

# Kepri™

### **UV LED Upper-Air System**

#### Applicable for the following part number:

Name/Type	Model/Part Numbers
Kepri Upper-Air System	010-00490R

## **Installation/Reference Guide**

#### Excelitas Canada Inc.

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#### 1 Introduction

Excelitas Kepri™ incorporates the most advanced UVC LED Upper Air technology, along with abundant safety features, to create a dependable, user-friendly wall-mounted guardian against airborne pathogens (including SARS-CoV-2, the virus that causes Covid-19). Kepri's sleek design and minimized profile allow for unobtrusive implementation in classrooms, hospital rooms, office suites and dental offices. Kepri's numerous safety features and UL-8802 regulatory approval allow for provide peace-of-mind operation, while its advanced LED technology continues Excelitas' long heritage of environmentally-responsible and energy-aware design.

It is essential that the operating specifications and parameters contained in this manual and those accompanying other manufacturers' components be observed and not exceeded under any circumstances.

Read and follow all safety instructions at all times during the operation and maintenance of this product. Failure to do so may result in personal injury or property damage.

### 2 Safety Precautions/User Warnings

#### 2.1 Glossary of Symbols



CAUTION - Risk of danger: consult accompanying documents.



WARNING – Eye damage may result from directly viewing ultraviolet light. Protective eye shielding and clothing must be used at all times.



WARNING - UV light hazard.

#### 2.2 Safety Precautions

This series of cautions and warnings relate to the installation, operation and maintenance of the Kepri system. They are also presented throughout this Installation/Reference Guide as applicable.

Read and follow all safety instructions at all times during the operation and maintenance of this product. Failure to do so may result in personal injury or property damage.

- This equipment is designed for use with germicidal UV radiation sources and must be installed in compliance with competent technical directions to prevent risk of personal injury from UV radiation.
- 2. UV radiation can pose a risk of personal injury. Overexposure can result in damage to eyes and bare skin. To reduce the risk of overexposure, this equipment must be installed in accordance with the manufacturer's site planning recommendations and this user's manual. This may include instructions on the relative location of each germicidal system component, the minimum distances between UV-generating devices and other objects or surfaces, and protection from line-of-sight exposure to UV radiation in occupied spaces located above the equipment mounting area (e.g. upper floor balconies, open staircases, etc.).
- UV and optical radiation can be reflected by surrounding surfaces such as ceilings and walls.
   Since the reflective properties of surfaces can vary widely, it should be considered as part of site planning. Follow the manufacturer's recommendations for selecting appropriate ceiling and wall finishes.
- 4. IT IS THE RESPONSIBILITY OF THE INSTALLER TO ENSURE THAT PERSONS WILL NOT BE EXPOSED TO EXCESSIVE UV OR OPTICAL RADIATION DURING EQUIPMENT OPERATION. THIS WILL REQUIRE THE INSTALLER TO CONDUCT AN ASSESSMENT OF IRRANDIANCE OR ILLUMINANCE LEVELS IN THE SURROUNDING OCCUPIED SPACES PRIOR TO OCCUPANCY.
- 5. Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by unauthorized personnel.
- 6. Maintenance and servicing of this UV generating equipment shall be performed by authorized personnel. Service personnel must wear appropriate Personal Protective Equipment (PPE) if the equipment will be in operation during the maintenance or servicing work. Contact the equipment manufacturer for PPE recommendations and guidance.
- When replacing arrays, only use the manufacturer's approved replacement parts for which the equipment is marked and intended.
- 8. The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.

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- 9. Do not use this equipment for other than intended use.
- 10. Always use this product with the supplied power cord.
- 11. It is recommended that ONLY QUALIFIED TECHNICAL PERSONNEL perform any array changes or maintenance. If servicing the unit, turn the device off and disconnect the power source before opening the cover of this unit. All cover screws must be replaced prior to applying power to the unit, or the safety of the unit will be impaired.
- 12. The device must be installed at least 2.3m (90.5") from the floor.
- 13. Using AC extension cord may change the EMC/EMI performance of this product and may cause/receive radio interference in which case the user may be required to take adequate measures for which Excelitas shall not be responsible.

### 3 Getting Started

### 3.1 System Components

This upper-air system contains the following components:

- Kepri upper-air unit
- Kepri wall mount bracket
- Power cord

Carefully unpack the unit and store the packing material for future use. If any components are missing or appear damaged, please contact the company you purchased the unit from or Excelitas directly.

### 3.2 Kepri Diagrams

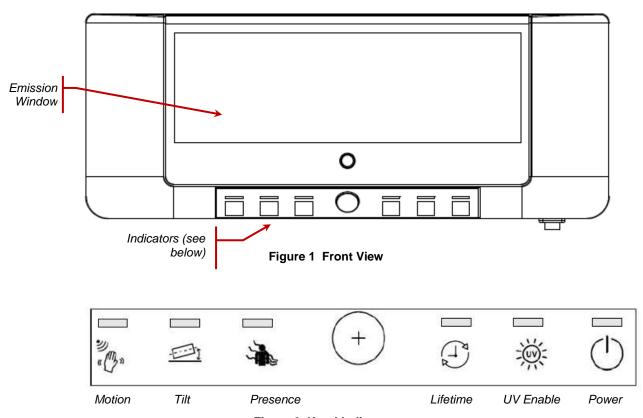
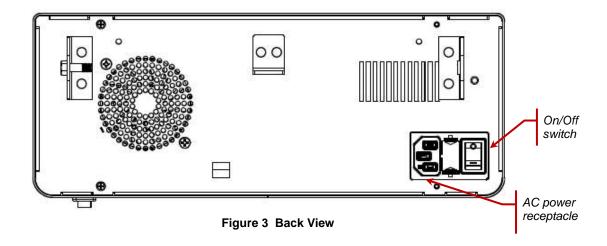
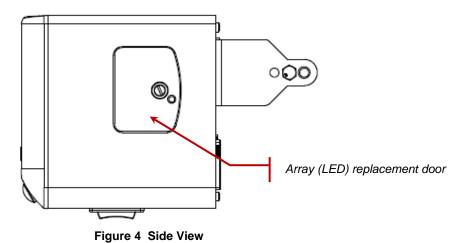


Figure 2 Kepri Indicators





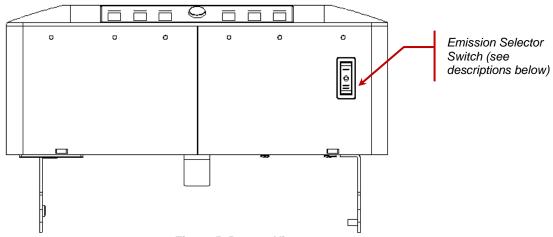


Figure 5 Bottom View

Icon	Description
(ON)	Always On – The device will continuously emit UV energy
	On when Unoccupied – The device will only emit UV energy if no motion is detected
÷ <b>∭</b> :	On when Occupied – The device will only emit UV energy if motion is detected

Table 1 Emission Selector Switch Descriptions-see section 5.2 for details

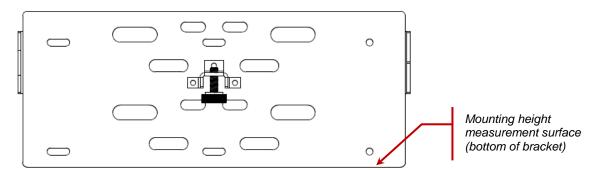


Figure 6 Mounting Bracket

#### 4 Installation

#### 4.1 Site Inspection

Before you install the device, verify the following:

- The potential installation location has a minimum ceiling height of 2.7m (9ft).
- The potential installation location has a nearby installed AC power receptacle easily reachable
  with the Excelitas-supplied detachable AC power cord. If there is no nearby accessible outlet,
  you may use your own CSA/UL safety approved AC power extension cord under your own
  responsibility.
- The area is free of any elevated flooring which might position a person above the surface used to determine the minimum ceiling height.
- Do not install the device in the following locations. Examples include:
  - Stairways
  - Upper floor balconies
  - Mezzanines
  - Atriums with multiple levels/tiers
- The area in front of the potential location is free of any artifacts that may obscure the emitted UV energy. Do not install the device if items are within 6ft of the front window, examples include but are not limited to the following:
  - · Sound-deadening material
  - HVAC ductwork
  - · Lighting fixtures
  - · Electrical or mechanical service conduit
  - Artwork

#### 4.2 Wall Bracket Installation

- 1. Position the bottom of the mounting bracket at least 2.3m (90.5") from the floor (remember the minimum ceiling height is 2.7m or 9'). Refer to Figure 7.
- 2. With 6 screws (M4 or #8) secure the mounting bracket to the wall using the appropriate wall anchors.

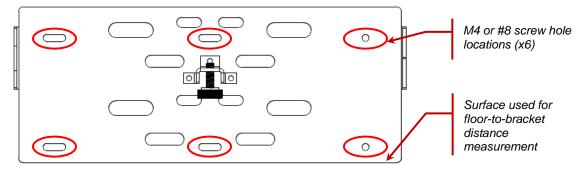


Figure 7 Mounting Bracket with Wall Mounting Holes Highlighted

#### 4.3 Pendant Bracket Installation

- 1. Select two clamping bolts based on the size and shape of the pendant.
- 2. Position the bottom of the mounting bracket at least 2 3m (90.5") from the floor. Refer to Figure 8.
- 3. Secure the clamping bolts to a pair of slots on the mounting bracket. Refer to Figure 9.

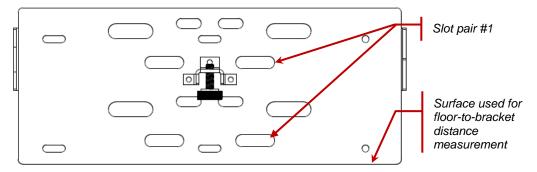


Figure 8 Mounting Bracket with Measurement Surface

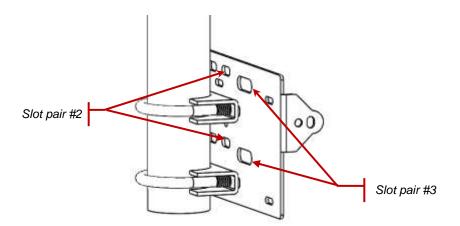


Figure 9 Mounting Bracket Secured to Pendant

### 4.4 Securing Kepri to the Mounting Bracket

1. Slide the Kepri module into the wall bracket and use the guide pins to engage the corresponding holes. Refer to Figure 10.

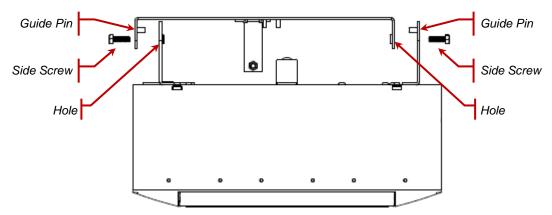


Figure 10 Kepri Module Engaging the Wall Bracket

2. Adjust the module so the bottom of the device is approximately parallel with the floor. Refer to Figure 11.

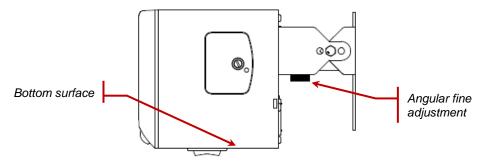


Figure 11 Kepri Side View with Bottom Approximately Parallel to the Floor

3. Secure the Kepri module with the side screws; use an 8mm nut driver to lock firmly. Refer to Figure 10.

### 5 Operation

#### 5.1 Powering Up

- 1. Ensure that the Kepri module is securely mounted as described in Section 4, "Installation".
- 2. Verify that the power supply is connected to a properly grounded AC outlet.
- 3. Insert the supplied detachable AC power cord into power receptacle in the rear. Refer to Figure 3.
- 4. Turn the power switch ON. The switch is located next to the power receptacle on the back of the unit. At this time no UV energy is being emitted. The power indicator should be green. Refer to Figure 2.



5. Adjust the angle of the Kepri module until the Tilt indicator is green. This may require you to loosen the side screws; but do not remove the screws. The target range is 1° - 5°; use the fine adjustment screw if necessary. Refer to Figure 11.



- Secure the side screws firmly once the Tilt indicator is green. The UV Enable indicator will begin to flash red.
- 7. Set the Emission Selector Switch to the desired setting. Refer to Table 1.
- 8. Remove the protective film over the emission window.
- 9. Ensure the area in front of the device is clear of any obstructions. Refer to section 4.1 for details.
- 10. To enable UV emission, press the UV Enable button. The UV Enable red indicator will stop flashing and become unlit.



After 30 seconds, the device will begin to emit UV energy. The UV Enable indicator will become solid red (not blinking) when UV emissions have started.

**Note** UV emission will begin depending on the position of the Emission Selector Switch. Refer to Table 1.

### 5.2 Understanding How the Emissions Work

#### **Emission Selector Switch and the Motion Indicator**

The Emission Selector Switch (refer to Figure 5) controls when the device emits UV energy. The switch relies on an industry-leading motion detector sensor with a field of view of approximately 110° (refer to Figure 12). When motion is detected, the Motion indicator turns green.



If the switch is set to Always On, Kepri will continuously emit UV energy regardless of the status of the motion detector.

If the switch is set to one of the other two settings, Kepri relies on the motion sensor to determine when UV Emissions starts and stops: Expect a 15 second delay when the unit will power on or off with the motion sensor.

Emission Selector is set to	UV Emission Starts	UV Emission Stops
Always On	Kepri will continuously emit UV of the motion detector.	energy regardless of the status
On when Occupied	When motion is detected. UV indicator is solid red.	15 minutes after motion is last detected. UV indicator is unlit.
On when Unoccupied	15 minutes after motion is last detected. UV indicator is solid red.	When motion is detected. UV indicator is unlit.

**Table 2 Emission Start and Stop** 

#### **Presence Indicator**



The Presence detection sensor increases device safety. This sensor detects IR radiation from a human body, not movement, to identify when a person enters the UV emission area. The sensor's field of view or coverage is focused at the most intense portion of the UV beam. The sensor will not cover every portion of the room. Refer to Figure 12.

When presence is detected, the Presence indicator will turn solid red and emission stops until 30 seconds after presence is no longer detected.

When presence is not detected, the Presence indicator will be unlit and the UV emissions operate according to the Emission Selector Switch as described above.

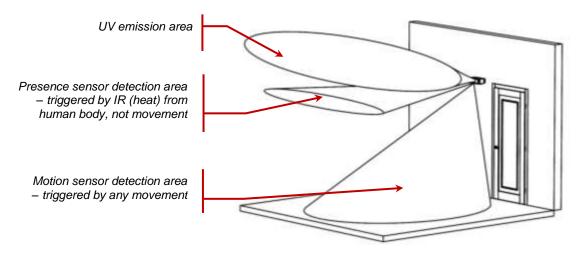


Figure 12 Sensor Detection Areas

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This feature is not designed to eliminate the exposure risk from entering the UV emission area. Before entering the UV emission area, always turn Kepri OFF.

### 6 Troubleshooting

If problems persist beyond these troubleshooting points, please contact Excelitas Technologies Service Department (refer to Section 10, "Contact Information").

#### 6.1 Failure to Power Up

If the Kepri unit fails to power up or function properly, use the following checklist to eliminate the most common causes of problems. Check for the following:

#### • Power Connection Check:

- The power supply cord is securely connected to a grounded (earthed mains socket) functional outlet.
- The power supply cord is securely connected to the "Power" receptacle on the rear of the Kepri unit.
- The main power switch on the back of the unit is in the ON position.

#### Fuse Check:

Check both main power fuses. First disconnect the power cord, then carefully remove the
fuse tray assembly next to the AC receptacle on the rear of the unit.
 Note Depending on the orientation of the AC receptacle, the fuse tray may be below or
beside it. The red arrow in Figure 13 (A) shows where a flat screwdriver can be inserted to

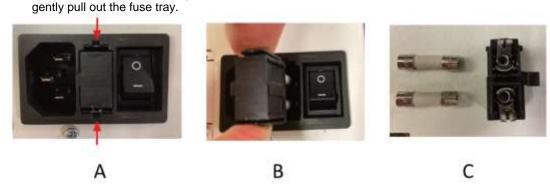


Figure 13 Location and Removal of Fuse Tray in AC Receptacle

- If either or both of the fuses are open, replace with the same type (F6.3A, 250V).
- **Note** To determine if a fuse is intact (i.e. OK) or open (i.e. blown), remove the fuse from the tray and check with a multimeter set to resistance ( $\Omega$ ). An intact fuse will read "0 $\Omega$ " (or another very low value), an open fuse will have an extremely high  $\Omega$  reading.
- Note Fuses that chronically need to be replaced are usually a signal that something is wrong and you should contact Technical Support.

#### • Unit Door Check:

• Verify the door screws of main unit are tight.

#### 7 Care and Maintenance

#### 7.1 General

Kepri is designed to be a very low maintenance system with only one consumable component – the replaceable LED array. By maintaining the following conditions, performance will be maximized and risk of future problems will be reduced.

- Always disconnect the device before servicing.
- Never touch the emission window with fingers, tools, or other abrasive/sticky/sharp materials, fluids, or other materials except as described in section 7.3.
- Never look directly into the emission window while ON.
- If cleaning is required, follow the directions in section 7.3.

### 7.2 Monitoring and Replacing the LED Array

Kepri is equipped with a replaceable LED array that allows the module to utilize the latest in UV LED technology. The device maintains an internal clock and indicates the percentage of remaining life. This is reflected in the **color** of the Lifetime indicator:



Lifetime Indicator Color	Percentage of Life Remaining	Suggested Action
Green	10-100%	-
Amber	1-10%	Order replacement array
Red	0	Change LED array

**Table 3 Lifetime Indicator Color Descriptions** 

Note Regardless of the color, the device will continue to emit UV energy.

#### Replacing the LED Array

When the Lifetime indicator turns amber or red, it is time to replace the LED array.

Replace the LED module with the following Excelitas Technologies part numbers:

Part Number	Description
016-00499R	Printed circuit board assembly (not sold)
012-00129R	Printed circuit board assembly (p/n: 016-00499R) with extrusion (for purchase)

**Table 4 LED Array Replacement Part Numbers** 

- 1. Using the ON/OFF switch, turn the Kepri device off.
- 2. Disconnect the power cord from the receptacle located on the rear of the device.
- With a small flat head screwdriver, unscrew the bolt on the LED replacement door and remove the door. Refer to Figure 14.

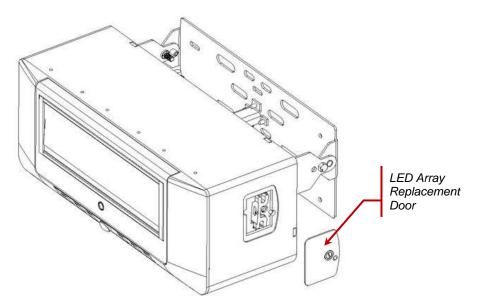


Figure 14 LED Replacement Door Removed

4. With your fingers, remove the LED array. Refer to Figure 15.

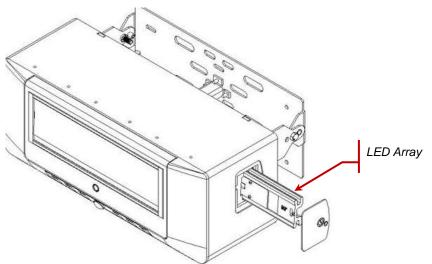


Figure 15 LED Array Partially Removed

5. Insert the replacement array into the device, so the area with the contact pads enters the device first. Refer to Figure 16.

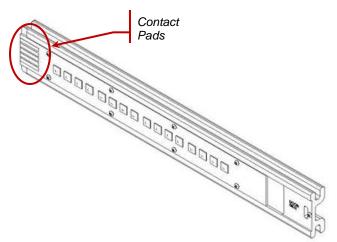


Figure 16 LED Replacement Array with Contact Pads Highlighted

- 6. Attach the LED replacement door to the Kepri module.
- 7. Tighten the screw attached to the door.
- 8. Plug the power cord into the receptacle.
- 9. Turn the device ON. See sections 4.4 and 5.1 for further details.

#### 7.3 Cleaning

#### **Exterior Surfaces**

If necessary, exterior surfaces can be cleaned with a mild soap and water solution and lint-free cloth.

- Turn the unit off and disconnect AC power prior to cleaning.
- Use a damp cloth only do not allow cleaning solution to get into any ports, air vents or seams.
- · Avoid the emission window.
- Allow the unit to dry before turning it back on.

#### **Front Window**

Cleaning of optical surfaces is not generally required. However, if any visible contamination or fingerprints appear on the lens surface, cleaning may be necessary.

Recommended cleaning materials:

- Compressed air can duster
- Lint-free lens tissue, lint-free cotton swabs
- Powder-free gloves or finger cots
- Lens cleaning solution, reagent-grade isopropyl alcohol, or another appropriate solvent

#### Cleaning procedure:

- 1. Use a compressed air can duster to blow off any loose lint, dust or other contaminants.
- 2. If the contaminant is a fluid (e.g., water, immersion oil), first use a dry lens tissue to wick away as much as possible do not wipe.
- 3. Saturate a corner of the lens tissue (or cotton swab) with cleaning solvent, and gently wipe the optical surface in one pass. Take care not to "flood" the area with solvent.
- 4. Repeat the previous step with a fresh portion of lens tissue—this will help avoid recontamination of the optical surface and minimize the amount of cleaning required.

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- 5. Let solvent evaporate and verify that the optical surface is clean. Repeat cleaning steps as necessary.
- 6. Before reinstalling and/or using the optics, allow them to dry completely.

CAUTION: Before using any solvent, consult the manufacturer's Material Safety Data Sheet (MSDS) and your internal Health and Safety Advisor for proper handling, storage, and disposal instructions.

## 8 Technical Specifications

#### 8.1 General

Parameter	Value
Length	300mm (11.8")
Width	117mm (4.6")
Depth	183mm (7.2")
Weight	2.5kg (5.5lbs)
Minimum mounting height	2.3m (90.5") measured from the bottom surface of the mounting bracket
Minimum ceiling height	2.7m (9')

**Table 5 General Specifications** 

#### 8.2 Electrical

Parameter	Value
Input Voltage	100-240VAC, 50/60Hz
Current	0.2-0.5A
Input Surge	Cold start 30A/115 VAC, 50A/ 23 0VAC
Fuse Rating	1A 250VAC
Wattage	35W max

**Table 6 Electrical Specifications** 

### 8.3 Electro-Optical

Parameter	Value
Peak Emission Wavelength	270nm
Optical Output	500mW
Emission beam vertical peak	5.5°
LED Array lifetime	2 years (ON for 12 hours per day or 8000h)
Presence sensor range	3m (118")
Presence sensor field of view	50° x 4°
Motion sensor range	4m (157")
Motion sensor field of view	110°

Note IES file are located on the Excelitas Technologies website.

**Table 7 Electro-Optical Specifications** 

### 8.4 Environmental – Operating Conditions

Parameter	Value
Ambient Temperature	10° to 30° C (50° to 86° F)
Altitude	2000m max
Atmospheric Pressure	700 to 1060 hPa
Relative Humidity	15 to 85% RH (non-condensing)
Installation Category	II
Pollution Degree	2

Table 8 Environmental - Operating Conditions

### 8.5 Environmental – Transport and Storage Conditions

Parameter	Value
Temperature	-35° to 60° C (-35° to 140° F)
Relative Humidity	10 to 95% RH (non-condensing)
Atmospheric Pressure	500 to 1060 hPa

Table 9 Environmental – Transport and Storage Conditions

### 8.6 Mechanical Specifications

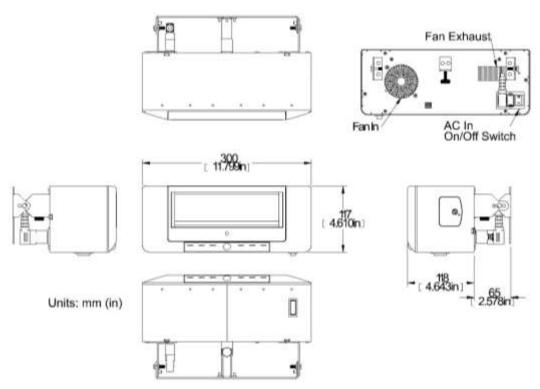


Figure 17 Mechanical Specifications - Kepri

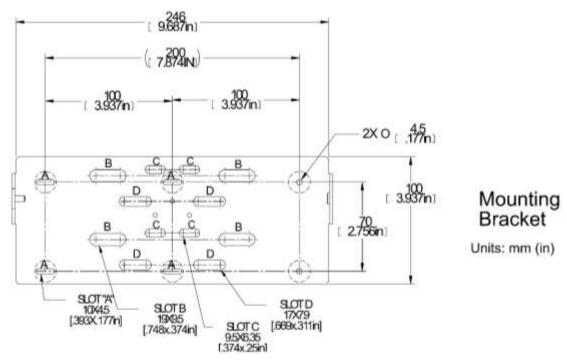
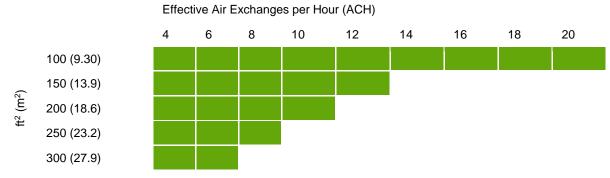


Figure 18 Mechanical Specifications - Mounting Bracket

#### 8.7 Room Dosing

The historic UVGI dosing criteria of  $12mW/m^3$  is primarily based on disinfection tests for Tuberculosis. Given the recent COVID-19 pandemic, Kepri was tested against a virus, Coliphage  $\phi$ X174, to correlate better its disinfection capability to SARS-CoV-2, the virus that causes COVID-19. Disinfection rates are highly dependent on air mixing, and your results may differ. The following effective air exchange (ACH) data should only be used as a best-case guideline.



#### Notes

- Effective air exchanges per hour (ACH) for a room with a 10ft (3.0m) ceiling.
- Values are extrapolated from Intertek test data dated Dec 17, 2021, available on our website.
   Original single point test measured a 99.9% reduction of Coliphage φX174 (typical single stranded virus) in 20 minutes. Effective air exchanges for other pathogens will differ.
- The times given assume perfect air mixing within the space (i.e. mixing factor = 1). Disinfection rates are dependent on air mixing. The following effective air exchange (ACH) data should only be used as a best-case guideline.

For more information refer to the CDC guidelines for Environmental Infection Control in Health-Care Facilities (2003) and the CDC Upper-Room Ultraviolet Germicidal Irradiation (UVGI) web page.

### 8.8 Regulatory Compliance

#### **Product Safety and Electromagnetic Compatibility:**

The Kepri has been tested and found to comply with product safety and electromagnetic compatibility requirements. For a complete list of tests and for certification details, please contact your Kepri representative or visit https://www.excelitas.com/product/kepri-upper-air-uvc-disinfection-system.

#### **Optical Safety:**

The Kepri is classified as Risk Group 0 / Exempt according to UL 8802 in conjunction with IEC 62471: Photobiological Safety of Lamps and Lamp Systems.

#### **CE Marking:**

Council Directive Low Voltage Directive

2014/35/EU

Council Directive **EMC Directive** 

2014/30/EU

Council Directive WEEE Directive

2012/19/EU

Council Directive **RoHS** 

2011/65/EU as amended by (EU)

2015/863

This is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

#### **FCC**

#### FCC Class A Digital Device or Peripheral - Information to User

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

#### WARNING

Changes or modifications not expressly approved by Excelitas could void the user's authority to operate the equipment.

#### WEEE Directive (2012/19/EU)



The symbol above indicates that this product should not be disposed of along with municipal waste, that the product should be collected separately, and that a separate collection system exists for all products that contain this symbol within member states of the European Union.

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

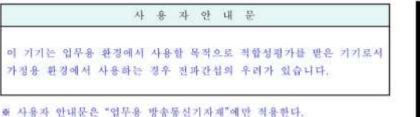
In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.

The crossed-out wheeled bin symbol indicated above invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

#### **Korean KC Certification**

#### 사용자안내문





#### Warning statement

EMC Registration is done on this equipment for business use only. If the product is used in the home, it may cause interference.

This warning statement applies to products for business use.

### 9 Warranty

Excelitas Technologies warrants the original purchaser for a period of one (1) full year, calculated from the date of purchase, that the equipment sold is free from defects in material and workmanship.

In the event of a claim under this warranty, the equipment is to be sent postage and carriage paid to the <a href="Excelitas Technologies Service Centre">Excelitas Technologies Service Centre</a>. Returned equipment will not be received without a Return Authorization (RA) Number, issued by the appropriate Service Centre.

Any claims for units received with defects in material or workmanship must be reported to an authorized Excelitas Technologies Service Centre within 30 days from the original date of receipt and returned within 30 days of reporting to a an authorized Excelitas Technologies Service Centre. Excelitas Technologies will repair or replace these reported defects free of charge. The equipment must be sent postage and carriage paid.

In the case of damage caused by wear and tear, careless handling, neglect, by the use of force or in the case of interventions and repairs not carried out by an Excelitas Technologies Authorized Service Centre, the warranty ceases to be valid. This warranty may not form the basis for any claims for damages, in particular not for compensation of consequential damages.

This warranty is not transferable.

Other than the replaceable LED array there are no field serviceable parts within the equipment.

#### Returning your Kepri System to Excelitas Technologies for Service

- 1. Make note of the problem encountered, the steps followed to isolate the problem, and the result of any troubleshooting steps taken.
- Contact the nearest Excelitas Service Center to obtain a Return Material Authorization (RMA) number.
  - For your convenience, RMA numbers can also be requested on-line at: <a href="https://www.excelitas.com/contact?area=uvc-disinfection-light-sources">https://www.excelitas.com/contact?area=uvc-disinfection-light-sources</a>
- Package the unit in its original packaging, if possible, or as appropriate to prevent damage during transport.
  - Include a written description of the fault and the name and telephone number of a contact person who may be contacted for additional service-related questions.
- 4. Follow shipping instructions provided by the service technician.

### 10 Contact Information

#### Excelitas Canada Inc.

Tel: +1 905 821-2600 Fax: +1 905 821-2055

Toll Free: +1 800 668-8752 (USA and Canada)

https://www.excelitas.com/product/kepri-upper-air-uvc-disinfection-system https://www.excelitas.com/contact?area=uvc-disinfection-light-sources

#### **Technical support and service**

(905) 821-2600, option 3

1-800-668-8752, option 3 (USA and Canada)

#### Replacement parts and accessories

Replacement parts and accessories can be purchased directly from Excelitas. For ordering and pricing information contact the Inside Sales department at:

(905) 821-2600

1-800-668-8752 (USA and Canada)