Information

Chapter Overview

- General Information
- Introduction to the LT-210MX Washing Station
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General Information

In general, this user manual has been written for the purpose of providing technical, installation, operating and troubleshooting information to the operators of the DropArray LT-210 MX Washing Stations. The content of this manual includes:

- How to unpack, set up and operate the LT-210 MX
- The principle of operation and modes of function for the LT-210 MX
- Safety features of the LT-210 MX and precautions to ensure safe operation
- Troubleshooting procedures and maintenance

Introduction to the LT-210 MX Washing Stations

The LT-210 MX provides gentle washing, and its 96 and 384 well clampers come equipped with individual magnets under each well to retain magnetic beads during the washing process. The instrument uses the novel “wall-less” technology of Curiox DropArray Microplates, which are available in 96 and 384 well formats. The instrument employs low velocity liquid exchange that ensures the retention of magnetic beads. Drainage of the wash buffer at the end of plate washing involves the automated tilting of the rinsing chamber, which ensures that the wash buffer is removed from the chamber.

Advantages

a. **Conceptual Simplicity:** Installation and operation are simple and convenient compared with other microplate washers that cater to microplates with wells. Tips are not used for liquid handling, hence parameters such as tip height and flow rates do not need to be optimized.

b. **Ease of use:** Washing cycles (the number of which can be adjusted) occur automatically following a pre-programmed process.

c. **Conservation:** There is minimal requirement for usage of assay material such as precious beads.

d. **Compactness:** The LT-210 MX is compact enough to fit on a bench or into a cell culture hood to avoid contamination.

e. **Safety:** Built-in safety features which include a plate-detection mechanism ensure the safety of the operator.

Technical Specifications

Description	Specification
Physical	
Dimensions	• 240 mm H x 375 mm W x 245 mm D (When clamper lever down) • 290 mm H x 375 mm W x 245 mm D (When clamper lever up)
Weight	• 7.5 kg (LT-210 MX instrument only) • 10 kg (LT-210 MX in packaging with accessories)
Electrical	
Voltage Requirement	100 - 220 V
Environmental†	
Operating Temperature Range	15 - 40 °C
Operating Humidity	< 80%, non-condensing
Experimental	
Plate Type‡	DropArray DA-Bead Microplates, 96- and 384-formats

† Actual values of environmental requirements have yet to be obtained from stress tests. The numerical values taken here are an estimate based on the typical operating parameters of biological devices.

‡ The LT-210 MX is exclusively compatible with proprietary DropArray DA-Bead Microplates.

Chemical Compatibility

The components exposed to fluids and reagents are composed of materials which were selected to be resistant against common chemical substances. However, some common disinfectants should not be used when decontaminating the LT-210 MX. Table 1-1 on page 4 lists the material composition of the main components of the LT-210 MX and shows some reagents which do not pose issues when in contact with these components. However, some reagents are not compatible with the component materials, and prolonged contact should be avoided to prevent corrosion and damage.

Component	Material	Approved Chemicals	Incompatible Chemicals
Clamper Body	Delrin (Polyoxymethylene)	Ethanol, benzene, soap solutions, THF, formaldehyde, propylene glycol, isopropanol, $KMnO_4$	Acetic acid, grease, ketones, ozone, phenol, ammonia, hypochlorite bleach, I_2, H_2O_2, H_3PO_4, NaOH (>50%)
External Surface of the Main Body	Stainless Steel (304)	Ethanol, benzene, chloroform, acetaldehyde, propylene glycol, isopropanol, formaldehyde, phenol, grease, $KMnO_4$, H_2O_2	Hypochlorite bleach, H_2SO_4
Some minor components of Main Body	Aluminum	Ethanol, benzene, propylene glycol, isopropanol, formaldehyde, ozone, grease, phenol, H_2O_2,	Hypochlorite bleach, soap solutions, H_2SO_4, $KMnO_4$, H_3PO_4

Table 1-1: *Chemical compatibility between the component materials in the LT-210MX, including common reagents and disinfectants. (Adapted from Ingersoll Rand Industrial Technologies, 2008 & K-mac Plastics).*

Safety

User Attention Notifications

Several user attention phrases are used throughout this manual. Each phrase should draw the following level of attention from the user:

NOTE Points out useful information.

IMPORTANT Indicates information necessary for proper instrument operation.

CAUTION Cautions users regarding potentially hazardous situations in regard to user injury or damage to the instrument if the information is not heeded.

!WARNING! Warns users that serious physical injury can result if warning precautions are not heeded.

Chemical Hazards

!WARNING! CHEMICAL HAZARD

Some chemicals used can be potentially hazardous and can cause injury or illness.

- Read and understand the Material Safety Data Sheets (MSDSs) provided by the chemical manufacturer before you store, handle, or work with any chemicals or hazardous materials.
- Minimize contact with and inhalation of chemicals. Wear appropriate personal protective equipment when handling chemicals (e.g., safety glasses, gloves, or clothing). For additional safety guidelines consult the MSDS.
- Do not leave chemical containers open.
- Check regularly for chemical leaks or spills. If a leak or spill occurs, follow the manufacturer's cleanup procedures as recommended on the MSDS.
- Comply with all local, state/provincial, or national laws and regulations related to chemical storage, handling, and disposal.

Chemical Waste Hazards

- Read and understand the Material Safety Data Sheets (MSDSs) provided by the manufacturers of the chemicals in the waste container before you store, handle, or dispose of chemical waste.
- Minimize contact with chemical waste. Wear appropriate personal protective equipment when handling chemicals (e.g., safety glasses, gloves, or clothing).
- Use precaution when emptying the waste bottle.
- Dispose of waste bottle contents in accordance with good laboratory practices and local, state/
- provincial, or national environmental and health regulations.

Material Safety Data Sheets

Some chemicals used with the LT-210 MX may be listed as hazardous. Warnings are displayed on the labels of all chemicals when hazards exist.

MSDSs provide users with safety information needed to store, handle, transport and dispose of the chemicals safely. Curiox recommends updating laboratory MSDS records periodically.

Material Safety Data Sheets for Curiox reagents are available online at www.curiox.com/downloads/ MSDS sheets or by calling 650 226-8420 in the US or +65 6507 0361 outside the US. Otherwise call the chemical manufacturer directly or visit their web site.

Instrument Safety Labels

The following safety label is located on the LT-210 MX. Label will display a safety alert symbol indicating a potential safety hazard.

Symbol	Description
	Separate collection for electrical and electronic equipment.

Table 1-2: Safety Label

Instrument Safety Features

Plate Detection

The LT-210 MX detects the presence of a DropArray Microplate. The machine will not begin operation under the following conditions:

- The Microplate/dummy plate is not detected in the clamper chamber.
- The Microplate/dummy plate is not oriented correctly.
- The machine will not operate in the SERVICE MODE (see page 29) if a plate is not detected in the clamper chamber.

Universal Power Supply

The power supply is a universal power supply (110 - 220 V) that provides 24 V DC to the LT-210MX.

Safety Precautions

CAUTION

Always power on the instrument before placing an assay plate in the LT-210 MX. If a plate is clamped in the clamper chamber before the power is on, it will cause the instrument to move straight to emergency draining (e-draining) mode. This is dangerous as the moving parts may cause injury if hands are placed on the instrument during this mode.

- At the end of a wash process, remove the plate from the clamper chamber IMMEDIATELY to prevent the wells from drying and/or deteriorating biological integrity.
- Keep the area around the power supply free from liquid.
- During active operation, keep your hands off the instrument other than using the control panel.
- Insert the Microplate/dummy plate into the clamper chamber from the right as shown in Figure 4-1. DropArray Microplates have an orientation indentation at the base of one lateral side under well A1 (Figure 4-2). Plates should be inserted into the clamper chamber with the indentation side facing away from the LT-210MX.
- If there is an unexpected error, reset the instrument by turning the power switch off and back on.

General Precautions

- Remove the Spill Tray before turning the instrument over.
- Do not use any other plate except the specified DropArray plates with the LT-210MX.
- Do not load more than one DropArray plate in the LT-210MX at a time.
- Insert a dummy plate into the clamper in between washes. This prevents excess wash buffer from dripping onto magnet array surface in between washes.
- Use only the supplied power adapter cord for electrical supply to the unit.
- Do not allow particles larger than 200 µm to enter any of the liquid tubes.
- Be careful to not let the Spill Tray overfill.
- Be careful not to spill liquid into the interior of the LT-210MX.
- Always perform a cleaning cycle with an appropriate cleaning solution after using serum-based or high salt solutions with the instrument.
- Use lint-free wipes to clean excess sample or wash buffer from the interior of the clamper chamber.

- Keep the original packaging material in case the unit should ever need to be shipped.
- Do not attempt to open or remove the instrument casing or motor parts. Doing so will void the calibration and warranty and may cause permanent damage to the instrument.
- Contact only qualified Curiox personnel for servicing of the LT-210 MX.

Prior to System Operation

Ensure that all users of the LT-210 MX have:

- Received instruction in general safety practices for laboratories
- Received instruction in specific safety practices for the instrument
- Received instruction on handling of biohazards if biohazardous materials are to be used on the system
- Read and understood all related MSDSs

CAUTION

Avoid using the LT-210 MX in a manner not specified by Curiox. While the system has been designed to protect the user, this protection may be impaired if the instrument is used improperly.

CE Mark

***Based on the testing described below and information contained herein, this instrument bears the CE mark. See the Declaration of Conformity for specific information*.**

Directive 2004/108/EC Electromagnetic Compatibility

This device has been type-tested by an independent, accredited testing laboratory and found to meet the requirements of EN 61326-1 for Emissions and Immunity.
Verification of compliance was conducted to the limits and methods of the following:

A. EN 61326-1: 2013 Emissions
    a. Harmonics Current Emission (Class A)
    b. Voltage Fluctuation/ Flicker
    c. Conducted Emission (Group 1 Class B)
    d. Radiated Emission (Electric Field) (Group 1 Class B)
B. EN 61326-1: 20143 Immunity
    a. Electrostatic Discharge Immunity
    b. RF Radiated Immunity
    c. Electrical Fast Transient/ Burst Immunity
    d. Voltage Surge Immunity
    e. Conducted Disturbance Immunity
    f. Voltage Dips & Interruptions Immunity

Directive 2006/95/EC Low –Voltage Device

This device has been verified and found to meet the requirements of Directive 2006/95/EC “electrical electronic equipment designed for use within certain voltage limits”.

Directive 2011/65/EU Restriction On the use of Hazardous Substances (ROHS)

This device has been verified and found to meet the requirements of Directive 2011/65/EU “restriction on the use of certain hazardous substances in electrical and electronic equipment”.

Directive 2012/19/EU Waste Electrical and Electronic Equipment (WEEE)

Dispose of the device according to Directive 2012/19/EU, on “waste electrical and electronic equipment (WEEE)” or local ordinances.

Customer Service and Technical Support

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Chapter 2:

Functional Description

Chapter Overview

- Introduction
- Functional Description

Introduction

This chapter gives a detailed overview of the parts of the LT-210MX and the phases which outline a typical washing process.

Functional Description

The simple digital interface located on the front left panel of the LT-210 MX allows operators to adjust the number of desired wash cycles, which will be shown numerically on the display. The main components of the LT-210 MX are shown in Figure 2-1 and Figure 2-2, and the included accessories are shown in
Figure 2-3.

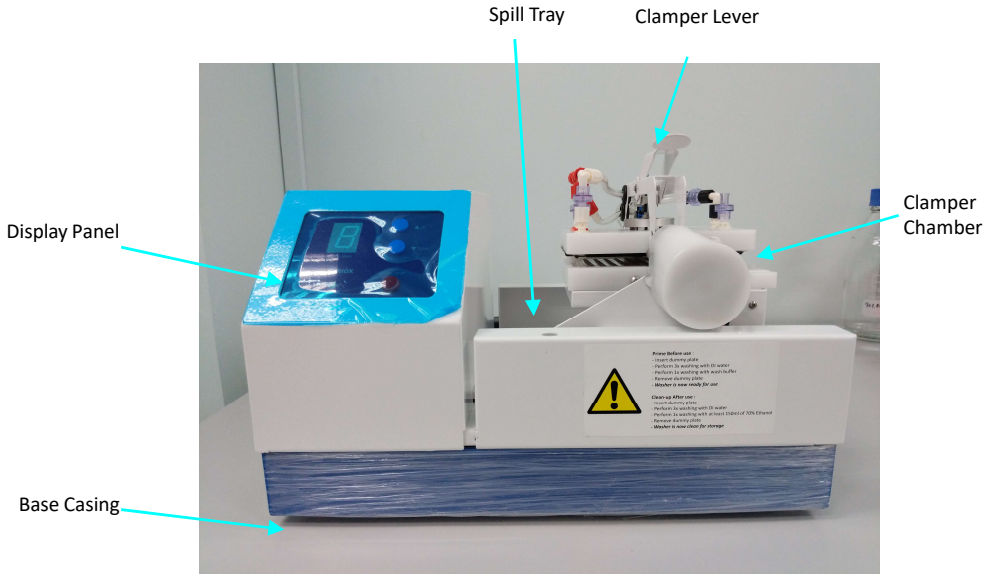

Figure 2-1: *Front view of the LT-210 MX Washing Station with main components labeled.*

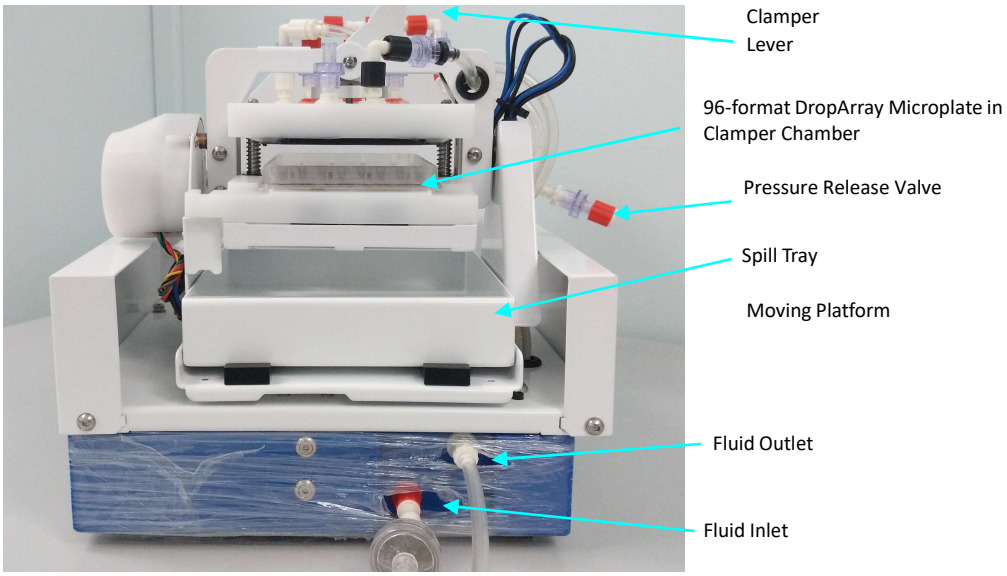

Figure 2-2: *Lateral (right side) view of the LT-210MX Washing Station with main components labeled.*

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Wash Cycle Process

Instrument Function

Each wash cycle is comprised of three phases:

- **Phase I: Addition of wash buffer.** After selecting the number of desired washes, the inlet pump will pump wash buffer into the clamper chamber (Figure 2-4).
- **Phase II: Gentle shaking.** The clamper mechanism tilts to the side. Subsequently, the washing process is initiated and the moving platform, which the clamper chamber rests on, will shake laterally to wash the plate (Figure 2-5).
- **Phase III: Drainage with tilting.** The outlet pump is activated, and all waste fluid will drain from the clamper chamber into the waste beaker (Figure 2-6).
- **Phase IV: Placing a dummy plate into clamper in between washes.** Place a dummy plate into the clamper in between washes. This prevents excess wash buffer from dripping onto magnet array surface in between washes. (Figure 2-7).

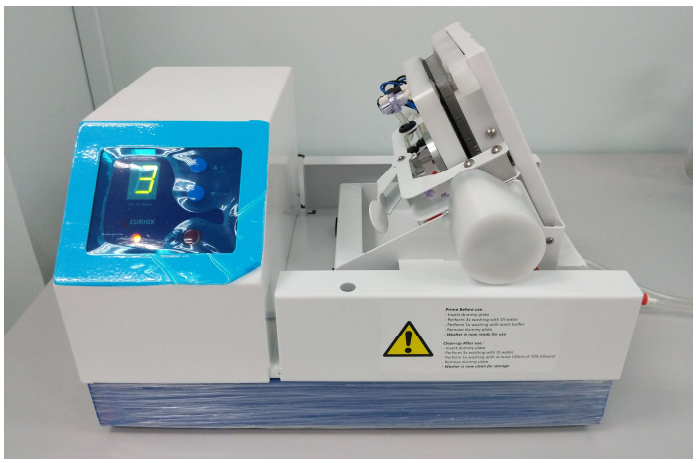

Figure 2-4: *Phase I: Addition of wash buffer.*

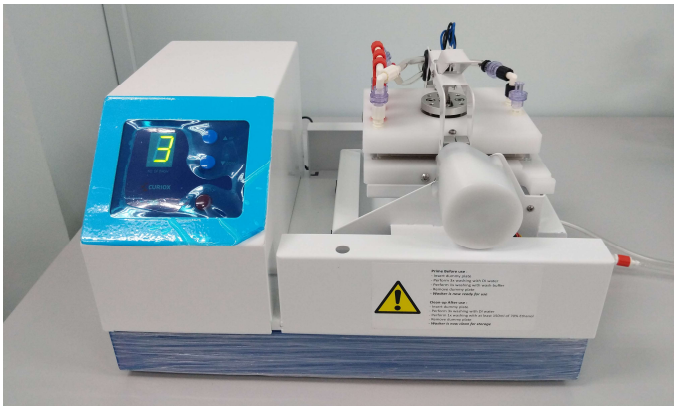

Figure 2-5: Phase II: Gentle shaking.

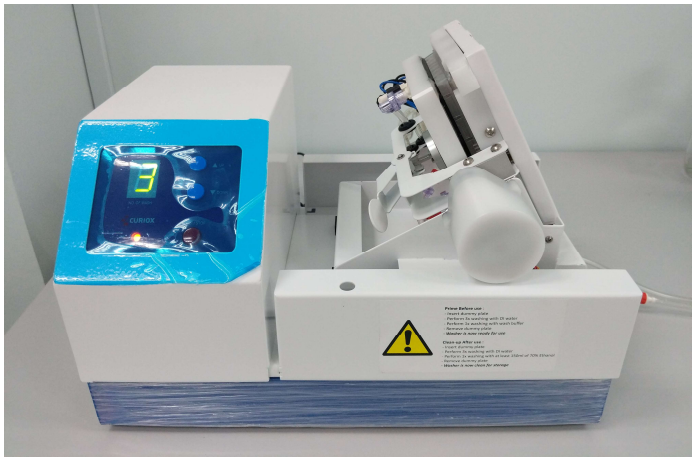

Figure 2-6: Phase III: Drainage with tilting.

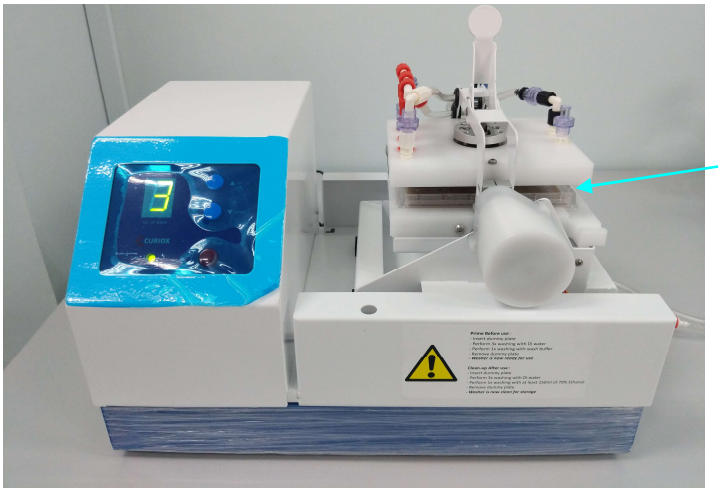

Figure 2-7: Phase IV: Place a dummy plate into the clamper in between washes.

Plate Washing

The plate wash cycle process is as follows, a schematic representation of the process is shown in Figure 2-8.

LT-210MX Applications

a. A DA-Bead Microplate is placed in the machine and properly clamped. A desired number of washes is selected, and the automated washing process is activated. The plate will next be held in the current position for 30 seconds to allow beads to settle on the well surface.

b. The plate is rotated to an angle of 120°. A bulk volume of wash buffer is then added.

c. The plate with wash buffer is then shaken in a horizontal position to mix the drops and wash buffer.

d. Additional wash buffer is added with the plate positioned at 30° to remove any remaining air in the plate.

e. The plate is then rotated to 120° and the wash buffer is drained.

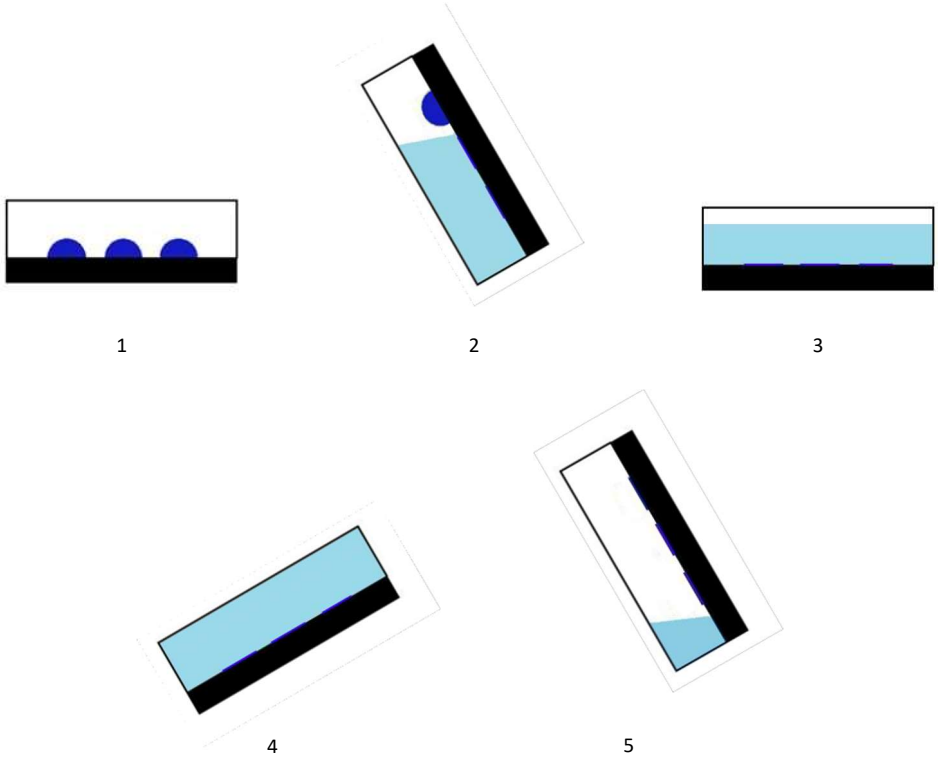

***Figure 2-9:** DropArray DA-Bead Microplate washing process on the LT-210MXMX.*

Chapter 3:

Setup

Chapter Overview

- Unpacking and Installation
- Preparation for Operation

Unpacking and Installation

Upon arrival of the LT-210 MX package, **check** if all of the parts and accessories listed below are present (Figure 3-1). Some of the components of the LT-210 MX have been secured with cable ties and brackets to protect against damage during transport. **Remove all cable ties and brackets** shown in Figure 3-2 before installing and powering up the LT-210 MX.

Checklist of parts:

- Curiox DropArray LT-210 MX Washing Station
- Power Cable with three-pin plug
- Universal Power Adapter (100 - 240 V)
- Inlet (connected with Filter) and Outlet Delivery Tubes
- Spill Tray (packed in a separate compartment from the LT-210 MX)
- Allen Wrench Set
- Dummy Plate
- User Manual in Thumb Drive
- Purple Valves (2 check valves, 2 anti-siphon valves)
- Hand Pump
- Inlet Diaphragm Pump 2 pieces

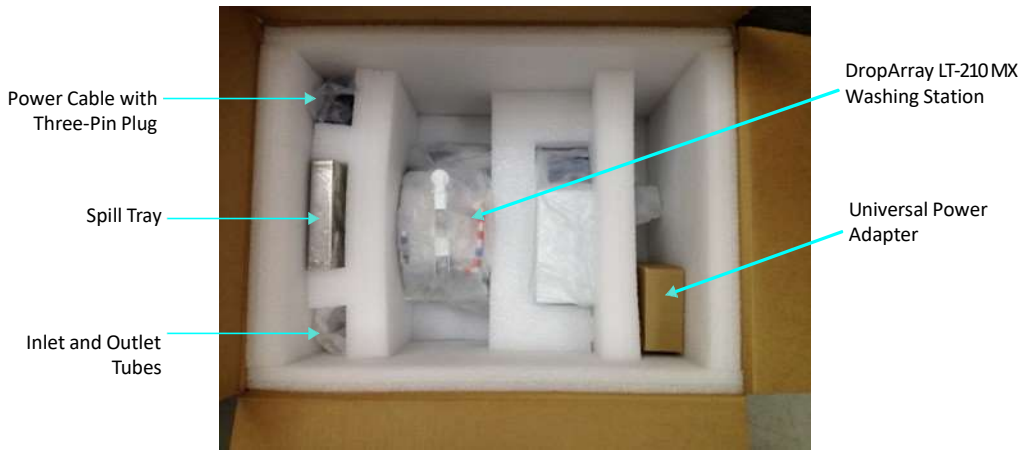

Figure 3-1: *Arrangement of the LT-210 MX Washing Station within package upon delivery.*

NOTE: The Spill Tray is packed separately from the LT-210 MX. The accessories box is packed on the bottom layer of the package.

IMPORTANT: Remove the brackets and cut the labeled cable ties as shown in Figure 3-2 before turning the LT-210 MX on.

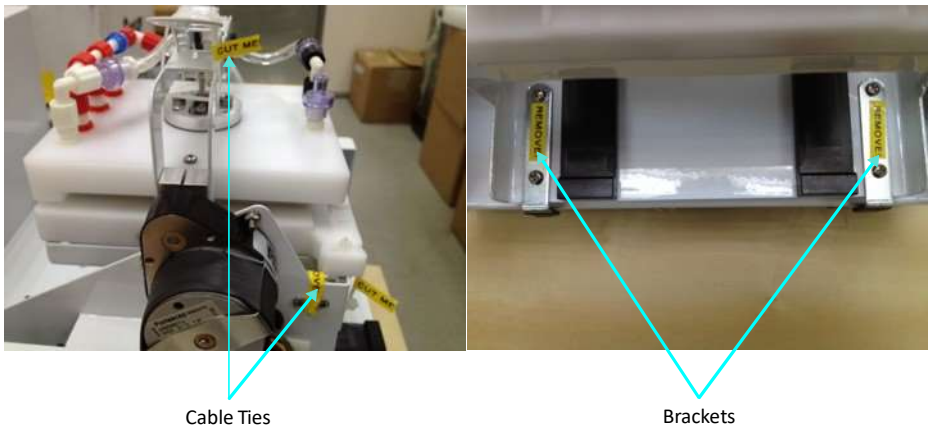

Figure 3-2: Cable ties and brackets to be removed before powering the LT-210MX on.

Installation

1. Place the LT-210 MX on a flat surface and in an environment with temperature and humidity conditions as stipulated in "Technical Specifications" on page 3. Connect the power cable to the universal power adaptor. Insert the power jack at the back of LT-210 MX as shown in Figure 3-3.

Figure 3-3: Installation Step 2.

2. Sterilize the interior of the two delivery tubes with 70% EtOH.
3. Insert the two delivery tubes to their respective ports on the LT-210 MX (Figure 3-4). Insert one end of the inlet tubing into the red port on the LT-210 MX and the other end in the wash buffer. Insert one end of the outlet tubing to the white port on the LT-210 MX and the other end into a waste container.

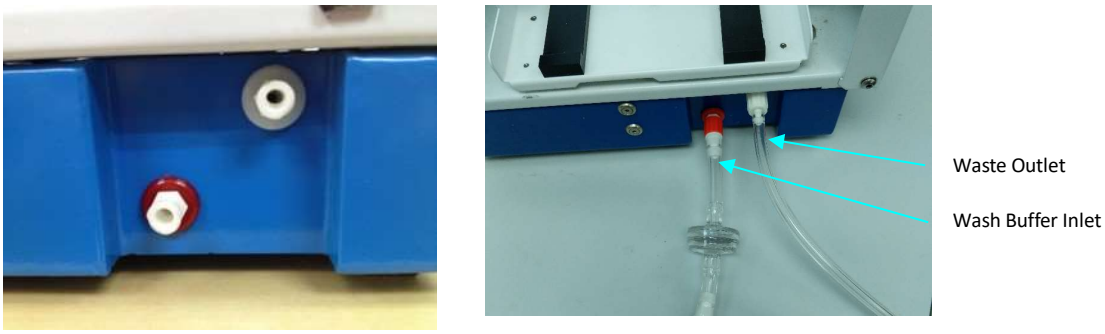

Figure 3-4: Installation Step 4.

4. Insert the spill tray between the clamper mechanism and the moving platform as shown in Figure 3-5

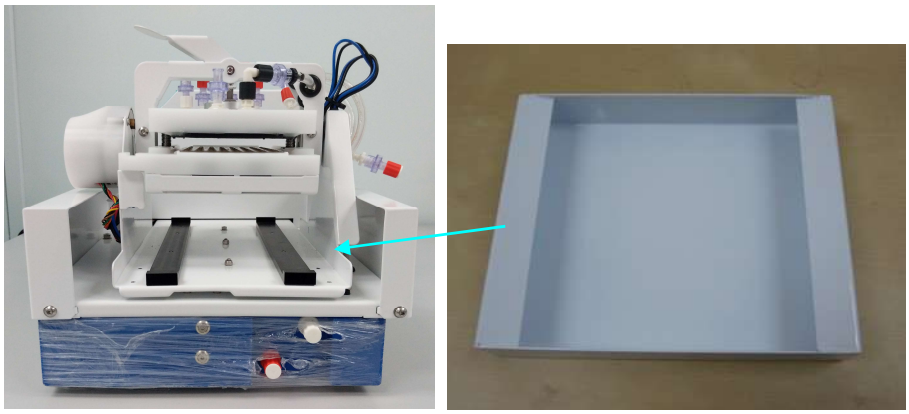

Figure 3-5: Installation Step 5.

Preparation for Operation

The delivery tubes have to be primed with fresh DI water or other compatible buffers prior to the operation of LT-210 MX. This is achieved by using a dummy plate to collect excess buffer solution resulting from the priming process.

1. Ensure the two delivery tubes have been sterilized with 70% EtOH and that they are properly connected to their respective ports (red and white) on the LT-210 MX. The other ends of the tubes should be connected to either the wash buffer container (from red port with filter) or the waste container (from white port). Refer to Figure 3-4 for a pictorial representation.

2. Ensure the power jack is connected. Power up the LT-210 MX (Figure 3-6) and wait for the homing sequence to complete.

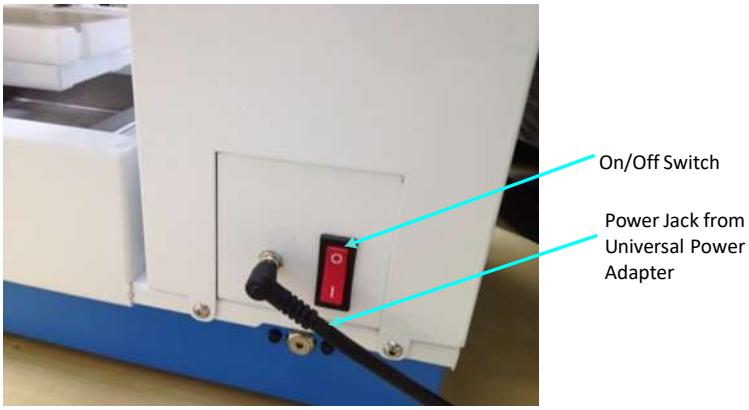

***Figure 3-6:** Rear view of LT-210MX. Preparation Step 2.*

3. Reset the Inlet Pump

   It is recommended to reset the inlet pump after long term shutdown to ensure its optimal performance. Follow the steps below for resetting the inlet pump with the use of the Hand Pump accessory provided.

   A. Disconnect the tubing with the red ring from the filter connection.

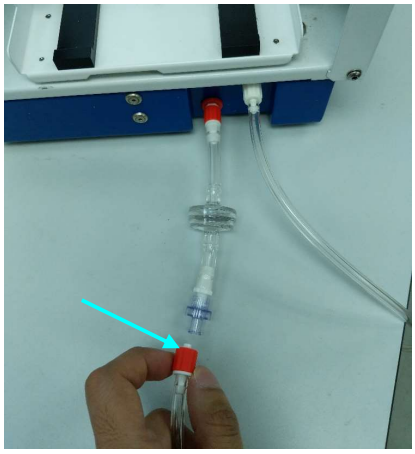

***Figure 3-7:** Disconnect Tubing*

B. Attach the Hand Pump to the filter connection (left photo). Then attach tubing to the other end of the Hand Pump (right photo).

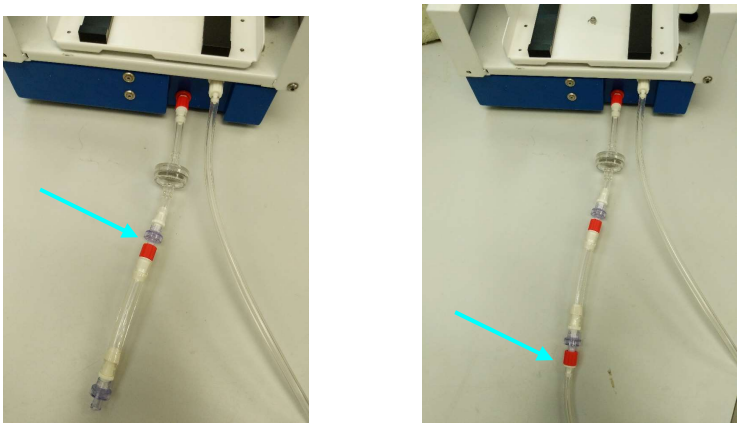

Figure 3-8: Installation of Hand Pump

C. Enter Service Mode by pressing “Up” and “Down” button simultaneously (left photo). The “No. of Wash” on the display will turn to “0” (right photo).

Figure 3-9: Enter the Service Mode

D. Press and hold the “Up” button to keep the pump running.

Figure 3-10: Press the “Up” button

E. While the pump is running, press the hand pump for about 20 times.

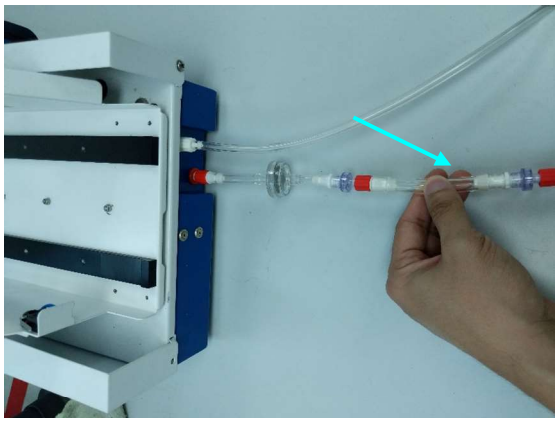

Figure 3-11: *Reset the Inlet Pump process*

F. Remove the hand pump by reversing the steps above. Exit Service Mode by pressing the "Up" and "Down" buttons simultaneously.

4. Place the dummy plate into the clamper chamber and lock it by pushing the clamper lever down and towards the user (Figure 3-7).

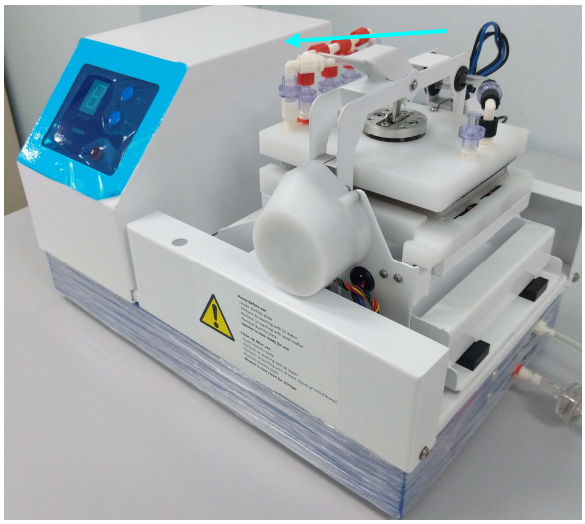

Figure 3-12: *Top view of LT-210MX. Preparation Step 3.*

NOTE: If the subsequent washing requires sterile environment, the dummy plate should be sterilized by rinsing with 70% EtOH and drying under UV before use.

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5. Push the 'Up' button to set the number of cycles to '2' on the display panel (Figure 3-8)

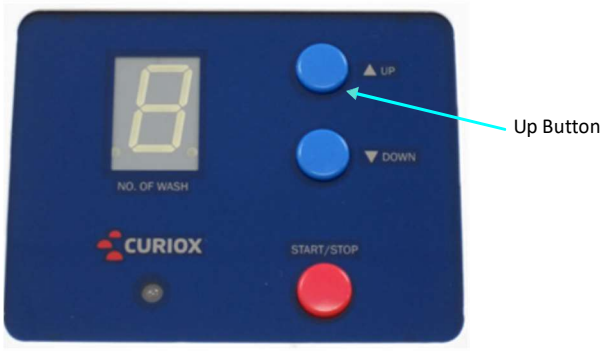

Figure 3-13: *LT-210MX Display Panel. Preparation Step 4.*

NOTE: If the instrument has been exposed to 70% EtOH previously, perform 4 wash cycles instead of 2.

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6. Press the 'Start' button to begin operation.
7. Upon end of operation, a 'beep' tone will be sounded. Unclamp and remove dummy plate.
8. The LT-210MX Washing Station is now ready for normal operation.

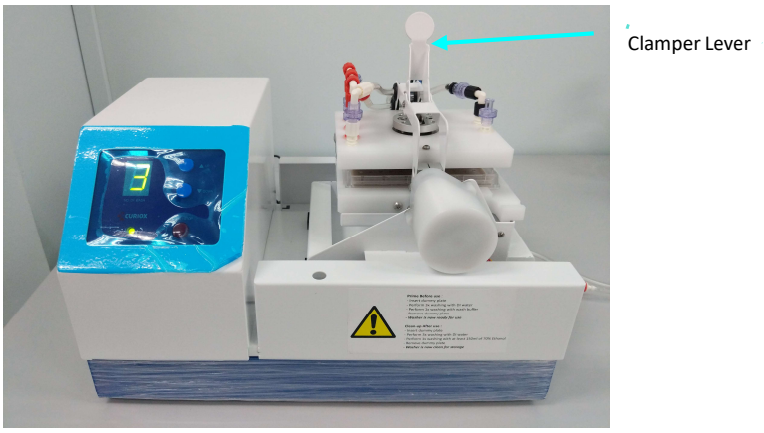

Figure 3-14: *Lateral (right side) view of LT-210MX. Preparation Step 6.*

Chapter 4:

Operation

Chapter Overview

- Before Operating the LT-210MX
- Operational Safety
- Operational Procedure
- Service Mode
- Long-Term Shutdown

Before Operating the LT-210 MX

The LT-210 MX should be placed on a flat surface and in an environment with temperature and humidity as stipulated in “Technical Specifications” on page 3.

Operational Safety

The LT-210 MX possesses the following built-in safety features which prevent the machine from operating under unsafe conditions.

Plate Detection

The LT-210 MX detects the presence of a DropArray Microplate. The machine will not begin operation under the following conditions:

- The Microplate/dummy plate is not detected in the clamper chamber.
- The Microplate/dummy plate is not oriented correctly.
- The machine will not operate in the SERVICE MODE (see page 29) if a plate is not detected in the clamper chamber.

Power Supply

The universal power adapter can accommodate electrical power in the range of 100 - 240 V. The resultant output to the LT-210 MX power jack is 24 V DC.

Emergency Draining (E-Draining)

In the event power to the LT-210 MX is cut off in the middle of a washing cycle, and subsequently turned on again, the LT-210 MX will perform draining for a duration of 30 seconds before homing.

General Precautions

In addition to the built-in safety features of the LT-210 MX, below are some precautions operators are advised to take while using the LT-210 MX in order to ensure their safety and to preserve the accuracy of the experiments.

CAUTION

Always power on the instrument before placing an assay plate in the LT-210 MX Washing Station. If a plate is clamped in the clamper chamber before the power is on, it will cause the instrument to move straight to emergency draining (e-draining) mode. This is dangerous as the moving parts may cause injury if hands are placed on the instrument during this mode.

- At the end of a wash process, remove the plate from the clamper chamber IMMEDIATELY to prevent the wells from drying and/or deteriorating biological integrity.
- Keep the area around the power supply free from liquid.
- During active operation, keep your hands off the instrument other than using the control panel.
- Insert Microplate/dummy plate into the clamper chamber from the right as shown in Figure 4-1. DropArray Microplates have an orientation indentation at the base of one lateral side under well A1 (Figure 4-2). Plates should be inserted into the clamper chamber with the indentation side facing away from the LT-210 MX.
- Insert a dummy plate into the clamper in between washes. This prevents excess wash buffer from dripping onto magnet array surface in between washes.
- If there is an unexpected error, reset the instrument by turning the power switch off and back on.
- The SERVICE MODE is an option for operators who wish to operate the LT-210 MX outside of pre-programmed parameters to allow for greater flexibility in the priming or aspiration process. (see page 29).

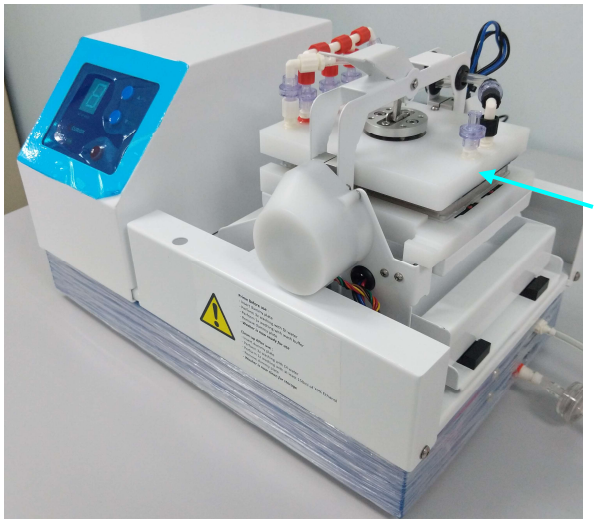

Figure 4-1: *Microplate/dummy plate insertion into the LT-210 MX clamper chamber.*

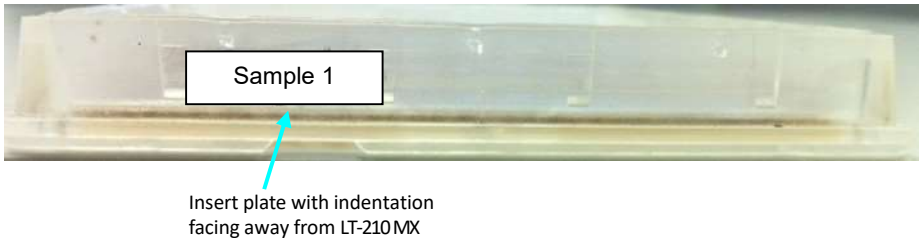

Figure 4-2: Lateral view of a DropArray Microplate.

Operational Procedure

1. Power up the machine (Figure 3-3) and wait for homing to complete.
2. Press either the 'Up' or 'Down' button to select the desired number of washes (1-9 cycles). The number of cycles will be shown in the display panel (Figure 3-8).
3. Place the assay plate into the clamper chamber and lock the clamper lever (Figure 3-7). Take note that the well A1 should be at the top left corner of the chamber when the LT-210 MX is viewed from the top-down while the operator is facing the front of the unit. An indentation located on the side of the plate just under well A1 also helps the operator to orientate the plate within the chamber correctly (Figure 4-2).

CAUTION

Always power on the instrument before placing an assay plate in the LT-210 MX Washing Station. If a plate is clamped in the clamper chamber before the power is on, it will cause the instrument to move straight to emergency draining (e-draining) mode. This is dangerous as the moving parts may cause injury if hands are placed on the instrument during this mode.

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4. Press the 'Start' button to begin operation.
5. Upon end of operation, a 'beep' tone will sound. Unclamp and remove the assay plate.

Service Mode

The SERVICE MODE allows an operator to carry out priming manually and modulate the duration of pumping of the wash buffer/fluid from the inlet tube to the chamber according to preferences.

To enter SERVICE MODE:

1. Power up the LT-210 MX and wait for the homing sequence to complete.
2. Press both the 'Up' and 'Down' buttons at the same time to enter SERVICE MODE. The display panel should show "0".
3. Insert the dummy plate into the clamper chamber and lock the clamper lever.
4. Press and hold the 'Up' button. The inlet pump will be activated for as long as the 'Up' button is pressed.
5. Release the 'Up' button when liquid is observed exiting through the outlet tubing to the waste container. This confirms that the wash buffer is flowing from the clamper chamber and draining into waste.
6. Press the 'Down' button once to activate the drain function that will remove excess liquid from the chamber.
7. Unlock the clamper lever and remove the dummy plate from the clamper chamber.

Long-Term Shutdown

In the event user wishes to keep the LT-210 MX in an unused state for an extended period which exceeds 7 days, it is advisable to carry out the following steps to clean and purge the delivery tubes and channels to prevent microbial growth during the storage period.

1. Ensure both delivery tubes are correctly attached to the machine. Connect the inlet tube to a bottle with 70% EtOH solution and the outlet tube to a waste container.
2. Power up the LT-210 MX and wait for homing sequence to complete.
3. Place the dummy plate into the clamper chamber and lock the clamper lever.
4. Set the number of cycles to "1".
5. Press the 'Start' button to begin operation.
6. Upon end of operation, a 'beep' tone will be heard. Unlock the clamper lever then lock it again while the plate remains in the chamber.
7. Remove the inlet tube from the 70% EtOH bottle and leave it exposed to the air.
8. Press the 'Start' button to begin operation. The display panel should show "1".

9. The pump will now aspirate air instead of liquid. Once all the fluid is drained from the tube, switch the LT-210 MX off.
10. Switch the LT-210 MX on again and wait for Emergency draining and homing to be completed.
11. Unlock the clamper lever and remove the plate.
12. All fluid channels and tubes are dried with residual 70% EtOH. The instrument now can be turned off and stored in a cool, dry location long-term.
13. It is recommended to reset the inlet pump after long term shutdown to ensure its optimal performance. Follow the steps described in Chapter 3: Preparation for Operation for resetting the inlet pump with the use of the Hand Pump accessory provided.

Chapter 5:

Troubleshooting and Maintenance

Chapter Overview

- Troubleshooting Checklist
- Technical Support
- Maintenance Schedule
- Replacing Valves
- Decontamination Procedure

Troubleshooting Checklist

Problem	Possible Cause	Proposed Action
Display panel is not lit up.	Power is not switched on, or LT-210 MX is not plugged into electricity supply.	Ensure the jack is properly connected to the LT-210 MX, and that the power is switched on (Figure 3-3).
Fluid left in Microplate.	Clamping was not properly done.	Always ensure that the Micro-plate is placed properly within the clamper chamber and make sure clamper lever is pushed down securely.
LT-210 MX fails to initiate wash cycle and add wash buffer. “E” appears in display panel.	• Microplate was not positioned/orientated properly within the clamper chamber. • Microplate was placed slightly outside of the clamper chamber, thus obscuring the red sensor (Figure 5-1 top).	• Ensure that well A1 of the plate is at the top left corner of the clamper chamber (when viewed top down while facing the front of the LT-210 MX), or that the indentation on the plate faces away from the unit when in the instrument (Figure 4-2). • Move the plate towards the left and further into the clamper chamber, such that more of the red sensor is visible (Figure 5-1).
Addition of wash buffer takes a long time.	Inlet tubing is not fully immersed in the wash buffer; hence the LT-210 MX is aspirating air instead of buffer.	Push the inlet tubing fully into the wash buffer bottle and ensure the tube is immersed in sufficient wash buffer.

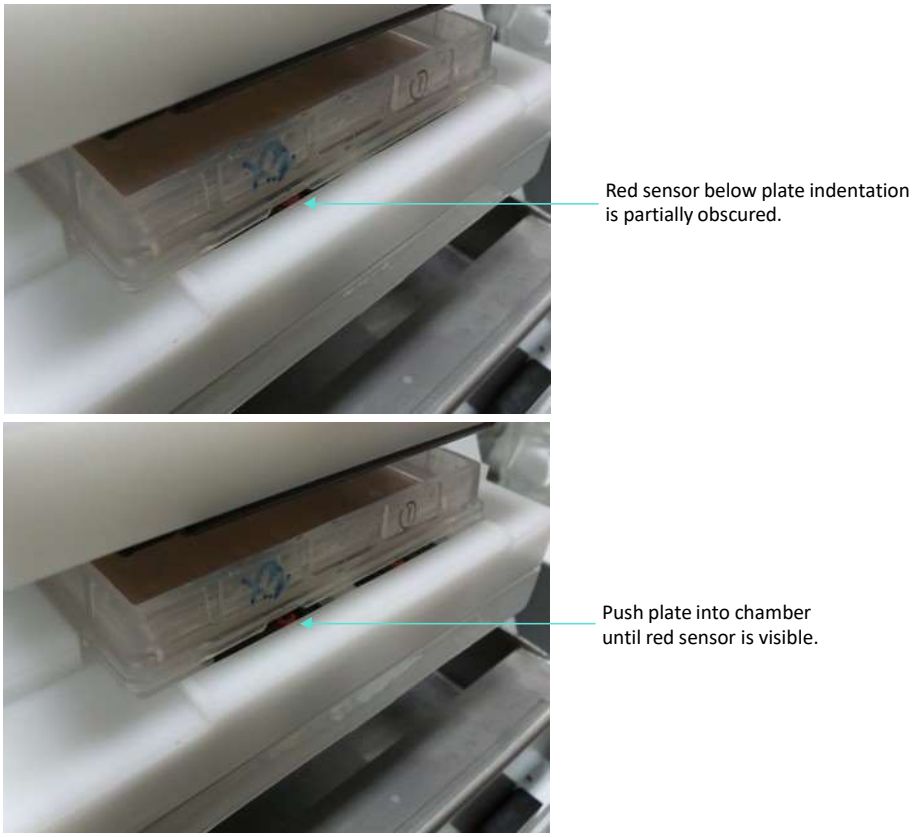


Figure 5-1: *DropArray Microplate within the clamper chamber. (Top) Plate not completely in chamber, red sensor is partially obscured. (Bottom) Red sensor is visible, plate is in correct position in chamber.*

NOTE: For safety reasons, the LT-210MX does not allow operation to begin if the DropArray Microplate is not inserted all the way into the clamper chamber. The LT-210MX will start operating when the microplate is placed in the correct position and orientation.

Technical Support

Kindly visit us at www.curiox.com for contact information or email us at techsupport@curiox.com if you require technical support or advice.

Maintenance Schedule

The DropArray LT-210 MX Washing Station was designed and constructed with convenience in mind, hence it does not require any daily maintenance or disassembling of parts. Below is the recommended maintenance schedule to ensure that the LT-210 MX runs smoothly and efficiently.

Action	Weekly	Monthly	Yearly	As Required
Wipe all surfaces (including clamper chamber and lever) with a cloth moistened with 70% EtOH.	✓			✓
Reset inlet pump with the use of a Hand Pump during installation and after long-term storage.	✓			✓
Replace valves on a yearly basis.				
Decontaminate the LT-210 MX.		✓		✓
Sending unit to Curiox Biosystems for service.				✓

Table 5-1: Maintenance Schedule

Replacing Valves

Replace the valves located on the machine clamper and hand pump on a yearly basis to ensure its optimal performance.

A. Clamper Valves

Follow the steps below to replace the 6 pieces of check valve (VPS5401068N) and 1 piece of antisiphon valve (VPS5401020N).

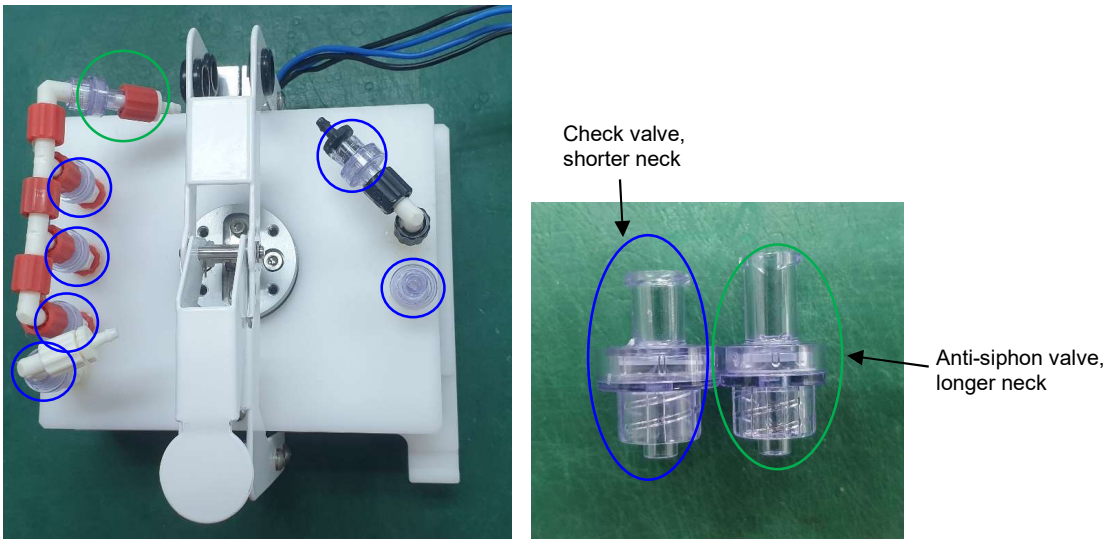


Figure 5-2: Check Valve and Anti-siphon Valve

1. Disconnect the inlet joint attached to the clamper by loosening the red rings. Loosen all 3 red rings simultaneously to ease the process.

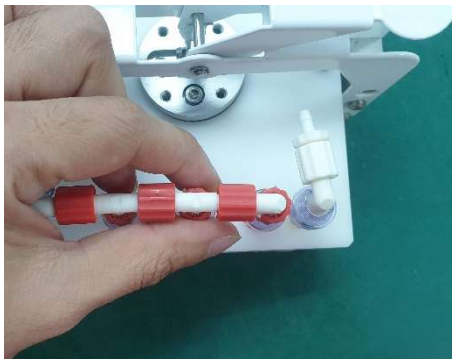


Figure 5-3: *Disconnecting the Inlet Joint*

2. Loosen the 3 pieces of check valves.

Figure 5-4: *Loosen the Check Valve*

3. Disconnect the waste outlet by loosening the white ring.

Figure 5-5: *Disconnect the Waste Outlet*

4. Disconnect the overflow outlet.

Figure 5-6: Disconnect the Overflow Outlet

5. Disconnect and replace the pressure relief valve.

Figure 5-7: Replace the Pressure Relief Valve

6. Disconnect the inlet subassembly and replace the anti-siphon valve.

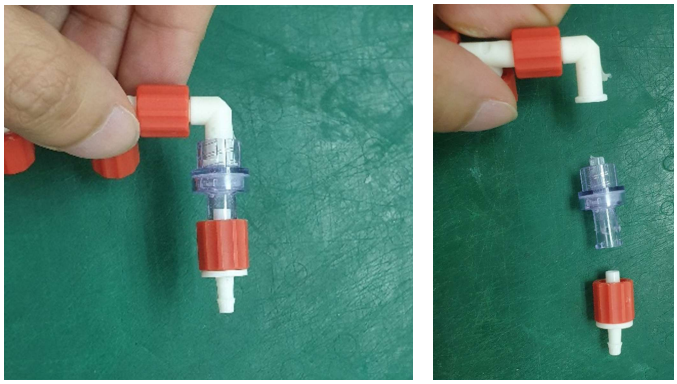


Figure 5-8: Replace the Anti-siphon Valve

7. Disconnect the overflow outlet assembly and replace the check valve.

Figure 5-9: Replace the Check Valve

8. All valves removed.

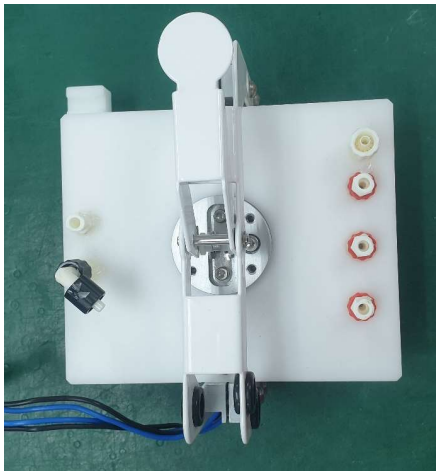


Figure 5-9: All Valves Removed

9. Reassemble all connector joints to the clamper.

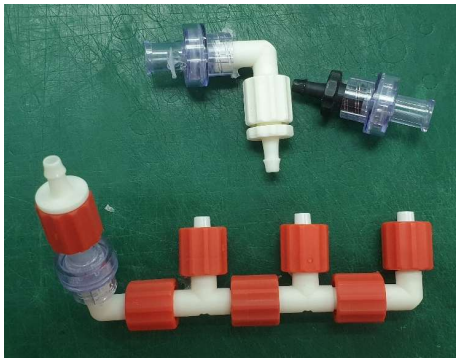


Figure 5-10: Reassemble Connector Joints to Clamper

B. Hand Pump Valves

Follow the steps below to replace the 2 pieces of check valve (VPS5401068N) on the hand pump.

1. Disconnect the hand pump to replace the valves.
2. Reassemble the hand pump.

Figure 5-11: Replace the Hand Pump Valves

Decontamination Procedure

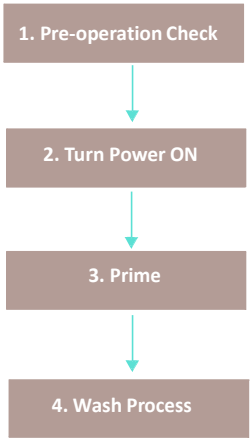
For environmental health and safety reasons, it is imperative that operators decontaminate the LT-210MX prior to transport to a different laboratory, or back to Curiox Biosystems for servicing and maintenance. The step-by-step procedure below is a generic decontamination guide, using chemicals which are compatible with the materials in the LT-210 MX.

1. Remove all biological contents from the LT-210 MX. This includes removing the assay/dummy plate within the clamper chamber. Turn off and unplug the LT-210 MX from the power supply and disconnect the power jack.
2. Wearing gloves, clean all surfaces of the LT-210 MX with warm soap solution. This initial step in decontamination is important as it ensures that any surface microbes will not contaminate and reduce the efficiency of the chemical disinfectant in the next step.
3. Moisten (do not soak) a cloth with EITHER 0.2-8.0% formaldehyde or 70-85% EtOH solution. Wipe all surfaces of the LT-210 MX, including the clamper chamber and moving platform. Wait for 20 minutes.
4. Moisten a cloth with deionized water and wipe all the surfaces previously cleaned with formaldehyde/EtOH. Dry the wet surfaces with a clean cloth. Ensure all used cloths are disposed of in a bio- hazard bag/container.
5. **If intended for transport:** Seal the machine in an airtight bag prior to transport. If you intend to return the device to Curiox Biosystems for servicing or maintenance, please fill out the Acknowledgment of Decontamination form found on Appendix B).

Appendix A:

Quick Reference Guide

Quick Reference Guide



1. Ensure the delivery tubes are correctly connected, empty the waste container and fill the wash bottle with the appropriate wash buffer solution.
2. Power up the LT-210 MX and wait for the homing sequence to complete
3. Insert the dummy plate and lock the clamper lever. Select “2” wash cycles on the display panel. Press “START”, allow automated washing to take place, and wait for the “beep” tone before unloading the dummy plate.

NOTE: Select 4 washes if the dummy plate used has been exposed to 70% ethanol.

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4. Select the desired number of wash cycles on the display panel, insert the assay plate and lock the clamper lever, then press “START”. Remove assay plate after “beep” tone is heard.

Appendix B:

Acknowledgment of Decontamination

Acknowledgment of Decontamination

Decontamination is required prior to LT-210MX return to Curiox Biosystems for reasons such as servicing and maintenance. It is required that you fill out this form to acknowledge that decontamination had been conducted on the instrument. Failure to do so may result in the return of the instrument to your address for decontamination. See “Decontamination Procedure” on page 34. for the recommended procedure for decontaminating the DropArray LT-210MX Washing Station.

PRODUCT SERIAL NO.	
CONTACT INFORMATION	
Dr./Mr./Mrs./Ms. (Please circle accordingly)	JOB TITLE
NAME	EMAIL ADDRESS
COMPANY	PHONE NUMBER
DECONTAMINATION INFORMATION	
DECONTAMINATION METHOD	
DECONTAMINATION DATE	
ACKNOWLEDGEMENT	
I hereby acknowledge that this piece of equipment has been decontaminated and sealed in accordance to the procedure recommended in this manual prior to shipment to Curiox Biosystems. To the best of my knowledge, the equipment is safe to handle by the receiving personnel. Name _____ Signature and Date _____	

Appendix C:

Purchase Information and Feedback Form

Purchase Information and Feedback Form

PURCHASE INFORMATION	
PRODUCT SERIAL NO.	
PURCHASED BY	**PURCHASED FROM**
COMPANY	DISTRIBUTOR
ADDRESS	DATE OF PURCHASE
PHONE	DATE OF DELIVERY
FAX	
CONTACT INFORMATION	
Dr./Mr./Mrs./Ms. (Please circle accordingly)	JOB TITLE
NAME	EMAIL ADDRESS

FEEDBACK (PLEASE CHECK/COMMENT ACCORDINGLY)					
	Excellent	Good	Average	Poor	Comments
User Guide					
Ease of Use					
Reliability					
Operating Costs					
Overall Experience					

Do you have any other comments/suggestions about the DropArray LT-210 MX Washing Station? If so, please let us know below.

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