



User Guide

Ultra-Violet/Ozone Probe and Surface Decontamination Series Instruments

Including PSD-UV3, PSD-UV4, PSD-UV6, PSD-UV8
PSD-UV10, PSD-UV1016, PSD-UV12, PSD-UV1216
PSDPro-UVT4, PSDPro-UVT6, PSDPro-UVT8
PSDPro-UVT10, PSDPRO-UVT1016,
PSDPro-UVT12, PSDPro-UVT1216



Dear Colleague,

Thank you very much for purchasing an Ultra-Violet/Ozone Probe and Surface Decontamination Unit.

These series of instruments are designed to improve your AFM imaging by ensuring that your probes and samples are in pristine condition.

If you would please take a moment to read through our manual, you will find some valuable hints that will assist you in operating this instrument and the cleaning process. If you have any questions, please feel free to contact us at info@novascan.com.

Best wishes and thank you again,

Novascan Technologies

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1. Equipment Purpose

The PSD-UV series of instruments have been engineered to assist you in cleaning samples such as AFM probes and surface. Each model operates using a high output ultraviolet (UV) light emitting grid (mercury vapor) that excites organic molecules and produces highly reactive ozone gas from oxygen that is present within the cleaning chamber.

The system can be used with ambient air or with an external oxygen supply provided by the end user. The reactive ozone interacts at the molecular level with surface contaminants causing them to degrade. This method is particularly effective with organic contaminants that are frequently found on AFM probes and surfaces.

The exact exposure times and methods required to remove various contaminants will, of course, vary and should be determined empirically. See operating instructions for guidelines and further information.

2. Unpacking

Depending on the model of the instrument, it will be packed in one to two boxes within the shipping box. Carefully remove all pieces from the boxes, but be sure to keep all packing materials.

2.1 Packing List

Included as standard items in each Novascan UV Cleaner series instrument are:

- a. UV Cleaner
- b. Power cord set specific for country of operation
- c. Instrument Manual

2.2 Damage Inspection/Initial Testing

Examine the components for evidence of shipping damage. If damage has occurred, contact the carrier and either Novascan Technologies (for direct purchases), or the distributor in which the instrument was purchased through.

2.3 UV Lamp Assembly Installation

The unit remains unplugged during lamp installation. Included with the lamp are the following installation accessories:

- a. Cotton or powder-free vinyl gloves
- b. UV Lamp Assembly
- c. Mounting screws (4)
- d. 5/64 Hex wrench

2.3.1 Remove *UV Lamp Assembly* from the packaging. It is best to wear gloves (cotton or powder-free vinyl) when handling the lamp assembly. When handling, limit touches to the lamp by holding the assembly brackets or reflector.

2.3.2 Remove mounting screws from the brackets on the *UV Lamp Assembly*.

2.3.3 Position the *UV Lamp Assembly* below the holes in the top of the *Incubation Chamber*. The lamp should be mounted with the arrow facing towards the back of the Incubation Chamber.

2.3.4 While holding the *UV Lamp Assembly* against the top of the *Incubation Chamber*, place and hand-tighten a screw through the top of the *Incubation Chamber* and into the brackets of the *UV Lamp Assembly*. Repeat this step for all of screws before releasing the *UV Lamp Assembly*.

2.3.5 Complete the attachment by tightening each of the mounting screws. Be careful not to over-tighten.

2.3.6 Once the *UV Lamp Assembly* has been mounted, insert the male connectors of the *UV Lamp Assembly* wires into the female connectors of the *PSD System Chassis*.

2.3.6.1 It is important to be sure that both male connectors are fully inserted into the female connectors. ****Failure to properly connect the lamp could lead to electrical arcing****

2.3.7 The *UV Lamp Assembly* is now mounted and connected for use.

2.3.8 Connect the PSD System to an appropriate power source using the power cord supplied.

2.4 Quick Start Test Instructions*

* Disclaimer: these abbreviated instructions are a supplement to the Operation Manual supplied with your instrument. They are to aid end users who want to run a quick preliminary operational check of the UV/Ozone cleaner before putting the instrument online.

2.3.1 Plug in the AC power cord to the back of the unit and to the appropriate AC power receptacle.

2.3.2 Turn on the main power switch located on the back panel.

- a. The controller will display **idle**.
- b. If the unit is equipped with a stage heater (PSDPRO-UVT) press the Temperature key, then set Increase or Decrease keys to 50 degrees Celsius.
- c. Press the Time key, then set Increase or Decrease keys to 10 seconds.
- d. Press the Start/Stop key to start unit.

3. Safety Precautions

This device is only intended for laboratory use by trained scientific personnel who are responsible for determining the suitability for specific end-uses. These personnel should be knowledgeable in all aspects of operation and should use the appropriate safety precautions.

3.1 Risk of Exposure to High Intensity Ultraviolet (UV) Light:

This device emits intense UV light. DO NOT expose materials that may be damaged by UV to the light source! DO NOT disable safety switches or mechanism! DO NOT use the device if damaged!

3.2 Risk of Chemical Exposure:

This device produces ozone gas, which can be toxic and is a strong irritant. While the half-life of ozone is relatively short, caution should still be exercised and the instrument should be operated in accordance with federal and local regulations for handling ozone gas, such as operation in an approved fume hood. The UV grid used in this instrument is a mercury-based device. Should damage to the grid occur resulting in leakage of mercury, contact the Local, State or Federal Environmental Health & Safety agents for instructions and disposal.

3.3 Risk of Electric Shock:

The output voltage of this device is several thousand volts and may be lethal. Further, the power supply may contain capacitors that may hold a residual charge allowing the instrument to operate briefly even with the power disconnected. NEVER use the instrument with a damaged or broken lamp!

DO NOT use with liquids!

DO NOT dismantle, modify or attempt to repair this device!

3.4 Risk of Fire or Explosion:

NEVER use with flammable liquids, gases or materials!

NOTE: This device generates electromagnetic fields.

3.5 Discarding of Instrument:

The UV lamp in the instrument contains mercury. DO NOT put in trash. Recycle or dispose as hazardous waste according to local laws.

4. Operating Instructions *(PSD-UV Instruments with Preset Countdown Timer jump to 4.11)*

Important Note: Prior to each use of this instrument you must visually inspect the UV grid, all wires, cables and switches. Do not plug in or operate if any wear, damage or unusual features are observed. Like all mercury vapor lamp based systems, this system operates at lethal high voltages. High voltage electricity may arc a significant distance. Thus it is the purchaser's sole responsibility to ensure that all personnel are authorized and properly trained to use this equipment.

4.1 Connecting to Power Source:

4.1.1 Plug the unit into a power source.

4.1.2 The unit's digital controller will display **idle** .

4.2 Exposing the Sample Stage:

4.2.1 Lift the UV Chamber/UV Grid by the handle off of the Base Unit until it rests on the hinges.

4.2.2 If the unit is equipped with ozone neutralization, connect this apparatus to a vacuum at this time (see Appendix iii).

4.3 Place probes, surfaces or samples on the Adjustable Sample Stage:

4.3.1 Set the stage height according to the sample height. The black line on the stage post indicates the lamp level.

4.3.1.1 Samples should be close to the UV Grid, i.e. typically within a centimeter, but the post should not be set under the last marking.

Caution: If the sample height is adjusted past the last marking, the mercury vapor UV grid may be damaged or broken when lowering the UV chamber to the base. If this should happen immediately contact the appropriate personnel to handle mercury clean up.

4.3.2 Lock stage in position using the stage lock screw located on the right side of the chassis.

4.3.3 Load the sample in center area of the stage.

4.4 Lowering chamber to base:

4.4.1 Carefully lower the chamber over the sample stage slowly down to the base. At rest the chamber should align with the Safety Interlock at the rear of the instrument.

4.4.2 If the interlock is not engaged, the unit will not turn on.

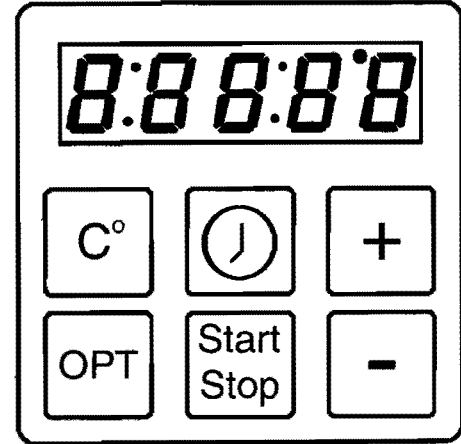
4.4.3 If the chamber is raised while the unit is in operation, the unit will automatically shut down until the interlock is re-engaged.

Caution: Do not apply force to the chamber to engage the interlock. Do not disable the safety interlock.

4.5 Summary of Controller Functions

Key Functions in Operation Mode

Key	Operation Function
Celsius	Temperature Setting
Clock	Time Setting
+	Increase
OPT	Custom Option (programmed by mfr)
Start/Stop	Start or Stop a Cycle
-	Decrease



4.5.1 The single step operation consists of one exposure temperature, one exposure time and one hold temperature.

4.5.2 Set the exposure temperature.

1. Press the Celsius key, **TEMP** and the exposure temperature value will appear on the display.
2. Press the Increase or Decrease key until the value you want appears on the display.
3. Press the Celsius key again.
4. The exposure temperature has been set, **idle** will appear on the display.

NOTE: If using UV exposure only and no heat, set the temperature setting to 0 degrees Celsius. The maximum temperature is 150 degrees C.

NOTE: The lid of the unit may become very hot at higher temperatures. Use caution when touching the lid and make sure there is adequate clearance from heat sensitive materials around the unit.

4.5.3 Set the exposure time.

1. Press the Clock key **time** and then the cleaning time value will appear on the display.
2. Press the Increase or Decrease key until the value you want appears on the display.
3. Press the Clock key again.
4. The cleaning time has been set.: **idle** will appear on the display.

4.5.4 Five Second Timeout

When using the Increase or Decrease keys to change a value, if you do not press any key for 5 seconds, the controller will automatically be set to the last value on the display and return to **idle**.

4.6 Run a UV Light/Ozone Exposure Cycle

4.6.1 With idle on the display, place the sample on the sample stage.

4.6.2 Press the Start/Stop key. The Start/Stop key indicator will light up. Time will count down on the display. **▯:▯▯:▯▯**

4.6.3 When the timed exposure sequence is complete, the unit will switch to the Hold sequence. An audible tone will sound for two seconds. The display will alternate slowly between **Hold** and count up time. The unit will count up time indefinitely. The hold sequence will end and the controller will go into idle when you cancel the current sequence by pressing the Start/Stop key.

4.6.4 Once the controller goes into idle, the Start/Stop key indicator light will switch off.

NOTE: The unit controller retains the last programmed Temperature and Time settings in internal memory. Check and adjust these settings if necessary before starting a new exposure sequence.

4.7 Incubating the Samples:

4.7.1 Incubate samples (with the power off) in the ozone environment for 30-60 minutes. Ozone will continue to attack organic materials within the chamber and much ozone will dissipate.

4.7.2 Regulations for properly handling residual ozone should be followed.

4.8 Removing Samples:

4.8.1 Raise the chamber lid and remove samples from the sample stage for use.

4.9 Additional Information

4.9.1 View Actual Temperature: You can view the actual temperature by pressing and holding the temperature key for three seconds.

4.9.2 Adjust Time & Temperature While Cleaning: Changes can be made to temperature and time during the portion of the cleaning sequence. For example, change the cleaning temperature **TEMP** while it is being run. Temperature changes made while cleaning are saved and become part of the permanent cycle. Time changes are not saved and do not become part of the permanent cycle.

4.9.3 Pause a cleaning: While cleaning, you can pause cleaning time by pressing the Start/Stop key once. The Start/Stop key indicator light will flash rapidly **PAUSE** will appear on the display. Countdown time will resume when you press the active cycle key again.

4.9.4 Cancel a cycle: Canceling a cycle stops the controller completely. The controller does not maintain set point temperatures or run time. You cancel a cycle to change the cycle, stop the cycle operation for any reason, or are preparing to shut off the PSD-UVT.

- Press the Start/Stop key for 2 seconds (in hold, momentarily press the Start/Stop key). Heat outputs will switch off. Heat output indicator lights will switch off. **idle** or time of day will be on the display.

4.9.5 Change or Restart: With the controller in idle, set the cycle as shown earlier and press the Start/Stop keys.

4.9.6 Chamber Opening: When you lift the chamber off of the PSD-UVT, the unit will act as described below.

4.9.6.1 During the cleaning sequence: time is paused and **door** will appear on the display. The heat will shut off.

4.9.6.2 During the preheat or hold sequence: **door** will appear on the display. The heat will shut off.

4.9.6.3 When you lower the chamber, the unit will operate normally.

4.10 Alarms or Errors

4.10.1 Temperature Alarms: The controller will alert you to temperature alarm conditions if they occur. If an alarm occurs, take action as determined by your supervisor.

Errors: The controller will alert you to errors if they occur. Errors are critical problems that shut down the unit. If an error occurs, an error message will appear on the display. You should switch off the power and call for service.

4.11 Operating Instructions (PSD-UV 3, 4 Preset Countdown Timer)

4.11.1. Set the stage height according to the sample height. The black line on the stage post indicate the lamp level.

4.11.2 Lock the stage in position using the stage lock screw located on the right side of the chassis.

4.11.3 Load sample in center area of the stage.

4.11.4 Close the chamber lid

4.11.5 Plug system in to the appropriate power. (Check the system rating for proper power.)

4.11.6 Turn the master on located at the back of the chassis

4.11.7 Press the Time button to select the time desired. (15 minutes is standard.)

4.11.8 Press the Start-Stop button to start the UV exposure cycle.

4.11.9 To interrupt the exposure press the Start -Stop button again.

4.11.10 When cycle is finished wait 5-10 minutes before opening the chamber to allow the sample to further incubate in the Ozone and to allow the ozone to disappate. If used in a hood or with an ozone neutralizer the system may be open sooner.

4.11.12 Turn master switch off

4.11.13 Open chamber and remove sample.

5. Helpful Hints

UV/ozone attacks contaminants at the molecular level and therefore it may not penetrate deeply into thick contamination layers. For new and used probes that may have thin contamination layers, a single cleaning in the PSD-UV is often sufficient. We recommend trying one or more of the following techniques to help you determine the best method for cleaning contamination layers.

5.1 Cleaning Single Type Samples First:

5.1.1 Do not treat multiple samples until you have determined the optimal conditions.

5.2 Cleaning with Solvents:

5.2.1 Clean the sample with an appropriate solvent* prior to UV/ozone treatment. This may reduce the thickness of the contamination layer and allow the ozone to penetrate.

5.3 Treat the Sample with Alternating Cycles of UV/Ozone Exposure:

5.3.1 After each incubation period, briefly remove the chamber to replenish the oxygen supply.

5.3.2 For example, treat for 1 to 5 minutes followed by a 30 to 60 minute incubation.

5.4 External Oxygen Supply:

5.4.1 Use an External Oxygen Supply to boost ozone levels within the chamber.

5.4.2 Two Gas Ports are provided at the rear of the Sample Chamber.

5.4.3 Connect your oxygen line to one of the ports using small flexible hose. Typically, a slow flow of approximately 5-PSI is used to enhance the level of oxygen within the chamber.

5.4.4 Prior to operation stop the flow.

5.5 Alternate Treatments with Solvent:

5.5.1 Alternating UV/ozone treatments with solvent* treatments may or may not be of benefit.

5.5.2 This method can break up the contamination layer.

*Be sure the solvent is dissipated prior to treatment with the PSD-UVT. This is particularly important if a flammable solvent is used, since flammable solvents could potentially ignite. We recommend using an Argon or Nitrogen stream to thoroughly dissipate any solvent.

6. Post Purchase Information

6.1 Satisfaction Guarantee:

We are very pleased that you have chosen our product and we are very confident that you will find it beneficial. If for some reason, however, you are not completely satisfied, you have 15 business days from the date of purchase* to return the product in new condition for a full refund, excluding any shipping or handling fees. You must, however, contact Novascan for an RMA number prior to returning any items.

6.2 Limited Warranty:

This limited product warranty covers 100% of all Parts and Labor for a period of 1 year from the date of purchase.* At its option, Novascan will repair or replace products that are found to be defective. This warranty does not include problems that are not the fault of the instrument or manufacturing. These include, but are not limited to, operator error, user damage, misuse, modification, dismantling, unauthorized repairs, voltage spikes, etc. The customer is responsible for shipping and handling.

The UV lamp will be covered under warranty for a period of 90 days from the date of purchase. *

6.3 Product Disclaimer:

Novascan Technologies will not assume responsibility for any damages to person or to property due to the operation of or to results obtained with the UV-Ozone Cleaning systems.

6.4 Repair or servicing of all PSD Series Systems

The authorized warranty and non-warranty repair or servicing of any PSD Series product requires return of the PSD system to Novascan Technologies, Inc. The PSD Series production facility is the only authorized agent for repairs and servicing. This includes third party transactions through domestic and international resellers regardless of the experience or expertise of the designated reseller. Resellers or distributors are not authorized to perform warranty or non-warranty repairs and servicing.

*Date of purchase is the date that the product is shipped.

7. Consumables and Replacement Parts

Part Number Description

PSD-UV.GA Power Light
PSD-UV.DM Sample Chamber
PSD-UV.ST Sample Stage
PSD-UV.HC Height Collar
PSD-UV.PS Power Supply
PSD-UV.FS Fuse
PSD-UV.SW Switch
PSD-UV.GRD UV Grid

For parts not listed please contact Novascan:

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Novascan Research Building

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If ordering consumables or replacement parts, please have serial number and/or purchase date available.

8. For more information

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Appendix i – OES1000D Optional ozone elimination set-up

If your PSD unit has been purchased with an OES1000D ozone elimination option, this appendix will describe the set-up of that apparatus. The OES1000D device consists of an Ozone Eliminator, the TS-350 Teflon and stainless steel Ozone Pump (13.5 lpm), fused electronics, benchtop enclosure and fittings. The fittings consist of two ¼" barb connectors.

The ozone neutralization apparatus included with your unit utilizes a thermal-catalytic method to remove ozone. The material is a transition metal manganese dioxide/copper oxide material. It is not consumed by the ozone and is therefore a true catalyst. The ozone elimination unit may be vented to the atmosphere. This unit is designed to be 95% effective when operated at or below its rated flow (30 SCFH).

1. Set-up

Using the ozone resistant tubing supplied, the ozone OES1000D should be connected to the associated PSD_PSDP system. The tubing may be connected to either of the ports on the rear of the PSD_PSDP incubation chamber as well as to the "IN" connector on the elimination system. Ozone is pulled from the incubation chamber, through the hosing system and into the ozone neutralizer. Neutralized air will be expelled from the "OUT" fitting.

2. Maintenance

Very little maintenance is required for the ozone neutralization apparatus. However, great care should be taken to prevent the catalytic contents of the apparatus from getting wet. Moisture will significantly reduce the effectiveness of this device.

If the contents are exposed to high moisture levels they can be recharged with heat. Carefully remove the ozone neutralizing device holding the anterior fittings with the appropriate wrench. The entire neutralizing unit can then be heated at 350°F for 3 hours. The destruct unit may be placed in a conventional oven. Reattach the device and use as directed above.

3. Operation

Since it is recommended that samples be incubated in ozone, vacuum pressure should be enabled following treatment, but prior to opening the incubation chamber. The time necessary to completely purge the chamber will vary with the flow rate. Typical ozone generation from ambient air within the chamber will peak at levels greater than 50 ppm, however the use of pure O₂ during treatment will produce higher levels. For most protocols 5-10 minutes of OES1000D operation will be sufficient. Even with the neutralization option there will be a faint ozone odor detectable on the interior surfaces of the incubation chamber following use.