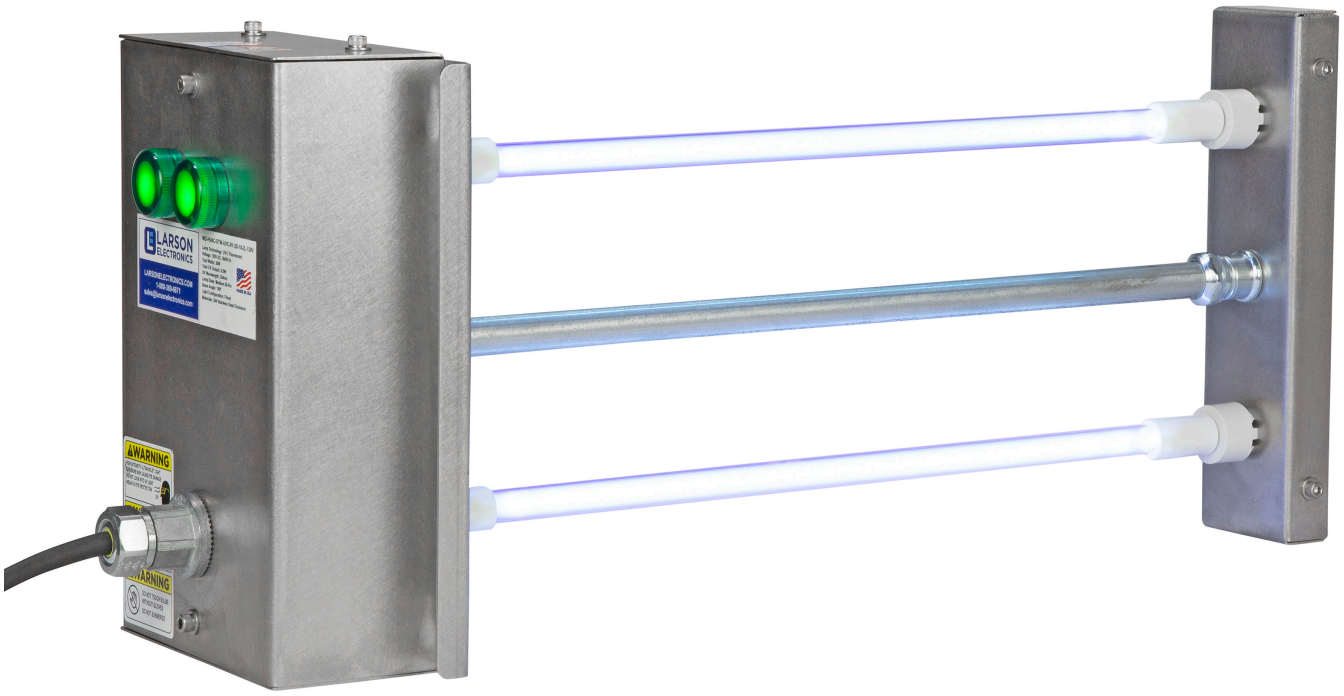
Air Duct Disinfection Systems Instruction Guide

EPA Reg. No 98409-1
EPA Est. No. 98409-TX-1

These instructions generally describe the installation, operation and maintenance of the IND-HVAC-DTR-UVC-R1-SS series. Questions that are not specifically answerable by these instructions should be directed to Larson Electronics. Larson Electronics takes all possible precautions when packaging equipment to prevent damage. Carefully inspect and report all damages. Do not install damaged equipment. Follow all instructions on any labels or tags. Carefully inspect all packing materials before discarding to prevent the loss of accessories, mounting hardware, spare parts or instructions.

The information and recommendations contained in this publication are based upon data collected by Larson Electronics and are believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. Specifications and information are subject to change without notice.



SAFETY WARNINGS

- All personnel should be alerted to the potential hazards indicated by the product safety labeling on this unit.
- The following conventions are used to indicate and classify precautions in this manual and on product safety labeling. Failure to observe precautions could result in injury to people or damage to property.

⚠ This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ **DANGER** Danger indicates an IMMINENTLY hazardous situation, which, if not avoided, WILL result in death or serious injury.

⚠ **WARNING** Warning indicates a POTENTIALLY hazardous situation, which, if not avoided, COULD result in death or serious injury.

⚠ **CAUTION** Caution indicates a POTENTIALLY hazardous situation, which, if not avoided, MAY result in minor or moderate injury.

CAUTION Caution used without the safety alert symbol indicates a potentially hazardous situation, which, if not avoided, may result in property damage.


This symbol/pictorial is used to identify an **ELECTRICAL SHOCK** or **ELECTROCUTION** hazard.


This symbol/pictorial is used to identify the need to wear approved ultraviolet blocking eye wear.


This symbol/pictorial is used to identify the need to wear protective gloves.


This symbol/pictorial is used to identify an **ULTRAVIOLET LIGHT** hazard.


This symbol/pictorial is used to identify the need to wear approved ultraviolet blocking face shield.


This symbol/pictorial is used to identify components which must not be disposed of in trash

SAFETY INSTRUCTIONS

⚠ **WARNING** To guard against injury, basic safety precautions should be observed, including the following:

1. Read and follow **ALL** safety instructions.


⚠ **WARNING** **Avoid exposure to direct or reflected germicidal ultraviolet rays. Germicidal ultraviolet rays are harmful to the eyes and skin.**

2. Intended for indoor use only.
3. Do not alter design or construction.
4. Do not use this fixture for other than its intended purpose, as described in this manual.
5. Do not mount under any source of moisture or condensation, such as humidifiers, cooling coils, etc.
6. Do not remove any labels or devices.
7. ⚠ **CAUTION** Germicidal ultraviolet rays may break down plastic, rubber or other non-metallic materials, with inadequate resistance to ultraviolet. Shield all plastic, rubber or other non-metallic parts such as; plastic drain pans, wire insulation, flex ducts, humidifiers, filters, etc. which may be exposed to direct or reflected germicidal ultraviolet rays.
8. ⚠ **WARNING** **Do not operate without proper electrical ground.**
9. Do not operate the unit if there is visible or suspected damage to the unit or, if applicable, there is damage to power cord and/or plug.
10. Utility power supplied, to the fixture, **MUST** match power requirements listed on the fixture label.
11. ⚠ **WARNING** **Always disconnect power to the unit before performing any service or maintenance.**
12. Ultraviolet light must be contained within duct and visible only through supplied sight glass assembly.
13. Read and follow all notices and warnings on the unit.
14. **SAVE THESE INSTRUCTIONS.**

CAUTION

It is the user's responsibility to determine and validate the suitability of this equipment for use in the user's system or process.

No warranty or representation is made by the manufacturer with respect to suitability or performance of this equipment or to the results that may be expected from its use.

The user should periodically inspect, clean as necessary and confirm the presence and good legibility of the product safety labels. Contact the factory for replacement labels in the event that any of the labels are missing or illegible.

PRODUCT APPLICATION

CONSTRUCTION

The Air Duct Disinfection Unit consists of:

- Germicidal Ultraviolet Lamps, which deliver ultraviolet energy in the specific wavelength of 254 nanometers (nm) which effectively destroys airborne microbes including: virus, bacteria, and mold spores.
- Units use Electronic Ballasts available in 120v 50/60Hz
- Units are equipped with a cord whip and flying leads for users to install their own cord cap, or for hardwired applications.
- All electronics and wiring are housed in an enclosure constructed of stainless steel. Stainless steel construction provides strength, durability and will withstand most harsh environments.

PRINCIPLE OF OPERATION

The design has been carefully conceived to provide adequate germicidal ultraviolet dosage for air stream or surface disinfection in new or existing HVAC(Heating, Ventilating & Air Conditioning) Systems. The dosage, as it applies to ultraviolet disinfection, is a function of time, and the intensity, of ultraviolet radiation, to which the air stream or surface is exposed. The exposure time, in seconds, is the total time it takes the air to move through the ultraviolet field, produced by the germicidal lamps. Exposure time is related to the airflow rate; the higher the airflow, the lower the exposure time or the lower the airflow, the higher the exposure time. The UV intensity is the amount of energy emitted by the germicidal lamps.

- Air moving in the HVAC System duct passes over the germicidal ultraviolet lamp of the Air Duct Disinfection Systems and is exposed to the ultraviolet rays emitted by the germicidal lamp.

- **LIMITATION OF USE**
- The Air Duct Disinfection Systems requires professional installation so all wiring complies with applicable state, local and national electrical and mechanical codes.
- The Air Duct Disinfection Systems requires knowledgeable planning for: location, installation, and supervision to prevent ultraviolet exposure of occupants.



⚠ CAUTION Overexposure to germicidal ultraviolet rays will result in the irritation of the eyes and reddening of the skin. For this reason, it is of the utmost importance that your ultraviolet application be carefully planned and implemented so as to avoid exposure,of personnel, to direct or reflected ultraviolet rays.

- The American Conference of Governmental Industrial Hygienists (ACGIH) has established a Threshold Limit Value (TLV) for occupational exposure to radiant ultraviolet energy.
- Currently the ultraviolet radiant exposure incident for unprotected eyes or skin should not exceed 0.2 microwatts per square centimeter (µW/cm2) at 254 nanometers (nm) for an eight (8) hour period.
- Safety and maintenance procedures **MUST** be implemented to prevent accidental exposure of personnel, who maintain the HVAC system. All work performed on the HVAC system must be monitored to ensure that it does not adversely impact the safety or effectiveness of the installation.

UNPACKING



IN ORDER TO PERFORM THIS TASK, BE SURE TO WEAR THE FOLLOWING SAFETY EQUIPMENT: SAFETY GLASSES OR A FACE SHIELD, AS WELL AS GLOVES.

- Remove the Air Duct Disinfection Unit from its shipping carton.
- Larson Electronics takes all possible precautions when packaging this unit to prevent damage. Carefully inspect the unit, and power cord for damage and report all damage immediately. Do not assemble or operate if there is any damage, visible or suspected.
- Germicidal lamps are packed separately, to ensure maximum protection for the lamps. Keep the lamps aside until ready for installation.
- Do not discard packing materials until unit is assembled and start up is complete.

The single unit includes:

- 1 - Single lamp unit with line cord
- 1 - Germicidal Ultraviolet Lamp
- 1 - Operating Instructions

The 2 unit includes:

- 1 - 2 lamp unit with line cord
- 2 - Germicidal Ultraviolet Lamps
- 1 - Operating Instructions

The 4 unit includes:

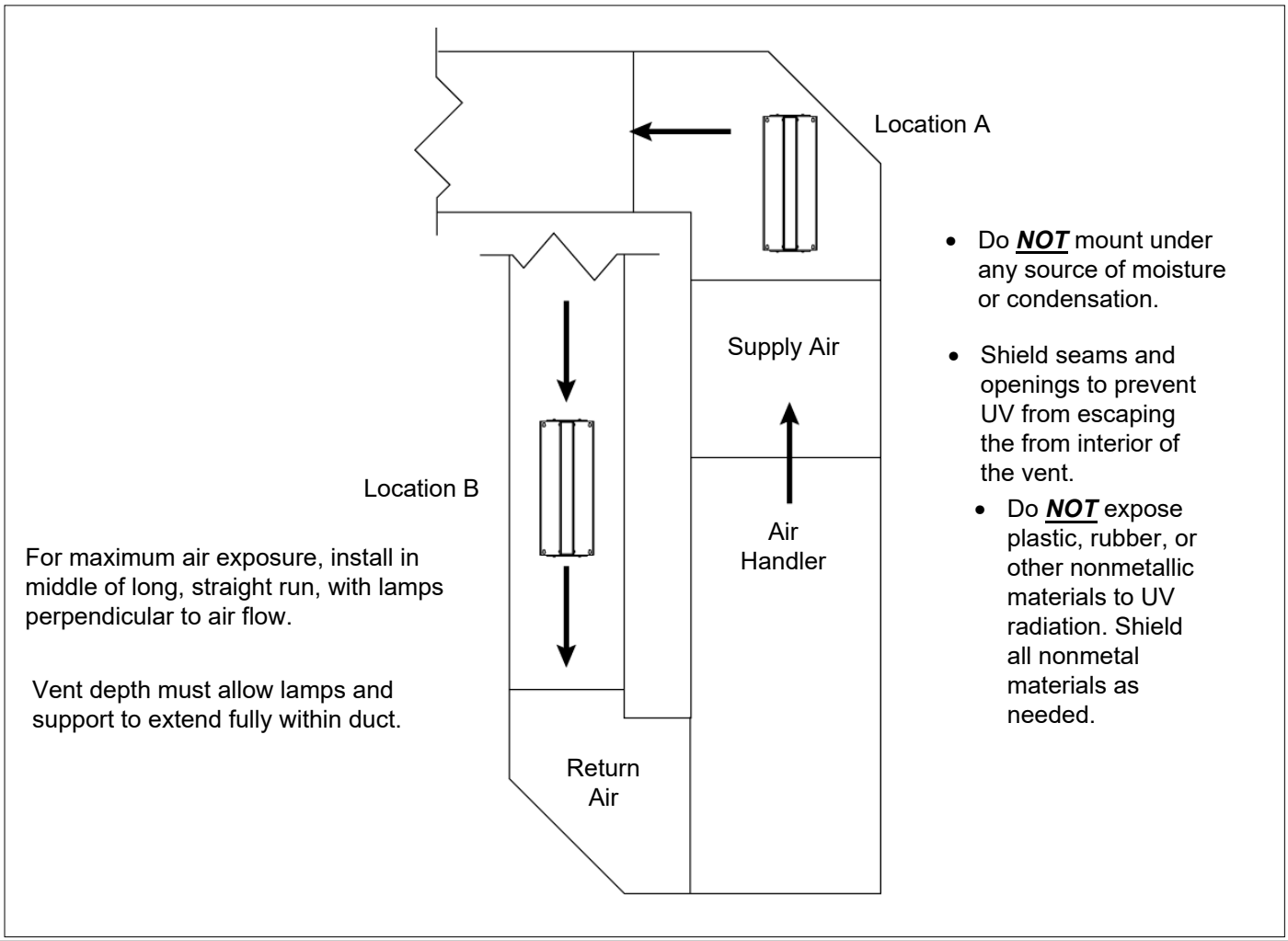
- 1 - 4 lamp unit with line cord
- 4 - Germicidal Ultraviolet Lamps
- 1 - Operating Instructions

INSTALLATION

UNIT PLACEMENT

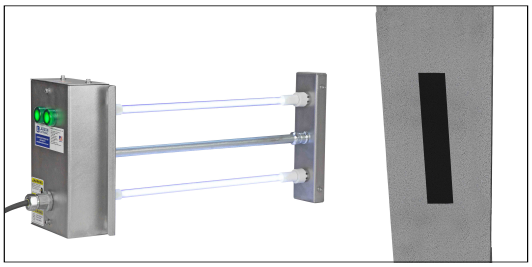
- Proper unit placement is essential. To ensure safe and effective operation, the location should:
- Have enough duct width to mount unit with lamps perpendicular to airflow, within the longest duct length for increased exposure time.
- Be able to support the weight of the unit. If the duct construction does not seem capable of supporting the unit, the duct must be re-enforced, to support the weight, before installing.
- Be on the supply air plenum, **LOCATION A** (preferred), or on the return air plenum, **LOCATION B** (alternative).
- Not be mounted under any source of moisture or condensation, such as humidifiers, cooling coils, etc.
- Not be mounted near any duct openings, joints, seams, etc. If necessary, seal all openings, joints, seams, etc. using aluminum tape or equivalent ultraviolet resistant material.
- Prevent exposure of any plastic, rubber or other non-metallic materials, with inadequate resistance to ultraviolet, such as; plastic drain pans, wiring insulation, flex ducts, humidifiers, filters etc. If necessary, shield all plastic, rubber or other non-metallic materials using aluminum tape, conduit, sheet metal or equivalent ultraviolet resistant material.
- Be free of any components that would be damaged by or interfere with the installation.
- Be easily accessible and allow enough clearance for routine cleaning or maintenance.
- Be downstream from air filters. Dust particles reduce the effectiveness of the unit.
- Other mounting positions and locations are possible; contact factory for any questions regarding this.

Figure 1 – Unit Placement

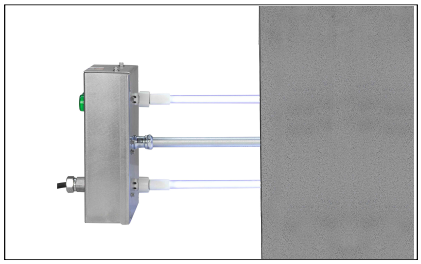


INSTALLATION

Figure 2 – Unit Installation - Outside Duct Mount



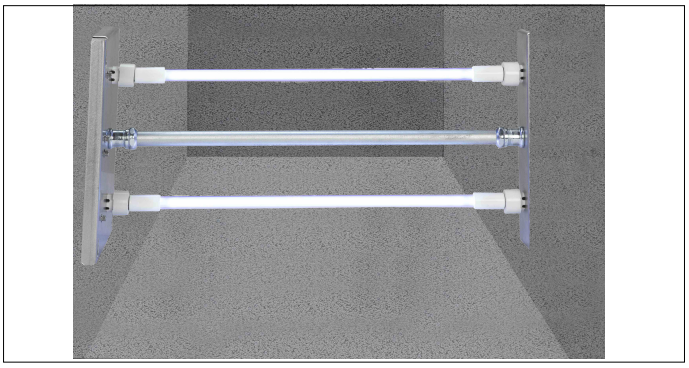
Opening for outside mount (shown)



Insert unit.



Attach unit using the face mounting bracket and self-drilling screws.



View inside duct.

UNIT AND LAMP INSTALLATION, REPLACEMENT, OR CLEANING

IN ORDER TO PERFORM THIS TASK, BE SURE TO WEAR THE FOLLOWING SAFETY EQUIPMENT: SAFETY GLASSES OR A FACE SHIELD, AS WELL AS GLOVES.

WARNING **Always disconnect power to the unit before performing any service or maintenance.**

CAUTION **Ultraviolet lamps are easily damaged and may cause injury if broken. Exercise care when handling.**

1. Disconnect power to the HVAC system.
2. Mark the centers of the four (4) mounting holes and edges of the rectangular openings for lamp assembly.

CAUTION **Mechanical hazard. Duct sheet metal has sharp edges. Wear protective gloves when working on or around duct sheet metal.**

CAUTION **Ultraviolet lamps are easily damaged and may cause injury if broken. Exercise care when handling.**

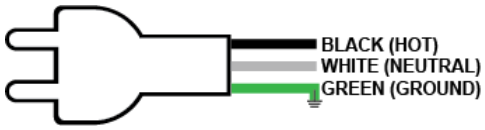
3. Cut out the rectangular openings for lamp assembly. Remove burrs and sharp edges where possible.
4. Test fit unit to duct. Lamp assembly should pass through rectangular opening, with no interference. Base plate should fit flush to duct and mounting holes of the base plate should be aligned with the center marks on duct.
5. Remove unit from duct; make any adjustments necessary until unit fits correctly.
6. Install lamp(s) in Air Duct Disinfection Systems. To install, insert lamp pin into spring-loaded lampholder. Carefully press lamp against the spring-loaded lampholder. Align upper lamp pin with stationary lampholder. Slowly ease the pressure until lamp is fully seated in lampholders.
7. Verify that the lamp is properly seated.
8. Repeat until all lamps have been properly installed.
9. Moisten a clean, lint-free cloth with denatured alcohol and wipe each lamp.
10. Clean the outer surface of duct around cutouts.
11. Fit the Air Duct Disinfection Systems into duct, align with the mounting hardware locations. (You must use a minimum of 4 screws)
12. Insert No.18 x 1/2” or No. 8-8 x 1/2”, depending on the modeled ordered, mounting hardware into each of the marked centers, screw in approximately half their length.
13. Finish tightening hardware.
14. Plug Air Duct Disinfection Systems into properly grounded, electrical outlet. If unit is supplied without a plug for direct wiring, connect wire leads to appropriate power connections. All wiring must comply with applicable state, local and national electrical and mechanical codes.

We strongly encourage a licensed electrician install this product, in all locations especially in outdoor areas where weatherproofing may be required.

Attach supply line wires to the appropriate light fixture wires as shown in the diagram ➔

Secure each pair of wires according to the diagram. Utilize a junction box or similar device and take precautionary steps for weatherproofing all connections if installed in a location where water may come in contact with the unit. Ensure the unit is properly grounded and that wiring is done according to all local and national electrical/building codes.





WARNING **Do not operate without proper electrical ground**

WARNING **Avoid exposure to direct or reflected germicidal ultraviolet rays. Germicidal ultraviolet rays are harmful to the eyes and skin.**

17. Restore power to HVAC system.
18. While wearing protective eye wear, inspect HVAC system for any ultraviolet light leakage. No ultraviolet light should be visible from any duct opening, joint, seam, or the unit itself. Use an ultraviolet resistant gasket if needed. The installation should also be inspected using a sensitive
19. ultraviolet meter, to ensure that the ultraviolet radiant exposure of personnel/occupants is within acceptable limits.
20. If necessary, seal any openings, joints, seams, etc. using aluminum tape or equivalent ultraviolet resistant material.

PRECAUTIONS

WARNING **To guard against injury, basic safety precautions should be observed.**

- Procedures MUST be adopted to ensure that the Air Duct Disinfection Unit is disconnected from power whenever personnel work on the HVAC system. Personnel who work in and around the system **MUST** be briefed on the precautions to be observed.
- The HVAC system **MUST** be re-inspected routinely for any ultraviolet light leakage. (Especially when maintenance or modifications are performed.)
- If there are any doubts or concerns about the safety or the effectiveness of the installation, or if a sensitive ultraviolet meter is required, please contact our Application Specialists.

MAINTENANCE

WARNING **Always disconnect power to the unit before performing any service or maintenance.**

- The Air Duct Disinfection Unit is designed to operate with a minimal amount of maintenance.
- A regular cleaning cycle of the germicidal lamps and sight glass should be established, and carefully maintained, based on inspection and experience. The frequency of cleaning will vary with the conditions surrounding each installation. It is recommended that the ultraviolet lamps be cleaned at least once every three (3) months.
- The germicidal ultraviolet lamps used in the Air Duct Disinfection Unit have a manufacturer's rated effective life of 10,000 hours. Lamps may operate longer than the rated effective life, but the reduction in ultraviolet output will make it impractical to use past the manufacturer's rated life. For maximum efficiency lamp replacement is recommended every 10,000 hours of operation or about one (1) year of continuous use.
- Unless lamp replacement is due to failure or breakage, it is recommended that all lamps be replaced at the same time.
- Contact Larson Electronics with questions.

BREAKAGE

⚠ CAUTION Broken Quartz is SHARP.



Wear protective gloves when handling broken ultraviolet lamp(s). In the event of breakage, **DO NOT** use a household vacuum cleaner to pick up quartz fragments. Sweep up debris into a plastic bag and dispose of properly.

DISPOSAL OF MERCURY ADDED LAMPS



Germicidal ultraviolet lamps, like standard fluorescent lamps contain small amounts of mercury. Mercury added lamps should not be placed in the trash. Dispose of properly. For further information regarding the disposal and recycling of lamps containing mercury, along with Federal and State requirements visit www.lamprecycle.org.

TROUBLESHOOTING

⚠ WARNING Always disconnect power to the unit before performing any service or maintenance.



Use personal protection equipment, such long sleeves with no gaps between cuffs and gloves, and ultraviolet resistant face shield, if troubleshooting Air Duct Disinfection Unit.

IMPORTANT: This unit is to be serviced **ONLY** by qualified, and appropriately trained and/or licensed personnel.

Table 1 – Troubleshooting

Problem	Possible Cause	Corrective Action
Unit not operating.	No electrical power.	Verify that the unit is connected to a live power source.
	Power connection to fixture is loose or disconnected.	Verify power connection to fixture is fully engaged.
Germicidal lamp not operating.	Germicidal lamp(s) not properly seated.	Confirm connection between lamp and lampholder is tight, and that lamp that is making full contact with lampholder.
	Germicidal lamp(s) faulty.	Swap suspect lamp with known good lamp. If known good lamp does not operate, replace ballast.
	Ballast not functioning.	Locate ballast and replace.
Lamp Operation Indicators (LEDs) not operating.	Germicidal lamp(s) out.	Check lamp(s) and replace.

THESE INSTRUCTIONS MAY NOT COVER ALL DETAILS OR VARIATIONS OF THIS PRODUCT FOR YOUR EQUIPMENT OR INSTALLATION REQUIREMENTS. SHOULD FURTHER INFORMATION NOT COVERED BY THESE INSTRUCTIONS BE REQUIRED, PLEASE CONTACT LARSON ELECTRONICS BY EMAIL AT SALES@LARSONELECTRONICS.COM OR BY PHONE AT 1-800-369-6671 FOR FURTHER ASSISTANCE.

PLEASE VISIT LARSONELECTRONICS.COM FOR **WARRANTY** AND **RETURN** INFORMATION.

Ultraviolet Radiation Safety

WARNING: Do not attempt operation until you are familiar with all warnings, precautions, and procedures outlined within this instruction sheet.

OPERATION PRECAUTIONS

- **UV LIGHT WARNING:** UV-C light can cause temporary or permanent loss of vision, and temporary acute redness or ulceration (mild to severe sunburn) to exposed skin. To prevent exposure, do not operate the device in any application that allows UV-C light to be visible during operation.
- **UV LIGHT CAUTION:** UV light may degrade plastic and rubber components after longterm exposure.
- Currently, there are no work place related rules and regulations that are set by OSHA (Occupational Safety and Health Association) in regard to UVC environmental health and safety.
- **NEVER LOOK DIRECTLY AT THE BULB OR DISINFECTING TARGET ZONE**

OPERATION SAFETY

- People and animals are forbidden from being exposed to the light output of this cart for extended periods of time. Long term exposure will case damage to the eyes and skin.
- This product produces UV radiation. Anything in front of the unit will be exposed to UV radiation. Operators positioning the cart while not illuminated will not be exposed. Radiation is only emitted while the light is turned on. Radiation will not linger in the environment when the lamps have been powered off. Safety equipment is only required when the device is in-use.
- Wear eye protective gear when operating the equipment. Polycarbonate safety glasses at minimum are required during all operations. Full frontal polycarbonate or UV-preventative face masks are recommended.
- Wear long sleeves and gloves when operating the equipment. Personal protective gear is required for long term exposure.

OPERATION SAFETY STRATEGIES

- Instruct service personnel to never look directly at UV-C light without adequate eye protection.
- Make it a policy to never enter areas being disinfected with UV lighting systems without powering the system down first. Methods of powering down depends on the options of the device purchased and may include unplugging the light source, operating the power switch to power the lamps off, or turning the system off via a wireless remote control or wireless application.
- Place warning labels near all openings/entrances to areas being disinfected with UV lighting systems. When possible, lock access doors to prevent unexpected guests from entering the area.
- Close blinds/curtains of areas being disinfected with UV lighting systems if available. If not available, block off direct access to windows/doorways to prevent access to the area. If you cannot fully block off all access (hallways with visible windows, etc) place exterior warnings in areas prior to the exposed windows (hall pedestals, banners, posters) explaining what areas are being disinfected and to not look into the room.
- Educate non service personnel about the intended operations for UV disinfecting and what signage will be posted. Instruct non service personnel to never look directly at UV-C light.
- Instruct service personnel to always wear personal protective gear (as outlined above) when they must operate in an area that has UV-C exposure, for short or long term work.

These safety precautions will help ensure service personnel are protected from accidental exposure while maintaining the effectiveness of UV-C to eradicate biological contaminants.

In the event of UV exposure, the following actions are recommended.

- See an ophthalmologist if eye damage is suspected.
- Treat skin lesions immediately.
- For severe skin lesions, seek local medical treatment and follow their recommendations for treatment.
- Follow your organization's incident reporting procedure. These often require documentation of the date and time of the incident, persons involved, equipment involved and type of injury.

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