

UV PREP FOR SEM

User Manual



UV Prep for SEM
User Manual
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UV Prep for SEM

User Manual

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SPI Supplies will not be responsible for injury or damage caused by using the instrument in any manner not specified in these instructions. Utmost care must be exercised when using the instrument.

UV PREP FOR SEM

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UV Prep for SEM

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1 Preface

1.1 Introduction

UV Prep Sample Cleaner is specifically designed to be used with Scanning Electron Microscope (SEM) samples, but can also be used for other similar applications requiring hydrocarbon free surfaces. For many SEM applications, the cleanliness of sample surfaces has become an important issue when attempting to achieve the best possible data from a sample, especially at very low accelerating voltages. The main issue is the covering layer of hydrocarbon based materials upon the sample itself, whether as part of the specimen preparation technique used or just due to exposure to a contaminated environment. The UV Prep cleaning system has been optimized to provide the user with a non-destructive technique for removing these surface hydrocarbons.

1.2 How To Use This Manual

This manual describes the operating procedures, maintenance and precautions for the UV Prep cleaning system.

Note: Please read the sections marked **WARRANTY** and **SAFETY SUMMARY** at the beginning of this manual.

Note: You are requested to carefully read the section marked **Safety Summary** until an adequate understanding of the instrument is obtained.

This User Manual Consists Of Eight (8) Sections:

Section 1 – Preface
Section 2 – Safety Summary
Section 3 – Installation
Section 4 – Features, Construction and Specifications
Section 5 – Operations
Section 6 – Maintenance
Section 7 – Troubleshooting
Section 8 – Appendix 1

The Notational Conventions Used In This Manual Are Shown Below For Your Reference:

1. The pages, figures and tables are numbered sequentially in each section.
2. Note that the figure and table numbers are given in explanation of some operational procedures. Example: (page) 1.10, (figure) Fig. 1.10, (table) Table 1.10
3. Smaller subsections are indexed as follows: 1.1; 1.2.2; 1.3.5.4
4. Bullets are used to make it easier for the user to read the information.
5. Smaller subsections (under bullets) are indexed as follows: a, b, c and i, ii, iii, iv.

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1.3 Product Warranty (Important!)

1.3.1 Warranty on This Product

- This UV Prep cleaner is warranted to be free from defects in material or workmanship, under normal use within the product specifications indicated in this manual and under the conditions given below.
- SPI Supplies, Inc. does not indicate warranties, either express or implied, as to product quality, performance and marketability/merchantability or for any particular purpose of use.
- No oral or written information or advice given by SPI Supplies. agents or employees without implementing the approval procedure determined by the manufacturer shall create a warranty if it does not match the product performance.

1.3.2 Scope of Warranty

- Any parts which prove to be defective in design or workmanship during the warranty period will only be repaired without charge.
- Wherever possible, a substitute part may be used or replacement with an equivalent product may be made. This is because some system components may be updated for improvement purposes and the original parts may not be available at the time of repair.
- This warranty does not apply to the discarded products, products resold without the manufacturer's permission, nor consumables or any failed part whose useful life has expired.
- The manufacturer assumes no liability for any damage to data or application material due to any possible fault or failure of this instrument.

1.3.3 Warranty Period

One year from the date of delivery.

1.3.4 Items not under Warranty

This warranty is void in the following cases, even if they occur within the warranty period.

- a) Failure due to operation at a place not meeting the installation requirements specified by SPI Supplies.
- b) Failure due to power supply voltage/frequency being other than specified by SPI Supplies or due to an abnormality in the input power supply.
- c) Corrosion or deterioration of the tubing due to impurities contained in gas or air supplied by the user.
- d) Corrosion of the electric circuits due to chlorine gas or a similarly highly corrosive gas in the atmospheric air or due to a dusty environment.
- e) Failure due to the use of hardware or spare parts other than that specified by SPI Supplies.
- f) Failure due to improper handling or repair by the user.

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Items not under Warranty (cont.)

This warranty is void in the following cases, even if they occur within the warranty period.

- g) Failure due to maintenance, or repair, done by a service agent who is not approved or authorized by SPI Supplies.
- h) Failure due to relocation or transport not under the manufacturer's control after initial installation.
- i) Failure due to disassembly/modification not approved by the manufacturer or relocation not reported to SPI Supplies.
- j) Failure due to fire, earthquake, storm, flood, lightning, social disturbance, riot, crime, insurrection, terrorism, war, radioactive pollution, contamination with harmful substance or other natural disaster/force majeure.
- k) Consumables and failed parts that have reached the end of specified useful life.
- l) When the product is disposed of, or resold, without consulting SPI Supplies.
- m) Failure due to use or usage not described in this manual or improper repair not under the SPI Supplies' control.
- n) Failure of parts excluded from the warranty in the instruction manual.

1.3.5 Limitations on Warranty

- Any express or implied warranties other than the explicit conditions indicated in Section 1.3.1 above are excluded from this warranty.
- Any other express or implied warranties of merchantability and fitness for a particular purpose are not included in this warranty.
- No liability is assumed for direct or indirect damages arising out of explicit or implied warranties.
- No oral or written information or advice given by SPI Supplies. agents or employees without implementing the approval procedure determined by the manufacturer shall create a warranty if it does not match product performance.

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1.4 Installation and After-Sales Support

1.4.1 Installation and Relocation

- The customer shall be responsible for preparation of the installation conditions in accordance with this manual and in advance of the installation.

1.4.2 After-Sales Technical Service

- For after-sales technical service, contact SPI Supplies, using the contact information found on page 2 of this manual.

1.4.3 Disposal of Instrument

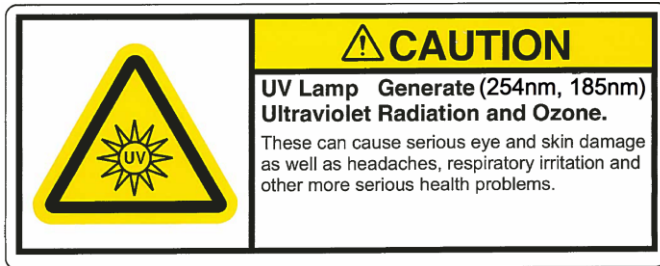
- **Important:** This unit contains a mercury vapor lamp and other materials that may directly cause environmental disruption.
- The local environmental protection laws and regulations must be adhered to.
- Therefore, the UV Prep system shall be discarded in accordance with these pertinent laws and regulations.

1.5 Customer Training

This manual is designed to provide complete information regarding the safe and proper use of the UV Prep. If additional training is desired, SPI Supplies, Inc. offers training on the operation of this instrument, at either SPI Supplies' facility or the customer's site, to ensure accurate and safe operation. For details, contact SPI Supplies. (training fees will apply).

2 Safety Summary

2.1 Ultraviolet Radiation



- This unit contains a UV lamp which generates Ultraviolet Radiation. (See Fig. 2.1.1)
- The UV light can cause serious eye damage if not used according to the safety instructions.

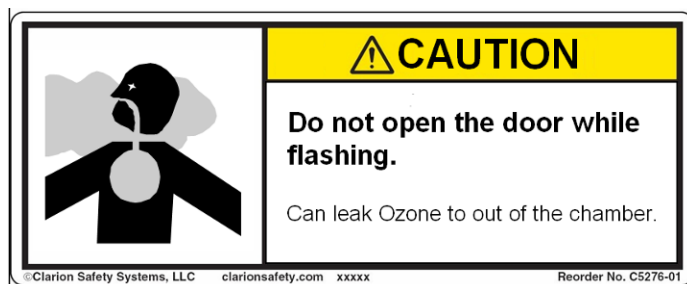
Fig. 2.1.1 - UV and Ozone Safety Label

Important!

- Ensure the sample door is closed properly!
- Do not open covers or bypass the safety interlock switches!

2.2 Ozone

- The UV Prep Sample Cleaner employs a UV (Ultraviolet) lamp in its cleaning process. This lamp generates Ozone as a by-product of its cleaning process.
- The UV Prep unit employs an Ozone Destruct Canister, which removes 99% of the Ozone from the airstream. The maximum Ozone at the exit is rated at $\leq 0.05\text{ppm}$.
- UV Prep Sample Cleaner meets Occupational Safety and Health Administration (OSHA) for Ozone.

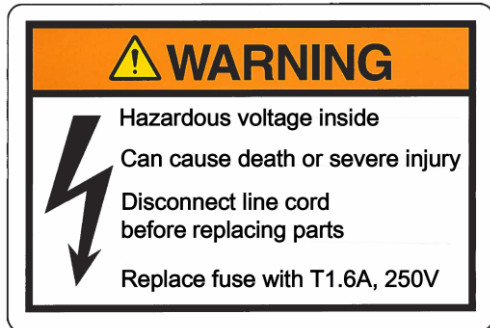


Do not use force to open the chamber door while the unit is running. Do not bypass the safety interlock switches.

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2.3 Electrical shock

Ensure that power cable is disconnected from the UV Prep unit before opening the covers.



Only power cords certified to the national safety standard requirements and rated for minimum 10A power cord can be used with the UV Prep Sample Cleaner. Failure to do so could result in injury or damage to the unit.

2.4 Pinch Point



The chamber door is driven by a motor and is activated by the control on the LCD panel of the unit. Ensure that nothing is obstructing the door while it is opening or closing. **Keep hands or fingers off/away from the chamber door while it is operational or in motion to prevent injury or harm.**

2.5 Recycling Policy:

Environmental laws and regulations are different for each jurisdiction. Since space does not allow us to cover all contingencies, the local environmental protection laws and regulations must be adhered to.

2.5.1 UV Lamp (Mercury Vapor)

- UV lamp has Mercury Vapor inside it (Do not break or discard!).
- Mercury is considered hazardous waste.
- Disposal of this Mercury lamp must be done according to strict local, state and federal regulations.
- Fines and other penalties may be imposed for the improper disposal of mercury lamps.
- Consult your local waste disposal authority for more information on proper disposal.

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Important: This unit contains a mercury vapor lamp and other materials that may directly cause environmental disruption. The local environmental protection laws and regulations must be adhered to.

Fig. 2.5.1 – Hazardous Waste Safety Label

2.5.2 Ozone Destruct Canister

- The Ozone Destruct Canister contains a catalyst.
- The Ozone Destruct canister can be disposed of in any Class 1 landfill.
- The Catalyst is not consumed by the Ozone but may require occasional replacement for reasons of contamination or moisture.
- Water must not enter this canister as it will damage the effectiveness of the catalyst.
- The catalyst is sealed inside so the canister may be safely handled, providing that it is not broken or opened.

2.6 Other Precautions

Handling of Chemicals and Samples

- The user is responsible for following relevant legal standards and regulations in the handling, storage and discarding of chemicals and samples.
- Reagents, standard solutions, and accuracy-control samples shall be handled, stored and discarded as instructed by their respective suppliers.

2.7 Disposal of Instrument

Important: This unit contains a mercury vapor lamp and other materials that may directly cause environmental disruption. The local environmental protection laws and regulations must be adhered to. Therefore, the UV Prep system shall be discarded in accordance with these pertinent laws and regulations.

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3 Installation

3.1 Unpacking UV Prep Contents

- Check the exterior of the package. If you find any damage or defect, contact SPI Supplies, Inc. right away.
- If the shipping package appears normal, remove the components carefully.
- Take out the main unit carefully and place it on a sturdy and level table.
- Before disposing of the packing materials, make sure that all of the items have been removed and checked off.
- If you find any parts missing or damaged or you have any questions, contact SPI Supplies.

Inspect The Contents Of The Package Against The Packing Slip.

The UV Prep package contains:

1. One UV Prep for SEM
2. One AC power cord
3. One UV Prep for SEM User Manual.

3.2 Set-up and Installation

3.2.1 Confirmation of Installation and Working Area Requirements

- **Installation and Working Area**
 - a) A flat space of 400mm x 400mm is required for the installation of the UV Prep cleaner unit.
 - b) A clean, dry, storage area, such as a Secador Desiccating Cabinet is suggested for storing sample mounts and tools that may be used for sample handling.
 - c) Main power outlet (for the unit) located within 1 meter of the installation is required.
- **Installation Environment**
 - a) Temperature: 15 to 30 °C
 - b) Humidity: 40 to 70%
 - c) Altitude: 2000m max.
 - d) Atmosphere Free from corrosive gases
 - e) Vibration: Strong vibrations must not be present.
 - f) Others : No electrical disturbance such as electromagnetic or static induction

3.2.2 Items to be prepared by Customer

- A.C. main power that meets the system requirements.

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3.2.3 Assembly

- After removing the packing material from the main unit, confirm that the power switch on the rear of the UV Prep unit is turned off (0).
- Connect the appropriate end of the supplied power cord to the rear of the UV Prep unit.
- Connect the power cord to a suitable power outlet. The unit is now ready for use. Please refer to Section 5 “UV Prep Operation” before turning the unit on.

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4 Features, Construction and Specifications

4.1 Features

The UV Prep Sample Cleaner is a self-contained microprocessor based system which has been configured for ease of use to obtain optimally cleaned samples. The configuration does not require any special process gasses to be used, so the installation and maintenance issues are reduced. The simplified operator interface allows the user to select from 2 functions: Clean and Store.

Clean function

- Allows the sample to be cleaned in a vacuum environment, which increases the speed of hydrocarbon removal and lowers the oxidation rate of the sample surface.
- The cleaning time is user selectable, from 1 minute to 24 hours.
- The vacuum level is also user selectable, with a vacuum level scale from 100 to 1, in increments of 1, to allow for optimal cleaning of the specimen surface. A setting of 1 is the highest vacuum level (100 Torr), and a setting of 100 is the lowest vacuum level (500 Torr). Each increment on the display represents a vacuum change of 4 Torr.
- Once the sample has been cleaned for the allotted time the chamber is automatically purged, after which the sample can be removed from the cleaning chamber.

Store function

- Allows the sample to be cleaned in a vacuum environment
- Keeps the cleaned sample in a vacuum environment to reduce sample recontamination from hydrocarbons present at atmosphere.
- The time and vacuum levels are user selectable and are similar to the clean function
- “Store” button can be selected to allow for samples to be kept under vacuum without the need to run a cleaning cycle first.
- Store function can also be selected after clean function if sample is needed to be cleaned prior to storing. This mode is useful for:
 - a) Cleaning multiple samples and then removing only the samples that are required for observation,
 - b) Saving time and reducing lamp usage time when compared to cleaning each sample individually.

Preset parameter for cleaning common samples

- Optimal parameters for common sample types are pre-programmed into the system. By simply selecting the type of sample from the menu, it can be cleaned using these preset parameters.
- Parameters for specific users’ own sample types can also be programmed and saved for future use.

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4.2 General Notes on Sample Cleaning

- The UV Prep cleaner removes hydrocarbons by breaking the hydrocarbon bonds with short wavelength photons and then binding them with activated oxygen that has been generated creating H₂O, CO, CO₂ etc., which are then removed by the vacuum system.
- For samples that are very temperature sensitive, it may be advantageous to clean the sample for the minimum time (1 minute) and let the sample chamber be brought to air for a few minutes. Then clean it again (for the minimum time). This will reduce the heat inducted on the sample.
- Typical temperature rise is less than 1° C per minute of cleaning.
- The main parameters the operator can control are:
 - a) The time.
 - b) The pressure.
 - c) The working distance between the surface to be cleaned and the light source.
- Using Table 4.2.1, the operator can adjust the pressure or working distance to fine tune the cleaning process.

Table 4.2.1 - Effects of changing parameters

Parameter Changes	Rate of Cleaning	Specimen Temperature	Oxidation	Photonic Action
Increase Pressure	Reduced	Reduced	Increased	Reduced
Increase Working Distance	Reduced	Reduced	No change	Reduced

General specimen cleaning practices should be used before attempting to clean the sample with the UV Prep cleaner.

- If the hydrocarbon layer is thick enough that it is can easily be seen with the unaided eye, then the thickness is too great to be cleaned by the UV Prep cleaner alone.
- Typical pre-cleaning processes include rinsing (or sonicating) the sample first with acetone, then isopropyl alcohol and then with de-ionized water. Finish by air drying the sample before cleaning it with the UV Prep cleaner.
- This assumes the sample will not be damaged by such a pre-cleaning procedure.

Trial Cleanings

- As it is difficult to measure the amount of contamination on the sample surface, some trial cleanings may be required to find the correct amount of cleaning time or pressure for a given sample.
- It is suggested to start with a short time of 1 to 5 minutes and check the sample after cleaning to determine if an adequate amount of hydrocarbons have been removed.
- If there is still too much contamination, longer cleaning times should then be tried.
- A typical cleaning time of 5 to 10 minutes should be adequate for most samples.
- As this is a surface cleaning technique, the surface chemical properties may be changed as a result of the process.

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NOTE: The UV light etches hydrocarbon based materials. If the sample is hydrocarbon based use care to avoid over-etching and causing any damage to it.

4.3 Construction

The entire UV Prep Cleaning System is a modular based system:

Hardware:

- The UV Lamp can be replaced in the field by the user or service personnel.
- The Vacuum System and Ozone Scrubber System have been designed to provide service for the entire lifetime of the unit. The Vacuum System is completely oil free to reduce any contamination of the samples while they are being cleaned or stored in the vacuum.

Access:

- The vacuum chamber allows samples up to 100mm in diameter and up to 37mm in height to be cleaned.
- The UV filtering chamber door is opened from the front to allow access to the sample tray.

Cleaning:

- The effective cleaning area is the sample stage diameter, so the user can readily identify the cleaning area.
- In the event that the chamber becomes contaminated, it has been designed to allow the user to clean the surface without damaging it and to keep the system at an optimum level of performance. See Section 6.1 for more information on cleaning the vacuum chamber.

4.4 Specifications

Cleaning function:

- UV and Vacuum cleans
- Cleaning times from 1 minute to 24 hours

Storage function:

- Stores under vacuum
- Vacuum levels from 1(100torr) to 100(500torr)

Vacuum System:

- Dry pumping system
- Achieves ultimate vacuum in 120 seconds
- Vacuum, from 1(100torr) to 100(500torr) in steps of 1(4torr)

Cleaning Chamber:

- Size: 65mm (H) x 150mm (W) x 150mm (L)
- Tray Size: 130mm (W) x 130mm (L);

UV Lamp:

- Rated for 1500 hours of operation (Typical 2000 Hrs)

Unit Size and Weight:

- Height: 305mm
- Width: 310mm
- Depth: 260mm
- Weight: 17 kg

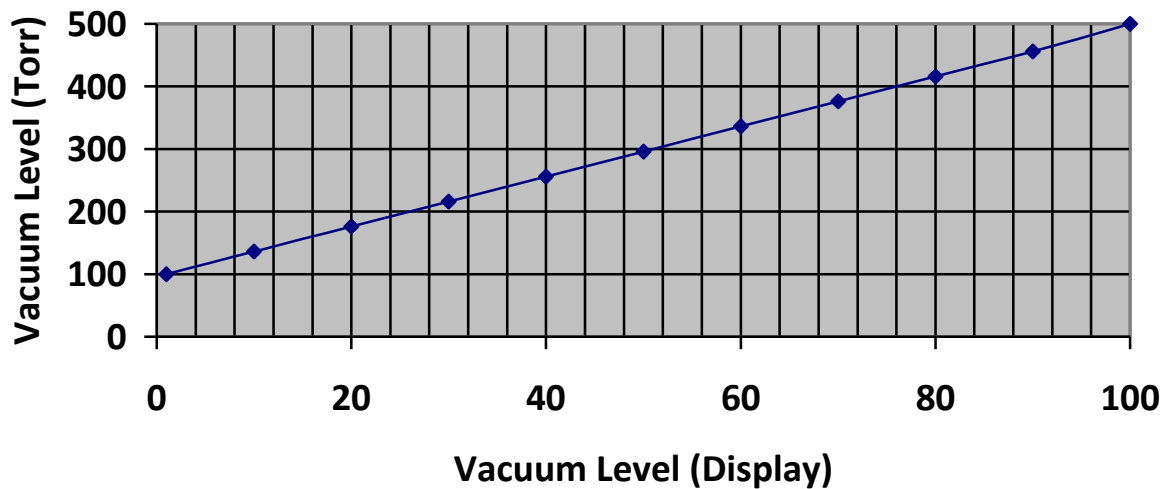
Installation Requirements:

- Room Temperature: 15-30° C
- Altitude: 2000m max.
- Input Power: AC 100 – 240 V
- Input Frequency: 50/60 Hz
- Max. Current Draw: 0.8 Amps
- Max. Footprint: 330mm (H) X 400mm (W) X 350mm (D) (include room for electrical connection and ventilation)

Certifications:

- IEC 61010-1 Ed 3.0 (CB scheme - includes)
 - UL61010-1 3rd Edition
 - CAN/CSA22.2 No. 61010-1-12 3rd Edition
- EN61326
- FCC15 B - Class A
- CISPR11:2004/ EN 55011:2007

Vacuum Level Conversion



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4.5 System Layout



Fig. 4.5-1: Front Panel



Fig. 4.5-2: Rear Panel

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5 UV Prep Operation

This section describes the operating procedure for the UV Prep cleaner system.

5.1 Introduction

- The UV Prep Sample Cleaner has two functions. They are the “CLEAN” and “STORE”.
- The functions and the system parameters are accessed via the touch pad on the front of the UV Prep cleaner unit.
- There are preset parameters for the common sample types to be cleaned. Custom parameters can be set and saved, or used for a single run.
- The default cleaning procedure is a single cycle process. The UV Prep is capable of a 2 step cleaning cycle by enabling the **Cleaning Cycle 2** check box when setting the parameters.

5.2 Cautions during Operation

- 1) Clean gloves should be worn when handling specimens or touching any part of the chamber.
- 2) Only samples which fit under the front edge of the chamber should be loaded.
- 3) Use the system in a well ventilated area
- 4) Do not open the chamber door until the system has finished flushing the chamber completely.
- 5) Never attempt to run the system with the chamber door open.

5.3 Operation Panel

- 1) To Turn ON the UV Prep unit.



Fig. 5.3-1

- a) Plug the end of the power cord into the back of the UV PREP cleaner unit. Plug the other end of the power cord into a suitable power outlet.

- b) Turn the power switch (at the back of the unit) 'On'. The '1' should be depressed as shown.



Fig. 5.3-2

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2) Unit Start up

- At power ON, a splash screen will appear for approximately 15 seconds with the following information:
 - Product Name: UV Prep for SEM
 - SW revision: 1.01
 - Lamp Usage: Hours; Cycles
 - Pump Usage: Hours



Fig. 5.3-3: Start Up screen

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- After the 15 seconds, Main screen will show and the following information/functions can be viewed or accessed.
 - 1st Window – Time/Date/Setting: Displays Time, Date and Setting button for sound volume and screen brightness. Note: The Time and Date can be set by touching the window of the screen where Time and Date shows. Settings can be changed by pressing the blue gear icon to the right of the Time/Date display.
 - 2nd Window - Status: Displays status, prompts and error messages.
 - 3rd Window – Setting Name: Displays the name of the Preset parameter chosen. If the word “MODIFIED” appear, that means the preset parameter chosen was modified.
 - 4th Window - Parameters: Displays parameter settings that is ready to run.
 - 5th Window - Function: Displays the Function buttons.



Fig. 5.3-4: Main Screen



Fig. 5.3-5: Main Screen

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3) Setting parameters

a) There are pre-programmed parameter settings available. To go to the list and choose a specific programmed parameter setting:

- Press the Setting Name (3rd window; Fig. 5.3-6), it will then show the list of names of programmed parameter settings (Fig. 5.3-7). Scroll up and down (as indicated by arrow) to see the list.
- Choose by pressing the Setting name, the set parameters are then displayed. Press “SELECT” (Fig. 5.3-8).
- The name and the parameters will show on the Main screen, ready to use (Fig. 5.3.9).



Fig. 5.3-6



Fig. 5.3-7



Fig. 5.3-8



Fig. 5.3-9

- These pre-programmed parameter settings are suggested settings only. The settings can be changed to your specific application needs.

Name	Cycle 1		Cycle 2	
	Pressure	UV Time	Pressure	UV Time
Standard	20%	5 minutes	-	-
Carbon	80%	3 minutes	-	-
Nanoparticles	1%	6 minutes	-	-
Semiconductor	1%	3 minutes	100%	7 minutes
Polymer	100%	3 minutes	-	-
Metals	1%	5 minutes	-	-
Silicon	1%	3 minutes	100%	7 minutes
Oxidation Prone	1%	3 minutes	-	-

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- Program parameter settings can be either for single use (without saving to memory) or, for future repeat use, saved to memory.
 - i. For single or one time use parameter settings:
 - Press the Setting Name (3rd window; Fig. 5.3-10), it will then show the list of names of programmed parameter settings (Fig. 5.3-11). Scroll up and down (as indicated by arrow) to see the list.
 - Pick any named setting from the list (Fig. 5.3-11) then change the settings by touching the parameter (Fig. 5.3-12), enter the new value then press “OK” (Fig. 5.3-13).
 - Press “APPLY” button to set the entered parameter (Fig. 5.3-14).
 - The screen will go back to the Main screen with the word “MODIFIED” beside the Setting name first selected. The entered parameter settings are displayed and ready to use (Fig. 5.3-15).



Fig. 5.3-10



Fig. 5.3-11



Fig. 5.3-12



Fig. 5.3-13



Fig. 5.3-14



Fig. 5.3-15

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ii. For future or repeat use of parameter setting:

- Press the Setting Name (3rd window; Fig. 5.3-16), it will then show the list of names of programmed parameter settings (Fig. 5.3-17). Scroll up and down (as indicated by arrow) to see the list.
- Pick any named setting from the list then change the settings by touching the parameter, enter the new value then press “OK” (Fig. 5.3-18; Fig. 5.3-19).

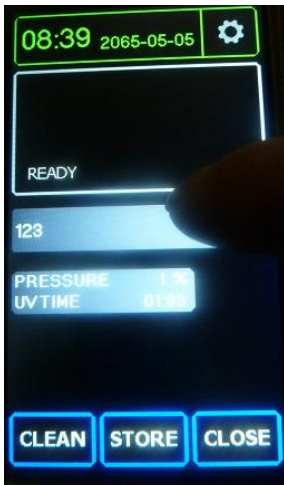


Fig. 5.3-16

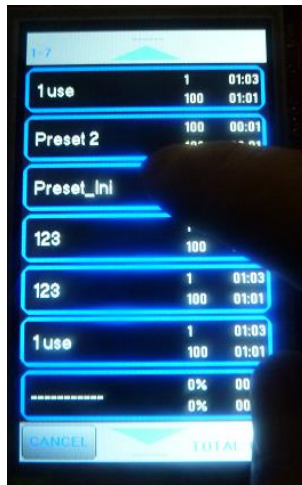


Fig. 5.3-17



Fig. 5.3-18



Fig. 5.3-19

- Either touch “SAVE & APPLY” (Fig. 5.3-20) to overwrite the existing setting under the Setting Name used or touch the “SAVE AS NEW” (Fig. 5.3-21) to save as a new set of settings.



Fig. 5.3-20

OR



Fig. 5.3-21

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- The Setting Name can be changed by touching the name (Fig. 5.3-22). A new screen will appear allowing a new name to be entered. Touch “OK” when done. (Fig. 5.3-23). This step can also be done before “save as new”.

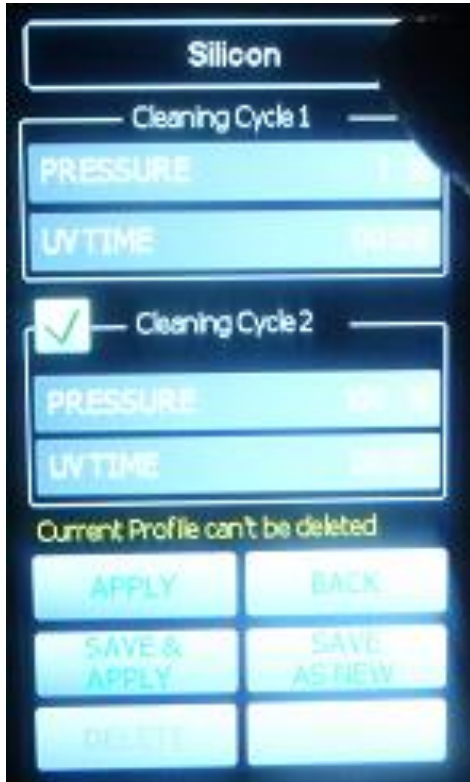


Fig. 5.3-22



Fig. 5.3-23

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5.4 Loading A Sample for Cleaning or Storage

- a) After turning the system ON, the system will display the Startup screen and will then go to the Main screen as detailed in the 5.3 Operation Panel section above.



Fig. 5.4-1



Fig. 5.4-2



Fig. 5.4-3

- b) To load a sample, on the Main screen, press the “OPEN” function to open the door of the chamber (Fig. 5.4-1) and then place a sample or SEM sample holder directly on the cleaning tray (Fig. 5.4-2). Note: While the door is open, the “OPEN” function on the screen will switch to “CLOSE” function.
- c) Adjust the specimen height by turning the sample tray clockwise or counterclockwise so it passes under the top edge of the chamber. Set the sample height to less than 10mm from the chamber opening. The optimum cleaning effect occurs just 3mm below the edge of the chamber opening.
- d) Close the sample door by pressing the “CLOSE” function on the screen (Fig. 5.4-3).

Notes:

- The optimum cleaning effect occurs just 3mm below the edge of the chamber opening.
- Having the sample height lower than the standard will cause the cleaning process to be less effective. This may be effective for cleaning easily damaged samples. The diameter of the stainless steel plate is the effective area of cleaning.
- Samples to be cleaned should be kept dry and free from solvents and oils.
- **The UV light etches hydrocarbon based materials. If the sample is hydrocarbon based use care to avoid over-etching and causing any damage to it.**

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5.5 CLEAN Function

- 1) Select the parameter to use. Refer to 5.3 Operation Panel – 3) Setting Parameters.
- 2) Follow the steps above in loading sample to the unit. Refer to 5.4 above.
- 3) Once back to the Main screen, touch “CLEAN” function to run the UV Prep using the parameter settings displayed (Fig. 5.5-1).
- 4) While running, the pressure status and UV time remaining are displayed. The current status and any error messages will also appear in the Status area of the screen.
 - The unit will start to pump down (Fig. 5.5-2), once the set pressure level is achieved, the UV Lamp will turn ON and will display “CLEANING” status (Fig. 5.5-3).
 - To stop or interrupt the cleaning, touch “STOP” function and the system will flush and end the cycle.
 - After cleaning, the chamber is then flushed and a “FLUSHING” status will show on the screen (Fig. 5.5-4).
 - After the flushing step is finished, a beep will sound indicating the completion of the cleaning cycle. The status “READY” appears (Fig. 5.5-5) and the door is then ready to open. Touch “OPEN” to open the chamber door.

Note: After cleaning, the sample can also be stored instead of retrieving by just touching the “STORE” function. The status will then show “STORING”.

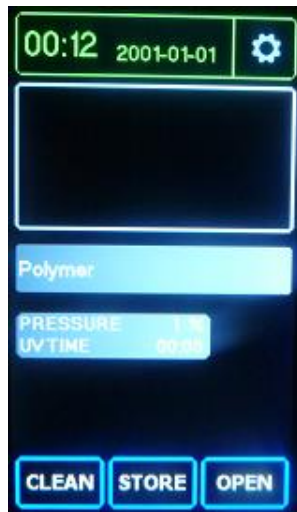


Fig. 5.5-1

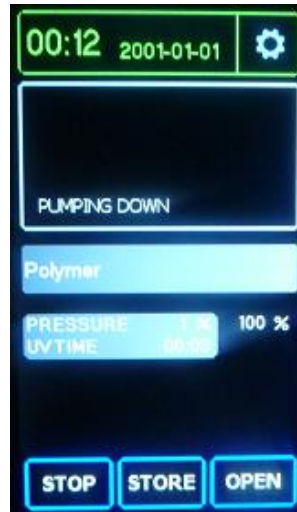


Fig. 5.5-2



Fig. 5.5-3

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Fig. 5.5-4

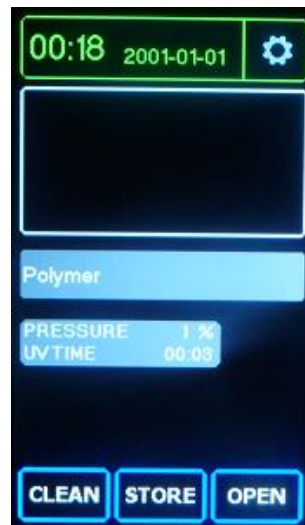


Fig. 5.5-5

5.6 STORE Function

- 1) Store function can be activated immediately after sample is loaded in the chamber (without cleaning) or after a cleaning process is finished (see 5.5 CLEAN Function).
 - Sample will be stored under the vacuum level set at Cleaning Cycle 1. Only the pressure setting in Cleaning Cycle 1 is used for storing function.
 - If a different vacuum level is required for storing, the parameter can be set as per the steps in 5.3 – 3 Setting Parameters prior to storing.
 - A short touch of “STORE” function (will blink function) will activate store function immediately.
 - A long touch of “STORE” function (will highlight function) will pre-set the function for activation after the cleaning cycle is finished. Note: To remove the pre-set, apply long touch to “STORE” function button until highlight is gone.
- 2) To store sample
 - Load the sample to the unit. Follow the steps in loading the sample to unit. Refer to Section 5.4 above.
 - If sample needs to be cleaned prior to storing, run “CLEAN” function prior to activating “STORE” function.
 - Touch the “STORE” function on the main screen (Fig. 5.6-1). The unit will pump down to the set pressure level, “PUMPING DOWN” status is displayed during this process (Fig. 5.6-2). The “STORING” status will then show in the status window when the pressure level is reached (Fig. 5.6-3).

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Fig. 5.6-1



Fig. 5.6-2

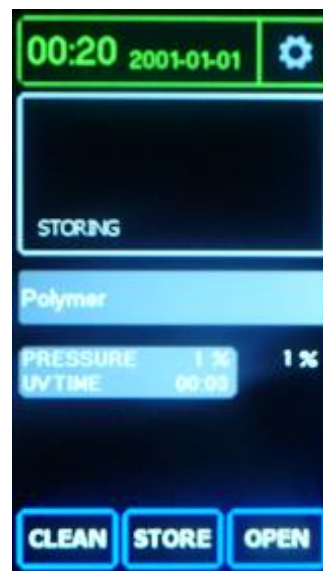


Fig. 5.6-3

- To end store function, any of the following actions can be done:
 - Touch “CLEAN” - the sample will be cleaned at the parameters set.
 - Touch “STORE” - the sample will be flushed and released from vacuum.
 - Touch “OPEN” – the sample will be flushed, released from vacuum and the door will be opened. The “OPEN” will toggle to “CLOSE” function.

Note: It is suggested not to put contaminated samples (i.e. samples with carbon or silver paint that is not completely cured, or solvents that have not completely dried) into the chamber until all of the volatile components have been removed.

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Maintenance

Under normal operation, the unit does not require routine maintenance.

5.7 Cleaning

- The unit needs to be kept clean to work at its optimum.
- Clean the outside of the unit with a damp cloth only.
- If the interior of the chamber has become contaminated by overly dirty samples, it may be cleaned using acetone or isopropyl alcohol.

To clean the chamber interior:

- Moisten a lint free cloth with the solvent and then wipe the soiled surface until the surface is clean.
- Remove the excess solvent with a clean dry cloth.

Important: Be careful not to touch any painted surface or the lamp with the solvent.

Important: Be careful not to touch the lamp surface with anything!

After the chamber area has been cleaned, it is recommended to run a cleaning cycle to clean the chamber. Run a cycle (without a sample in the chamber) in Vacuum Clean mode for 15 minutes at a pressure of 1. This will remove any remaining solvent hydrocarbons.

5.8 Consumables

Part Name	QTY	Lifetime
UV Lamp Assembly	1	1500 hours
Chamber Door O-ring	1	1500 hours

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5.9 Replacing the Fuse



Fig. 6.3-1



Fig. 6.3-2



Fig. 6.3-3



Fig. 6.3-4



Fig. 6.3-5

- 1) Turn off main power switch at the rear of the unit (Fig. 6.3-1).
- 2) Remove power cord from the power source and the rear of the unit (Fig. 6.3-2).
- 3) Remove fuse cover by pulling back on the tab (Fig. 6.3-2).
- 4) Pull out the fuse from the holder (Fig. 6.3-3; Fig. 6.3-4; Fig. 6.3-5).
- 5) Insert a new **1.6A - 250Volt** slow blow fuse. Replace holder and cover.

Note: DO NOT USE ANY FUSE EXCEPT THE RECOMMEND SIZE AND TYPE!

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5.10 Replacing the Lamp



Fig. 6.4-1



Fig. 6.4-2



Fig. 6.4-3



Fig. 6.4-4



Fig. 6.4-5



Fig. 6.4-6

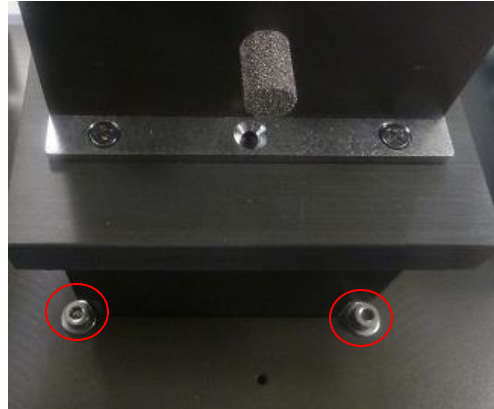


Fig. 6.4-7

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- 1) Turn off main power switch at the rear of the unit (Fig. 6.4-1).
- 2) Remove power cord from the power source and the rear of the unit (Fig. 6.4-2).
- 3) Remove 4 screws from rear of the unit (Fig. 6.4-3).
- 4) Remove the top cover.
- 5) Disconnect the tube connected to air inlet of the UV Lamp assembly (Fig. 6.4-4) and the UV Lamp power connector from the main board (Fig. 6.4-5).
- 6) Remove the 4 hex screws holding the UV Lamp assembly to the chamber (Fig. 6.4-6 and Fig. 6.4-7). Keep for later use.
- 7) Gently lift the lamp assembly from the Chamber. **Carefully** set the old lamp assembly aside.
- 8) Replace the Lamp Flange O-ring. Ensure it is dust free and that there are no tears.
- 9) Remove the new lamp assembly from its packaging, being careful not to touch the lamp glass against anything. Place the new lamp assembly on top of Chamber.
 - **Notice: DO NOT TOUCH THE LAMP GLASS WITH YOUR HANDS!**
 - Place the used lamp assembly in the packaging taken from the new lamp assembly. The bulb has mercury vapor in it and must be recycled. Please refer to the recycling policy stated in Section 2.5
- 10) Secure the new lamp assembly to the top of the chamber with the 4 hex screws that were removed earlier. Tighten the screws carefully.
- 11) Reconnect the UV Lamp power connector and the tube to the lamp assembly.
- 12) Replace the unit cover and secure with the 4 screws.
- 13) Power up the unit.
- 14) Reset the Lamp cycle counter. Refer to the procedure below.

5.10.1 Resetting the Lamp Counter

After replacing the Lamp reset the Lamp counter. To reset Lamp counter:

- 1) Go to settings by touching the Setting button beside the Date and Time in the Main screen (Fig. 6.4.1-1).
- 2) In the Setting screen, just right beside the “BACK” button, touch at the corner and hold for several seconds to go to the Counter screen. Note: There is no button for this function. (Fig. 6.4.1-2)
- 3) In the Counter screen enter the serial number of the new lamp by touching the “Serial #” line (Fig. 6.4.1-3). This will then bring you to the next screen where you can enter the new serial number. Press OK when done. (Fig. 6.4.1-4)
- 4) Touch and hold the “RESET LAMP” button until the counters are reset (Fig. 6.4.1-5). When done, press “BACK” to return to Setting screen then press “BACK” to return to the Main screen.

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Fig. 6.4.1-1



Fig. 6.4.1-2



Fig. 6.4.1-3



Fig. 6.4.1-4

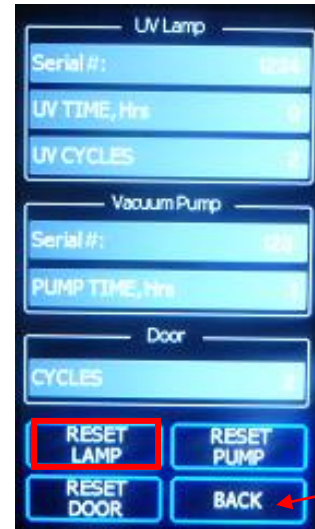


Fig. 6.4.1-5

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5.11 Replacing Chamber door O-ring

1. Open the chamber door (Fig. 6.5-1).
2. Remove the chamber door O-ring from the groove (Fig. 6.5-2, Fig. 6.5-3). Be careful not to damage, scratch or gouge the groove for the chamber door O-ring.
3. Place the new O-ring (Fig. 6.5-4). Ensure the cleanliness of the O-ring and the groove.
4. Close the chamber door.



Fig. 6.5-1

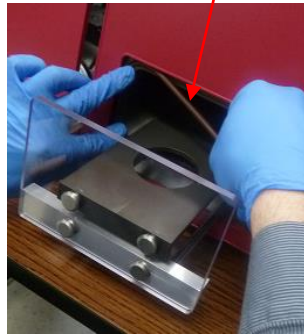


Fig. 6.5-2

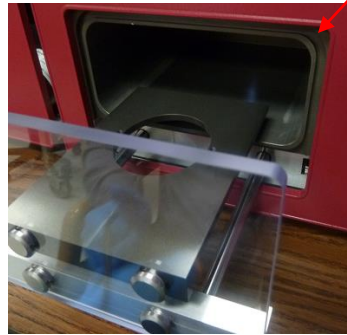


Fig. 6.5-3

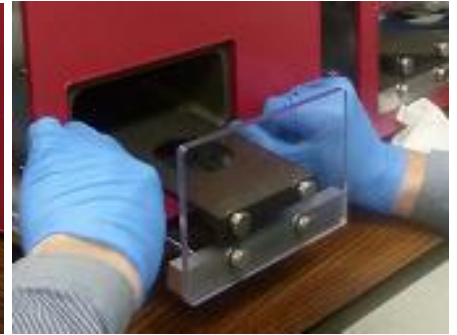


Fig. 6.5-4

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6 Troubleshooting

6.1 Error Messages

The UV Prep cleaner system will typically only have 2 normal operating errors. The error message will appear on the Status window of the Main screen in red text. It can be cleared from the display panel by pressing any function, or by correcting the problem as described below and pressing any function.

6.1.1 Check Lamp

The message “Check Lamp” will appear and a beep will be heard.

- Run the “CLEAN” function to see if the message still appears.
- Try several times to confirm. Note if the message appears consecutively every try or only sporadically.
- Contact SPI Supplies if the message still appears.

6.1.2 Cannot Reach Vacuum

The message “Cannot reach Vacuum” appears and a beep will be heard.

- This is typically due to the door not sealing properly. Open then close the door and check if the door closes flat to the chamber. Then run either the “CLEAN” or “STORE function.
- If the error message is again displayed, check the O-ring seal on the door for tears or contamination, and wipe it with a dry clean cloth.
- If still the error message appear, contact SPI Supplies.

6.2 Malfunctions

6.2.1 No Display or Power Light Is Off.

Check that the power cord is attached and plugged in properly at both the back of the unit and the wall outlet. Check that the power switch is in the ‘on’ position, with the “1” pressed in.

If there is still no power, turn off the power switch on the unit. Then disconnect the power cord from the wall outlet. Remove the power cord from the rear of the unit. Check the power fuse on the power receptacle of the UV Prep cleaner. See section 6.3

If there is still no power after replacing the fuse, contact SPI Supplies.

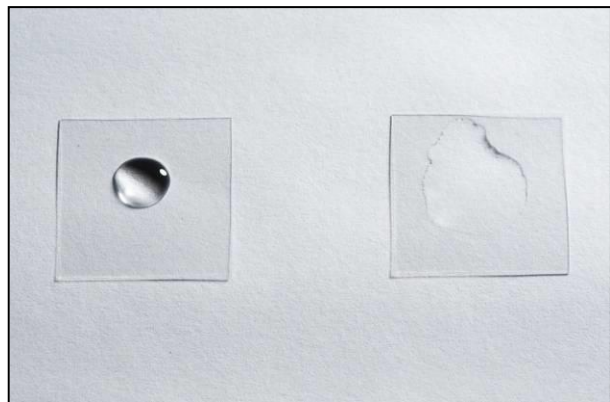
6.2.2 Door Does Not or Stops Opening / Closing

Try to operate again by pressing the OPEN/CLOSE button. You might need to do this several times for motor to find the reference point again. If the door still does not OPEN or CLOSE, contact SPI Supplies.

7 Appendix 1

7.1 How To Verify That The System Is Cleaning Properly

The UV Prep system is designed to remove residual hydrocarbons and not gross surface contamination. Typical cleaning rates for hydrocarbon residues are on the order of 1nm per minute. Most samples, when cleaned using standard techniques such as various solvent rinses followed by a DI water rinse, will typically leave a layer of hydrocarbon residue a few nanometers thick on the sample surface. This residue is easily removed by the UV Prep.



One of the most reliable and easy-to-use methods for checking the surface cleanliness is that of water contact measurement.

When a surface has a hydrocarbon layer, it is hydrophobic which will cause a drop of water to form a bead. (see figure 8.1 – left image)

If the surface is free from hydrocarbons, it will become hydrophilic, and the water will spread out over a large area. (see figure 8.1 – right image)

Fig. 8.1

This wetting or contact angle measurement test can be used to verify if the UV Prep system is working correctly. A smooth surface works best i.e. a light microscope glass slide, a cover slip, or a piece of a silicon wafer will all work well.

1. First, clean the surface of gross contamination by sonicating it in acetone and then isopropyl alcohol.
2. Check that the surface is hydrophobic by placing a drop on the surface and confirming that it does form a bead as shown above. Remove the water from the surface, ensuring it is completely dry.
3. Place the sample in the UV Prep cleaner at the correct working distance and run a cleaning cycle for 15 minutes at a vacuum setting of 30. Again try placing a drop of water on the surface and look for the spreading out of the water as shown above. This will indicate the surface is now clean and is hydrophilic.
4. If the water still beads on the surface try cleaning again for another 15 minutes. If the surface still causes the water droplet to form a bead the system may not be working properly. First clean the surface again as described in Step 1 to remove gross contaminants and then repeat the test. If there is still no cleaning result, contact SPI Supplies.