

# URSA

**GERMICIDAL ULTRAVIOLET UPPER-ROOM AIR DISINFECTION**



**MODEL  
URSA-28**

**MODEL  
URSA-F**  
(optional add-on fan  
module for URSA-28)



## **Installation, Operation & Maintenance**

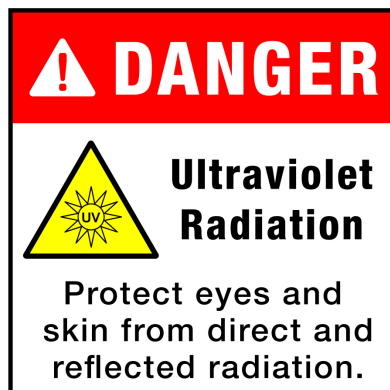
Please read and follow all safety instructions.  
Retain these instructions.

**reflectair**

 [www.reflectair.com](http://www.reflectair.com)

 [info@reflectair.com](mailto:info@reflectair.com)

 +852 2319 4248



# Owner's Manual


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# SAFETY WARNINGS


- All personnel and occupants of a room containing this unit should be alerted to potential hazards indicated by the product safety labeling on this unit.
- The following conventions are designed to indicate and categorize precautions in this manual and on product safety labeling. Failure to observe precautions could result in human injury and/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 an **POTENTIALLY** hazardous situation, which, if not avoided, **MAY** result in death or serious injury.


 **CAUTION** Caution indicates an **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 is used to identify an **ELECTRICAL SHOCK** or **ELECTROCUTION** hazard.

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


 This symbol is used to identify the need to wear approved ultraviolet blocking eyewear.

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





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






 This symbol 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. Handle the reflector mirror with extreme care during unpacking and assembly in order to avoid scratches or marks which can affect the safe and effective operation of the device. After removing the protective film, never directly touch the mirror. Follow the cleaning instructions outlined in the maintenance section of this manual.
3. Intended for indoor use only.
4. Do not modify design or construction.
5. Do not use this unit for anything other than its intended purpose, as described in this manual.
6. Do not mount under any source of moisture or condensation, e.g. humidifiers, cooling coils, etc.
7.  **CAUTION** Germicidal ultraviolet rays may degrade plastic, rubber or other non-metallic materials. 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. Do not remove any labels or components from the device.
9.   **WARNING** Do not operate without proper electrical ground.
10. Do not operate the unit if there is visible or suspected damage to the unit or, if applicable, there is damage to the power cord and/or plug.
11. Utility power supplied to the unit **MUST** match power requirements specified on the unit label.
12.   **WARNING** Always disconnect power to the unit before performing any service or maintenance.
13. Read and follow all notices and warnings on the unit.
14. SAVE THESE INSTRUCTIONS.

# SAFETY LABELS

	<b>⚠ DANGER</b>	
	<p><b>HAZARDOUS VOLTAGE</b> Turn off and disconnect power before servicing.</p> <p><b>ULTRAVIOLET RADIATION</b> Protect eyes and skin from direct and reflected radiation.</p>	

<b>⚠ WARNING</b>
<p>This device is designed for use with germicidal ultraviolet lamps and must be installed in compliance with competent technical directions so that the user's eyes and bare skin will not be exposed to injurious rays.</p>

<p><b>HG - LAMP CONTAINS MERCURY</b> Do not put in trash. Dispose of in accord with local, state or federal law.</p>
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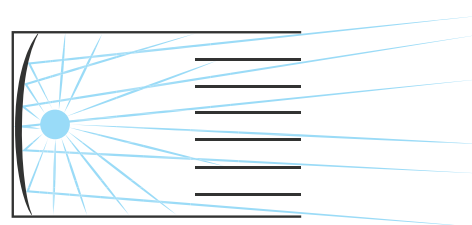
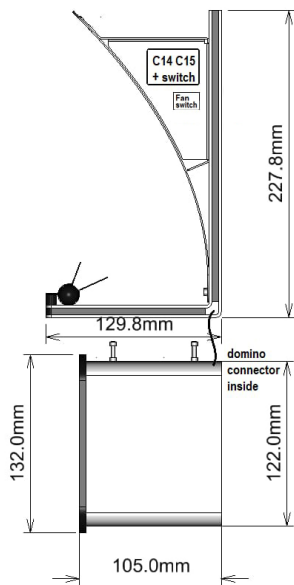
# CAUTION

It is the user's responsibility to determine and verify the appropriateness of this unit for use in the user's facilities and systems. The manufacturer makes no representation or guarantee with regards to the suitability or performance of this equipment or the results that may be expected from its use. At regular intervals, the user should inspect and clean the unit, at the same time making sure all safety and product labels are present and in good, legible condition. If any labels are missing or damaged, please contact the manufacturer and specify which replacements you require.

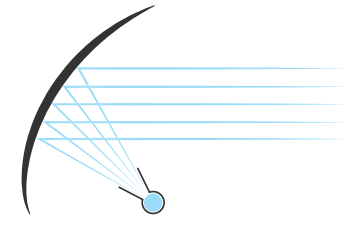
# PRODUCT APPLICATION

## CONSTRUCTION

URSA (upper-room sterilization of air) units are indirect type germicidal ultraviolet (GUV, UVGI) light projectors designed to deactivate and destroy viruses, bacteria and other microbes carried into the upper-room or upper-air region of a room via convection currents or air circulation. Unlike other upper-room UVGI fixtures, which feature fully enclosed designs with louvers, URSA utilizes an open system that ensures the UV light beam is safely contained within the upper-room zone without the need for such physical barriers. Rather, this is achieved through precision optics involving a parabolic reflector and a smaller UV tube positioned further from the mirror than is the case with louvered designs.



Traditional louvered design



URSA's precision parabolic design

Each URSA-28 unit is equipped with a high quality 28W UVC low-pressure mercury 254 nm fluorescent tube and ballast. The tube, located along the focal line of the parabolic reflector, is housed in a secondary reflector which focuses and directs the UVC light beam towards the main reflector's specular aluminium surface. Optionally, the URSA-28 can be combined with the URSA-F cross-flow blower fan unit, which easily attaches to the bottom of the URSA-28 unit, creating a coanda effect that draws contaminated air towards the zone of highest UVC irradiation.

## METHODOLOGY & BENEFITS

URSA's innovative open design provides much higher germicidal intensity (more than 3 times our competitors), greater coverage of the upper room area, at all times ensuring human safety through a tightly focused UVGI beam, without the need for inefficient louvers. Like all upper-room UV air disinfection systems, the goal is to reduce the risk of cross infection between room occupants via aerosolized pathogens (viruses, bacteria etc) by continuously disinfecting air as it circulates throughout the occupied space.

Airborne microbes like viruses require specific dosages of UVC irradiation for deactivation to be achieved, and in the context of upper-room UVGI applications achieving this dosage is a function of time (the total time it takes the air to flow through the germicidal ultraviolet field) and intensity (the power of the germicidal rays within the ultraviolet field). Exposure time is contingent on the airflow rate with an inverse relationship applying; the higher the rate of airflow, the lower the exposure time, the lower the rate of airflow, the higher the exposure time.

URSA's methodology can be summarized as follows:

1. A high-intensity germicidal ultraviolet light beam is continuously projected across the upper-room air;
2. Viruses and bacteria drawn into the upper-room layer via convection currents are deactivated and destroyed by the UV light;
3. Continuous air disinfection is maintained, reducing the risk of cross-infection among room occupants.

## LIMITATION OF USE

Qualified and knowledgeable personnel are required for the planning, implementation and continued supervision of URSA upper-room air sterilization systems. **Reflectair strongly recommends that its clients engage professional contractors to carry out the installation of URSA-28 germicidal UV fixtures** in order to ensure compliance with the ultraviolet radiant exposure incident Threshold Limit Value (TLV) / Recommended Exposure Limit (REL) for UV radiation at 254nm, set out by the American Conference of Governmental Industrial Hygienists (ACGIH) / National Institute for Occupational Safety and Health, namely: 6mJ/cm<sup>2</sup> (total energy) or 0.2µW/cm<sup>2</sup> (total power) for up to 8 hours a day (40 hour work week).

Safety and maintenance procedures and policies **MUST** be established and implemented to prevent accidental exposure of anyone who may enter the irradiated upper-room zone, especially electricians, maintenance staff, or other trades people who may work at height (using ladders for example). Any work carried out subsequent to installation of URSA-28 (painting, ceiling replacement, installation of new fixtures or equipment, especially high on the walls or suspended from the ceiling) within the irradiated zone must be designed and monitored such that they do not endanger workers and/or interfere with the safe and effective operation of the URSA installation.

# UNPACKING & ASSEMBLY

## UNPACKING



IT IS RECOMMENDED THAT YOU WEAR THE FOLLOWING PERSONAL PROTECTIVE EQUIPMENT (PPE) BEFORE PERFORMING THIS TASK:

**SAFETY GLASSES OR A FACE SHIELD, AS WELL AS GLOVES.**

- Handle the URSA-28 reflector mirror with extreme care in order to prevent leaving scratches or marks which can affect the safe and effective operation of the device;
- URSA-28 ships in a wooden box for added protection during shipping. Carefully pry open the box with a flathead screwdriver;
- Carefully remove your URSA unit (URSA-28 or URSA-F) from its shipping carton;
- Reflectair takes precautions to minimize the chance of damage occurring to the unit during transit. Please carefully inspect the unit, power cord and plug for any signs of damage and report any damage immediately. Do not assemble and attempt to operate any unit/s with any signs of damage;
- The URSA-28 unit ships pre-wired and flat-packed, with some assembly required. The URSA-F unit ships fully assembled (all that is required is connection to an URSA-28 unit);

- Carefully inspect all packaging to make sure you have all parts, accessories, documentation and safety labels;
- Do not discard packaging until your unit is assembled and operational.

**URSA-28** Model includes:

- The primary reflector with protective film;
  - Electrical mounting set\*, including:
    1. **Aluminium mounting frame** with perforated folding lines and attached ballast;
    2. **UVC tube** pre-assembled inside the **secondary reflector**;
    3. **2 x L-brackets** with screw holes for attaching to aluminium mounting frame, primary reflector and secondary reflector (housing UVC tube).
- \* All components are pre-wired together.

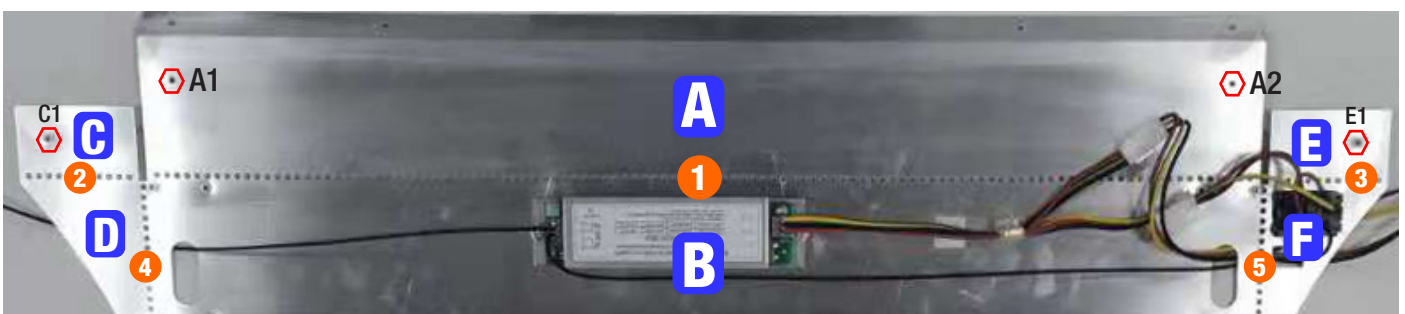
- 1 x pair protective gloves;
- 1 x power cable;
- 1 x set square (to assist in folding the frame);

**URSA-F** Model includes:

- URSA-F crossflow fan unit, fully assembled and ready for connection to the URSA-28 reflector.

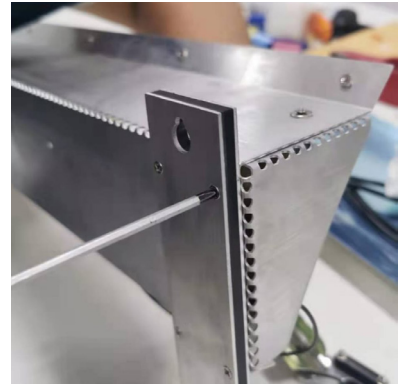
## ASSEMBLY INSTRUCTIONS

1. Carefully remove the primary reflector and set aside;
2. Remove the Electrical mounting set and lay it out on a flat, clean work surface. Make sure that you can see the ballast and wiring. If you cannot, flip the Electrical mounting set over;
3. Referring to the below annotated photo of the Aluminium mounting frame, bend along perforated Line 1 so that section A folds up over the ballast and sits at 90 degrees to section B. Use the set square provided to assist in achieving a 90-degree fold;
4. Remove screws, nuts and washers seated in screw holes A1 and A2 and set aside for later use;
5. Bend along perforated Line 2 so that section C folds up and sits at 90 degrees to section D. Use the set square provided to assist in achieving a 90-degree fold;
6. Bend along perforate Line 3 so that section E folds up and sits at 90 degrees to section F. Use the set square provided to assist in achieving a 90-degree fold;
7. Bend along perforate Line 4 so that section D folds in towards section B and sits at 90 degrees to section B, also ensuring section C lies underneath section A and that screw holes C1 and A1 line up. Use the set square provided to assist in achieving a 90-degree fold;
8. Bend along perforate Line 5 so that section F folds in towards section B and sits at 90 degrees to section B, also ensuring section E lies underneath section A and that screw holes E1 and A2 line up. Use the set square provided to assist in achieving a 90-degree fold;
9. Gather the screws, nuts and washers set aside in step 4. Lay out one washer over screw hole A1, insert one screw through holes A1 and C1, thread on a nut and tighten with a screwdriver. Repeat process for other side (screw holes A2 and E1);

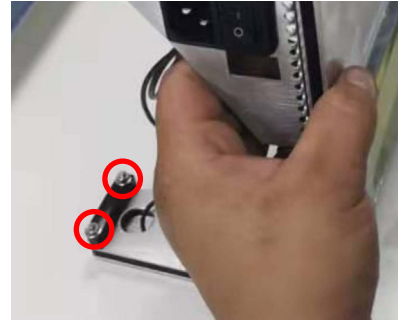


## UNPACKING & ASSEMBLY

10. Remove the uppermost four each of screws, nuts and washers on the longer section of one of the L-brackets (the two upper rows of 2 each). Set aside for later use;
11. Repeat step 10 for the other L-bracket (you will now have 8 each of screws, nuts and washers set aside);
12. Stand the Aluminium mounting frame up (*see picture right*). Take one of the L-brackets and align the four uppermost screw holes on the longer section of the L-bracket with the corresponding four screw holes on the back panel of the Aluminium mounting frame, also making sure to pull the wiring into the housing through the oval-shaped hole in the back panel;
13. Take four of the screws previously removed and screw them back into their original holes;
14. Repeat steps 12 and 13 for the other L-bracket. Set aside four screws and washers for later use;

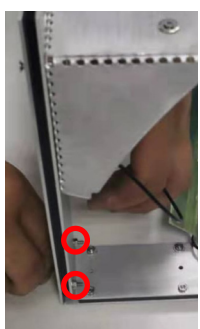


15. Remove the two each of nuts and washers from the end of the shorter section of one of the L-brackets (see circled in picture, far right). Set aside;
16. Repeat step 15 for the other L-bracket;



17. Position the secondary reflector so that the two empty holes at each end fit over the threads protruding from the end of the shorter section of the corresponding L-bracket (*see picture, immediate right*), ensuring that the opening on the secondary reflector is pointing towards the Aluminium mounting frame (where the main reflector will be installed);

18. Lay the four washers over each protruding thread then attach the four nuts. You should now have something like this (*see picture right*). Make sure to pull up any slack in the wires connecting to the secondary reflector;
19. Now it is time to attach the main reflector. Remove the six screws and washers from the screw holes along the top of the Aluminium mounting frame (*see circled in picture right*). Set aside;



20. Remove the lowermost two each of screws, nuts and washers from the longer section of one of the L-brackets (see circled in picture left). Set aside. Repeat for other L-bracket;

21. Taking care to hold the mirror by the top and bottom edges (avoiding the central section which is critical for precisely reflecting the UVC beam), position the primary reflector so the six holes along the top and the four at the bottom (two pairs of two, left and right sides) align with the corresponding holes in the Aluminium mounting frame and the bottom of the longer sections of the L-brackets respectively;

22. Starting with the top row of six screws, carefully lay down a washer on the main reflector and insert a screw (items set aside in step 19), then screw in carefully without over-tightening. Repeat process until all six screws are in place;

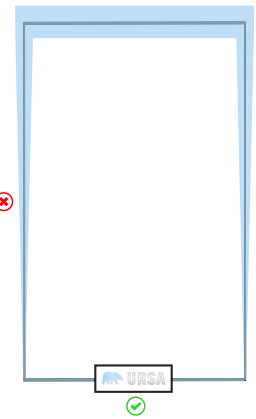
23. Using the washers and screws set aside in step 20, apply the process described in the previous step to fasten the bottom of the primary reflector to the lower part of the longer section of the L-brackets. You should now have something that looks like this (*see picture below*).



# INSTALLATION & COMMISSIONING

## URSA UNIT PLACEMENT

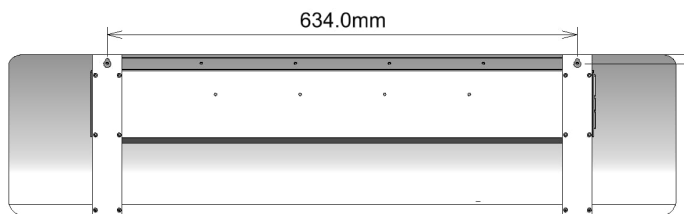
- The **URSA-28** unit is recommended for use in rooms with good ventilation, with a ceiling height of more than 3 meters, where the room is occupied for prolonged periods;
- Access to the room does not need to be regulated while the unit is in operation;
- As **URSA-28** is an open luminaire design, there is the potential for UV light 'backscatter' from the wall behind and to either side of the unit. Therefore attention must be paid to the reflectance of the wall material in the areas of potential UV light backscatter. Unacceptably high UVC light meter readings in the lower area of rooms (particularly smaller spaces) may be a result of this backscatter phenomenon. In such cases, we recommend using our *ScatterStop Wallpaper* - a subtle, velvet-like wall covering material with adhesive backing that eliminates wall reflectivity;
- Backscatter and unwanted reflections can also be caused by objects in the upper-room zone, such as pendant lights, ceiling-mounted accessories like projectors, exposed pipes etcetera. Whenever possible, avoid placing the **URSA-28** unit where its beam will collide with such objects;
- The **URSA-28** unit is designed to mount horizontally on a vertical surface (usually a wall) at a **minimum** height of 3 meters above the floor (distance to bottom of the unit, i.e tube level);
- To ensure the **URSA-28** unit is mounted to a secure vertical surface, installation location must be able to safely support 5kg (combined weight of URSA-28 and URSA-F);
- If possible, the **URSA-28** unit should be placed in the center of the wall. In rectangular shaped rooms (where one wall axis is longer than the other) the unit should be installed on the shorter axis, so the beam projects out along the longer axis (*see diagram, top right*);
- Ultraviolet energy produced by the germicidal tube can cause color fading and/or alteration of the surfaces of some materials, especially those directly irradiated by the UV lamp. If you require assistance in determining the ultraviolet resistance of any material, please contact us.



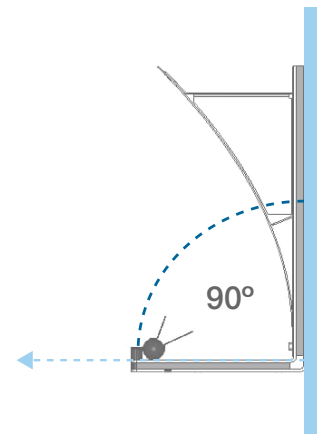
Top view of room indicating potential backscatter zones and correct placement in rectangular rooms

## INSTALLATION

- The **URSA-28** unit is designed to be fixed in place via screws or other fasteners via the 2 suspension holes - one on the uppermost point of the longer section of each L-bracket. These holes are separated by a horizontal distance of 634 mm (*see diagram below*);



- Care **MUST** be taken to ensure that the **URSA-28** unit is level, i.e. the shorter sections of the L-brackets are perpendicular to the vertical mounting surface (usually a wall, *see diagram right*) and parallel to the ground. You can place a spirit level on the shorter section of one of the L-brackets to test this.



Side view of URSA-28 unit mounted on a vertical surface

## COMMISSIONING

All steps up to this point (Unpacking, Assembly, URSA Unit Placement, Installation) can be safely carried out by a layperson with a minimum of specialist equipment and professional knowledge. This step (Commissioning) involves potentially placing oneself in a zone of dangerously high levels of UVC 254nm radiation, which can cause injury to the eyes and skin. **We strongly urge end-users to engage professionals in the commissioning and testing of any URSA-28 installation. Thus, the below advice is intended for a professional contractor with experience and expertise in working with 254nm UVC lighting products.**



### CAUTION

Personal protective equipment, such as gloves, a long-sleeved shirt with no gap between the cuffs and gloves, and ultraviolet resistant face shield, is **required** when entering the irradiated zone (likely to occur during commissioning).

- Once **URSA-28** unit has been securely installed, attach the power cord to the unit. You can leave the switch to ON (*see picture right*), ensuring the wall socket is switched OFF before you connect the power cable to your mains power. That way you can use the wall socket switch to active/deactivate the device;
- Before first switching on your **URSA-28** unit, carefully remove the protective film from the primary reflector, **taking care not to scratch or smudge the polished aluminium surface**;



# INSTALLATION & COMMISSIONING

- First switch on the unit in a darkened room, ideally after sunset, in order to observe any significant UVC leakage from the main reflector is evident. After switching on, blue light will be visible on any objects in the direct light of the projected beam. These include the upper wall sections of the room, objects such as luminaires hanging from the ceiling, and the ceiling (in particular, the section of the ceiling farthest from the device);
- If stray blue light is observed at human level, identify if it is direct light from the unit by trying to observe blue light from the mirror from this location or whether it has been reflected or scattered by another object in the upper room.
- If objects causing significant scattering or reflection are identified, they need to be removed or covered in an absorptive material such as our *ScatterStop Wallpaper*. Typically, backscatter off the wall directly opposite the device is the source of the majority of backscatter.
- **Human level light measurements:** American Conference of Governmental Industrial Hygienists (ACGIH) guidelines for safe human UVC exposure are given in the following table:

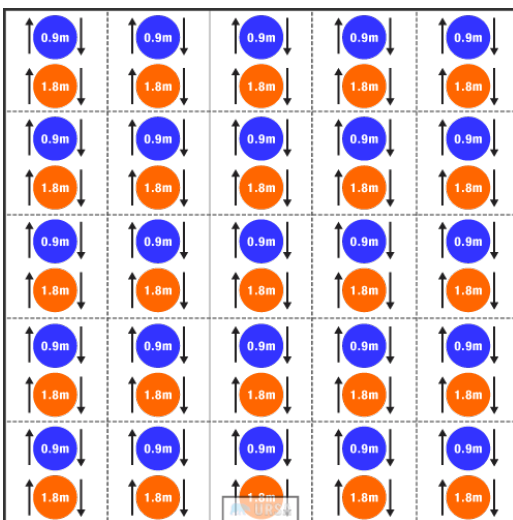
Permissible UVC exposure time	Effective irradiance $\mu\text{W}/\text{cm}^2$
24 hours	0.07
18 hours	0.09
12 hours	0.14
10 hours	0.17
8 hours	0.2
4 hours	0.4
2 hours	0.8
1 hour	1.8
30 minutes	3.3
15 minutes	6.7
10 minutes	10
5 minutes	20
1 minute	100
30 seconds	200
15 seconds	400
5 seconds	1200
1 second	6000

$<0.8\mu\text{W}/\text{cm}^2$

operating range for TLV assessments

$>0.8\mu\text{W}/\text{cm}^2$

is not allowable for design acceptance criteria and commissioning



- Sketch a floorplan of the room and divide it into a grid with 1m spacing (see example for 5m x 5m room in diagram left):
- Measurements should be taken at each node in this grid using a UVC light meter at 0.9m height and 1.8m height. Include points in the room where people are sitting at desks.
- One measurement should be made facing the **URSA28** unit and the other measurement should be made facing the **back wall**.
- In total, **for each node on the grid, 4 measurements should be made** and recorded for two heights and two directions.
- **Use the above table** to determine if the measurements recorded at these points are consistent with the safe exposure levels.
- If the values fall within this safe zone, the device is safe to use with human and animal occupants of the room.
- If the values measured when directly facing the unit fall within the safe level but the values measured facing the far wall are too high, further measures need to be taken to absorb the light backscattered off this far wall. The easiest way is to use our *ScatterStop Wallpaper* to cover areas of visible blue light.
- Typically this is most easily addressed by sticking a 0.5m square sheet of

*ScatterStop Wallpaper* to the upper section of the wall farthest from the unit. Contact Reflectair directly to order.



## MAINTENANCE



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



**WARNING**

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



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

- The **URSA-28** unit is designed to operate with minimal maintenance. The only regular maintenance required is light cleaning, at a frequency of once at least every 3 months:
  - Lightly dust the entire unit with a feather duster;
  - To remove any remaining dust, dirt, fingerprints, smears etc from the primary reflector, moisten a clean, lint-free cloth with denatured alcohol and carefully wipe the surface. Buff out any streaks left by the cleaning with a soft clean cloth.
- 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 clean up the fragments of the lamp. Sweep up the 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 disposed of in the trash. Dispose of properly. For more information contact the relevant authority in your area.

## OPTIONAL ACCESSORIES

- ScatterStop Wallpaper* (30m roll)
- URSA-F crossflow fan unit

## TECHNICAL SPECIFICATIONS

Model		URSA-28		URSA-F	
Dimensions	Length:	90cm		90cm	
	Width:	13cm		12cm	
	Height:	22cm		12cm	
	Weight:	1.75kg		2.7kg	
	Volts:	110-120V	220-240V	110-120V	220-240V
Electrical	Amps:	0.26A	0.13A		
	Frequency:	50/60Hz			
	Lamp Watts:	28W			
Total Ultraviolet Output:		8.5W			
Manufacturer's Warranty		24 months*			

\* Based on 9,000 hour bulb life, allows for 12 hours' use each day for 24 months.