



UV Ozone Cleaner

User Manual

Manual version 2.0.G

Product code: L2002A2

Product Version: 2.0

Software Version: 2.0

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1. Overview

Our UV Ozone Cleaning System provides a simple, inexpensive, and efficient method of obtaining ultra-clean surfaces free of organic contaminants. The UV Ozone Cleaning System can clean a wide range of substrates, such as quartz, silicon, gold, nickel, aluminium, gallium arsenide, alumina, and glass slides.

The cleaning procedure is based on a photo-sensitized oxidation process, where the contaminant organic molecules are excited and/or dissociated by the absorption of short wavelength UV radiation. The unit operates using a high-output ultraviolet (UV) light emitted from a mercury tube grid lamp, which excites organic molecules and produces highly-reactive ozone gas from oxygen that is present from the air within the cleaning chamber. Atomic oxygen is simultaneously generated when molecular oxygen and ozone are dissociated by 185 nm and 254 nm wavelengths respectively. The 254 nm radiation is absorbed by most hydrocarbons, as well as ozone. The excited contaminant molecules react with atomic oxygen to form simpler, volatile molecules that desorb from the surface. When both UV wavelengths are present, atomic oxygen is continuously generated, and ozone is continually formed and destroyed.

The UV/ozone cleaning process can produce an atomically-clean surface in only a few minutes. However, the substrate surface must be nominally clean beforehand. The cleaning rate of UV/ozone using atmospheric oxygen at ambient conditions depends on the nature of the contaminant molecules, but is typically of the order of 0.1 - 1.0 Å/s. The exact exposure times and methods required to remove various contaminants will vary and should be determined empirically. Please refer to the operating instructions for guidelines and further information.

1.1 Applications

- Improving surface hydrophilicity
- Surface cleaning
- Preparation for thin-film deposition and surface treatment
- Ultraviolet curing
- Removal of surface monolayers
- Surface oxidation

1.2 Contaminants

- Photoresist
- Resins
- Cleaning solvent residues
- Plastic surface/silicon oil residues

- Solder flux

2. EU Declaration of Conformity (DoC)

We

Company Name: Ossila Limited

Postal Address: Solpro Business Park, Windsor street.

Postcode: S4 7WB

City: Sheffield

Telephone number: +44 (0)114 2999 180

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declare that the DoC is issued under our sole responsibility and belongs to the following product:

Product: UV Ozone Cleaner (L2002A2)

Serial number: L2002A2-xxxx

Object of declaration:

UV Ozone Cleaner (L2002A2)

The object of declaration described above is in conformity with the relevant Union harmonisation legislation:

Low Voltage Directive 2014/35/EU

EMC Directive 2014/30/EU

RoHS Directive 2011/65/EU

The following harmonised standards and technical specifications have been applied:

BS EN 61010-1:2010/A1:2019 Safety requirements for electrical equipment for measurement, control, and laboratory use.

Signed:

Ossila.com


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A circular blue stamp containing the text: "Ossila Limited, Solpro Business Park, Windsor Street, Sheffield, S4 7WB, UK" around the perimeter. In the center, it says "AUTHORISED SIGNATURE" above the "Ossila" logo.

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Name: Dr James Kingsley

Place: Sheffield

Date: 11/09/2020

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3. Safety

3.1 Warning

Warning

- Operate within a fume cupboard in a room with suitable air ventilation at all times
- Only use the power cord (and transformer) supplied with the unit
- Mains inlet rated for 230V \pm 10%. For 110V mains supplies, use the transformer supplied
- Do not cover the ventilation slots
- If the lamp breaks, leave the room ventilating for at least 15 minutes & contact Ossila
- The unit must be connected to a grounded power outlet

3.2 Use of Equipment

This UV Ozone Cleaner is designed to be used as instructed. It is intended to be operated in a laboratory environment under a fume cupboard/hood. It was designed to be used in the following environmental conditions:







- Indoors in a laboratory environment (pollution degree 2)
- Altitudes up to 2000 m
- Temperatures of 5°C to 40°C; maximum relative humidity of 80% up to 31°C.

The cleaner is supplied with a power cord (and if necessary an additional power transformer) for the country of purchase, in accordance with European Commission regulations and British Standards. Use of any other electrical power cables, adaptors, or transformers is not recommended.

3.3 Hazard Icons

The following symbols can be found at points throughout the rest of the manual. Note and read each warning before attempting any associated operations associated with it:

Table 1.1: Hazard warning labels used in this manual.

Symbol	Associated Hazard
	General warning or caution, which accompanying text will explain
	Electrical shock
	Severe injury or death by electrical shock
	UV radiation
	Ozone inhalation
	Explosion

3.4 General Hazards

Before installing or operating the UV Ozone Cleaner, there are several health and safety precautions which must be followed and executed to ensure safe installation and operation.

WARNING: Improper handling when operating or servicing this equipment can result in serious injury. Read this manual before operating or servicing this equipment.



I. DANGER: DO NOT use the UV Ozone Cleaner in the presence of an explosive atmosphere.



II. WARNING: Emergency Power Disconnect options: Use the power cord as a disconnect method, ensure that the power outlet for this cord is easily accessible by the user.



III. CAUTION: The UV Ozone Cleaner uses a ground-type power plug, which must be connected to a grounded outlet to prevent electrical shock. The UV Ozone Cleaning unit will be supplied with an earthed plug appropriate for the country of purchase.

IV. The UV lamp is a mercury vapour lamp. The consumer may be exposed to mercury only if the glass of the lamp is cracked /broken. If this happens, please abide by the following rules to minimise exposure:

- Ensure the power is disconnected to avoid the risk of electrocution.
- Leave the room under ventilation for at least 15 minutes.
- Using cut-resistant gloves, collect any stray glass pieces in a sealed container and close it tightly.

- Store the container and UV Ozone Cleaner in a fume hood until they can be taken to the next collection point for waste lamps.

3.5 Power Cord Safety



- I. Emergency power disconnect options: Use the power cord as a disconnecting method and remove it from the power source. To facilitate disconnect, make sure the power outlet for this cord is readily accessible to the operator.



- II. Only use the power cord (and transformer if using 110 V mains supply) supplied with the UV Ozone Cleaner. Using an unearthed plug may result in serious injury or death.

3.6 Servicing

If servicing is required, please return the unit to Ossila Ltd. The warranty will be invalidated if: Modification or service has taken place by anyone other than an Ossila engineer.

The Unit has been subjected to chemical damage through improper use.

The Unit has been operated outside the usage parameters stated in the user documentation associated with the Unit.

The Unit has been rendered inoperable through accident, misuse, contamination, improper maintenance, modification or other external causes.

3.7 Health and Safety – Installation



- I. High-intensity, mercury vapour lamps can generate extreme heat and temperatures. Furthermore, ozone is a powerful oxidising agent and can react explosively with combustible materials. Keep flammable materials a minimum of three feet away from operating equipment.



- II. The UV Ozone Cleaner is intended for operation inside a fully-functioning fume hood or fume cupboard only. There is no ozone filtration system incorporated into the UV Ozone Cleaner.

3.8 Health and Safety – Operation



- I. UV radiation can cause severe burns to the eyes and skin. The UV Ozone Cleaner prevents direct and reflected incident UV radiation through the positioning of the lamp. Furthermore, an integrated safety interlock prevents the lamp from being

powered on whilst the tray is open. As a precaution, never look directly into the sample chamber when the UV ozone cleaner unit is powered on.



- II. Ozone is a highly reactive substance. Any adverse health effects will be found at the sites of initial contact: The respiratory tract, lungs - and at higher concentrations, the eyes. The principal health effects are caused by irritation or damage to the small airways of the lungs, and symptoms include coughing and a feeling of tightness in the chest. Uncontrolled exposure to high levels of ozone could lead to more severe health effects.



- III. When operating the UV cleaning system, air flow in and around the unit (lamp housing) must remain unobstructed to prevent the unit from overheating.

If the temperature inside the unit reaches above 65 °C, the unit will automatically switch off to prevent overheating. Switch off the system and allow it to cool back to room temperature before resuming use.



- I. **IMPORTANT NOTE:** Excessive cooling will diminish the lamp's operating voltage and effectiveness, whereas Inadequate cooling may cause damage to system components.

3.9 Health and Safety – Servicing



- I. Service or installation work that includes integrating electrical components should only be performed by an Ossila engineer. Never alter the wiring of any purchased equipment. If changes are made, such alterations may damage the equipment, cause injury, or death. At the very least, such alterations will void your equipment's warranty.



- II. If the fuses located in the fuse drawer at the back of the unit need changing, the unit must be placed in a safe mode by switching the unit off and disconnecting the power cord from the power socket.

4. Unpacking

4.1 Packing List

The standard items included with the UV Ozone Cleaner are:

- UV Ozone Cleaner unit
- Power cord set (specific for country of operation)

- User guide manual on a USB stick.

4.2 Damage Inspection

Examine the components for evidence of shipping damage. If damage has occurred, please contact Ossila directly for further action.

The UV lamp is a mercury vapour lamp. The consumer may be exposed to mercury only if the glass of the lamp is cracked or broken. If this happens, please contact Ossila after abiding by these rules to minimise exposure:

1. Leave the room under ventilation for at least 15 minutes.
2. Using cut-resistant gloves, collect any escaped glass pieces in a sealed container and close it tightly.
3. Store the container and UV Ozone cleaner in a fume hood until they can be taken to the next collection point for waste lamps.

5. Specifications

The UV Ozone Cleaner specifications are shown in Table 5.1.

Table 5.1. UV Ozone Cleaner Specification.

UV Ozone	Specifications
UV Lamp	Synthetic quartz UV grid lamp
UV lamp key wavelengths	185 nm and 254 nm
Power supply	230V \pm 10 %; 50/60Hz, 50 VA
Class of protection	Class I
Degree of protection	IP20
Maximum run time	59 minutes and 59 seconds
Safety features	Drawer safety switch; thermal cut-out
Unit dimensions	Width: 193 mm
	Height: 230 mm
	Depth: 300 mm
Tray dimensions	100 mm x 100 mm
Fuses	1 A slow blow
Weight	5 kg



Warning: The unit contains a source of high voltage.

Internal UV lamp supply

4 KV no load across secondary terminals or
2 KV no load to earth (max); 30 mA

6. System Components

The UV Ozone Cleaner L2002A comprises of two items:

- UV Ozone Cleaner unit (Figure 6.1).
- Power supply cord (Figure 6.2). The UV Ozone Cleaner unit is powered by 230V, 50/60Hz supply, Countries with a 110V power supply are supplied with an additional power transformer.

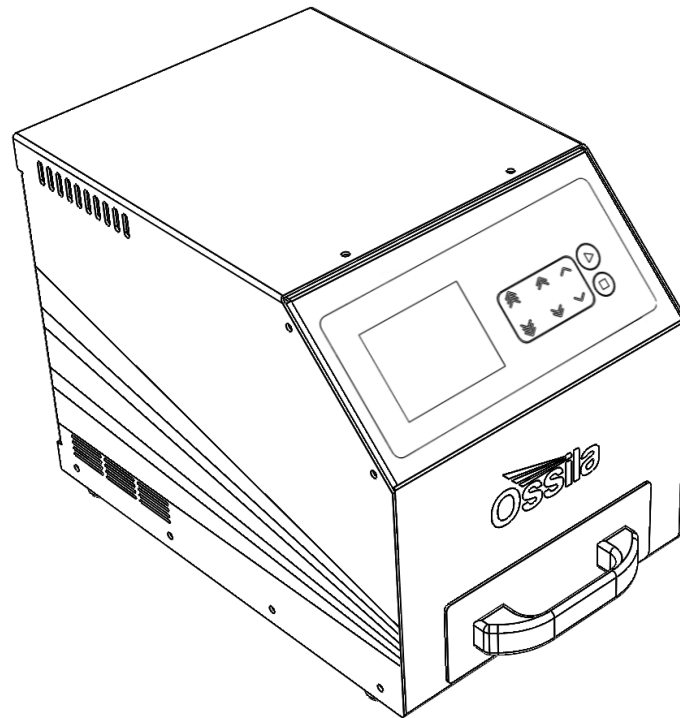


Figure 6.1. Ossila's UV Ozone Cleaner.

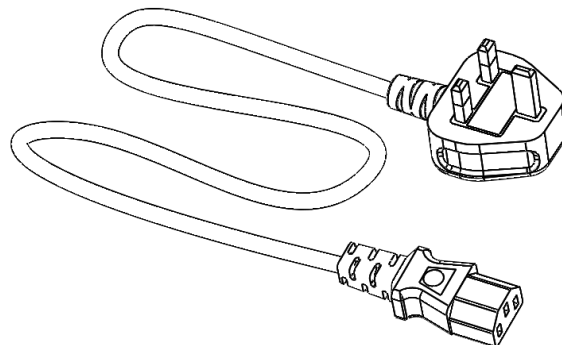


Figure 6.2. Main power cord adapter. Plug shown is for United Kingdom; the UV Ozone Cleaner ships with a suitable plug for the country of purchase.

7. Installation

1. Place the unit on a solid, level surface inside a fume cupboard.
 - i. Ensure the area is free from vibrations, temperature extremes and highly flammable or explosive materials.
2. Before plugging in the UV Ozone Cleaner, ensure the power switch on the unit is switched to the '0' position (off).

3. Connect the power cord to the UV Ozone Cleaner unit.
 - i. See Figure 7.1 to see how to connect the UV Ozone Cleaner to the power supply cable.
4. Switch the UV Ozone Cleaner power switch to the 'I' position to turn on.



Figure 7.1. Installation of the UV Ozone Cleaner by plugging in the power cord cable.

8. Operating the UV Ozone Cleaner

8.1 UV Ozone Cleaner Overview

A top-down view of the UV Ozone Cleaner is shown in Figure 8.1, with all the relevant components highlighted. Figure 8.2 shows the power cord socket, fuse socket, and the power switch.



Figure 8.1. UV Ozone Cleaner front panel image.

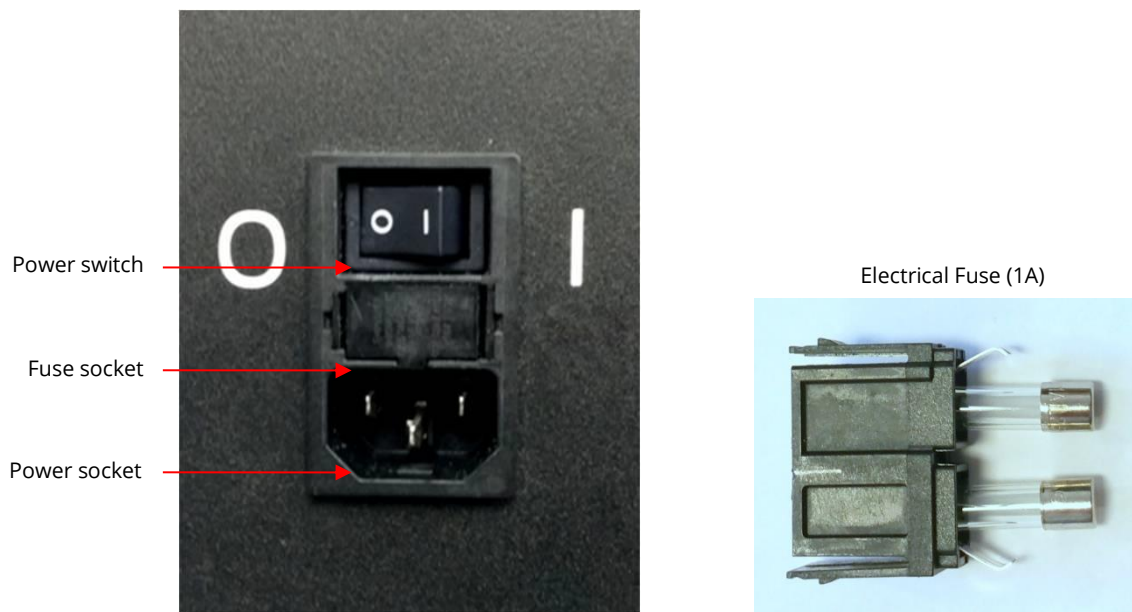


Figure 8.2. UV Ozone power switch, fuse socket, and power socket position on the back panel.

8.2 UV Ozone Cleaner User Interface

Figure 8.3 shows the front panel of the UV Ozone cleaner, where the function of each of the keypad buttons is explained in Table 8.1.

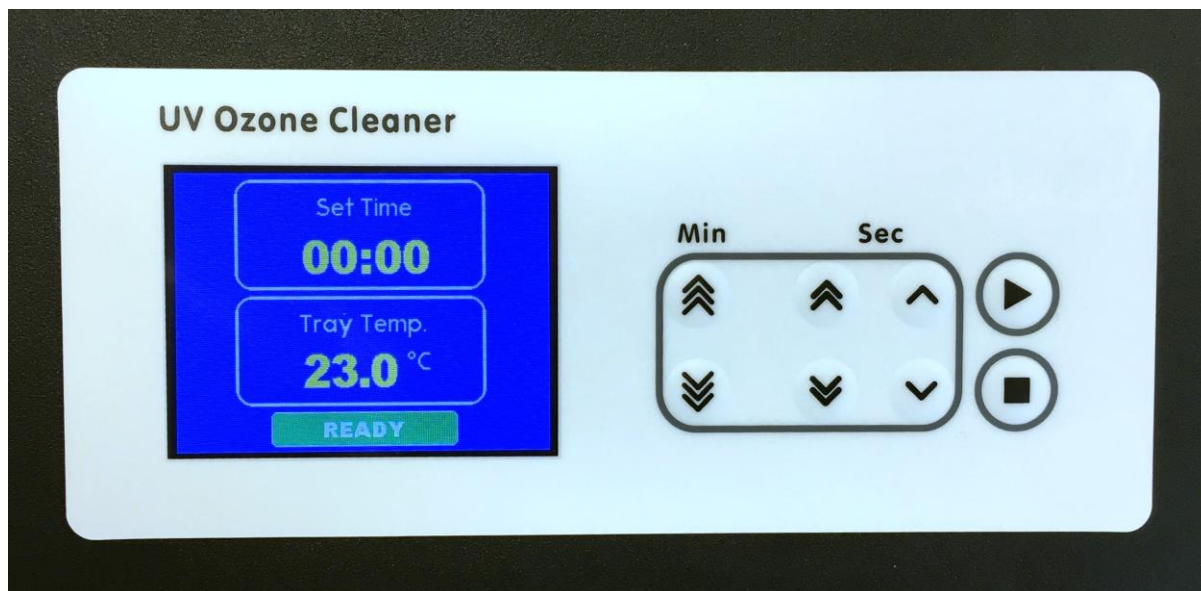










Figure 8.3. UV Ozone Cleaner LCD screen and keypad.

Table 8.1. Operational buttons and their associated functions.

Button	Function
START	 Starts operation for the Set Time programmed.
STOP	 Terminates the running program and resets the Set Time to zero.
MIN	 Increment the set time by 1 minute.
	 Decrement the set time by 1 minute.
SEC	 Increment the set time by 1 second.
	 Decrement the set time by 1 second.
	 Increment the set time by 10 seconds.
	 Decrement the set time by 10 seconds.

8.3 Practical Operation



Operate within fume cupboard in room with suitable air ventilation at all times.

1. Open the tray door.
2. Load your sample to be cleaned carefully onto the tray.
 - I. The tray surface may become slippery with use of the UV Ozone Cleaner; take care to avoid your sample sliding off the surface.
 - II. **WARNING:** Should your sample fall inside of the UV Ozone Cleaner unit, do not attempt to retrieve it. Doing so may result in damage to the unit or personal injury. The UV Ozone Cleaner can operate safely should small objects fall off the tray provided the tray door can close fully.
3. Program the UV Ozone Cleaner with the desired **Set Time** and run the program (see section below).
4. Once the program has finished, open the tray door and remove your sample.



8.4 Program Operation



WARNING! High voltage

The UV lamp can operate at a maximum of 4000 V. Avoid any electrical cables or solvents around the UV Ozone Cleaner.

**WARNING! Ultraviolet light**

The low-pressure mercury vapour grid lamp inside this equipment emits harmful UV radiation. Avoid exposure at all times.

**WARNING! Inhalation hazard**

Ozone is produced by this equipment during operation. Use only inside a fume cupboard and in an area where appropriate ventilation is available.

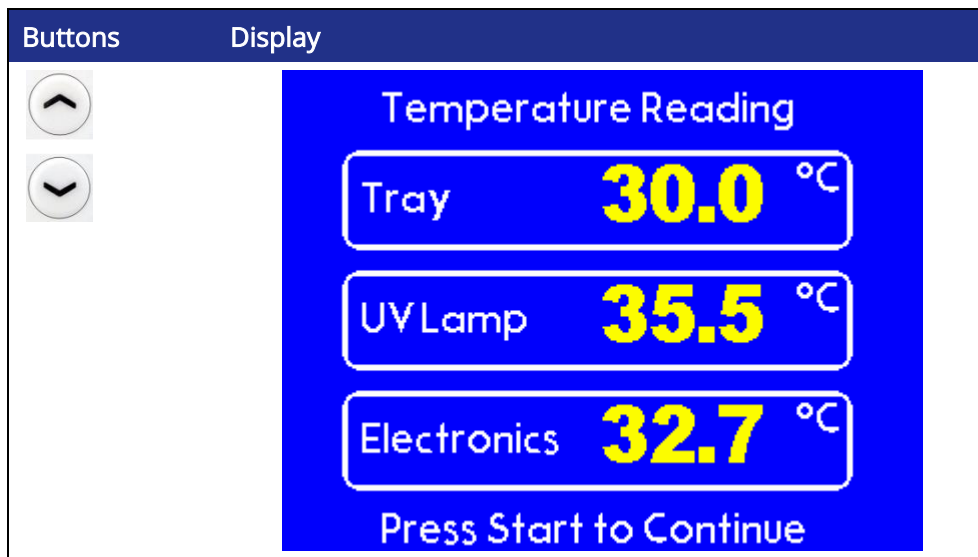
1. Turn the UV Ozone Cleaner power switch on (position 'I'); the bootup screen is shown Figure 8.4.



Figure 8.4. Bootup screen.

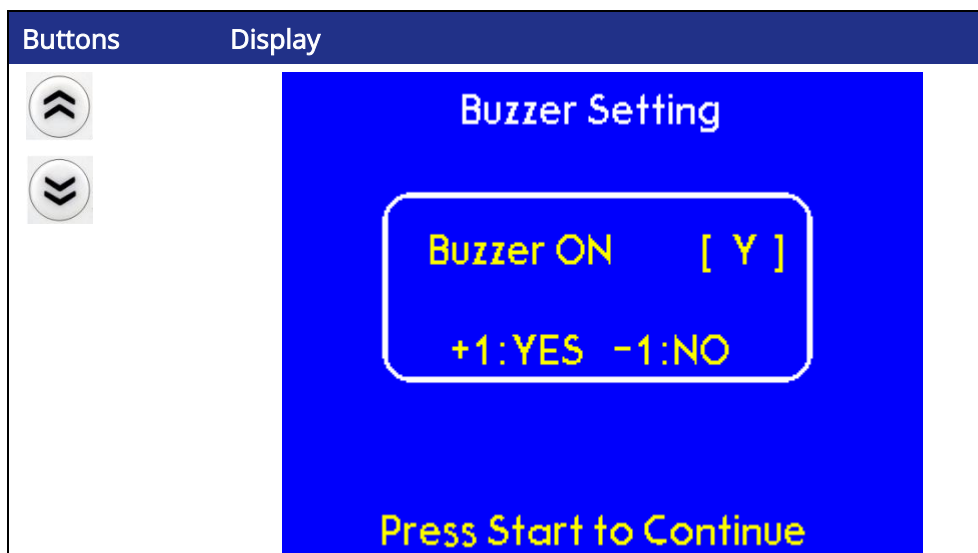
2. During the bootup time, the user can enter the buzzer setting and temperature reading menu screens for the UV Ozone Cleaner.
 1. Press and hold both **single-increment second buttons** (up and down) at the same time to see the temperature readings display as in Table 8.2.

Table 8.2. Temperature readings display.



- II. Press and hold **both double-increment second buttons** (up and down) at the same time to enter the buzzer settings as in Table 8.3
- III. To change the buzzer settings, press the **single-increment up second button** to turn the buzzer sound on, or the **single-increment down second button** to turn the buzzer sound off.

Table 8.3. Buzzer settings menu.



- 3. To exit the Settings page, press the **START** button to proceed to the Caution page.
- 4. The user must read the instructions and press **START** to enter the main screen of the UV Ozone Cleaner as shown in Figure 8.5.



Figure 8.5. Instruction screen.

5. Modify the **Set Time** using the **Minute (MIN)** and **Second (SEC)** buttons on the keypad. The maximum value of the timer is 59 min 59 secs as in Figure 8.6.



Figure 8.6. Set time screen.

6. Once the timer has been set, press the **START** button to run the program. The LCD will display the following information as in Figure 8.7.
 - I. The **Elapsed** timer will begin and the LED indicator light will switch on.
 - II. When the **Elapsed** time matches the **Set Time**, the one-note buzzer will sound - indicating the program has finished.
 - III. While the program is running, the user can stop the program by pressing the **STOP** button. This will also reset the **Set Time** to 00:00.

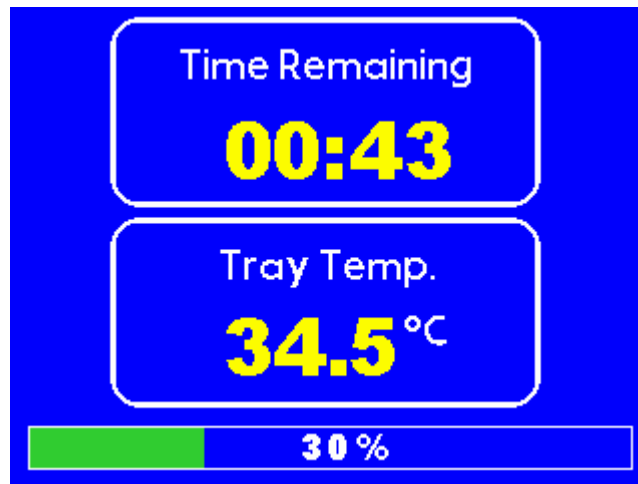


Figure 8.7. Run screen.

8.5 Operational Safety

(I) Safety interlock

If the tray is opened while the system is running the program will automatically stop, turn the lamp OFF and reset the **Set Time** to 00:00. The unit displays a 'TRAY OPEN' warning message shown in Figure 8.8.

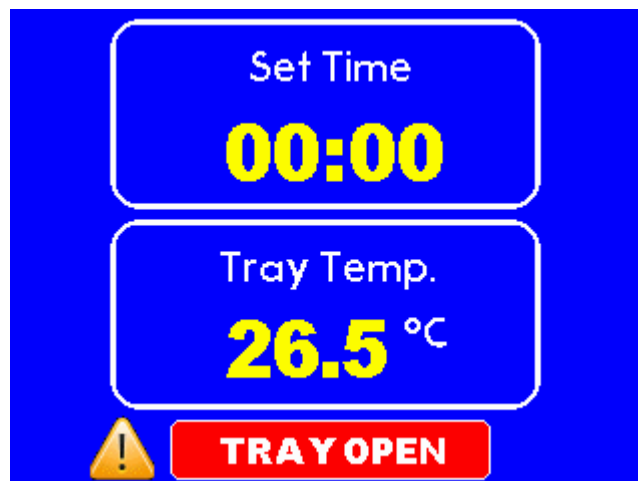


Figure 8.8. Tray open warning.

(II) High Temperature Safety Warning

If one or more of the internal temperature sensors reads above certain temperature value, a high temperature warning will appear on the screen. Table 8.4 shows the different warnings for this

unit for given temperatures. The error code that is displayed when a sensor exceeds 65 °C indicates which sensor is at high temperature and is used for troubleshooting.

(III) Temperature Error

In case one of the temperature sensors is giving an error reading, a warning as shown in Figure 8.9 will appear and the user is required to restart the unit. The error code that is displayed indicates which sensor is in error and is used for troubleshooting.

Table 8.4. High temperature warning.

Warning	Display
<p>HIGH TEMP (> 50°C)</p>	
<p>VERY HIGH TEMP (> 65°C)</p>	



Figure 8.9. Temperature error warning.

9. Maintenance

9.1 Cleaning

Maintenance consists of periodic cleaning. The exterior of the instrument can be cleaned with a clean, dry cloth to remove any oil, grease, or grime. Never use liquid solvents or detergents. Repairs or servicing not covered in this manual should only be performed by qualified personnel.

9.2 Repair & Service

There are no user-serviceable parts in this unit except for the fuse which is accessible externally. If the unit is faulty, return it to Ossila Limited. Our service department will promptly quote to repair any faults that occur outside the warranty period.

9.3 Storage Conditions

The UV Ozone Cleaner should be kept in dry conditions; away from direct sources of heat or sunlight, and in such a manner as to preserve the working life of the instrument.

10. UV Ozone Cleaner Troubleshooting

Problem	Possible cause	Action
No power / display	The power switch on the unit is in the OFF position	Check the connection and ensure the power is turned ON
	The power supply may not be connected properly	Ensure the unit is firmly plugged in to the power supply and the plug is firmly connected to both the power inlet and the power socket
	The fuse on the rear panel has blown	Ensure the unit is unplugged Check the fuse on the rear panel. If it has blown, replace with a suitably rated 1A slow blow fuse
	The power supply adapter has a fault	Contact Ossila for a replacement power supply adapter
	Fault (fuse) on circuit board	If all the above causes have been considered, there may be a fault on the board. Please contact Ossila for information
Power but timer does not operate	The tray door has not been closed properly 'TRAY OPEN' will display	Ensure the tray door is fully closed the drawer should hold firmly in position when it is fully closed
Continuous buzzer	Error in temperature reading UV Ozone Cleaner temperature is extremely high	Check the temperature reading by entering the settings mode (refer to Section 6.2) If the temperature is extremely high, turn the unit OFF and allow it sufficient time to cool down

11. List of Related Products

Compatible substrates



[ITO Substrates \(e.g. S111\)](#)

All of our 15 x 20 mm ITO substrates for OPV, OLED and sensing applications.



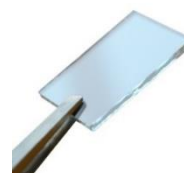
[Pre-patterned ITO OFET Substrates \(S161/S162\)](#)

The Ossila ITO OFET substrates have been designed to enable fabrication and characterisation without the need for vacuum evaporations or probe stations.



[Silicon Oxide OFET Substrates \(S146\)](#)

Silicon substrates with thermal oxide layer pre-cut to fit the Ossila OFET fabrication systems. Also used for applications including ellipsometry and X-ray measurements.



[Synthetic Quartz Coated Substrates \(S151\)](#)

Flat glass substrates coated with 20 nm of SiO₂ to help with surface wetting and prevent ion migration from the glass to the active layer.

Related processing equipment



[Spin Coater \(L2001A3\)](#)

Ossila Personal Spin Coater offers the ideal solution for a busy lab where space is at a premium. It does not require a vacuum pump or nitrogen line, and offers better film quality - making it the ultimate plug-and-play spin coater.



[Contact Angle Goniometer \(L2004A1\)](#)

Provides a fast, reliable and easy method to measure the contact angle of a droplet on a surface. With its low price, compact size, and intuitive PC software - the barrier-to-entry is lowered, enabling more researchers than before to perform this useful and versatile measurement.

12. Revision History

Rev	Date	Description
A	Nov 2017	Updated manual V2.0.
B	Feb 2018	Change company's address
C	Jul 2018	Add languages in DoC and updated formatting
D	Aug 2018	Removed Warranty Information; Updated formatting
E	Dec 2018	Minor corrections, update images
F	Sept 2020	DOC update, addition of servicing caution