Laminar Wash™ HT1000 Station 96 User Manual

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Laminar Wash HT1000 User Manual

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General Information

Chapter Overview

- General Information
- Introduction to the Laminar Wash HT1000
- Chemical Compatibility
- Safety
- CE Mark
- Customer Service and Technical Support

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 Laminar Wash™ HT1000 Station. The content of this manual includes:

- How to set up and operate the HT1000
- The principle of operation and modes of function for the HT1000
- Safety features of the HT1000 and precautions to ensure safe operation
- Troubleshooting procedures and maintenance

Introduction to the Laminar Wash HT1000

The Laminar Wash solution enables sample preparation for multi-color flow cytometry and bypasses the need of centrifugation for washing cells in suspension. The Laminar Wash technology is designed to maintain samples in a 96-droplet based format instead of using a conventional microwell with walls. It is a centrifuge-less processing method using the unique wall-less features of the Laminar Wash technology combined with a fully automated washer. The Laminar Wash HT1000 generates a laminar flow for each drop on the Laminar Wash 96-well Plate via dual-nozzle action, with one nozzle dispensing liquid into the drop and the other nozzle aspirating liquid. The Laminar Wash workflow is superior over the traditional centrifugation method.

Technical Specifications

Description	Specification
Physical	
Dimensions	310 mm H x 262 mm W x 302 mm D
Weight	14 kg
Electrical	
Voltage Requirement	100 - 240 V
Environmental	
Operating Temperature Range	15 - 28 °C
Operating Humidity	< 80%, non-condensing
Operation	
Plate Type	Laminar Wash Plate in 96-well format
Capacity	1 plate per operation
Performance	
Flow rate at nozzle	5-20µl/s
Volume capacity	80µl per nozzle
Wash sequence	96 wells simultaneous washing
Dilution factor per cycle	Approx. 3.5 times
Bulk flow rate for priming	Approx. 300ml/ min
User Interface	
Display	A single plus a double-digit display, 4 status indicating LED
Input control	4 input buttons
Number of washes per cycle	1x to 9x selectable
External Interface	
1x inlet	A connector for incoming fresh wash buffer
1x outlet	A connector for outgoing waste wash buffer
1x RS232	A plug-in for updating operating parameters

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 HT1000. Table 1-1 on page 4 lists the material composition of the main components of the HT1000, 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
Internal base structure	Stainless Steel (304)	Ethanol, Benzene, Chloroform, Acetaldehyde, Propylene Glycol, Isopropanol, Formaldehyde, Phenol, Grease, Potassium Permanganate, Hydrogen Peroxide	Hypochlorite bleach, Sulfuric Acid
Some minor components of main body	Delrin (Polyoxymethylene)	Ethanol, Benzene, Soap Solutions, THF, Formaldehyde, Propylene Glycol, Isopropanol, Potassium Permanganate	Acetic acid, Grease, Ketones, Ozone, Phenol, Ammonia, Hypochlorite bleach, Iodine, Hydrogen Peroxide, Phosphoric Acid, Sodium Hydroxide (>50%)
Internal structural parts	Aluminum	Ethanol, Benzene, Propylene Glycol, Isopropanol, Formaldehyde, Ozone, Grease, Phenol, Hydrogen Peroxide	Hypochlorite Bleach, Soap Solutions, Sulfuric Acid, Potassium Permanganate, Phosphoric Acid
External structure			

Table 1-1: *Chemical compatibility between the component materials in the HT1000, 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!	Warn 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 HT1000 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 upon request 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 HT1000. The label displays a safety alert symbol indicating a potential safety hazard.

Symbol	Description
	Pinch point hazard. Keep hands clear.
	Separate collection for electrical and electronic equipment.

Instrument Safety Features

Plate Detection

The HT1000 detects the presence of a Laminar Wash 96-well Plate. The machine will not begin operation if a plate is not detected on the feeder platform.

Power Supply

The universal power adapter is able to accommodate electrical power in the range of 100 - 240 V. The resultant output to the HT1000 power jack is 24 V DC.

Start / Pause

Activating the “Start / Pause” button in the middle of a washing cycle will cause the machine to immediately freeze. The machine goes to home position when the button is subsequently activated again.

Machine Homing

In the event power to the machine is cut off in the middle of a washing cycle and subsequently switched on again, the machine will go to home position.

Spill Tray

The spill tray sensor detects excess liquid in the tray to prevent it from spilling onto the machine’s interior. When this happens, the machine LED light turns red and error code “E31” is prompted on the machine display panel. User may only access the draining button during this time.

Safety Precautions

- At the end of a wash process, remove the plate from the feeder platform immediately to prevent the wells from drying, stressing cells 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 display panel.
- If there is an unexpected error, reset the instrument by turning the power switch off and back on.

General Precautions

- Do not use any other plate except the specified Laminar Wash 96-well Plate with the HT1000.
- Do not load more than one Laminar Wash 96-well Plate in the HT1000 at a time.
- 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 not to spill liquid onto the interior of the HT1000.
- Always perform a cleaning cycle with an appropriate cleaning solution at the end of an experiment.
- 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 HT1000.

Prior to System Operation

Ensure that all users of the HT1000 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 HT1000 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.

Directive 2014/30/EU 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:

1. 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)
2. EN 61326-1: 2013 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 2014/35/EU Low –Voltage Device

This device has been verified and found to meet the requirements of Directive 2014/35/EU "electrical electronic equipment designed for use within certain voltage limits".

Directive 2011/65/EU Restriction On the use of Hazardous Substances (ROHS 2)

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 HT1000 and the phases which outline a typical washing process.

Functional Description

The simple digital interface located on the top front panel of the HT1000 allows operators to adjust the number of desired wash cycles and the initial sample volume which will be shown numerically on the display. The main components of the HT1000 are shown in Figure 2-1, Figure 2-2 and Figure 2-3.

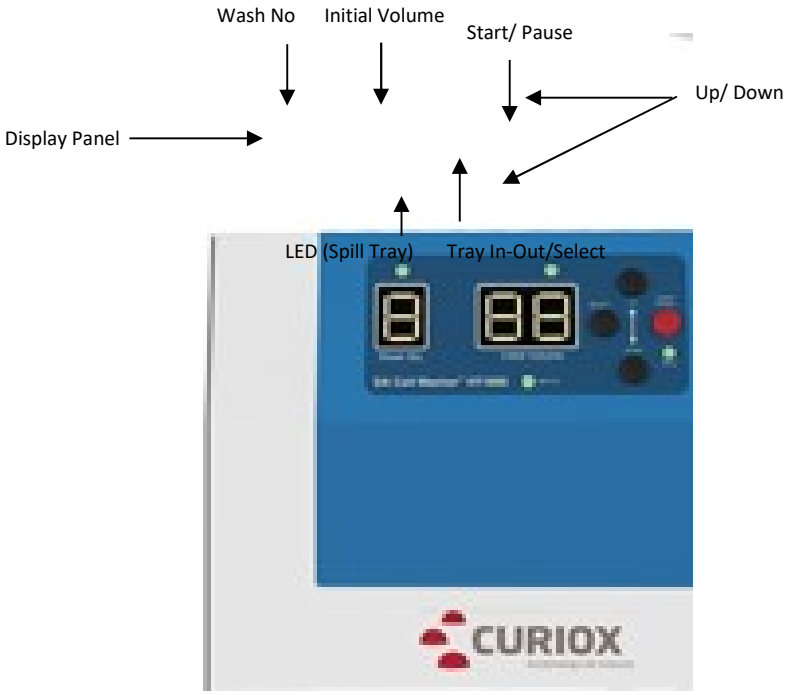

Figure 2-1: *Front view of the Laminar Wash HT1000 with main components labeled.*

Figure 2-2: Lateral (right side) view of the Laminar Wash HT1000 with main components labeled.

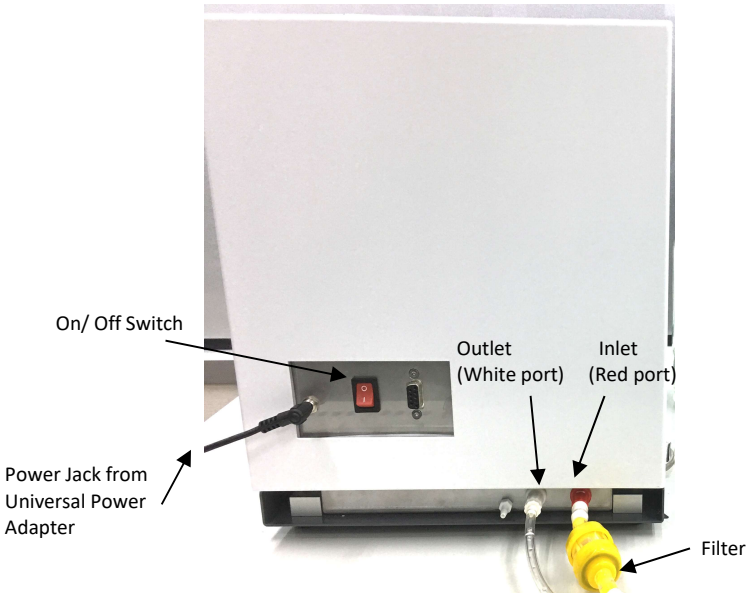

***Figure 2-3:** Back view of the Laminar Wash HT1000 with main components labeled.*

Wash Cycle Process

The plate wash cycle process is as follows, a schematic representation of the process is shown in Figure 2-4.

1. Feeder platform detects for presence of plate and retracts into the machine.

2. Fluidics head lowers down into plate.

3. Based on indicated initial volume, dispensing head tops up or removes each well content until 80µl (e.g. if initial volume is 50µl, dispensing head adds 30µl to the droplet).

4. Aspirating head aspirates full volume based on internal firmware. It is intended that contact between aspirating nozzles and well droplet breaks before aspiration is completed. Once the aspiration nozzle completes the aspiration of existing drops at a given height of a nozzle, it continues to aspirate air. Resultant residual volume should be approximately 25µl based on the height of an aspiration nozzle.

5. Dispensing head tops up well contents based on internal firmware.

6. Steps 4 and 5 are repeated until stipulated number of washes is reached. Note: if only 1 wash is specified, the machine will only run until step 4.

7. Feeder platform extends out of the machine, returning plates with approximately 25µl residual volume in each well.

Figure 2-4: *Laminar Wash 96-well Plate washing process on the HT1000*

Chapter 3:

Setup

Chapter Overview

- Unlocking and Installation
- Preparation for Operation

Unlocking and Installation

Upon arrival of the HT1000 package, check that all the accessories listed below are present. Some of the components of the HT1000 have been secured with brackets to prevent from damage during transportation. Remove all brackets shown in the steps below before installing and powering up the HT1000.

List of items:

- Laminar Wash HT1000 Station
- Fluidic Head
- Power Adapter (Output 24V, 3A)
- Electrical Power Cord
- RS232 to USB Cable
- Allen Key Set
- User Manual in USB Thumb Drive
- Declaration of Conformity (for CE compliant)
- Filter
- 1m Tubing, Red Coded Ring on Connector connected to Filter
- 1m Tubing, White Coded Ring on Connector
- Dummy Plate
- Calibration Plate
- 10ml Manual Priming Syringe with 0.1m Tubing
- Buffer Inlet Bottle Cap
- Nozzle & Plunger Replacement Tools
- Spare Nozzles & Plungers Set (Aspirating & Dispensing)
- Spare 3.5 ID O-rings (10X Red, 3X Black)

Unlocking

1. Lift machine top cover and push hinge to lock the cover in the open position.

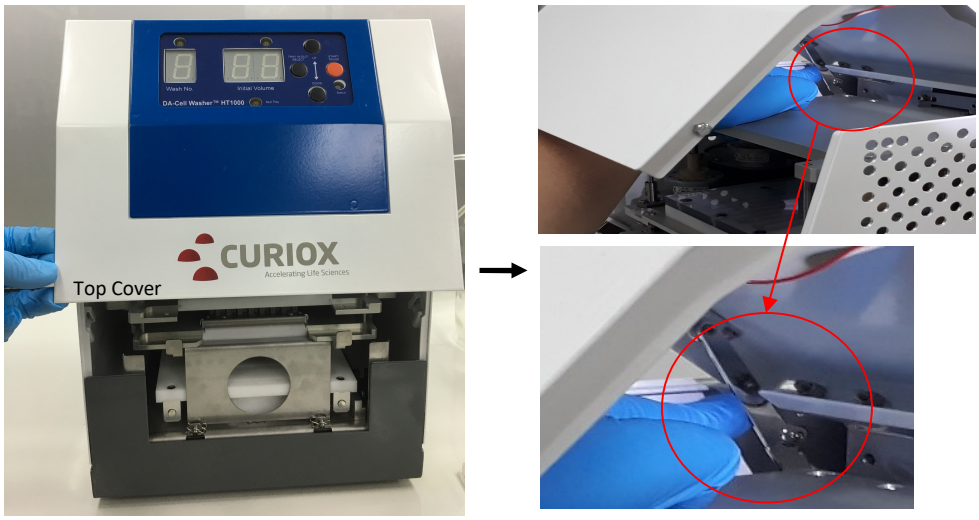

Figure 3-1: *Lift the machine top cover and lock in the open position.*

2. Hold and pull down the two ends of the supporting bracket to remove. Please note that some force may be required for this step. The supporting bracket must be kept in a secured location for any transportation which may arise in the future. For convenience, we would suggest taping it to the back of the machine.

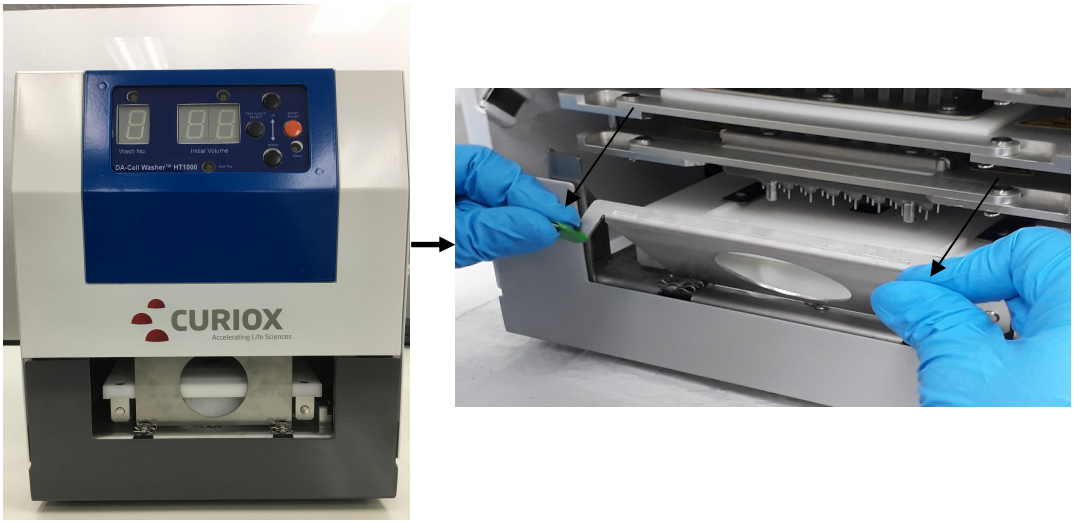

Figure 3-2: *Remove the machine supporting bracket.*

3. Using a size 3 Allen key, loosen bolts (x3) by turning to the anti-clockwise direction. Do not over loosen bolts. Move the locking bracket to the right.

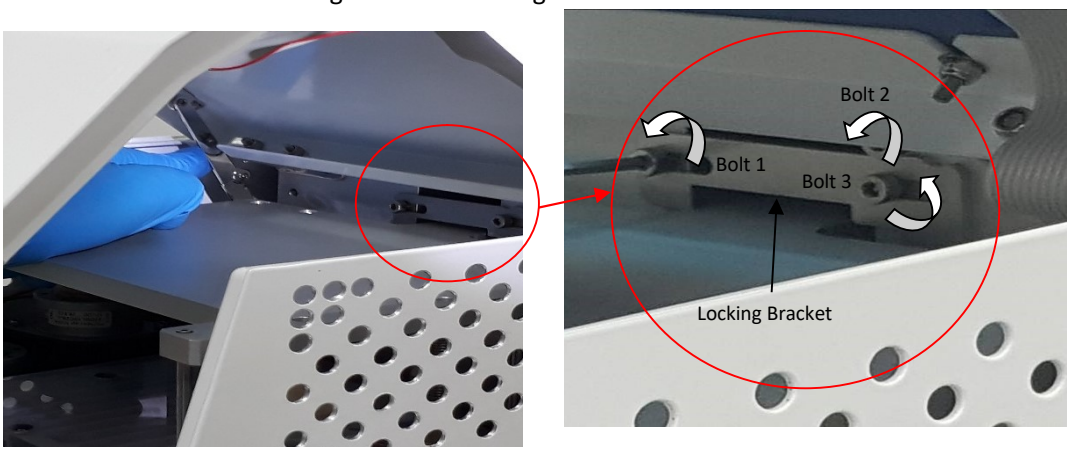

Figure 3-7: *Loosen bolts to move locking bracket to the right.*

4. Once the locking bracket is on the right, use the same Allen key to tighten bolts (x3) and lock the locking bracket into position by turning to the clockwise direction. Do not over tighten bolts.

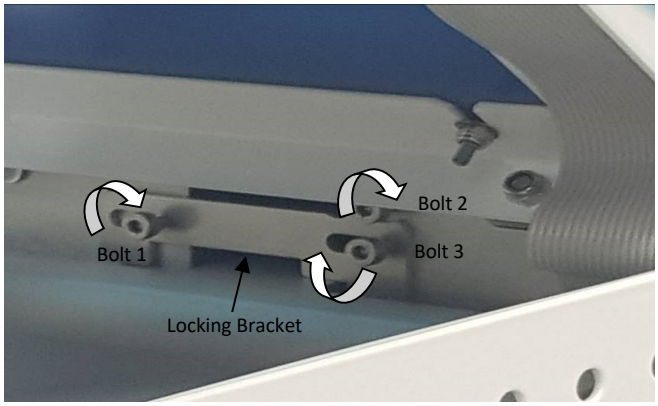

Figure 3-8: *Lock locking bracket into position by tightening bolts*

5. Close the machine cover by returning the hinge back to its original position.

Installation

1. Place the HT1000 on a flat surface and in an environment with temperature and humidity conditions as stipulated in “Technical Specifications” on page 3.

2. Connect the power cable to the universal power adaptor. Insert the power jack at the back of the HT1000 as shown in Figure 2-3.

3. Insert the two delivery tubes into the respective ports on the HT1000 in the manner specified below (Figure 3-1):
    - Install a clean filter into one end of the inlet tubing and insert into the red port on the HT1000. Insert the other end into wash buffer bottle via the buffer inlet bottle cap. Refer to the next section “Buffer Inlet Bottle Cap Installation” for installation instructions.
    - Insert one end of the outlet tubing into the white port on the HT1000 and the other end into the waste bottle.
      NOTE: The buffer inlet bottle cap must not be used on the waste bottle.

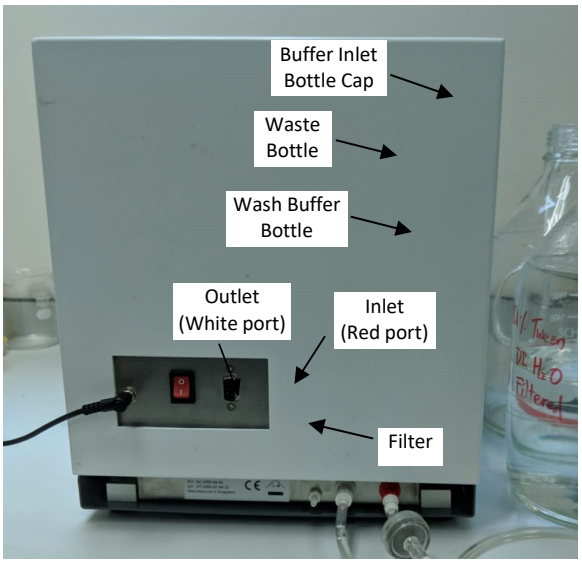

Figure 3-1: *Installation Step 3.*

Buffer Inlet Bottle Cap Installation

NOTE: The buffer inlet bottle cap must not be used on the waste bottle.

1. 3 sets of buffer inlet bottle caps are packed with the machine. Each bottle cap comes with a pre-installed tubing, as shown in Figure 3-2 below.

Figure 3-2: *Buffer inlet bottle cap accessories*

2. Connect a buffer inlet bottle cap onto a 2L glass bottle containing the wash buffer of choice, as shown in Figure 3-3 below.

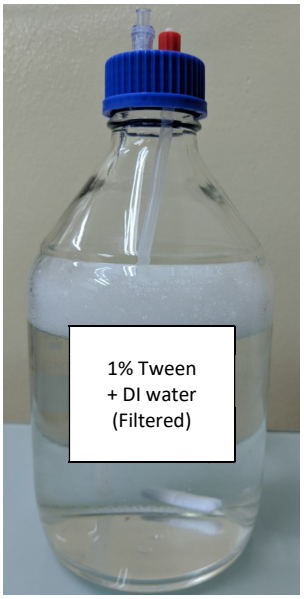

Figure 3-3: *Buffer inlet bottle cap connected to 2L bottle containing wash buffer of choice.*

4. Install a clean filter onto one end of the inlet tubing and insert into the red port on the HT1000. Insert the other end into wash buffer bottle via the buffer inlet bottle cap. Refer to Figure 3-1.

Preparation for Operation

It is recommended to perform priming of the machine with 1% Tween 20 in 70% Ethanol, followed by 1% Tween 20 in DI water and finally with Wash Assay Buffer at the start of the day's operation. A dummy wash is ran after priming for added assurance that the machine is performing to specifications prior to an actual wash. Follow the steps below to prepare the machine for operation.

1. Ensure the power jack is connected. Power up the HT1000 and wait for the homing sequence to complete.
2. Enter Service Mode by pressing the "Up" + "Down" buttons simultaneously.
3. Ensure the two delivery tubes are properly connected into the respective ports (red and white) on the HT1000. A clean filter is installed into one end of the inlet tubing and inserted into the red port on the machine. The other ends of the tubes are connected to either the wash buffer bottle via the buffer inlet bottle cap (from red port) or the waste container (from white port). Refer to Figure 3-1.
4. Ensure that each bottle is filled with the appropriate fluid, connected to the buffer inlet bottle cap and properly installed into the machine. Refer to "Buffer Inlet Bottle Cap Installation" on page 20.
5. Ensure 1% Tween 20 in 70% Ethanol is connected to the machine.
6. Place a dummy plate onto the feeder platform.

Figure 3-6: *Insert dummy plate into machine (in Service Mode).*

7. Short press the “Up” button to perform the auto-prime with 1% Tween 20 in 70% Ethanol process.
8. HT1000 completes the auto-prime with 1% Tween 20 in 70% Ethanol when the feeder platform moves out the dummy plate.
9. Repeat steps 5 to 8, replacing fluid to 1% Tween 20 in DI water.
10. Replace the dummy plate with a calibration plate.
11. Short press the “Select” button to dispense 80µL 1% Tween 20 in DI water into all wells.
12. Remove the calibration plate from the feeder platform.
13. Visually observe that all wells are dispensed evenly and weigh on a calibrated balance.
14. Weight of empty plate is subtracted from weight of filled plate.
15. Resultant value is divided by number of wells to obtain volume dispensed per well, with the assumption that 1mg = 1µL and that all wells are filled evenly.
16. Using “Up”/ ”Down” buttons for adjustment, input the calculated value into the system by holding the “Select” button.
17. Repeat steps 11 to 15 until 80µL is achieved.
18. Press the “Up” and “Down” buttons simultaneously to exit the Service mode.
19. Using “Up/Down” buttons for adjustment, input the number of washes value as “1” and the initial volume value as “80” into the system by holding the “Select” button.
20. Press the “Start” button to start the wash cycle.
21. Remove calibration plate from the feeder platform.
22. Visually observe that residual volume on all wells are even and weigh on a calibrated balance.
23. Weight of empty plate is subtracted from weight of filled plate, then divided by the number of wells to obtain residual volume per well, with the assumption that 1mg = 1µL and that the residual volume on all wells are even.
24. Repeat steps 5 to 8, replacing fluid to buffer of choice (e.g. FACS buffer).
25. The machine is now ready for operation.

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.

Chapter 4:

Operation

Chapter Overview

- Before Operating the HT1000
- Operational Safety
- Operation Mode
- Service Mode
- Shutdown Procedure

Before Operating the HT1000

The HT1000 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 HT1000 possesses the following built-in safety features which prevent the machine from operating under unsafe conditions.

Plate Detection

The HT1000 detects the presence of a Laminar Wash 96-well Plate. The machine will not begin operation if a plate is not detected on the feeder platform.

Power Supply

The universal power adapter is able to accommodate electrical power in the range of 100 - 240 V. The resultant output to the HT1000 power jack is 24 V DC.

Start / Pause

Activating the “Start / Pause” button in the middle of a washing cycle will cause the machine to immediately freeze. The machine goes to home position when the button is subsequently activated again.

Machine Homing

In the event power to the machine is cut off in the middle of a washing cycle and subsequently the machine is switched on again, the machine will go into home position.

Spill Tray

The spill tray sensor detects excess liquid in the tray to prevent it from spilling onto the machine’s interior. When this happens, the machine LED light turns red and error code “E31” is prompted on the machine display panel. User may only access the draining button during this time.

Safety Precautions

In addition to the built-in safety features of the HT1000, below are some precautions operators are advised to take while using the HT1000 to ensure their safety and to preserve the accuracy of the experiments.

- At the end of a wash process, remove the plate from the fluidics chamber immediately to prevent the wells from drying, stressing cells 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 display panel.
- If there is an unexpected error, reset the instrument by turning the power switch off and back on.

Operational Mode

The Operation Mode allows an operator to carry out initial aspirations as well as washes.

LEDs and Buttons

- ***User Interface LEDs***
  The user interface LEDs indicate 2 values: “No. of Washes” as well as “Initial Volume”. A third LED indicates when spill tray is full and needs to be drained. (Figure 2-1).

- ***“Select” button, short press***
  Short press the “Select” button to retract the feeder platform if it is extended, or extend the feeder platform if it is retracted.

- ***“Select” button, long hold***
  Long hold the “Select” button to toggle between “No. of Washes” and “Initial Volume” values for adjustment.

- ***“Start / Pause” button***
  Press the “Start” button to initiate full wash cycle. When pressed mid-operation, it will stop the wash cycle immediately. Pressing the button again after pausing, will extend the feeder platform, returning the plate.

- ***“Initial Volume”***
  The “Initial Volume” value will indicate the volume of the droplets in the wells of the plate just before it undergoes washing. If droplet volumes in wells vary (e.g. 40µl and 60µl droplets in the same plate), specify the largest volume (60µl).

- ***"Up"/ "Down" button***
  The "Up"/ "Down" buttons allow continuous change in value when held. Values of 1-9 for "Number of Washes" and 1-99 for "Initial Volume".

Wash Cycle

1. Feeder platform detects for presence of plate and retracts into the machine.

2. Fluidics head lowers down into plate.

3. Based on indicated initial volume, dispensing head tops up well contents until 80µl (e.g. if initial volume is 50µl, dispensing head adds 30µl to the droplet).

4. Aspirating head aspirates full volume based on internal firmware. It is intended that contact between aspirating nozzles and well droplet breaks before aspiration is completed. Once the aspiration nozzle completes the aspiration of existing drops at a given height of a nozzle, it continues to aspirate air. Resultant residual volume should be approximately 25µl based on the height of an aspiration nozzle.

5. Dispensing head tops up well contents based on internal firmware.

6. Steps 4 and 5 are repeated until stipulated number of washes is reached. Note: if only 1 wash is specified, the machine will only run until step 4.

7. Feeder platform extends out of the machine, returning plates with approximately 25µl residual volume in each well.

8. The wash cycle of 1x dispensing and aspiration consumes ~6 ml wash solution. For example, 5x wash cycle consumes ~30ml wash solution.

Service Mode

The Service Mode allows an operator to carry out priming, cleaning and draining operations. While in Service Mode, simultaneously pressing “Up” + “Down” enters (and exits) this mode.

LEDs and Buttons

- ***User Interface LED***

  The user interface will display both values as “0” when idling in this mode.

- ***“Up” button, long hold***

  Long hold the “Up” button to prime fluid into the dispensing block until released. When released, dispensing block moves up + down 3X. Presence of plate in feeder not required.

- ***“Down” button, long hold***

  Long hold the “Down” button to drain spill tray until released.

- ***“Up” button, short press***

  Short press the “Up” button to perform auto-prime function:
  Activate pump for 10s to fill dispensing block, dispense 5X to flood plate, aspirate 7X to clear plate, dispense 3X to flood plate, then fill both nozzles by sequential dispense, aspirate, dispense and aspirate.

- ***“Down” button, short press***

  Short press the “Down” button to remove fluid in aspirating nozzle by moving aspirating block up + down 3X, followed by 5s of actively sucking away liquid from aspirating pool.

- ***“Start” button***

  Press the “Start” button to perform continuous wash (normal aspirating plus dispensing cycle) until “Start” button is pressed again.

Calibration

It is recommended to perform volume calibration of the machine during new machine installation, quarterly and after long term storage.

- ***"Select" button, short press***

  Short press the "Select" button to calibrate the dispensing values.

  1. Weigh plate to prepare for the calibration step.
  2. Feeder platform detects for presence of plate and retracts into the machine.
  3. Dispensing head dispenses 80µl into plate wells, then returns plate.
  4. Weigh the filled plate on a calibrated balance.
  5. Weight of empty plate is subtracted from weight of filled plate.
  6. Resultant value is divided by number of wells to obtain volume dispensed per well, with the assumption that 1mg = 1µL and that all wells are filled evenly.
  7. Using "Up"/ "Down" buttons for adjustment, input the calculated value into the system by holding the "Select" button.

- ***"Select" button, long hold***

  Long hold the "Select" button to calibrate the aspiration values.

  1. Feeder platform detects for presence of plate and retracts into the machine.
  2. Aspirating head aspirates 50µL out of filled (80µL) plate wells and returns plate to operator.
  3. Weigh the aspirated plate on a calibrated balance.
  4. Weight of aspirated plate is subtracted from weight of filled plate.
  5. Resultant value is subtracted from 80µL, then divided by number of wells to obtain volume aspirated per well, with the assumption that 1mg = 1µL and that all wells are filled evenly.
  6. Using "Up"/ "Down" buttons for adjustment, input the calculated value into the system by holding the Select button.

Shutdown Procedure

It is recommended to perform priming of the machine with 1% Tween 20 in DI water, followed by 1% Tween 20 in 70% Ethanol and finally without fluid at the end of the day's operation. Follow the steps below to prepare the machine for operation.

1. Ensure the power jack is connected. Power up the HT1000 and wait for the homing sequence to complete.

2. Enter Service Mode by pressing the "Up" + "Down" buttons simultaneously.

3. Ensure the two delivery tubes are properly connected to their respective ports (red and white) on the HT1000. A clean filter is installed into one end of the inlet tubing and inserted into the red port on the machine. The other ends of the tubes are connected to either the wash buffer bottle via the buffer inlet bottle cap (from red port) or the waste container (from white port). Refer to Figure 3-1.

4. Ensure that each bottle is filled with the appropriate fluid, connected to the buffer inlet bottle cap and properly installed into the machine, as per "Bottle Cap System Installation" on page 20.

5. Ensure 1% Tween 20 in DI water is connected to the machine.

6. Place the dummy plate onto the feeder platform.

7. Short press the "Up" button to perform the auto-prime with 1% Tween 20 in DI water process.

8. HT1000 completes the auto-prime with 1% Tween 20 in DI water when the feeder platform moves out the dummy plate.

9. Repeat steps 5 to 8, replacing fluid connection to 1% Tween 20 in 70% Ethanol.

10. Repeat steps 5 to 8, replacing connection to air intake only, refer to Figure 3-4.

11. Return to Operation Mode pressing the "Up" + "Down" buttons simultaneously and short press "Tray-In".

12. Power down the HT1000 and prepare for storage.

Chapter 5:

Troubleshooting and Maintenance

Chapter Overview

- Troubleshooting Checklist
- Technical Support
- Maintenance Schedule

Troubleshooting Checklist

Problem	Possible Cause	Proposed Action
Display panel is not lit up.	Power is not switched on, or HT1000 is not plugged into electricity supply.	Ensure the jack is properly connected to the HT1000, and that the power is switched on. Ensure that the adaptor is working.
Aspirating/ dispensing channels not working, resulting in inconsistent residual volume after washing.	Clogging of fluidics path.	1. Enter Service Mode and initiate continuous wash with 0.5 % Bleach for strictly 10 minutes only. 2. Rinse the external surface of an inlet tube thoroughly with DI water and run another continuous wash with 1% Tween 20 in DI water for 20 minutes minimum. 3. If problem persists, contact Curiox technical support for assistance.
A Laminar Wash 96-well Plate has a drop bigger than it should be after a wash step.		1. Enter Service Mode and place plate onto the feeder platform. 2. Long hold the "Select" button to aspirate excess buffer on the affected well. 3. Repeat above steps until the excess buffer is removed from the affected well.
Washer stops in the middle of a run.		1. Pause machine and remove plate. 2. Turn on and off the machine. 3. Estimate the leftover volume visually and run another wash step with the desired wash number and estimated volume of the drop. 4. Alternatively, if a washer stopped at the last aspiration step, go to Service Mode and aspirate out the uneven drops as instructed above.

Technical Support

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

Maintenance Schedule

Below is the recommended maintenance schedule to ensure that the HT1000 runs smoothly and efficiently.

Action	Daily	Weekly	Monthly	As Required
Perform priming of the machine with 1% Tween 20 in 70% Ethanol, followed by 1% Tween 20 in DI water and finally with Wash Assay Buffer at the start of the day's operation.	✓			
Perform priming of the machine with 1% Tween 20 in DI water, followed by 1% Tween 20 in 70% Ethanol and finally without fluid at the end of the day's operation.	✓			
Wash Filter under running DI water on a weekly basis.		✓		
Bleach run for cleaning of internal fluidics: 1. Enter Service Mode and initiate continuous wash with 0.5 % Bleach for strictly 10 minutes. 2. Run continuous wash with 1% Tween 20 in DI water for minimum 20 minutes.				✓
It is recommended to perform volume calibration during new machine installation, quarterly and after storage for long period. Refer to "Calibration" on page 28.				✓
Sending unit to Curiox Biosystems for service.				✓

Appendix A:

Acknowledgment of Decontamination

Acknowledgment of Decontamination Form

Decontamination is required prior to HT1000 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.

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 B:

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 Laminar Wash™ HT1000? If so, please let us know below.

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