

UV Germicidal Cabinet

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Your Comprehensive Equipment Source





UV Germicidal Cabinet

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Safety Notice

A thorough familiarity with all operating guidelines is essential to safe operation of the product. Failure to observe safety precautions could result in poor performance, damage to the system or other property, or serious bodily injury or death.



CAUTION

Cautions are used when failure to observe instructions could result in significant damage to equipment.

The following symbols are intended to call your attention to two levels of hazard involved in operation:



WARNING

Warnings are used when failure to observe instructions or precautions could result in injury or death.

The information presented here is subject to change without notice.

1.0 Description

This manual provides information on installing and operating your Terra Universal UV Germicidal Cabinet.

This polypropylene cabinet features a variable-speed ceiling fan/filter module that removes submicron particles, including bacteria, aerosols and other biohazards. Select 99.99% HEPA filters (rated at 0.3µm-diameter particles) or 99.999% efficient ULPA filters (rated at 0.12µm-diameter particles). Perforated shelves optimize the vertical flow of clean air through the cabinet; air exits through exhaust slots on the amber acrylic doors.

Each of the four chambers features a 254nm UV germicidal lamp with optional timer. A safety "kill" switch automatically halts lamp operation the instant either of the amber acrylic access doors is opened. Refer to "Specification" for additional lamp information. A stand raises the cabinet off the floor for easy cleaning (optional casters available).



Shown with optional casters, without optional UV light timer



2.0 Operation and Maintenance

Pre-Installation Inspection: Unpack the system and check for damaged or missing components. The cabinet is generally shipped with the filter-blower module pre-assembled, ready for operation. Any damage should be reported to the shipping company immediately.

2.1 System Operation

The fan/filter module and the UV germicidal lamps operate on two separate circuits.

To turn ON the fan/filter module, depress the green ON/OFF toggle switch, which energizes the fan circuit. Rotate the variable-speed power switch on the front of the unit in the clockwise to adjust the fan speed.

To turn ON the four UV germicidal fixtures, rotate the timer in the clockwise direction. In the fully clockwise position, the timer allows approximately 6 hours of lamp operation; the lamps will operate until time expires or either of the access doors is opened. The UV light can be turned off by rotating the timer fully counter clockwise. See information on the UV safety switches below.

Although the amber door material is an effective UV shield, care should be taken to ensure that hands, face and especially eyes are not exposed to direct UV radiation.



WARNING!:

- **Wear goggles or face shield and hand and arm protection (shirt sleeves and gloves) when operating the UV germicidal lamps.**
- **Never attempt to operate UV lamps if the doors are not closed and/or the safety “kill” switch is not operational.**

UV Safety Switches

The magnet at the top of each door activates a door safety switch that halts UV lamp operation if the door is open. Always ensure that the magnet is properly aligned with the opposing switch connector before attempting to operate the system.

UV exposure of 60 seconds provides a “kill” dosage for most bacteria and viruses located within 12” of the UV source, making this cabinet an effective sanitizing chamber for use with most pathogens. Refer to appendix for additional information on UV disinfection.

Operation Status Indicator

The Operation Status Indicator lights (blue TUI logo seen on right) glow to indicate that fan is operational. When unit is powered off, the Operation Status Indicator lights flash intermittently to call attention to the fact that the unit is not operational.





2.2 System Maintenance

Cleaning

These units should be cleaned periodically with warm water and a mild detergent. Frequent cleaning is especially important if the interior is often exposed to chemicals that could drip onto the inner surface of the cabinet.

To maximize cleaning uniformity, wipe in one direction, from top to bottom or left to right. Use only slight overlapping strokes, and fold the wiper before between strokes. Do NOT use circular motion, which moves but does not remove surface particles and produces non-uniform results. Begin cleaning from the top of each panel, working to the very bottom, and then wipe down the vertical and horizontal frame members when all panels are clean.



CAUTION: Do not use alcohol or other cleaning agents on the acrylic doors.

Filter Replacement

Depending on operating conditions, the system will require a periodic HEPA/ULPA filter replacement. Replacement intervals depend on frequency of use and particle load in the ambient environment. As the filter loads, fan operation will become noisier and the air speed will diminish. A recommended filter monitoring protocol is to measure the air speed approximately 6" below the filter face using a hand-held anemometer. When the air speed drops to below 90 feet/minute, a filter change is recommended.

Replacement HEPA Filter (12" x 12" x 3", rated 99.99% efficient at 0.3 micron particles): Terra # 2100-30



WARNING!: Turn the unit OFF and disconnect it from system power before attempting to replace the filter.

To replace the system filter (requires two technicians),

1. Remove the cross-head screws along the perimeter of fan/filter module cover that hold it in position.
2. Carefully lift the cover away from the unit, being careful not to stress the wire harness that connects the fan (attached to the inside of the cover) to the electrical board.
3. Detach the wire fan wire harness by turning the twist connector. Set the cover aside.
4. The filter is held in place by a retaining clamp. Remove the screws that hold this clamp in position. Replace the filter and re-attach the retaining clamp.



CAUTION: Do not touch the filter, or you may damage the delicate filter pleats. Handle the filter only by the frame.

5. Reattach the fan wire harness and position the fan/filter module cover carefully in place.
6. Re-attach the perimeter cross-head screws to secure the cover in position.
7. Re-connect the unit to system power (120 or 220VAC).

Replacing Gasketing

The gasketing that lines the access doors helps to ensure a tight seal when doors are closed. This gasketing is selected on the basis of its durability, but it may in time need to be replaced. Replacement gasketing (Cat. No. 1100-



26) is easy to install. Simply peel off the old stripping (you may need to scrape portions off with a razor blade), clean the old adhesive with a solvent, and replace it. The self-adhesive backing guarantees a secure bond.

Replacing UV Lamp

Model: 25 watt Preheat Strip Fixture

Lamp: 05-1107

Call Terra 714-578-6000

3.0 Specifications

Materials: Stress-relieved white polypropylene (cabinet); amber acrylic (doors); stainless steel (fan/filter housing)

Dimensions: 25.75"W x 13.5"D x 56"H (654mm x 343 mm x 1422 mm), excluding stand.

Fan:

Motor	250 mm Backward Curved Motorized Impeller
CFM	991.8
Power	115 VAC/ 60 Hz, 105 W

UV Germicidal Lamps

Manufacturer	Atlantic Ultraviolet Corporation
Model	25 watt Preheat Strip Fixture
Lamp	05-1107
Total UV output	5.0 Watts
Length	19-1/2"
Dimensions Width	2-5/8"
Height	3-1/2"
Rated Average Lamp Life	6 Hours



4.0 Warranty

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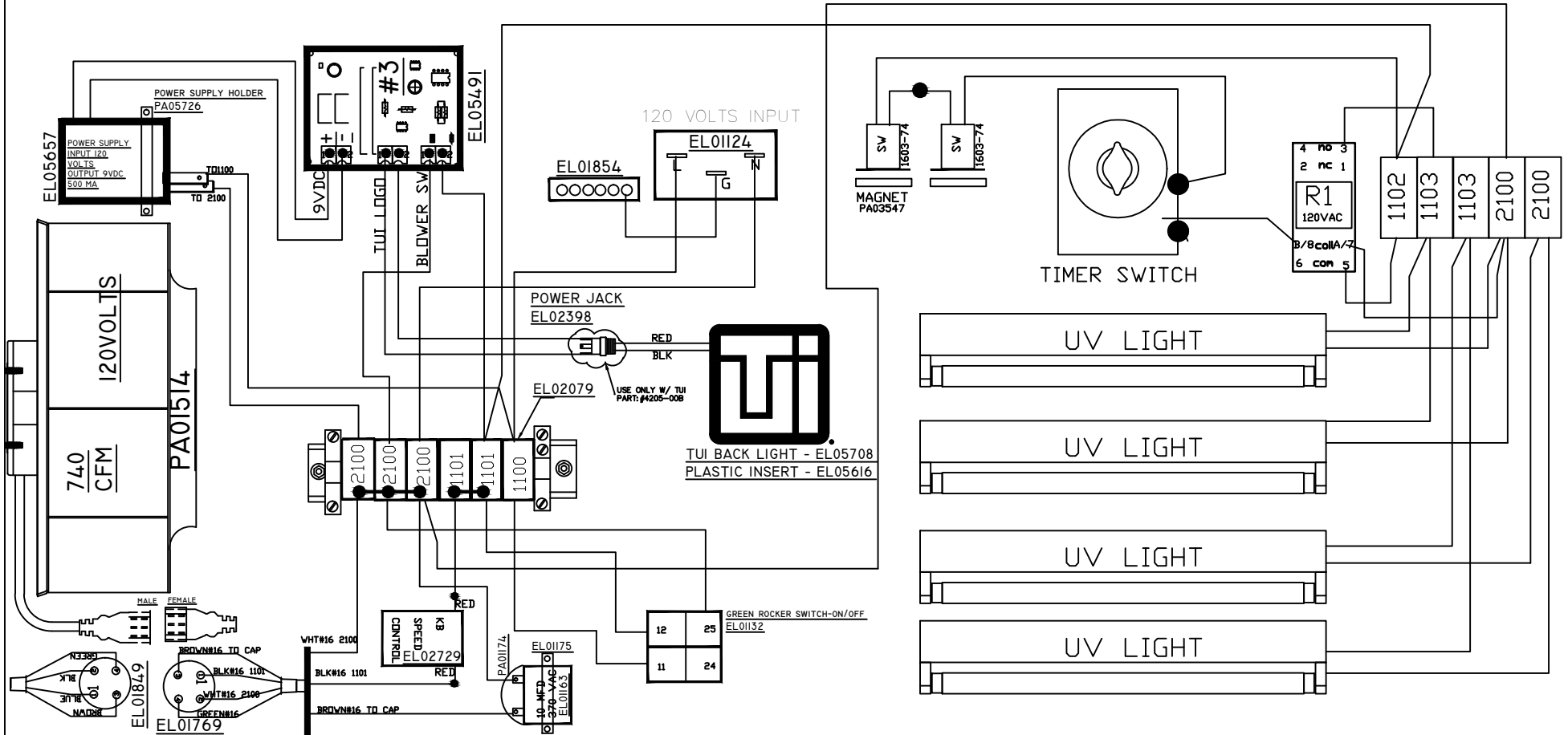
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Generally, customers can improve the chance of collecting on a freight claim by following these procedures: 1) formally requesting that the carrier inspect the shipment immediately upon suspecting damage or shortage to verify condition; 2) notifying the carrier upon discovery of concealed damage and requesting an inspection within 15 days of receipt, both in person or phone and following up via mail; 3) keeping the shipment as intact as possible, including retaining original packaging materials and keeping the product as close to the original receiving location as possible; 4) holding salvage for disposition by the carrier.

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*Thank you for ordering from
Terra Universal!*



LTR	DESCRIPTION	DATE	APPD
NC	INITIAL RELEASE	1/8/07	

CONFIG	DESCRIPTION
MATERIAL SPEC.	FINISH SPEC.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES
TOLERANCES ON:

.XX DECIMALS ± .03	X'± 1"
.XXX DECIMALS ± .010	X/X ± 1/64

SIGNATURES	DATE
DRAWN: CATALAN	01/29/09
ENGR:	

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 ALL RIGHTS RESERVED BY
 TERRA UNIVERSAL
 DISCLOSURE OR COPYING PROHIBITED

TITLE
UV STERILIZATION, FILTRATION CABINET ELECTRIC DRAWING 120V
6081-05revA
154459
A
NONE
SHEET E01OF E01

Ultraviolet Disinfection: Crucial Link in the Sterilization Chain

Many manufacturers face the challenge of maintaining sterile products and processes. In most cases, there's no one-size-fits-all solution. Highly effective sterilization technologies like ethylene oxide gas (EtO) or hydrogen peroxide vapor carry substantial risk and often come at a high cost. Frequent manual wipe-down with IPA or other cleaning agents is much less expensive but introduces difficulties related to operator training and process documentation and consistency. In many cases, the challenge amounts to managing multiple technologies that provide microbial control throughout widely differing processes—while minimizing costly disruptions for bioburden testing or decontamination routines.

Fortunately, ultraviolet sanitizing technology provides a range of safe, cost-effective disinfection measures that simplify this task, whether employed as a stand-alone measure or as part of a broader sterilization program.

Sanitizing vs. Sterilization: What UVC Does and Doesn't Do

Ultraviolet C (UVC) radiation is the germicidal range of the ultraviolet spectrum. UVC energy, with wavelengths in the 280 - 100nm range, is removed from sunlight by the earth's atmosphere, so earth-bound microorganisms have not developed a natural defense against it and are highly susceptible to cellular damage—particularly, disruption of DNA sequencing—as a result of relatively low levels of UVC exposure.

UV Germicidal Irradiation (UVGI) has been studied for over a century, and UVGI effects on common bacteria, viruses and mold spores are well known. Manufacturers of UVC equipment often provide D99 dosages (the duration and intensity of UVGI necessary to a 2-log reduction of all microbes present) for specific pathogens and exposure conditions, making it relatively simple for a manufacturer to select a system for a particular situation. Although UVC lamps may not produce an entirely sterile surface, they can maintain consistently low microbial loads throughout a wide range of operations and eliminate bioburden spikes that could necessitate extensive testing and decontamination measures.



Microorganism	D99% (1) Dose Req'd MicroWatts - sec/cm ²	Time to reach D99 Dosage in Minutes (2)				
		5 ft	8 ft	11 ft	14 ft	17 ft
Virus and Bacteria						
Influenza A	3,880	2	2	3	3	4
Vaccinia	3,014	2	2	2	3	3
Coxsackievirus	4,156	2	2	3	3	4
Staphylococcus A	1,324	2	2	2	2	2
Tuberculosis	2,160	2	2	2	2	3
Legionella	2,250	2	2	2	2	3
Average Virus and Bacteria from above	2,797	2	2	2	3	3
Fungal- Spores						
Aspergillus niger spores	270,892	39	52	77	114	152
Penicillium italicum spores	63,960	10	13	19	28	37
Cladosporium spores	121,188	18	24	35	52	69
Average airborne Fungal spores from above	152,013	23	30	44	65	86
Time to deliver 40,000 MicroWatts - sec/cm ²	40,000	7	9	13	18	24 (Minutes)
Notes:						
1. Dosage required to disinfect 99% at lowest intensity point						
2. Horizontal distance from Sanitizer to point on a wall. Distance to the furthest corner of the room should be used. Assumes a ceiling height of 9' and uses intensity at ceiling as lowest point of intensity.						
3. Time required to reach theoretical 99% disinfection plus an allowance of 1.5 minutes for lamp to reach temperature.						

Figure 1:
 Characteristic UVC "Kill Rates"
 Table courtesy of UVDI

In many situations, a D99 dosage is adequate guarantee of germicidal control (D99.9 and D99.99 levels are also obtainable in many cases). As shown in Figure 1, the D99 "kill rate" is reached in as little as two minutes of exposure for common pathogens like influenza A, tuberculosis and legionella. Even when absolute product sterilization requires additional equipment, use of UVC sanitizers often minimizes the frequency of more disruptive sterilization and testing.

Safe, Simple Implementation

UVC is relatively easy to implement safely in a wide range of situations. Such applications typically fall into two categories: surface disinfection and airflow disinfection.

Surface disinfections entails UVC exposure to wall or chamber surfaces, as well as to surfaces of manufactured samples. As long as surfaces to be disinfected are within the line of sight of the lamp, it is fairly simple to select a system with the proper intensity to provide D99+ dosing with a few minutes of UVC exposure.

Whole room sanitizers provide this germicidal control for walls, ceiling and floor of a lab, cleanroom or other production space. These units include cycle timers that let a user set the unit for operation and then safely leave the room. Because they require only a few minutes to provide a D99 dosage, they can be operated before and after processing shifts to provide a first line of defense against bioburden accumulation.

A range of UVC lamps is available for standard process enclosures, such as gloveboxes, isolators and hoods. Small enclosure sizes allow effective irradiation with lower-wattage fixtures and shorter cycle times. Because standard glass and many plastics, including acrylic, PVC, and polycarbonate, are effective UVC shields, UVC lamps can be safely incorporated into the systems without risk to the personnel who use them. Laminar flow and exhaust fume hoods, which allow limited exposure of UVC light to the operator's hands and face, can be fairly simply modified with a pull-down sash and interlock device to preclude exposure during UVC lamp operation. Protective gloves and face shields minimize risk when physical barriers may not be possible.

Airflow sanitizing contributes further to bioburden control in a cleanroom or other air conditioned facility. Because viral particles typically fall in the sub-micron particle size, often below the 0.12-micron diameter pore size used to rate Ultra-Low Particulate Air (ULPA) filters, their transmission is difficult to control even in classified cleanrooms. In most cases, however, special UVC ductwork fixtures can be installed to minimize the bioburden in a cleanroom or other controlled production environment. Even with air moving as fast as 100 feet/minute, a fixture optimized to increase the exposure time will attain D99 dosage for most bacteria and viruses.

UVC Limitations

The principal limitation of UVC germicidal irradiation is the need for direct exposure. Place a sample too far from the UVC source, or move it out of the direct line of sight, or cut the exposure time too short, and you lose germicidal efficacy.

Extended UVC exposure also degrades some materials over time. Although it has no effect on most construction materials inside a lab or cleanroom, including metals, painted surfaces, and most plastics, UVC prematurely ages many elastomers and paper-based products. Fortunately, these effects can typically be minimized through controlled exposure cycles.

In most cases UVC solutions can vastly reduce the bioburden with negligible effects on materials and processes and minimal risk to samples or personnel. By maintaining consistently low microbial loads, such UVC technology drives down the need for more expensive sterilization and testing, and with it the overall cost of production.



Figure 2: UVC Lamp Fixture Installed Inside Cleanroom Air Return (shown with cover removed)

Photo Courtesy of Terra Universal, Inc.