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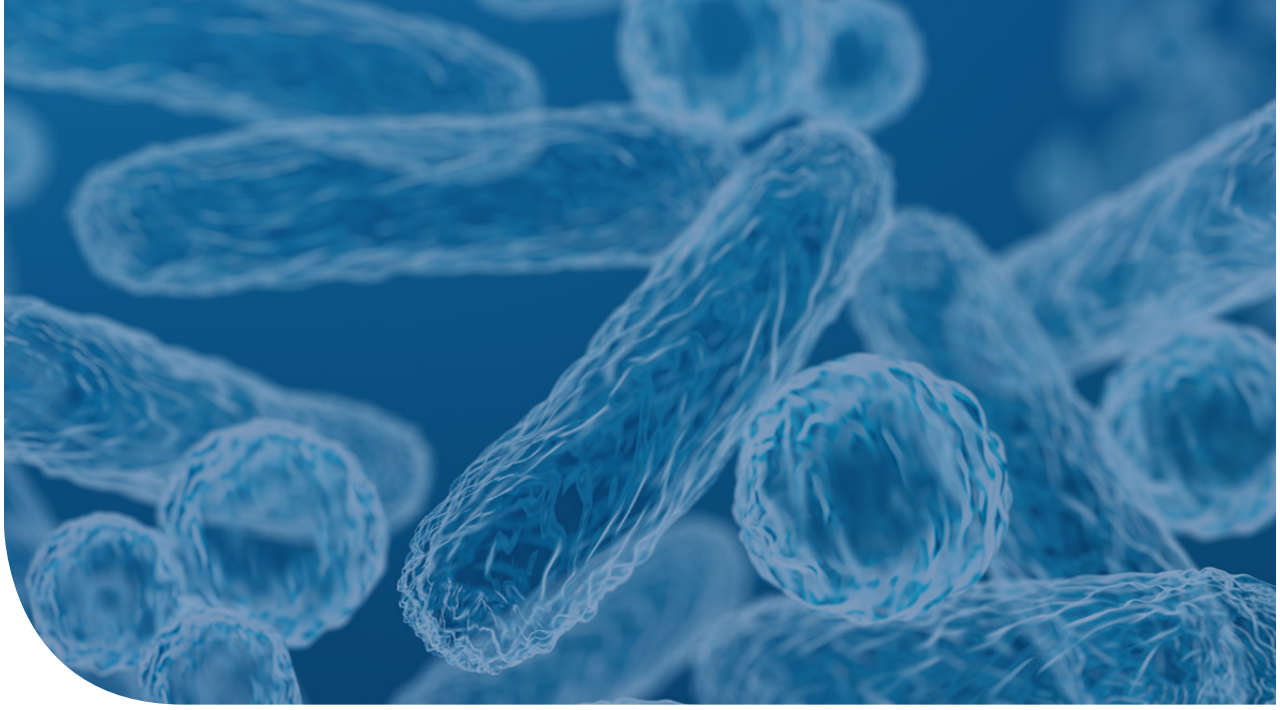
MSU-DFX Application Guide

Recommended Practices and Application Guidelines.



Surface Disinfection Lighting for Occupied Spaces

Continuous UVA surface disinfection for occupied spaces.

Leviton DFX series luminaires using 365DisInFx™UVA technology—

- Unless otherwise marked, Leviton DFX luminaires fall under IEC 62471 risk group 0, Photobiological Safety of Lamps and Lamp Systems, with no restrictions on application.

- If marked on the device and installation instructions with a minimum mounting height Leviton DFX series luminaires meet risk group 0 levels of IEC62471 when installed at or above the marked minimum mounting height, and following the fixture spacing guidelines in this document.

Definition of risk groups: IEC 62471 classifies the photobiological risk of light sources into risk groups 0, 1, 2 and 3 (from 0 = no risk through to 3 = high risk). The photobiological safety is measured at a distance of 200 millimeters from the light source. After proper evaluation, a light source is given a risk group (RG) classification, which indicates whether the source presents a risk and, if so, what labeling requirements should be undertaken to alert the user or other protection measures required. A luminaire employing a light source classified RG0 requires no warning or caution.

Model Series	Fixture Style/Type	Sizes	Spacing Restrictions	Minimum Mounting Height
MSUi-DFX	Recessed Troffer	2x2, 2x4	None	None (exempt)

The safe use of GUV luminaires is specific to only the fixtures listed above. This guide is not to be used for other GUV fixtures.

Application Considerations for UVA

Disinfection performance is directly related to two factors:

- The duration of UVA disinfection fixture use per day. Continuous operation provides superior performance.

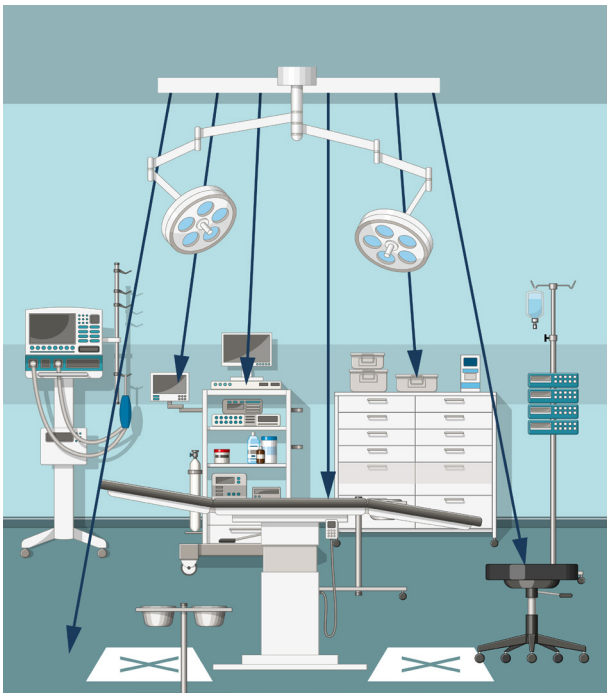
- Meeting target average irradiance on surfaces to be disinfected as determined by lighting layouts using GUV spectral IES files unique to each fixture.

To provide disinfection, the GUV irradiance must directly reach the surface to be disinfected—shadowed areas will not be effectively disinfected. Most surfaces have poor reflectance of GUV irradiance. Therefore when designing the layout of a space, it is suggested to use surface reflectances of 1% when calculating GUV irradiance.

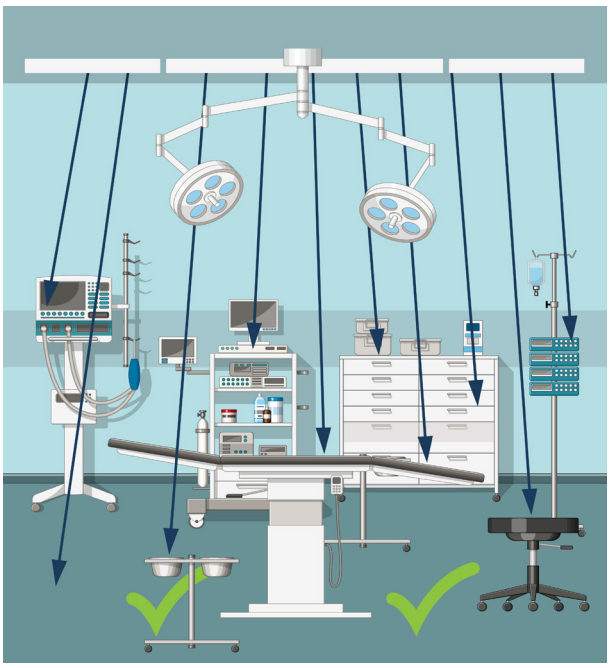
Leviton luminaires with 365DisInFx UVA technology are intended for occupied commercial and institutional spaces and not recommended for residential or home use.

The use of controls for the visible light circuit is suitable and recommended. To maintain effectiveness, the GUV circuit should not be deenergized with controlled circuits.

Please note that some surface materials may fluoresce when exposed to some forms of UVA light.



Surfaces without direct line-of-sight to the fixture are not effectively disinfected.



Fixture placement can often resolve the problem.

UVA Fixture Layout Calculations

Calculating Proper Irradiance using AGI32™

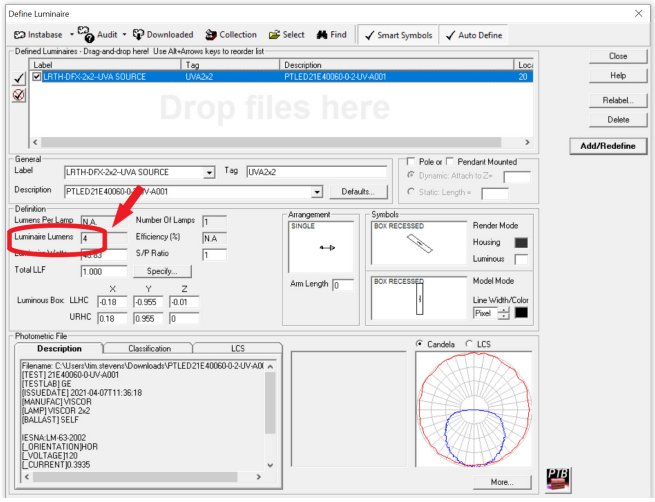
Leviton DFX series luminaires:

• Separate IES files are provided for both white light illuminance and GUV. IES files are readily available at www.viscor.com

• A space utilizing Leviton DFX series luminaires should be first designed with GUV irradiance to meet the recommended target of 0.5 W/m^2 average irradiance.

• The GUV wattage output is shown in the Lumens category of the UV IES file and has an associated distribution.

• Visible light IES files should then be used in the layout to determine the correct lumen output required to meet illuminance targets.



AGi32® Setup and Use

In order to calculate the design goal irradiance within an area we can use AGI32 and the .ies files containing GUV data. The unit of measure for GUV irradiance is watts per square meter (W/m2). Ordinary visible light is calculated as LUX, lumens/m2. IES files for Leviton DFX series luminaires are generated to show GUV irradiance as LUX. Therefore, using the DFX series GUV IES file to calculate lux in a space will represent the GUV irradiance in W/m2. If you typically calculate in footcandles you will need to adjust a few settings.

1. Within AGI32 Systems Setting, navigate to the Units/ Precision Tab.

2. Change Illuminance Units to LUX.

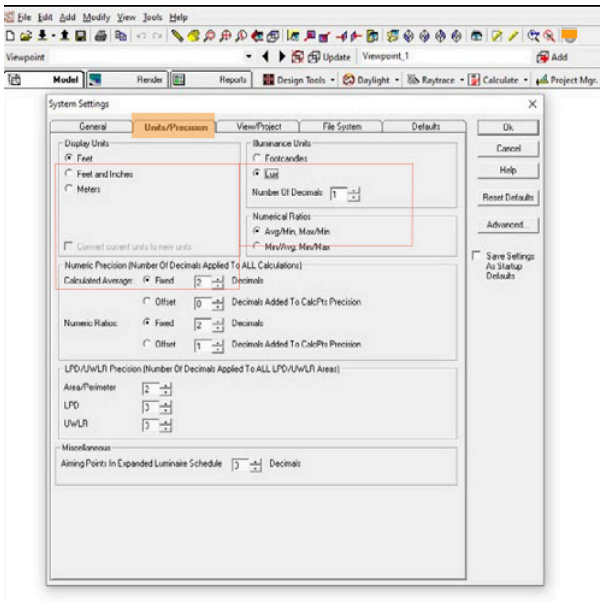
3. Set Numeric Precision to show two (2) decimal places.

4. If you normally use imperial display units, you should verify the fixture dimensions. They may need to be rescaled.

Proceed to model the room as normal, except;

5. Within the Calculations menu add a calculation grid using an equivalent calc grid height to match the display units (feet or meters) of your design. The height of the grid should be that of the surfaces needing disinfection.

6. Calculation grid spacing should be set to 0.25m x 0.25m (0.82 ft x 0.82 ft) to provide enough data points to calculate relevant average values. (See next page for continuation...)



Fixture, Room and Object Entry Details

• Common indoor materials have a low reflectance in the UVA range; use 1% reflectance for all room surfaces on rendered calculations and utilize direct calculation results when possible.

• GUV luminaires should use 1.0 LLF.

• Fixture symbols default to the IES file luminous aperture. Since GUV irradiance does not effectively reflect off luminaire reflector, the luminous aperture is depicted in the IES files as only the lens. This is normal for GUV luminaires. To address this, when laying out a space, add an object to represent the fixture body in renderings, make sure that the surface reflectance is set at 10% or lower and make sure the object is placed above the source.

Most room surfaces do not reflect UVA light well. Use 0.1% surface reflectivity in calculations.

UVA Target Levels

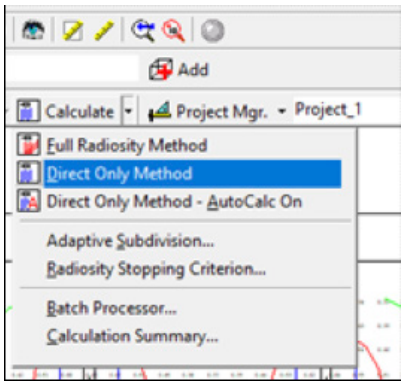
• 365DisInFx™ UVA technology: The minimum effective irradiance for 365DisInFX™ technology is 0.25W/m2. The desired average irradiance at the surface to be disinfected is 0.5W/m2 for Leviton DFX series luminaires.

• Highlight GUV workplane calc points below 0.25W/m2. To do this select the “Highlight Values” button on the “Calculations” menu. The selection is in the “Illuminance” tab.

Calculating Results

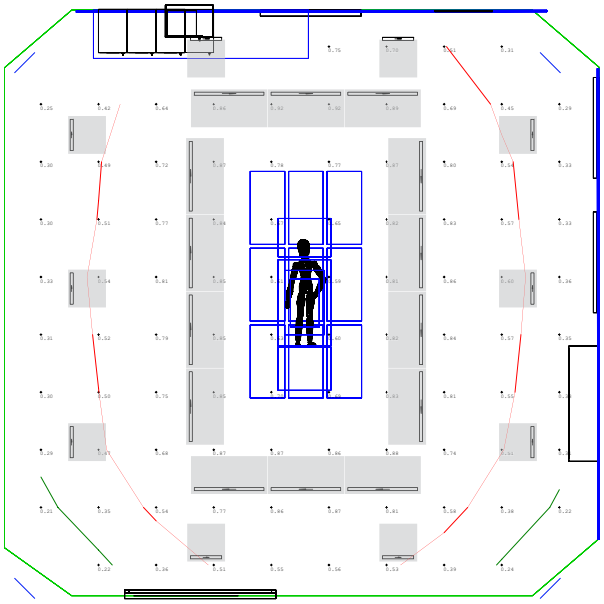
• When calculating results, you may use full radiosity if you have properly entered surface reflectance. Otherwise use “Direct Only Method”.

(See next page for GUV and Visible light calculations)

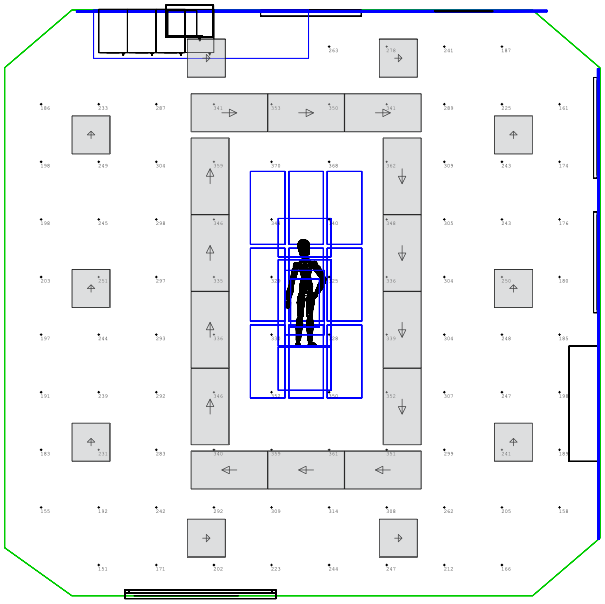


Use Direct Only Method to eliminate the effect of surface reflectivity.

GUV Calc Irradiance (W/m2)



Visible Light Calc Illuminance
(Foot-candles)



AGi32 Summary Output (Fixtures With 365DisInFx™ GUV Technology)

CALCULATION SUMMARY							
Label	Calc Type	Units	Avg.	Max.	Min.	Avg./Min	Max./Min
White Light Workplane	Illuminance	Foot-candles	271	370	151	1.79	2.45
UV Disinfection Mode at 1m	Illuminance	W/m2	0.61**	092	0.21	2.90	4.38

Target average irradiance for UVA fixtures on workplane: 0.5W/m²
**(LUX Illuminance results represent W/m2 in UV calculations)

CAUTION

UVA 365nm Ultraviolet

• In application, products with 365DisInFx™ GUV technology (Leviton DFX series luminaires) must follow, when provided, the guidelines on spacing and mounting height.

• Leviton DFX series luminaires without a minimum mounting height should not be installed where a person will be within 20cm (8") of the luminaire.

• Leviton DFX series luminaires with a labeled minimum mounting height should be installed at or above the specified minimum mounting height, per UL 1598.

• Disregarding recommended parameters will negatively impact disinfection efficacy.

• Leviton DFX series luminaires should not be installed at a spacing closer than specified in the table below.

Fixture	Minimum End to End spacing (distance between fixtures, lengthwise)	Minimum Side to side spacing (distance between fixtures)	Minimum mounting height above floor
MSUi-DFX 2x2, 2x4	1'	1'	None

Make an Informed Decision

• GUV radiation can pose a risk of personal injury. Overexposure can result in damage to eyes and bare skin. To reduce risk of overexposure, equipment must be installed in accordance with manufacturer's site planning and application recommendations, including minimum ceiling height restrictions.

• GUV solutions are intended for common high traffic spaces and not recommended for dwellings or home use.

• Installation of the devices should be performed by qualified professionals as detailed in Leviton's installation guide.

• To allow for occupancy during use, Leviton DFX series luminaires comply with IEC 62471 – Photobiological Safety of Lamps and Lamp Systems standards and American Conference of Governmental Industrial Hygienists (ACGIH®) TLVs® guidelines when installed as directed.

• Leviton DFX series luminaires are meant to be used in conjunction with other protective measures like manual cleaning and the use of proper PPE. They are not a substitute for other measures.

• Leviton DFX series luminaires are not intended for use as a medical device.

• If combining two or more UV solutions, whether from Leviton and/or other manufacturers, please consult a trained product application representative to ensure the total irradiance (UV dose) does not exceed recommended human exposure limits. To the extent UV solutions are combined, it may impact deactivation rates.

For more information about 365DisInFx™ technology, visit viscor.com

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