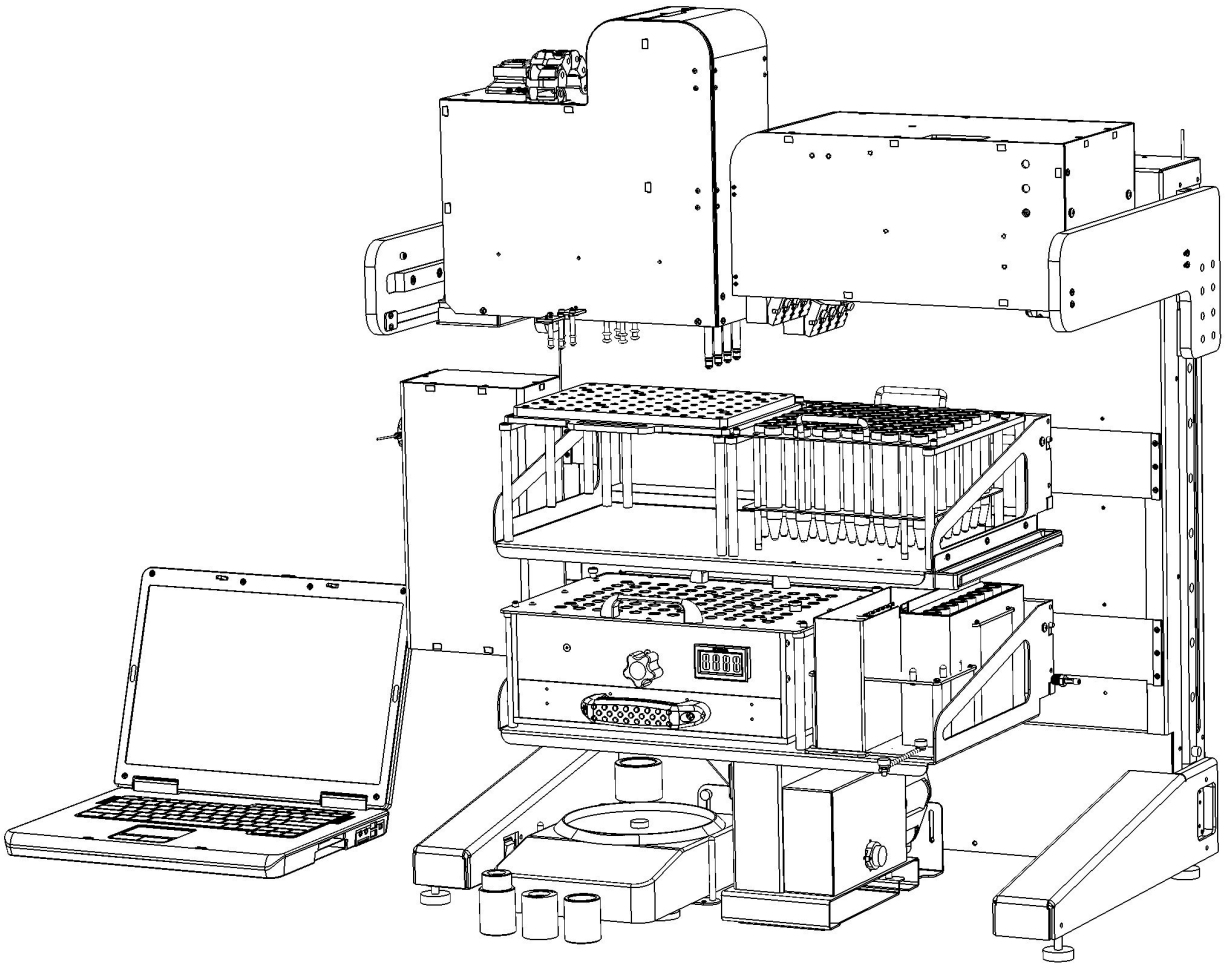
LH 96

Automated Homogenizer Workstation

User Manual



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This product has been engineered for safety; however, basic safety precautions and common sense must always be demonstrated when using any electrical product.

- Use this product only for its intended purpose.
- Keep this product away from heated surfaces.
- **DO NOT** attempt to modify any part of this product.
- **DO NOT** allow the machine to be submerged in any liquid.
- **DO NOT** use in any setting other than an indoor laboratory.
- **DO NOT** plug power cord into an incorrect outlet or subject it to an incorrect voltage.
- **DO NOT** use attachments not recommended by the manufacturer.
- **DO NOT** operate the product if it is damaged in any way.
- **DO NOT** operate the product with the safety ground disconnected.
- **DO NOT** modify the plug or cord that is provided. If the plug will not fit the outlet, have the proper outlet installed by a qualified electrician.

WARNING: Reduce the risk of unintentional starting; make sure the speed switch is in the OFF position before plugging in the motor.

WARNING: Damaged or worn power cords should be repaired or replaced immediately by a qualified electrician.

WARNING: Improper connection of the equipment can result in a risk of electric shock.

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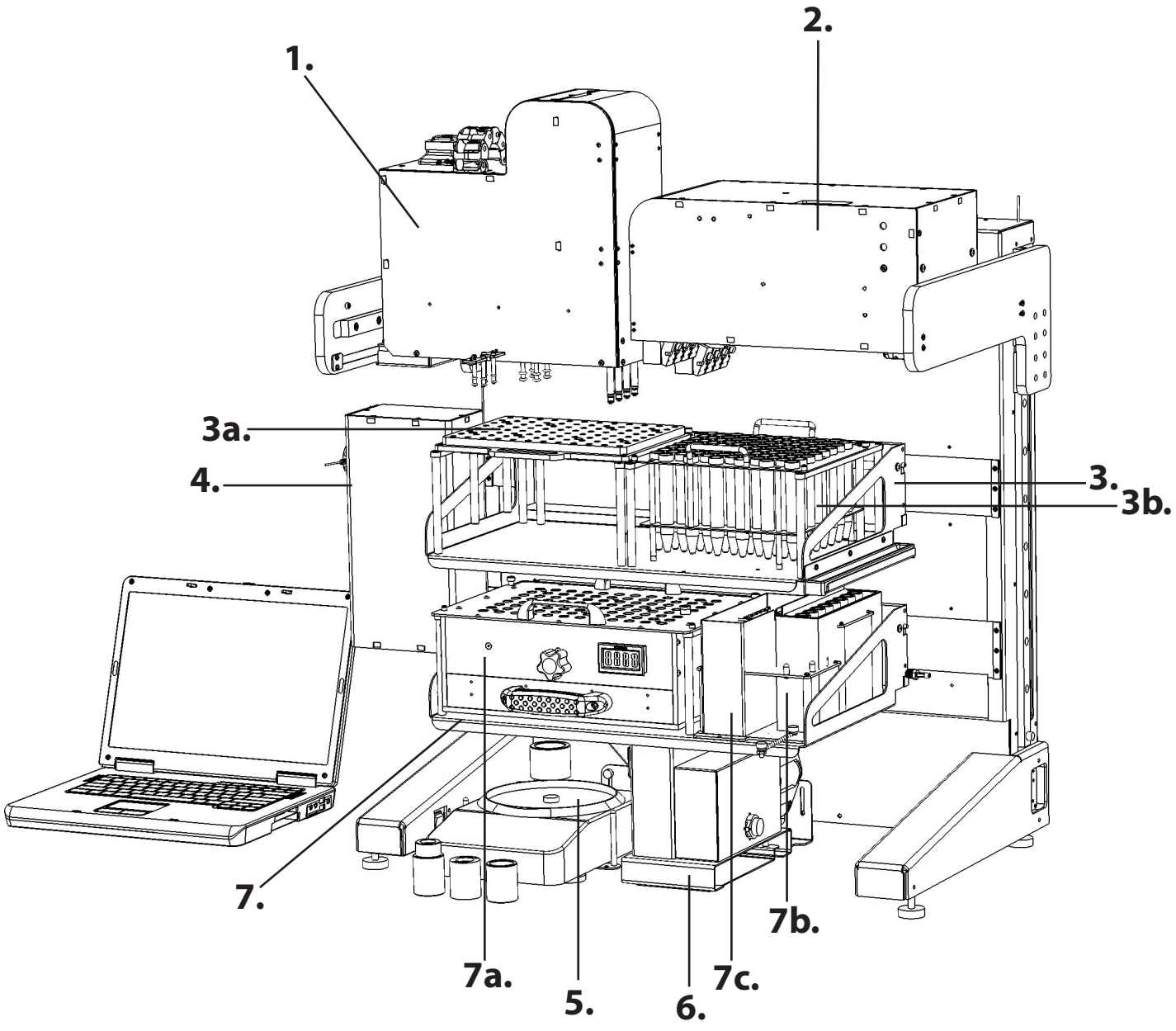
Chapter 1: Introduction

Overview

This chapter describes the OMNI LH 96 Homogenizing System and provides a brief description of its capabilities and optional accessories.



1. Liquid Handling Module
2. 8-Motor Homogenizing Module
3. Top Shelf
    a. OMNI Tip™ Rack
    b. Disposable Tip Rack
4. Cauro Pump
5. Scale
6. Ultra Sonic Cleaning Module
7. Bottom Shelf
    a. Sample Tray
    b. Flush Tank
    c. Static Tank

Key Features and Specifications

The LH 96 is a fully automated sample homogenizing workstation. The LH 96 can homogenize up to eight samples simultaneously, and can process up to ninety-six samples per cycle. The equipment is compact enough to fit into a standard laminar fume hood and the potential for cross-contamination of samples can be reduced by using disposable Omni Tip™ Homogenizer probes.

The LH 96 Homogenizer workstation fully automates the time consuming manual homogenization of samples. Load the sample tubes into the sample tray, and the LH 96 will quickly and efficiently homogenize the samples in accordance with the selected profile.

The LH 96 is also fully configurable to perform multiple sample preparation steps to increase productivity and reduce cross-contamination and preparation errors.

OMNI International's installation personnel work with your laboratory to identify the best probe and optimal processing profile for the specific samples used at each facility. OMNI's applications staff is available to help solve specific processing questions as they may arise. Please call us at 1-800-776-4431 to aid in answering any of your questions.

Specifications

PC/ Remote Operation	Windows OS (Win 7) based PC supplied with control software and graphical user interface. Connects to LH 96 via USB, enabling use either within or outside of bio-safety cabinet or fume hood. Remote accessibility enabled through internal network or with air card.
Homogenizer	Control Head is supplied with 8 brush-less motors with programmable variable speeds up to 28,000 rpm. Customizable settings for run time, probe depth, probe oscillation dimensions, and speeds.
Processing Range	Sample size varies from 300uL to 30 mL per tube depending on tube size. Samples racks are designed to accommodate 5 mL, 14 mL, 35 mL, and 50 mL sample tubes. Rack capacity ranges from 24 to 96 samples based upon sample tube size.
Required Components	Omni Tip™ Plastic, Hybrid, or Stainless Steel homogenizer probes are required for LH 96 Homogenizer platform.
Physical Dimensions	28 in. (w) x 20 in. (d) x 40 in. (h) 71.1 cm (w) x 50.8 cm (d) x 101.6 cm (h) Weight: 95 lbs. (base unit).
Electrical Requirements	115VAC or 230VAC (Universal Power Input) 50/60Hz
Environmental Requirements	Unit operates at ambient room air temperature (50 to 95 degrees F or 15 to 35 degrees C). Base unit fits into most fume hoods. Custom enclosures are also available.
Warranty	1 year (12 months). Extended warranty/service agreements are available.

Available Modules

Available Modules For Expanding The OMNI LH 96

The Omni LH 96 Homogenizer has a variety of modules that can be added to increase productivity, reduce processing time, and decrease the potential for errors. The following sections describe some of the options available to expand the LH 96 Homogenizer into a multi-functional sample preparation platform that can accommodate the specific needs of your laboratory.

Stainless Steel Sample tube tray

The included tube rack holds up to 96 sample tubes. Custom sample tray can be provided for a variety of sample tube sizes ranging from 5mL to 50 mL.

Pipette Transfer of Samples

The LH 96 can be modified with four independent pipette channels to transfer homogenate from the sample tubes into 96-well plates or other user- specified tube matrices. Disposable pipette tips can be used in conjunction with Omni Tip™ Plastic Probes to virtually eliminate cross-contamination.

Weighing Module

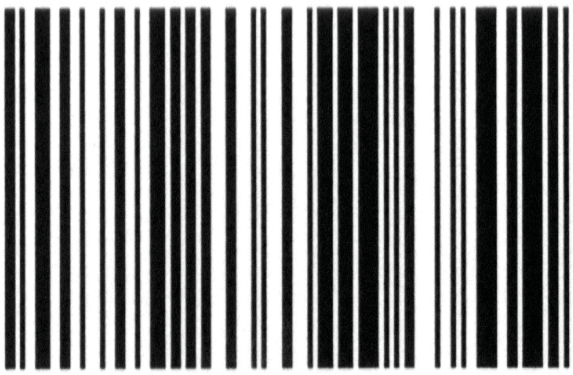
The weighing platform can be used to weigh samples or to input pre-weighed sample data. The weighing platform accurately records sample weights to within 0.001 gram.

Integrated Temperature Control Module

A special active or passive cooling or heating module can be specified to keep sensitive samples at the desired temperature during the entire processing cycle of the workstation.

Bar Code Reader

A bar code reader module (not shown) can be specified to aid in the electronic tracking and cataloging of samples to eliminate processing errors.



Chapter 2: Preparing the OMNI LH 96 For Use

Overview

This chapter describes the equipment set-up and sample preparation required to prepare the OMNI LH 96 Homogenizer for use.

Prepare and Turn On System

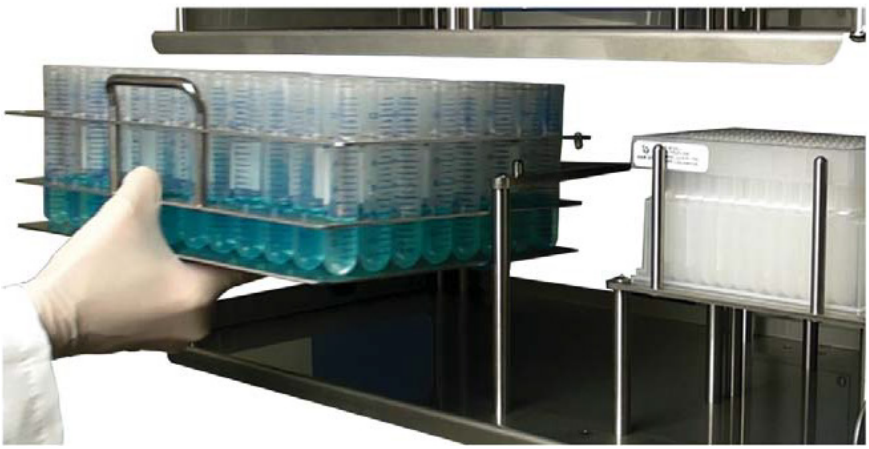
1. Check the LH 96 unit to verify that there are no used probes or sample tubes left in the racks. Verify that the unit is clean and that no contaminants remain from previous runs.

2. Turn on the LH 96 by pressing the ON-OFF toggle switch to the ON (1) position. The ON-OFF switch is located on the inside of the left leg at the base of the LH 96 unit.

3. Turn ON the Control PC and allow to initialize.

4. Prepare samples in accordance with standard preparation methods and protocols. Place sample tubes into the LH 96 sample tray.

5. Load sample tray into the LH 96 frame.



6. Samples are ready for processing.

Chapter 3: Operating the OMNI LH 96

Overview

The OMNI LH 96's graphical user interface is intuitive and easy to use. The software presents the set-up and operation in a simple step-by-step format that even a novice user will find easy to operate. This chapter describes the methods for operating the OMNI LH 96 Homogenizer.

Operating the LH 96

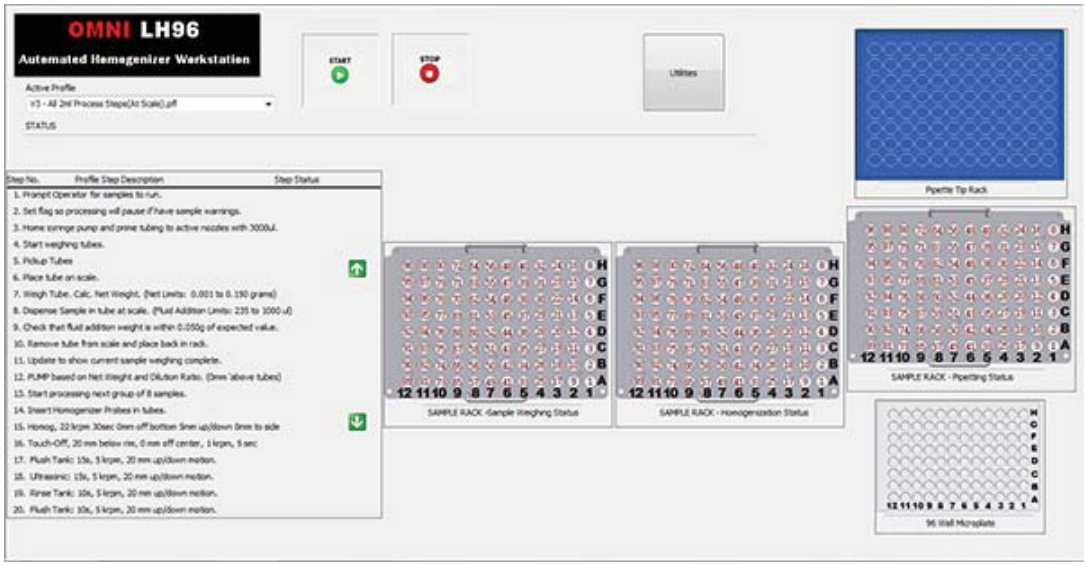
To start processing samples, click the OMNI LH 96 software shortcut icon on the laptop screen to open the program software.

1. Once the LH 96 program is open, use the pointer to select the profile pull-down menu as shown below. The profiles are software programs that control the LH 96 operations and set the parameters (tube size, probe size, probe speed, etc.) used to perform the sample processing. The default profiles were created during the equipment installation to meet the laboratory's specific needs. You can also change or create new profiles to match new sample requirements. See Chapter 6: Editing Profiles.

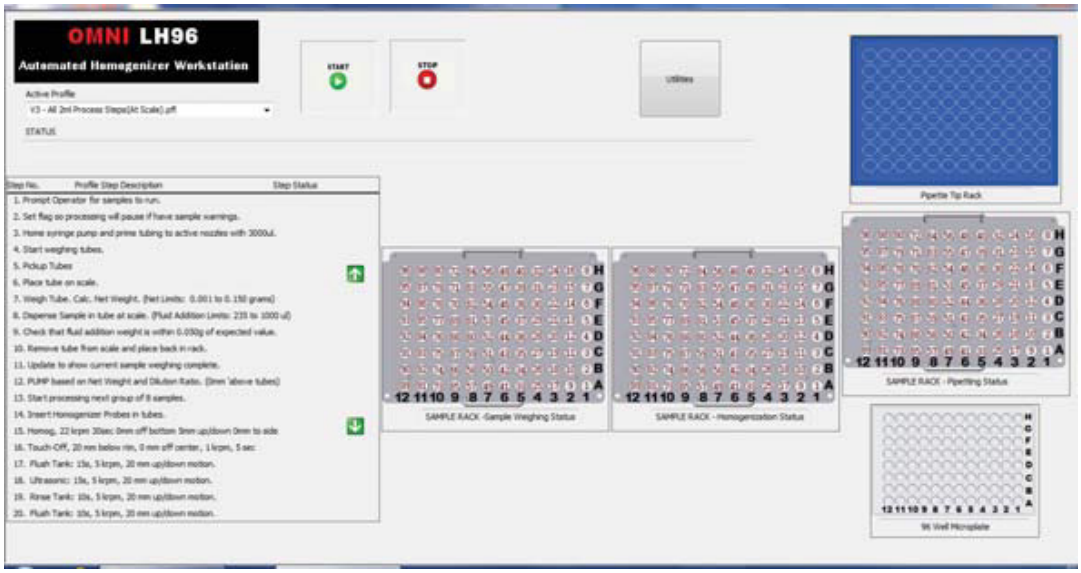
2. Using the pointer, select and click the appropriate processing profile from the drop-down menu.

3. Once the profile is selected, you may view the processing steps on the left side of the screen.

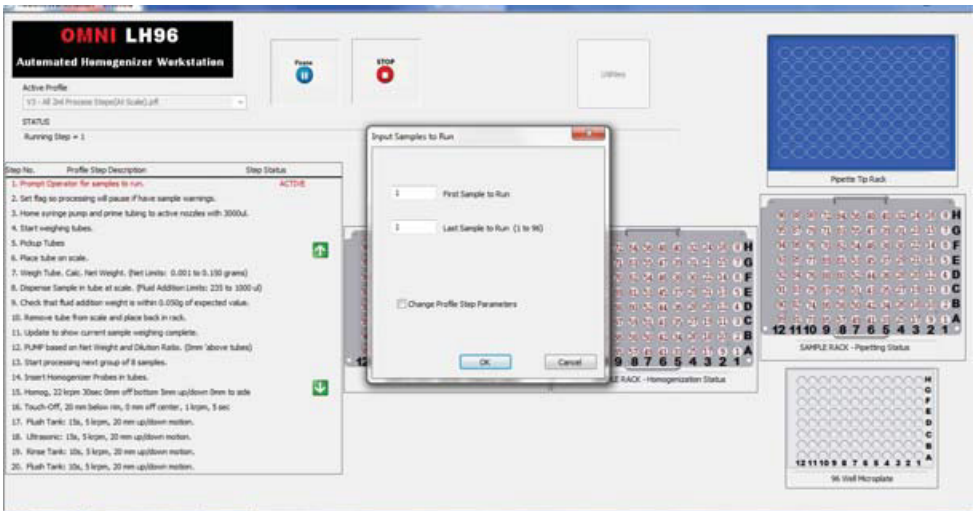
4. Verify and click the START button to start the sample processing program.



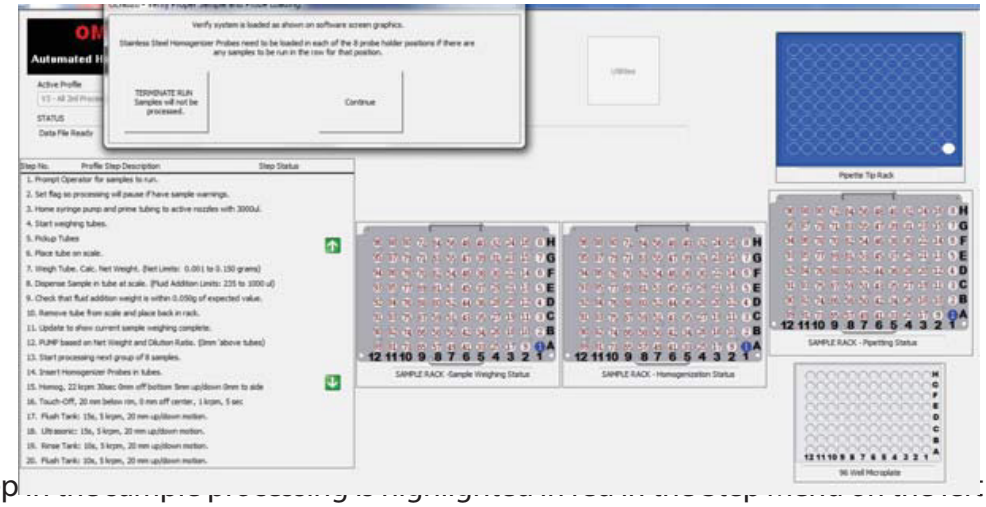
5. The clean probe and sample tube tray layouts are displayed at the center of the screen.



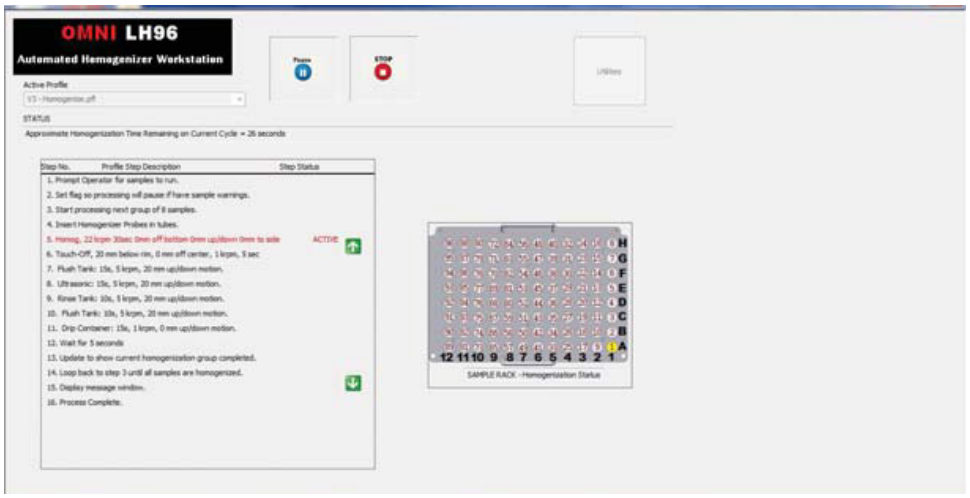
6. A pop-up menu opens asking you to enter the number of samples and the start and finish sample locations. Enter the number of samples in the boxes and click OK to continue.



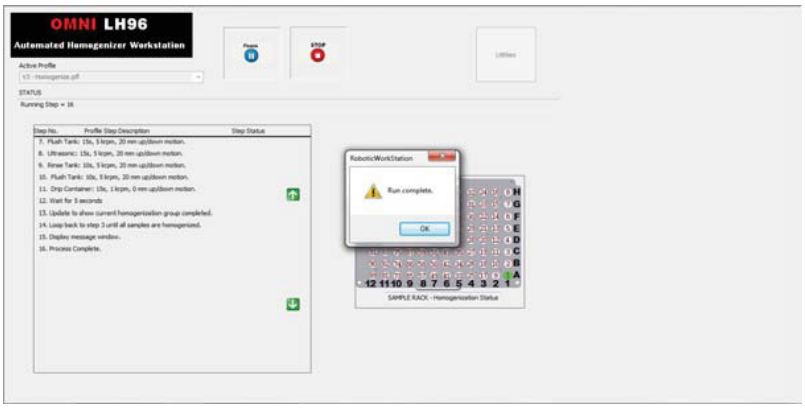
7. A pop-up menu which asks you to verify that the probe and sample tube trays are properly loaded. The proper probe and sample tube locations are shown on the tray graphic at the center of the screen. Insert probes according to the graphic, if not previously inserted. Click CONTINUE to start the sample processing. Click TERMINATE if there is a problem. NOTE: Improper loading can result in: the samples not being processed.



8. The current step in the sample processing is highlighted in red in the step menu on the left side of the screen. Use this indicator to follow the progress of the sample processing.

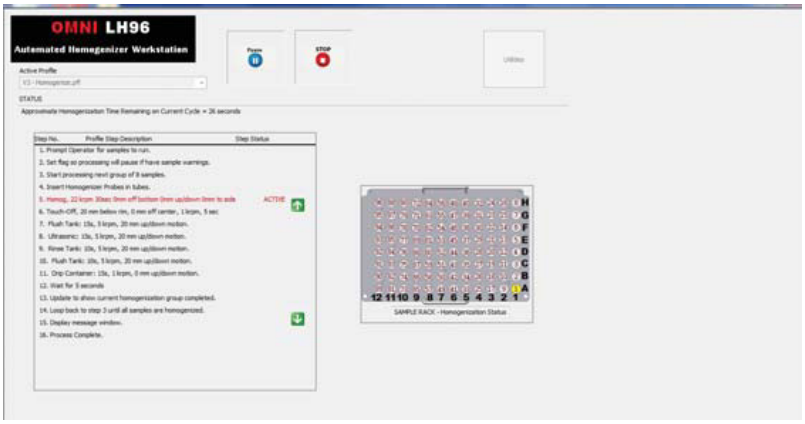


9. Once all the samples are processed, a pop-up box will notify you that the run is complete. Click OK to finish the run. You can repeat the process with new samples or close the program to complete.



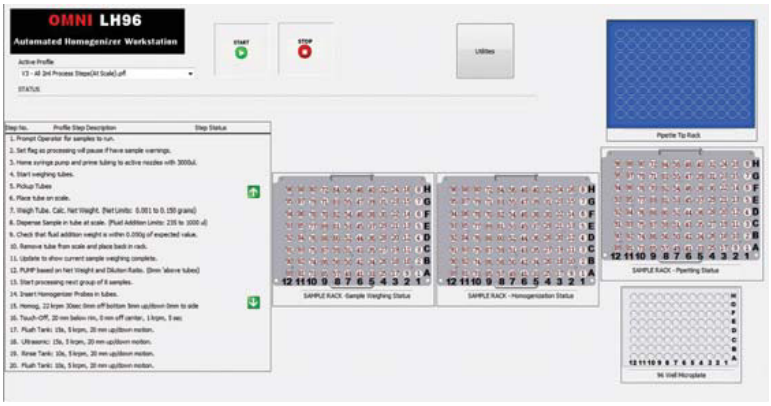
Pausing and Stopping the LH 96

You may need to pause or stop the processing operation to correct an error or prevent damage to the LH 96 unit. This sections describes the various options for pausing or stopping the operations.



1. Click the PAUSE button at the top of the screen to pause the current program. CAUTION: Do not reach into LH 96 until unit has paused. The LH 96 unit will finish its current movement prior to pausing. Pausing allows you to stop the processing operation temporarily and then resume at the next operation step. TERMINATE button will illuminate on the screen to terminate current and subsequent steps on specific samples. Click on this button to terminate the program or click CONTINUE button to resume the program.

2. Click the STOP button at the top of the screen to immediately stop the program. The LH 96 stops without finishing its current movement. NOTE: The STOP function allows for program recovery, but the LH 96 unit will need to perform initialization and homing operations prior to continuing.



3. Press the red Emergency Stop button, attached to the base of the LH 96 unit, in the event of an emergency to immediately shut down the entire operation. Power will not be restored to the LH 96 unit until the Emergency Stop button is rotated and pulled back out into the operational position. CAUTION: pressing the Emergency Stop button requires a complete restart of the system and all remaining processing steps are lost.

Indicator Lights

There are three indicator lights located at the top right corner of the LH 96 unit. These indicator lights show the status of the LH 96 system.

1. 
2. 
3. 

1. The top light glows RED when active and indicates a system error or a process interrupt.

2. The center light glows BLUE to indicate that the process is running.

3. The bottom light glows GREEN when the system power is on.

Chapter 4: Rotor Stator Homogenizer Probes

Overview

The following sections describe the types and uses of various homogenizer probes available for use with the OMNI LH 96 Homogenizer.

Description

The key component in the OMNI LH 96 Homogenizer is the Rotor Stator Homogenizer Probe. The Rotor Stator Homogenizer Probe spins a rotor cutting shaft at high speeds with a stationary housing to create a shearing force within the sample media. This shearing action effectively cuts, mixes, and homogenizes the sample. The homogenizer probe consists of a rotating shaft with a cutting tip (Rotor) held within a stationary housing (Stator). The OMNI LH 96 Homogenizes a sample by inserting a specific probe into the specified sample tube and operating the probe at high rotational speeds to shear and mix the sample. The OMNI LH 96 also oscillates the probe up-and-down and side-to-side to fully process the entire sample, simulating the motions used in manually operated homogenizers. The OMNI LH 96 uses dedicated probes to process up to samples simultaneously and up to ninety-six samples in a single processing run. As dedicated individual probesare assigned to each sample tube, the potential for cross-contamination is minimized. By using disposable probes, the potential for cross-contamination is virtually eliminated.

Probe Applications

Homogenizer probes are available in flat bottom, saw-tooth bottom or extended knife configurations. Flat bottom probes work best with liquids or soft tissue and for gentler applications, such as creating emulsions, basic mixing, and liquid-liquid processing. Saw-tooth and extended knife probes work best with fibrous tissue. Probes with oversized windows work best with frozen or solid samples.

Probe Sizes

Homogenizer probes are available in a variety of sizes, with the 5 mm, 7 mm, and 10 mm probes being the most common. When working with liquids, choose a probe diameter based upon the expected volume of the sample processed. For solid samples, choose a probe that is as large or larger than the initial size of the sample being processed.

Probe Speeds

The homogenizer probes can be operated at speeds ranging from 500 to 28,000 rpm. The optimum speed is highly dependent on the type of sample and the consistency of the end product.

Types of Homogenizer Probes

The LH 96 has several types of homogenizer probes available for use based upon the your specific requirements.

OMNI Tip™ Homogenizer Probes

OMNI Tip™ probes are disposable rotor stator homogenizer probes that are constructed of durable plastic (polycarbonate tube and ultem shaft). OMNI Tip™ probes are specifically designed to be discarded after use to prevent cross-contamination of samples. For many applications, the probes can be cleaned, sterilized, or disinfected for extended re-use. The clear stator tube allows you to view the interior of the probe to ensure that valuable sample material is not trapped or lost. The OMNI Tip™ probe's patented design eliminates the hassle of disassembly and maintenance required with traditional stainless steel homogenizer probes. OMNI Tip™ probes are available in both soft tissue (deaggregation) and hard tissue (frozen) versions.

OMNI Tip™ Specifications - 7 mm Disposable Plastic Probe

Width	7 mm
Length	110 mm
Minimum Inside Diameter of Sample Tube	8 mm
Applications	Soft Tissue OMNI Tip™: liquid/liquid or soft tissue processing Hard Tissue OMNI Tip™: frozen or fibrous tissue processing
Processing Range	2 mL to 50 mL

Stainless Steel Homogenizer Probes

Stainless steel homogenizer probes are available as separately ordered items for all OMNI Homogenizers. The stainless steel probes consist of an inner rotating shaft with a rotor knife housed within a stationary windowed outer tube. The probe uses upper and lower bearings to separate the rotor and stator. Both the rotor and stator are constructed of stainless steel. The bearings are available in stainless steel or PTFE. The stainless steel bearings are quieter and more durable than the PTFE bearings; however, the stainless steel bearings are subject to corrosion and can damage the homogenizer assembly if not properly maintained. The PTFE bearings are inert and corrosion resistant, but are less durable and need to be replaced more frequently.

Stainless steel probes are ideal for larger sample volumes, larger initial tissue size, and tougher tissue types. Stainless steel probes can be disassembled for cleaning and re-use.

Stainless Steel Probe Specifications

Probe Diameter	5mm	7mm	10mm
Sample Processing Volume Range	<0.20 mL - 5 mL	0.25 mL - 30 mL	1.5 mL - 100 mL

Hybrid Probes

Omni Tip™ Hybrid Homogenizer Probes combine the convenience of disposable plastic probes with the durability of traditional stainless steel probes. Hybrid Homogenizer probes are made of a stainless steel outer stator tube with a inner ultem plastic rotor shaft. The plastic shafts can be disposed after each use or they may be cleaned and re-used multiple times. The simple two-piece design makes these probes much easier to clean than traditional stainless steel probes. Omni Tip™ Hybrid probes are ideal for applications where chemical compatibility issues are a factor. OMNI's Hybrid Probes are compatible with most chemical compounds, including trizol, chloroform, and phenol.

Chapter 5: Liquid Handling Module

Overview

The following sections describe the process of dispensing one or more reagents/solvents using the OMNI LH 96 Liquid Handling Module.

Description

The OMNI LH 96 Liquid Handling Module is designed to greatly reduce the time spent preparing samples by automating the dispensing of reagents directly into sample tubes or collection plates. Located on the left head of the unit, thin tubing is routed from the syringe style pump to the front of the gripper on the left head of the LH 96. The amount of reagent dispensed can be determined by the weight or volume. Although Liquid Handling is a discrete module that can work independently, the standard output/design is used in conjunction with the Weighing Module to dispense directly to the tube at the scale.

The Liquid Handling Module ensures precise sample prep by:

- Accurate dispensing
- Saving reagent waste
- Increasing throughput
- Providing precision by eliminating human error

All of which will provide for a better homogenized product.

Components

Syringe Specifications

Stroke Travel	60 mm
Syringe Sizes	5 mL, 10 mL
Speed	1.2 seconds - 160 minutes per stroke
Precision	≤ 0.05% C.V. within run at full stroke (at 23°C, with 500µL syringe and above using deionized water)
Accuracy	≤ 0.5 % deviation from theoretical result at full stroke (at 23° C, with 500µL syringe and above using deionized water)

The OMNI LH 96 Liquid Handling Module offers multiple options for output locations at:

- Scale (Conjunction with Weighing Module)
- Stainless Steel Sample Tube Tray
- Microplate

Another option available for dispensing reagent to the sample is a Peristaltic Style Pump.

Liquid Handling Module Performance

The automated Liquid Handling process starts by determining the liquid reagent(s) needed for the sample. Before the cycle can begin, the LH 96 Software first primes the system. This guarantees absolute precision in transmitting liquid to the sample. After completing the priming step, the Gripper takes a tube from the Stainless Steel Sample Tube Tray and delivers it to the Weighing Module. The weight is recorded and then dispensed by the module directly at the scale. Verifying the right amount has been delivered to the sample, the tube is then placed back into the rack and is ready to be homogenized.

Here you can see the Gripper taking the tube from the Stainless Steel Sample Tube Tray, to place it in the Weighing Module.

Once the weight is recorded, the liquid is dispensed directly into the tube, while the tube remains in the Weighing Module.

Chapter 6: Using the Liquid Handling Module

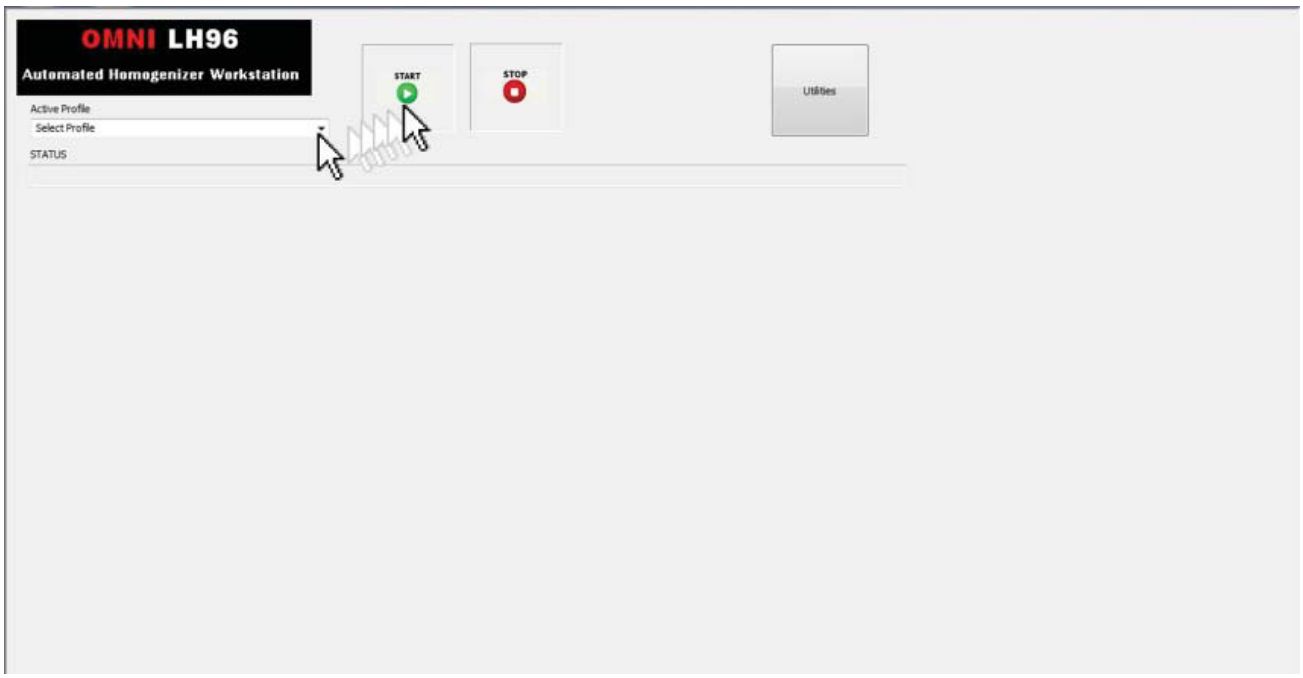
Overview

These steps describe the equipment set-up and operations required to properly prepare the OMNI LH 96 Liquid Handling Module for use.

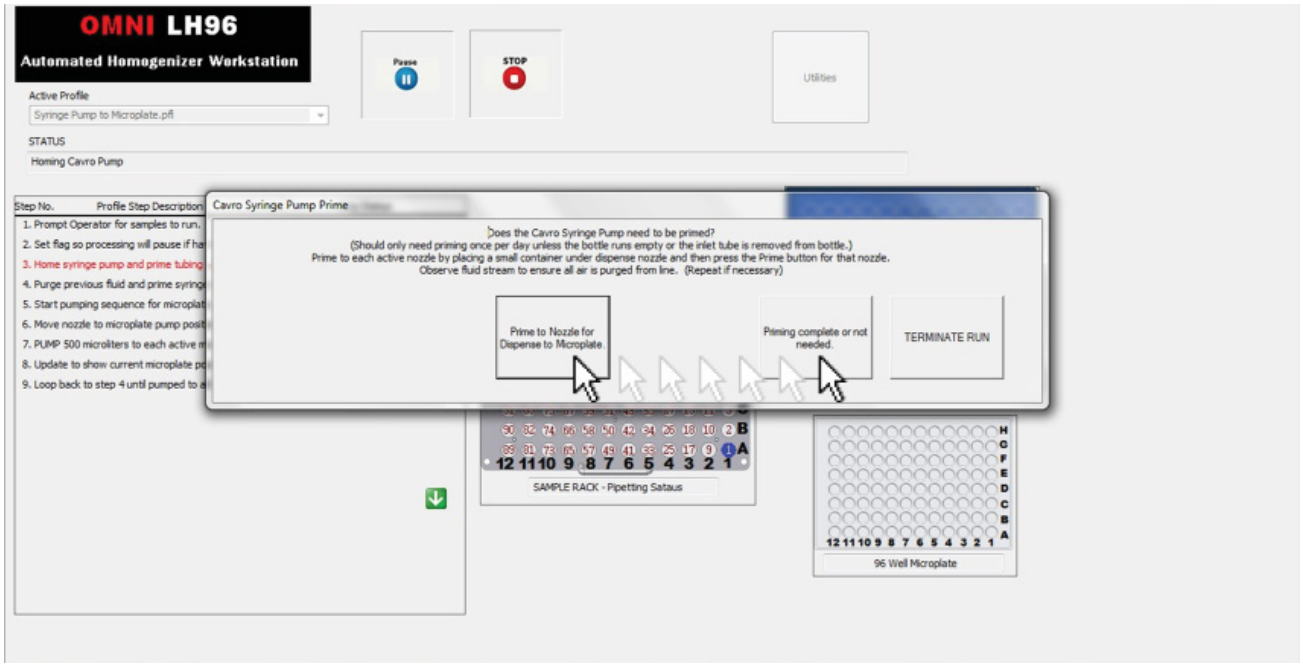
Preparation/Operations

1. Verify samples are in uncapped tubes placed in the Stainless Steel Sample Tube Tray. Prepare selected reagent by ensuring thin tubing is placed within container, ready to be extracted.

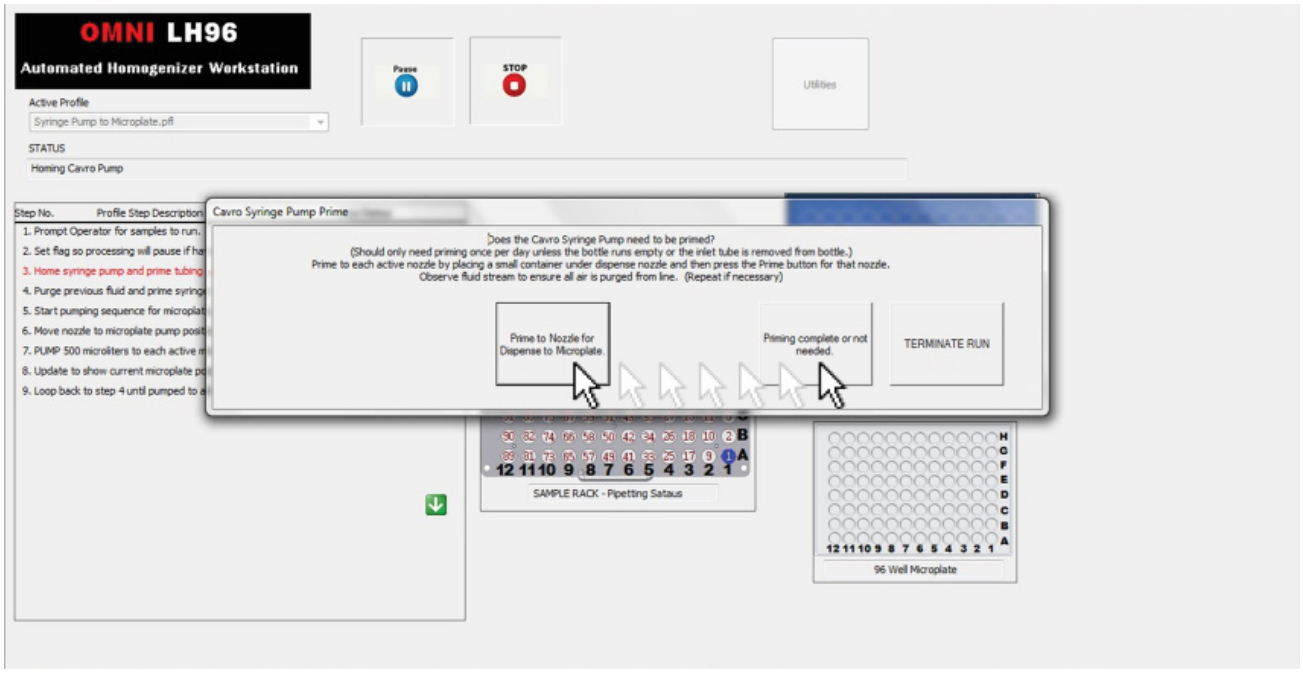
2. Using the pointer, select and click the appropriate profile from the drop-down menu. Click START to begin preparing LH 96 for the Liquid Handling cycle.



3. A pop-up dialog opens asking you to enter the number of samples from First to Last. Enter the number of samples in the boxes and click OK to continue.



4. A pop-up dialog asks you to verify system is properly loaded. The proper locations are shown on the tray graphic at the center of the screen. Click CONTINUE to start process. Click TERMINATE if there is a problem. CAUTION: Another pop-up menu will open to prime pump. Click PRIME TO NOZZLE to begin priming system. After complete click PRIMING COMPLETE to start transferring reagent.



5. Once the reagent has been transferred, a pop-up box will notify you that the run is complete. Click OK to finish the run.

Chapter 7: Pipetting Module

Overview

The following sections describe the features, functions, and capabilities of the OMNI LH 96 Pipetting Module.

Description

The OMNI LH 96 Pipetting Module is designed to transfer a portion of each homogenized sample directly to a secondary collection plate (such as 96 well plate or other customer-defined receptacle). The Pipetting Module consists of four independent pipette channels that are connected to a series of syringe style pumps. In a standard configuration, the LH 96 accommodates for 1000µL pipette tips, while other sizes can be utilized on a custom design basis. The Pipetting Module consists of four main features that include:

- Aliquot (Transfer)
- Mixing
- Clog Detection
- Liquid Level Detection

When withdrawing a portion of the homogenate, the pipette tip location in the sample can be controlled by either of two methods:

- Distance off the bottom of the tube
- Distance from the top of the liquid in the tube (utilizing liquid level detection)

With some settling occurring after the homogenization cycle, the ability to mix by running several pump cycles displaces the homogenized sample for a more evenly dispensed product. This aids in helping to extract an optimal aliquot. The Clog Detection feature is able to detect a clogged tip or inaccurate volume during liquid extraction, eliminating errors that might occur during the transport of liquids to the collection plate. After liquid is dispensed, the collection plate is then ready for further downstream processing.

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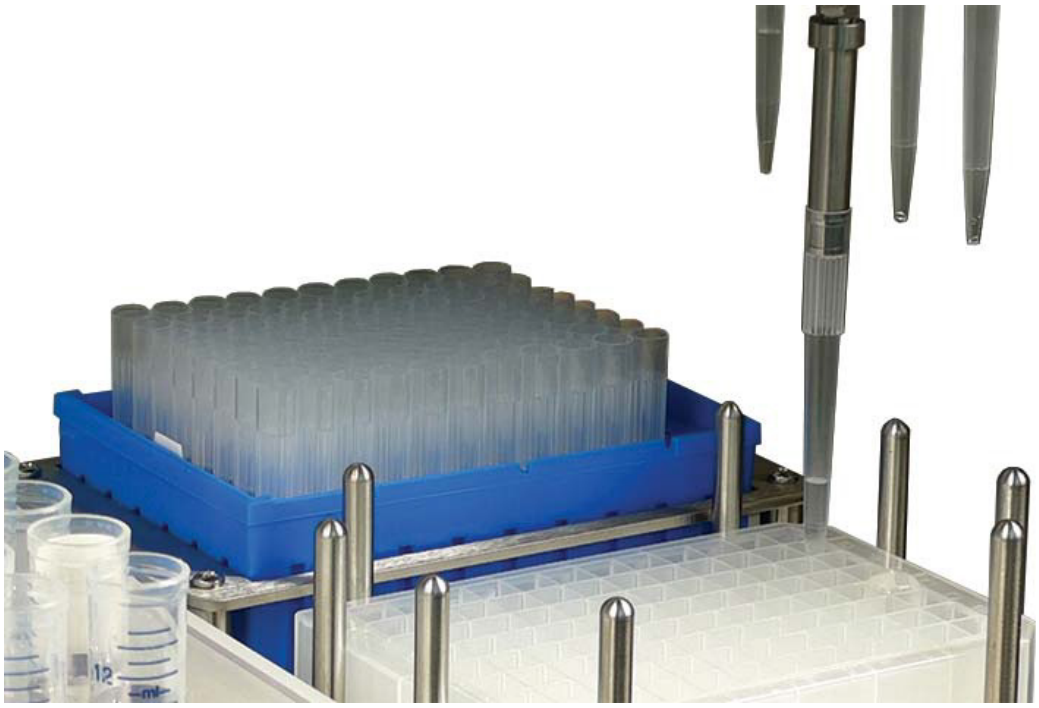
Components

Pipette Specifications

Volume Range	5µL - 500µL (Higher transfer volumes performed by multiple transfers)
Fluid Delivery	Air Displacement Rotary Pump
Dispense Accuracy	±1% typical at 100µL
Pipette Tips	Disposable Tips – 10µL, 50µL, 200µL, 1000µL (Dependent on customer preference)
Safety Features	Liquid Detection – Aids in extracting optimal aliquot. Clog Detection – Detects clogged tip or inaccurate volume. Drip Prevention – Oscillates tip to edge preventing cross-contamination.

Pipetting Module Performance

The OMNI LH 96 Pipetting Module begins its process by moving the pipette nozzles to the top shelf, where the selected pipette tips are positioned. The Pipetting Module engages and vacuum seals four pipette tips. The nozzles are lowered to the Stainless Steel Sample Tube Tray, where the homogenization process has been completed. The specified amount of liquid sample will be pumped into the tip from the uncapped tubes and dispensed directly to the collection plate placed in the tray before the cycle. Each pipette tip is oscillated to the edge of the tube to reduce the likelihood of any cross-contamination. Once Pipetting is completed, the tips are then ejected into a receptacle for later disposal.



Chapter 8: Using the Pipetting Module

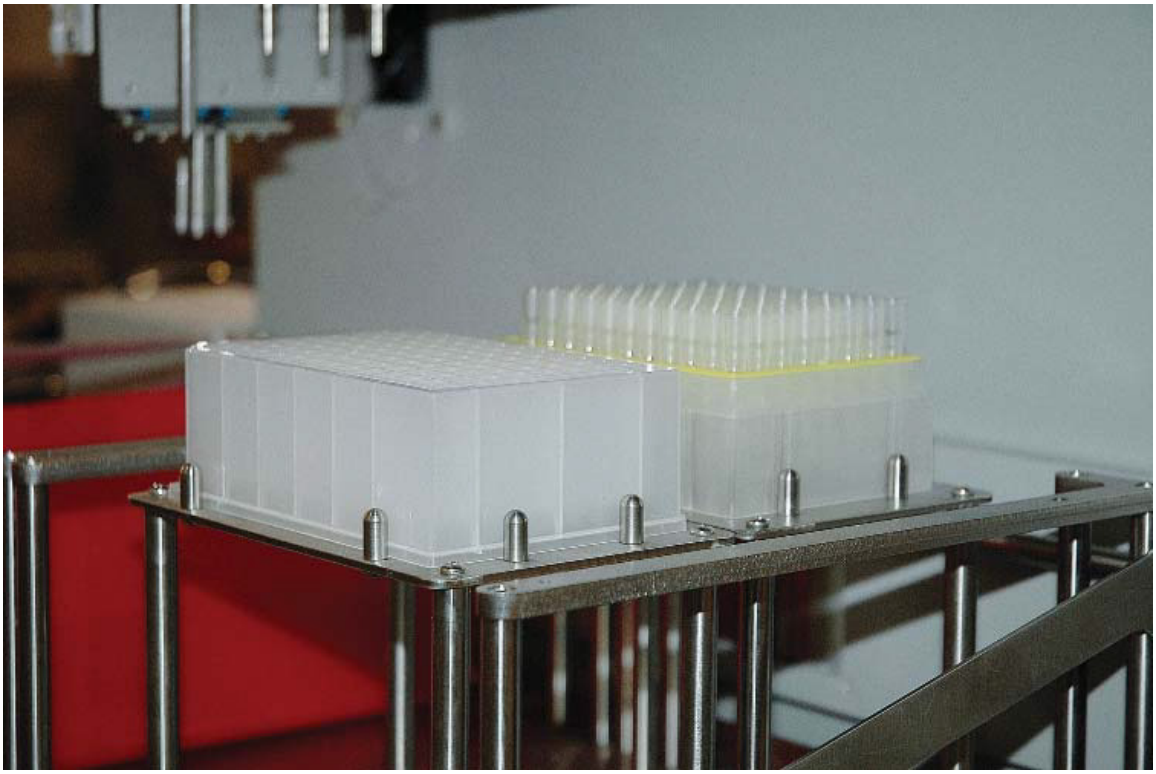
Overview

These steps describe the equipment set-up and operations required to properly prepare the OMNI LH 96 Pipetting Module for use.

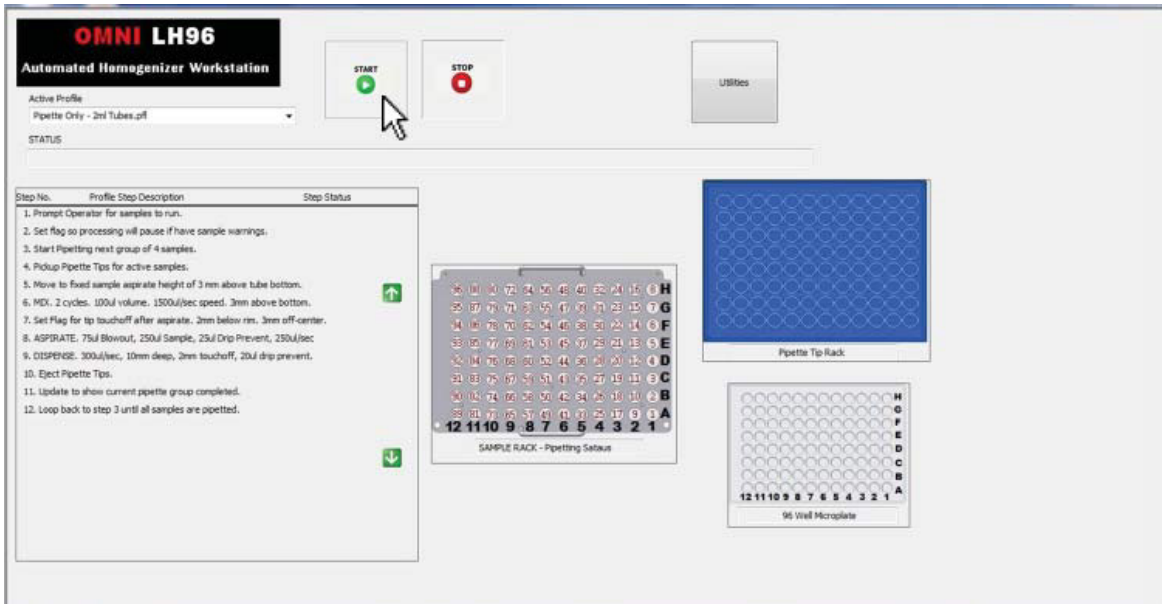
Preparation/Operations

1. Verify tubes in the Stainless Steel Sample Tube Tray have completed the Homogenization Cycle and are ready for liquid transfer.

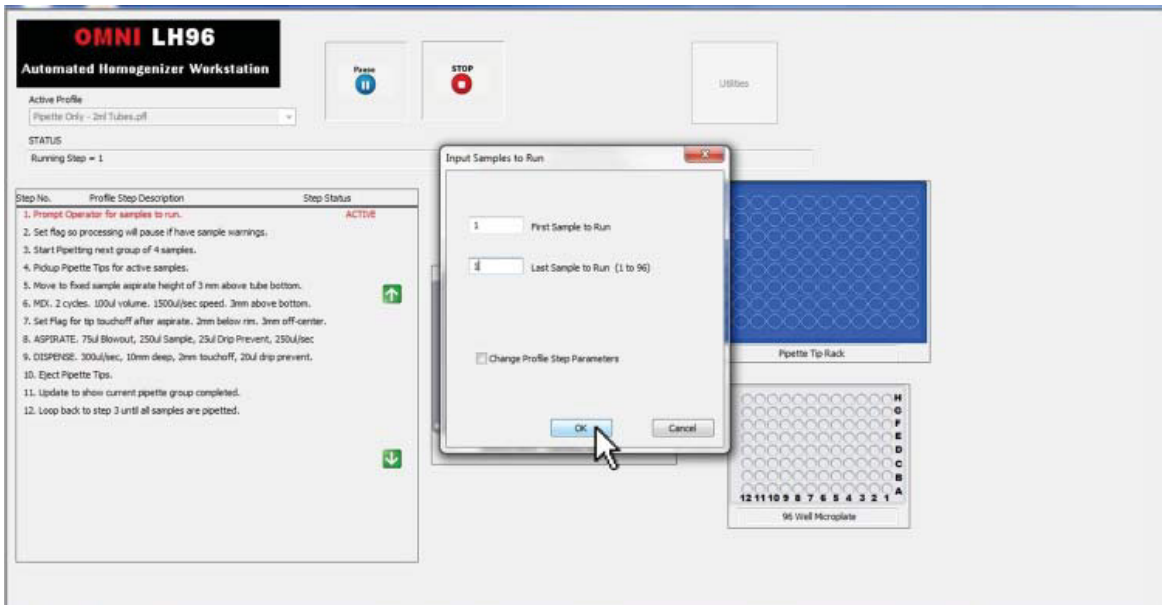
2. Prepare selected Pipette Tips and Microplate in accordance with standard preparation procedures. Load Pipette Tips, Microplate, and Disposable Bin in top shelf of LH 96.



3. Using the pointer, select and click the “Pipette Only” profile from the drop-down menu of LH 96 software. Click START to begin preparing LH 96 for the Pipette cycle. Alternately, the Pipetting functionality can be part of a more comprehensive profile to maximize the efficiency of the LH 96. See your OMNI representative for more information.



4. A pop-up dialog opens asking you to enter the number of samples from First to Last. Enter the number of samples in the boxes and click OK to continue.



5. CAUTION: A pop-up dialog asks you to verify system is properly loaded. The proper locations are shown on the tray graphic at the center of the screen. Click CONTINUE to start the liquid transfer. Click TERMINATE if there is a problem.

6. Once the liquid samples have been transferred, a pop-up dialog will notify you that the run is complete. Click OK to finish the run.

Chapter 9: Ultrasonic Cleaning Bath

Overview

The following sections describe features of the Ultrasonic Cleaning Module, used for cleaning/rinsing Stainless Steel and Hybrid style probes after homogenization.

Description

The OMNI LH 96 Ultrasonic Cleaning Module enables a simplified cleaning process of Stainless Steel and Hybrid Probes after homogenizing. The Module cleans the probes after each row of samples have been homogenized depending on user preference. This helps to ensure that processed sample remaining on Stainless Steel or Hybrid Probes is removed, thereby greatly reducing the chance of cross-contamination between samples.

Components

The three-step LH 96 Ultrasonic Cleaning feature consists of:

• **Flush Tank** – Flows water or liquid cleaning solution through probes as they are spun to eliminate sample left from homogenizing (user provides water or cleaning solution supply).

• **Rinse Tank** – Probes are dipped into water or cleaning solution to rinse off before continuing further cycles.

• **Ultrasonic Tank** – Uses ultrasonic waves in a liquid tank to loosen and remove particles adhered to stainless steel or hybrid probes after homogenizing.

Chapter 10: Using the Ultrasonic Cleaning Feature

Overview

These steps describe the equipment set-up and operations required to properly prepare the OMNI LH 96 Ultrasonic Cleaning Feature.

Preparation/Operations

1. Fill the Rinse Tank and Ultrasonic Tank with water or cleaning solution before starting the homogenization cycle. The tanks need to be filled with enough water for probes to be completely submerged without overflowing.

2. Connect pump and drain hose to Flush Tank. CAUTION: Verify that hose is securely connected and water or cleaning solution can flow through Flush tank to clean probes. Open the supply valve slowly to achieve a low flow rate through Flush Tank. Make sure that drain hose empties into proper receptacle.

3. Using the pointer, select and click a profile from the drop-down menu of the LH 96 software. Click START to begin preparing the LH 96 for the homogenization cycle. The Ultrasonic Cleaning will be utilized in profiles where Stainless or Hybrid Probes are used.

4. Once the homogenization process and Ultrasonic Cleaning cycle are complete, a pop-up dialog will notify you that the run is complete. Click OK to finish the run.

Chapter 11: Weighing Module (Scale/Gripper)

Overview

The following sections describe the features and applications of the OMNI LH 96 Weighing Module.

Description

The OMNI LH 96 Weighing Module is designed to accurately weigh samples prior to homogenization on the LH 96 platform. Collecting sample data with the OMNI LH 96 Weighing Module is made simple by using a precision scale along with a series of tube adaptors (which accommodates tube sizes ranging from 2 mL - 50 mL). Standard functionality of the weighing module and software includes the following functions:

- Record sample weight directly from scale.
- Tube tare weight per one of the following:

1. Tare weigh empty tubes and import file for net weight calculation in subsequent profiles.
2. Enter an average tare weight for tubes at the beginning of a run.
3. Utilize the stored tare weight within the software for streamlined operation.

Components

The weighing module consists of:

1. The Gripper
2. Tube Adaptor(s)
3. High Precision Scale

1.

2.

3.

Scale Specifications

Accuracy Class	Class II
Weighing Capacity	320 g
Readability	0.001 g
Response Time (Average)	≤ 1 s
Applications	Weighing various sample types in sample tubes (2 mL, 5 mL, 14 mL, 15 mL, 35 mL, and 50 mL) before homogenization process.

The OMNI LH 96 also offers an optional Liquid Handling Module that works in conjunction with the Weighing Module. Using a liquid delivery system, the OMNI LH 96 Liquid Handling Module accurately dispenses the desired volume of liquid directly into the sample tube at the Weighing Module. The diluted sample is then weighed and placed back in the Stainless Steel Sample Tube Tray, ready to be homogenized.

Weighing Module Performance

The scale communicates directly with the OMNI LH 96 Software via USB. Each tube adapter on the scale can be selected to fit the specific sample tube size needed. This allows for a consistently accurate measurement. Once the tube is aligned to the scale, the sample is then released to begin measuring. The weighing process is highly accurate, measuring within 0.001g on the scale. Once the sample has been weighed, the OMNI LH 96 Gripper then returns the tube back to the Stainless Steel Sample Tube Tray, saving time, effort and ensuring the most accurate sample preparation. Through a series of internal calculations, the software also checks the weight of the added liquid to determine if any errors occurred during dispensing, such as depletion of the source liquid.

Chapter 12: Using the Weighing Module

Overview

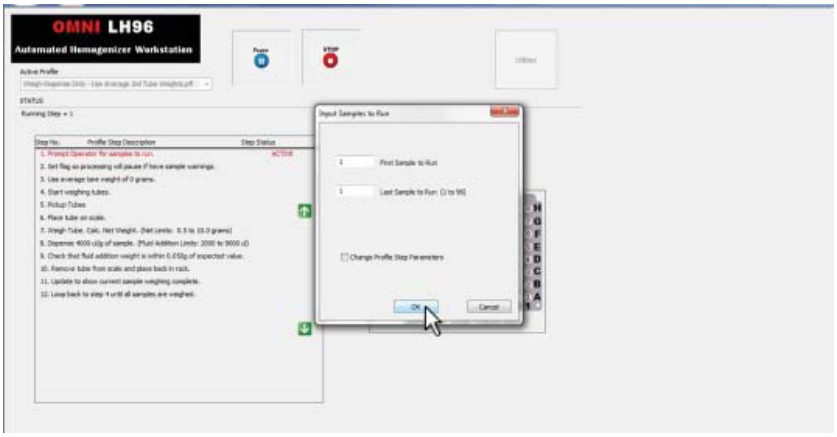
These steps describe the equipment set-up and operations required to properly prepare the OMNI LH 96 Weighing Module for use.

Preparation/Operations

1. Verify samples are in uncapped tubes placed in the Stainless Steel Sample Tube Tray. CAUTION: Adjust scale to align with tube Gripper if needed. If tare weight functionality is desired, the uncapped tubes should be completely empty and dry.

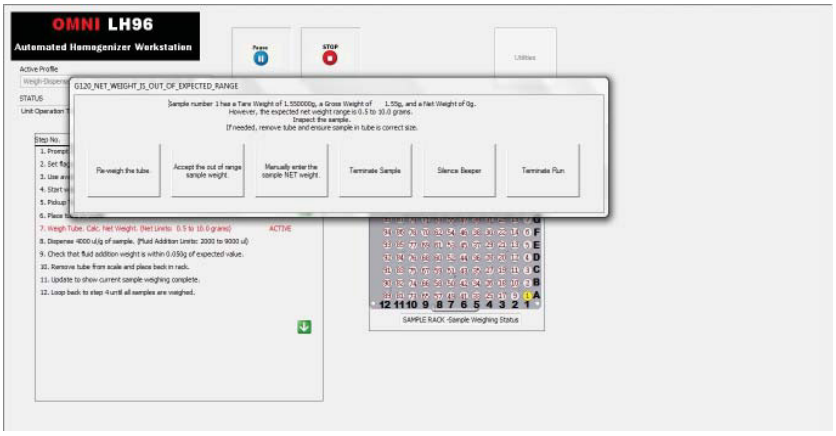
2. Using the pointer, select and click the appropriate profile from the drop-down menu. Click START to begin preparing the LH 96 for the Weighing cycle.

3. A pop-up dialog opens asking you to enter the number of samples from First to Last. Enter the number of samples in the corresponding boxes and click OK to continue.



4. A pop-up dialog asks you to verify the system is properly loaded. The proper locations are shown on the tray graphic at the center of the screen. Click CONTINUE to start the process. Click TERMINATE if there is a problem. CAUTION: Improper loading of OMNI Tip™ or pipette tips can cause ERRORS and halt operation.

5. If weight does not meet predefined values, a pop-up dialog will ask you to ensure sample weight is correct. If sample weight is incorrect click RE-WEIGH THE TUBE or MANUALLY ENTER THE SAMPLE NET WEIGHT. Otherwise, click ACCEPT THE OUT OF RANGE SAMPLE WEIGHT to proceed with weighing cycle.



6. Once the weighing process is complete, a pop-up dialog will notify you the run is complete. Click OK to finish the run.

Chapter 13: Passive Cooling Rack

Overview

The following sections describe the features of the optional Passive Cooling Rack.

Description

The OMNI LH 96 Passive Cooling Rack is designed to keep samples at near freezing temperatures during the homogenizing process. The rack stores dry ice in a sealed chamber beneath the sample tubes keeping the tubes at near-freezing temperatures for extended periods of time. This allows for sensitive samples to remain cold throughout homogenization process.

Components

Available Tube Sizes	2 mL, 5 mL, 14 mL, 15 mL, 35 mL, and 50 mL
Cooling Method	Sealed Dry Ice
Temperatures	Starting temp: -78° C (-109.8° F)
Duration	Minimizes heat gain for duration of homogenizing cycle

Chapter 14: Using the Passive Cooling Rack

Overview

These steps describe the equipment set-up and operations required to properly use the OMNI LH 96 Passive Cooling Rack.

Preparation/Operations

1. Remove the Passive Cooling Rack from the LH 96. Unclamp and lift to remove bottom of rack. Using gloves and other safety precautions, place dry ice on the cooling rack. Carefully place top of rack over dry ice and securely clamp before returning to LH 96.

2. Ensure the profile selected in the LH 96 Software is compatible with the Passive Cooling Rack installed.

Chapter 15: Maintaining and Cleaning the OMNI LH 96

Overview

This chapter provides details for maintaining and cleaning the OMNI LH 96 Homogenizer.

Cleaning the LH 96

WARNING: Turn the power OFF to the LH 96 unit prior to cleaning to minimize the potential for electrical shock and to prevent damage to sensitive components on the LH 96 unit.

1. After each use and at the end of the work day (after all processing is complete), remove the samples, new probes, and used probe trays from the LH 96 unit, and clean separately with a mild detergent.
2. Wipe the unit with a moist cloth to clean any spills. You may also use a mild detergent if necessary; however, be careful not to spill water on any sensitive electronics or electrical connections. Wipe surfaces dry prior to replacing trays.
3. If necessary, you may move the shelves and robot arms to access covered areas. CAUTION: Move the shelves and robot arms slowly. Fast movements may induce stray currents in the stepper motors that can damage the stepper motors or other sensitive electrical components. The shelves and robot arms must not be moved manually while the power is ON. Manually moving the control arms with the power ON may result in damage to the stepper motors.

Maintaining the LH 96

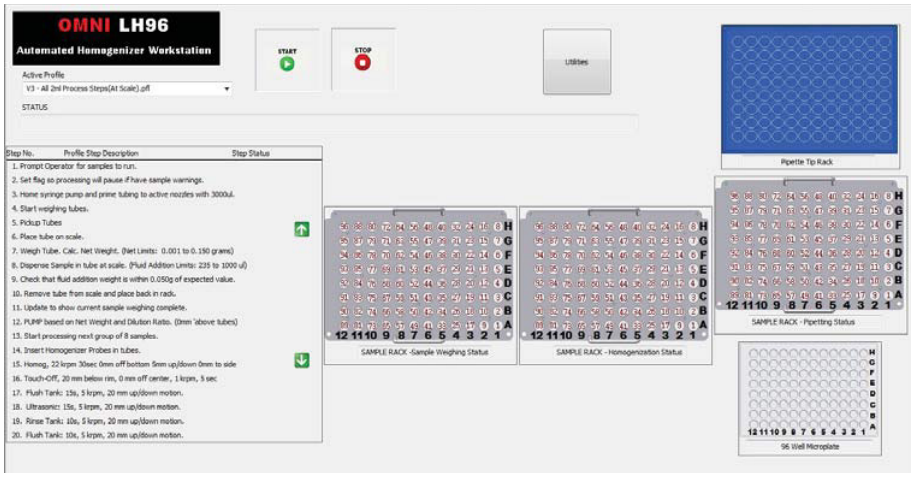
The OMNI LH 96 has very few user serviceable parts. For serious problems that prevent normal use, contact your authorized dealer or call Omni at 1-800-776-4431 or 770-421-0058.

Clearing Jams

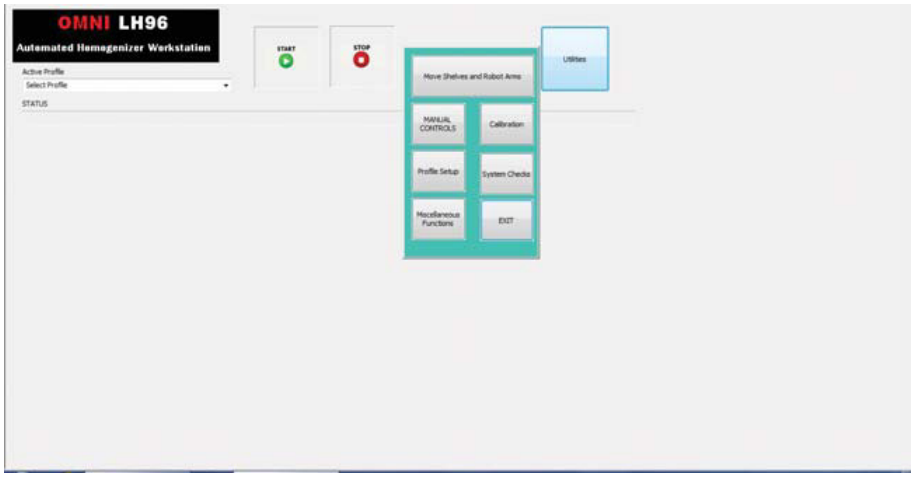
The OMNI LH 96 has very few user serviceable parts. For serious problems that prevent normal use, contact your authorized dealer or call Omni at 1-800-776-4431 or 770-421-0058.

Minor problems such as jammed trays may be resolved by attempting to clear the jam using the software while the system is ON. Complete the following steps.

1. Use pointer to select "Utilities Menu" at the top of the screen.



2. Select "Move Shelves and Robot Arms" button from the Utilities menu.



3. Select appropriate pre-programmed motions from the pop-up menu.

4. Clear obstructions once shelves or robot arms are clear of the jam.

You may also clear jams manually if the software is not operating by doing the following:

1. Turn OFF power to the LH 96 unit.
2. Slowly and gently slide shelf or robot arm laterally away from the jam.
3. Clear the jam and remove any obstructions.
4. Gently move shelf or robot arm back into its proper position.

Chapter 16: Editing and Creating Operating Profiles for the OMNI LH 96

Overview

This chapter describes the default operating profiles and discusses the methods required to edit and create new profiles for the OMNI LH 96 Homogenizer.

Default Profiles

The LH 96 is delivered and installed with a full set of default profiles based upon your laboratory's specific needs. As your needs change, OMNI's Installation Representatives can work with your laboratory to set up and modify these default profiles to accommodate your normal processing needs.

The profiles are software programs which set the parameters and control the operations in the homogenizing process. Initializing the system, setting the sample tube sizes, setting the probe size and type, setting probe speeds, and homogenizing times are all examples of the parameters controlled by the profile.

Editing Profiles

There may be times when the default profiles do not adequately homogenize a certain type of sample or when the sample processing needs to be adjusted slightly to provide better results. You can edit the default profiles to modify the operating parameters to address these operating issues. CAUTION: Prior to performing any edits on the default profiles, you should save the profiles to be edited in a separate file to maintain uncorrupted file backups. In case of problems, you can then use the original profile. Use a Text Editor such as Microsoft Notepad to open the profile. WARNING: Do not edit any of the data lines above Step 1 in the profile. These are initialization and homing commands that should only be modified by an OMNI representative. Modifying these commands may result in damage to the LH 96 unit.

NOTE: The following is a step from a typical profile:

'SET PSTEP **4**
' SET PROFILE_ARRAY[PSTEP] "HOMOGENIZE_SAMPLES"
' SET HOMOG_RPM[PSTEP] **15**
' SET HOMOG_TIME[PSTEP] **60**
' SET HOMOG_Z_HEIGHT_FROM_TUBE_BOTTOM[PSTEP] **3**
' SET HOMOG_CYCLE_HEIGHT[PSTEP] **10**
' SET HOMOG_CYCLE_VELOCITY[PSTEP] **15**
' SET HOMOG_SIDE_TO_SIDE_DISTANCE[PSTEP] **0**
' SET HOMOG_SIDE_TO_SIDE_VELOCITY[PSTEP] **4**
' SET PROFILE_ARRAY_TEXT[PSTEP] PSTEP ". Homog, " HOMOG_RPM[PSTEP] " krpm " HOMOG_ TIME[PSTEP] "sec " HOMOG_Z_HEIGHT_FROM_TUBE_BOTTOM[PSTEP] "mm off bottom " HOMOG_CYCLE_ HEIGHT[PSTEP] "mm up/down " HOMOG_SIDE_TO_SIDE_DISTANCE[PSTEP] "mm to side"

MODIFY ONLY THE STEPS THAT CONTAIN NUMERIC VALUES (i.e., **RPM**, **TIME**, **Z HEIGHT FROM TUBE BOTTOM**). Be careful in changing the numeric values, as improper values may result in interference between the probe and sample tube or cause other forms of damage to the equipment.

Creating Profiles

You can create new profiles to address new sample matrices. To create a new profile, save a default profile that most closely matches your new profile under a new name to provide a template.

Build the new profile by changing the numeric values listed in the file. WARNING: Do not change the data lines above Step 1. These data lines control the initialization and homing of the LH 96 unit. Modifying these data lines may result in damage to the LH 96 unit.

Adding steps or modifying routines require a basic knowledge of computer programming. You may find instructions for in-depth profile design in the service manual or you may request assistance from OMNI International's Applications Department.

OMNI International's Applications Department is available to answer your questions or assist you in creating new profiles. Call OMNI International at 1-800-776-4431 or 770-421-0058.

Chapter 17: Troubleshooting the OMNI LH 96

Overview

This chapter describes basic troubleshooting methods and the error codes that may display in the event of a malfunction in the OMNI LH 96 Homogenizer.

Problem Identification

Problem	Check
No Power to LH 96 unit	Is LH 96 unit turned on? Is LH 96 unit plugged into power outlet? Is power available at outlet (check circuit breaker)?
No Power to Control PC	Is Control PC turned On? Is Control PC plugged into power outlet? If not plugged into power outlet, is battery charged?
LH 96 unit does not respond to Control PC	Is USB data cable connected?
LH 96 unit not processing samples properly	Are the sample tubes and new probes properly placed in racks according to Control PC screen graphic? Has Processing Profile been modified or corrupted?
LH 96 unit head jams or interferes with trays	Are the sample or probe racks properly installed in unit? Are the sample tubes or new probes installed in proper order according to Control PC screen graphic? Were used probes removed from rack prior to starting new sample run?

Error Codes

Operating the LH 96 is straightforward; however, if you see an error code or informational window on the screen, the following table may be useful in determining the source of the problem.

GENERAL ERROR CODE WINDOWS

Window Code	Title/Description	Details/Resolution
Info	Continuing after STOP was cancelled	If user selects to STOP a run by pressing button on main interface, this window appears to either accept the stop command or to continue with processing.
E050	VERIFY_RUN_TERMINATION	Confirm a requested termination of the current run. If user selects to terminate, all sample processing stops and cannot be restarted without initiating an entire new run. If user selects NOT to terminate, control will be returned to the previous window.
E100	MOTION_ERROR_WINDOW	Window appears if one of the motor's motions was interrupted or if a motor is knocked out of position.
Info	?? Axis Motor had motion error. Code = ??	Reports the motor that had a motion error.
E200	SELECT_A_SAMPLE_TO_ TERMINATE	Window appears if user presses the terminate sample button on the main screen while system is paused. Provides options for terminating samples.
Info	The sample number entered is not an active or valid sample.	Alerts user to invalid selection in sample termination window (E200)
E210	VERIFY_SAMPLE_ TERMINATION	Confirm a requested termination of a single sample. Only the selected sample will terminate. If termination is confirmed, all subsequent processing steps will NOT be performed on the sample. NOTE: once sample is terminated, it cannot be restarted.

GENERAL ERROR CODE WINDOWS CONT'D

Info	Profile Setup Error	Alert for person that is programming a profile that the selected graphic is not correct or the maximum specified number of samples in the tray is not correct.
Info	Run Setup Window	Appears at the beginning of a run to allow user input of number of samples. Also provides options for changing certain run parameters.
Info	First Sample to run needs to be equal to or less than Last Sample to run.	Warning appears if user inputs an inappropriate starting sample for a run.
Info	Last Sample to run needs to be equal to or less than ?? for the tray selected.	Warning appears if the user inputs an inappropriate final sample, for example, if the user selects to run 55 samples in a 24 position tray. The ?? value is usually 24, 48, or 96 depending on the sample tray.
GEN010	VERIFY_PROPER_LOADING_FOR_ RUNNING_OMNI_TIPS	Appears when running Omni Tip™ to allow user to confirm proper loading of tips before run starts.
Info	There should not be any Omni Tip™ in Probe Holders on Robot Arm. However, probe(s) is (are) detected in position(s): ??	Displays if Omni Tip™ is improperly loaded in probe holders at the start of the run.
GEN020	VERIFY_PROPER_LOADING_FOR_ RUNNING_FIXED_ PROBES_AND_ CLEANING TANKS	Appears when running fixed homogenization probes (i.e., Stainless Steel or Hybrid Probes) to allow user to confirm proper loading.
Info	System detected that OMNI Tip™ is not loaded in the correct positions.	Appears if system detects an improper loading of fixed homogenization probes.
Info	Cannot run sample tray that has a wide spacing with fixed probes in probe holder positions 2, 4, 6, and 8.	Appears if probes are in positions 2, 4 6, or 8 when running 24 position rack.
Info	CHANGE_STEP_ PARAMETERS	Appears if user selects to change step parameters while starting a run.

GENERAL ERROR CODE WINDOWS CONT'D

Info	Enter any extra name or description to add to tare weight data file name	Prompts user to input a description added to the tare weight file name. The description entered appears in the file name after the current date and time.
Info	Run complete	Appears if run completes with specific samples having errors or warnings. The error or warning will highlight in the screen graphics and appear in the sample data file.
Info	Cavro Syringe Pump Prime	Appears at the start of a run that requires fluid addition to the sample tube. Gives options for priming syringe pump.
Info	Homing sequence has been terminated. Need to clear all obstructions and then restart.	Appears if system detects a motor error while homing system at the start of a profile. Since proper homing is critical, the startup sequence must be restarted if this error occurs.
Info	Enter tare weight in grams to use	Appears when tare weighing tubes if profile step is set to allow user to manually input an assumed tare weight.

HOMOGENIZER ERROR CODE WINDOWS

Window Code	Title/Description	Details/Resolution
Info	Cannot cycle to more than 50 mm from bottom of tube. The processing parameters need to be changed. This run will be terminated.	Appears if the person who programmed the profile specifies a cycle height of more than 50 mm. A cycle height of over 50 mm is greater than the allowed travel distance of the homogenizer probe axis.
Info	Edit Homogenizing parameters for Step No. ??	Appears if user selects to override the default profile parameters for homogenizing.
H120	HZF_DID_NOT_FULLY_LOAD_ OMNI_TIPS	Appears if the system was not able to properly load the FRONT four Omni Tips ™. Follow the on-screen prompts that instruct the operator on how to recover and proceed.

H130	HZB_DID_NOT_FULLY_LOAD_ OMNI_TIPS	Appears if the system was not able to properly load the BACK four Omni Tip™ . Follow the on-screen prompts that instruct the operator on how to recover and proceed.
H135	VERIFY_OMNI_TIP_ PROPERLY_ LOADED_ AFTER_MISLOAD	Appears after an Omni Tip™ loading error window. It allows the user to confirm system has properly loaded probes before proceeding.
H150	IMPROPER_PROBE_ LOADING	The system has sensors that detect the position in which homogenizer probes are loaded. Appears if there are probes in locations that should be empty or there are empty positions that should have a probe. After the user takes action to correct the problem, this window reappears until the loading is correct.
H510	SENSOR_DETECTED_ STUCK_ PROBE	Appears if the system sensors detect a probe is stuck in the holder after it should have been ejected. The user is prompted to make sure all probes are fully ejected.
H520	DETECTED_STUCK_PROBE_ DURING_MOVE	The system makes a slow move after ejecting homogenizer probes. If this move is obstructed, a probe may not have been fully ejected. The user is prompted to make sure all probes are fully ejected.

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