FireJet™ FJ801
Area Curing Solution

User Manual

Revision: 1

November 2019

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Contact Phoseon Sales for a Return Material Authorization (RMA)

Table of Content

Overview and Safety

UV Curing System Components

The FireJet FJ801 system consists of the following components:

- FireJet FJ801 Light Sources
- FJ801 Controller

The product label on the FJ801 light source identifies the production model and configuration. See the example (pictured right):

- FireJet is the product family
- FJ801 100x100 is the model number
  - 100x100 represents the UV curing area in mm
- Configuration information follows the model number
  - AC defines unit as air cooled
  - 395 defines the dominant wavelength in nm
- 1.7W defines the peak irradiance in W/cm^2

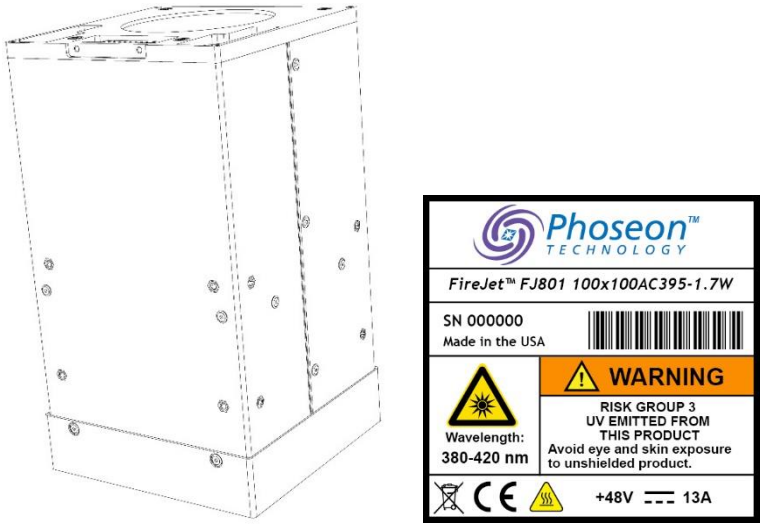


Figure 1.1: Light Source Safety Label Placement (safety label on side of product)

CAUTION: The window frame may become a hot surface during UV operation.

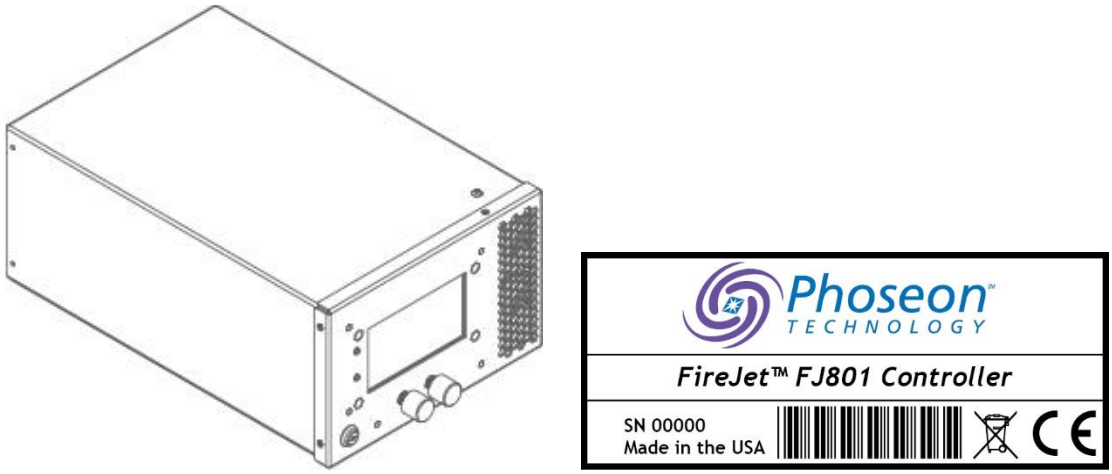


Figure 1.2: Controller Safety Label Placement (safety label on bottom of product)

Product Safety Information

UV LED Curing Sources

Intended Use

Phoseon light sources and optional power supplies are supplied as “open type” equipment. These system components must be mounted within an enclosure that is suitably designed for the specific environmental conditions present for the final product, and appropriately designed to prevent personal injury resulting from accessibility to live parts.

Protective Guards

Phoseon light sources include protective guards to fully enclose electrical mechanisms that may cause operator harm during normal use. These fixed guards adhere to the appropriate international safety standards.

CAUTION: **Do not operate the light sources or the machine in which they are installed while any safety guards are open, loose, damaged, or missing.**

Phoseon light sources are classified as Risk Group 3 under IEC 62471 at a distance of 200mm.

Risk groups defined in IEC 62471:

Exempt – There is no photo-biological hazard for the end points in this standard.

Risk Group 1 – Low Risk. Does not pose a hazard due to normal behavioral limitations on exposure.

Risk Group 2 – Moderate Risk. Does not pose a hazard due to aversion response to very bright light sources or due to thermal discomfort.

Risk Group 3 – High Risk. May pose a hazard even for momentary or brief exposure.

WARNING: **DO NOT LOOK DIRECTLY AT THE UV LIGHT SOURCE WITHOUT WEARING UV SAFETY GOGGLES.**

Note: A portion of the UV light will be visible and will be a strong visual stimulus.

Minimum requirement: UVEX SCT-orange lens which reduces eye fatigue by absorbing blue and green light and allows the operator to clearly view components during curing and inspection processes while absorbing 99.9% of UV radiation and visible light up to 532nm.

Note: Phoseon UV LED products emit 90% or more of the total UV light energy in a narrow wavelength band:

Wavelength	Band
365nm	345 to 385nm
385nm	370 to 410nm
395nm	380 to 420nm
405nm	390 to 430nm

Hazard and Safety Notices

The symbols and labels in the following table are used in Phoseon's light source product documentation and on the product labels. Please familiarize yourself with the symbols and their meaning in order to avoid misuse of the product.

Table 1.1: Safety Notices

Symbol	English Description Safety Notices	French Description Consignes de Sécurite	Italian Description Avvertenze sulla sicurezza	German Description Sicherheits-hinweise	Spanish Description Notas de Seguridad	Dutch Description Veiligheids-aanduidingen	Polish Description Ostrzeżenia dotyczące bezpieczeństwa
	Attention Read manual for safety instructions	Attention Lisez les instructions de sécurité dans le manuel	Attenzione Leggere il manuale per le avvertenze sulla sicurezza	Achtung Bitte Vorsichtsmaß-nahmen in der Gebrauchsan-leitung lesen	Atención Lea el manual de Instrucciones de seguridad	Opgelet Lees handleiding voor veiligheids-voorschriften	Uwaga Zapoznaj się z zaleceniami bezpiec- zeństwa w instrukcji
	UV Light Read manual for safety instructions	Lumière UV Lisez les instructions de sécurité dans le manuel	Luce UV Leggere il manuale per le avvertenze sulla sicurezza	UV LICHT Bitte Vorsichtsmaß-nahmen in der Gebrauchsan-leitung lesen	Luz UV Lea el manual de Instrucciones de seguridad	UV-licht Lees handleiding voor veiligheids-voorschriften	Promieniowa- nie UV Zapoznaj się z zaleceniami bezpiec- zeństwa w instrukcji
	Hot Surface	Surface Chaude	Superficie calda	Heiße Oberfläche	Superficie Caliente	Heet oppervlak	Gorąca powierzchnia
	Warning RISK GROUP 3 UV EMITTED FROM THIS PRODUCT Avoid eye and skin exposure to unshielded product.	Avertissement Rayonnement UV À Risque de Groupe 3 Eviter l'exposition des yeux et de la peau sans protection adéquat.	Attenzione DA QUESTO PRODOTTO EMISSIONI UV DELLA CLASSE DI RISCHIO 3 Evitare l'esposizione di occhi e pelle al prodotto non schermato.	Warnung Dieser Strahler emittiert UV-Strahlung der Risikogruppe 3. Setzen Sie Haut und Augen nicht der Strahlung des nicht abgeschirmten Strahlers aus.	Advertencia RADIACION UV DE RIESGO GRUPO 3 EMITIDA POR ESTE PRODUCTO Evite la exposición de ojos y piel por el producto sin protección adecuada.	Waarschuwing UV-STRALING RISICOGROEP 3 UITGEZONDEN VAN DIT PRODUCT Vermijd blootstelling van ogen en huid aan niet-afgeschermd product.	Ostrzeżenie GRUPA ZAGROŻENIA 3 PRODUKT EMITUJE PROMIENIOW ANIE UV Unikać wystawiania skóry i oczu na działanie nieosło- niętego produktu.

Similar to the ANSI Z535.4 standard, the ISO 3864-2 standard defines the hazard severity panels as follows:

Yellow safety alert symbol Indicates possible human injury hazard exists.

DANGER signal word: used to indicate an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING signal word: used to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION signal word: used to indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Restriction of Hazardous Substances (RoHS)

Phoseon Technology declares, to the best of our knowledge based on available information conducted to us, that our light sources do not contain any homogeneous materials that:

- Contains lead (Pb) in excess of 0.1 weight -% (1000 ppm)
- Contains mercury (Hg) in excess of 0.1 weight-% (1000 ppm)
- Contains hexavalent chromium (Cr VI) in excess of 0.1 weight-% (1000 ppm)
- Contains polybrominated biphenyls (PBB) or polybrominated dimethyl ethers (PBDE) in excess of 0.1 weight-% (1000 ppm)
- Contains cadmium (Cd) in excess of 0.01 weight-% (100 ppm)

Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Phoseon Technology has determined our products are not subject to EU REACH directive registration requirements.

With regards to the projected candidate list of substances of very high concern (SVHC) – issued 10 October 2008, Phoseon Technology further declares that, to the best of our knowledge, our products do not contain any currently listed SVHC above the level 0.1% by weight.

Product Recycling

This symbol is an internationally agreed indicator that the product bearing it should not be disposed of as general waste or garbage which might end up in landfill sites, but should instead be returned to Phoseon for reuse or be disposed of in accordance with local laws.

Figure 1.1: Do Not Dispose in Trash Symbol

Setup & Installation

The safety of any system incorporating the FJ801 UV LED light source and controller is the responsibility of the assembler of the system. Please review all of the information included in this manual and related documentation.

NOTE: Carefully review the Product Safety Information and take proper precautions when the UV is enabled.

When installing the FJ801 controller, make sure it is positioned such that the Main Power Switch is easily accessible.

Refer to the following documents for detailed information regarding integration into OEM equipment.

Table 2.1: FireJet FJ801 Documentation

FireJet FJ801	
Product Specification	38348
Tech Note, Scaling Light Sources	30756
Control Drawing, Light Source	38417
Control Drawing, Controller	38418
Reducing Light Reflection	28658
Window Cleaning Instructions	27182
Declaration of Conformity	29321

The above documents are included in this manual and also available as individual documents on the Phoseon Customer Resource Center (CRC) website at www.phoseon-support.com.

Electrical

Power is supplied to the FireJet FJ801 system, which includes light source(s) and controller, by means of an AC power cord (various wall options with a C19 power cord plug) connected to the controller. A three-prong power cord must be used that connects the FJ801 Controller to Protective Earth (PE).

Each FJ801 light source connects to the controller via a DB-15 Male-to-Female cable. The wire gauge must be at least 20AWG.

As shown in Figure 2.1, remote switches for manually turning the light source UV on and off are connected to the DB-9 connectors on the controller rear panel. The remote switches are typically Single Pole Single Throw (SPST) toggle switches.

Machine control is implemented via the PLC I/F connector on the controller rear panel.

Machine Control Vs Manual Control

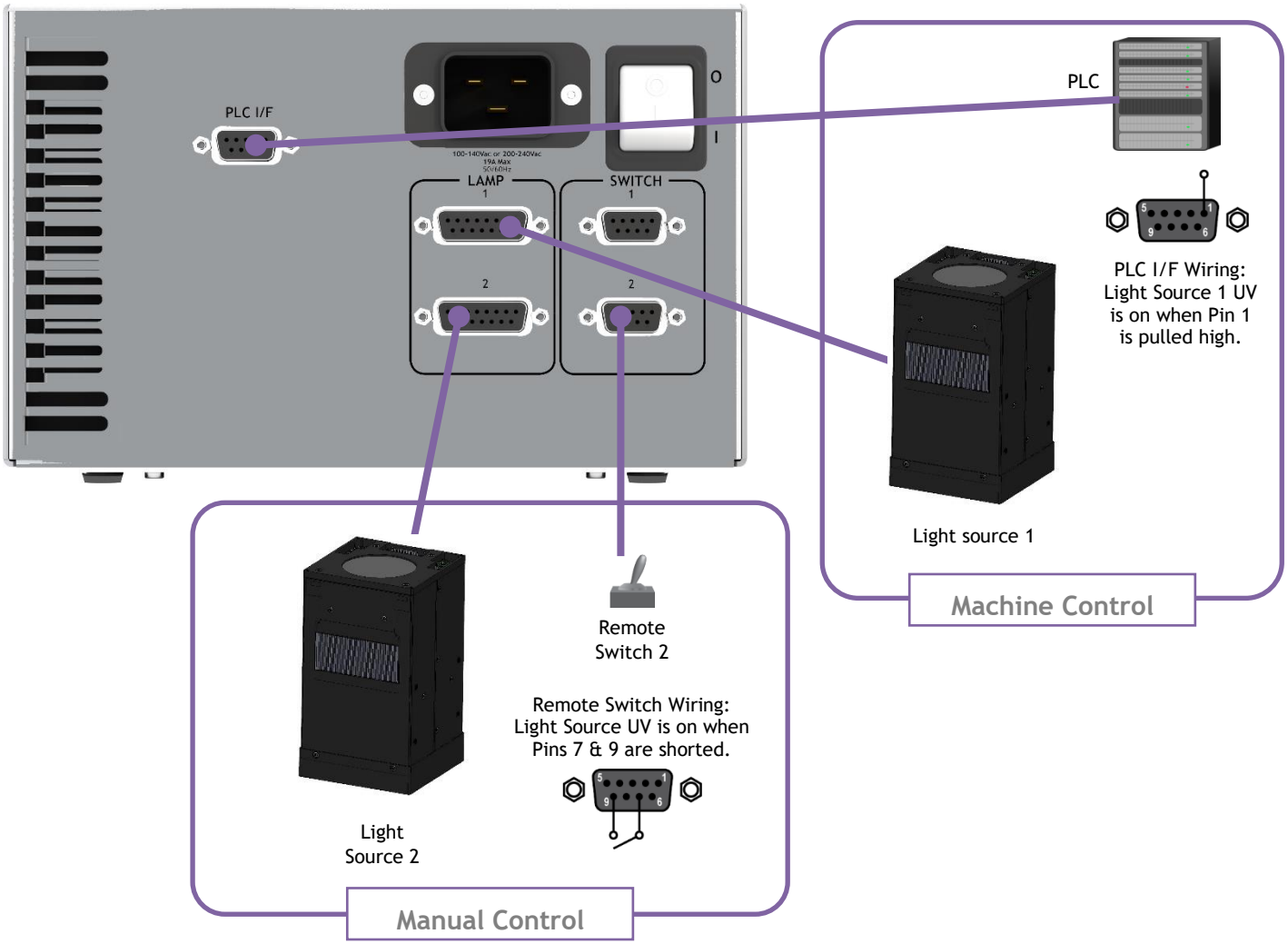


Table 2.2: the PLC I/F Connector Pins

PLC I/F (Interface)				
Pin Number	**Pin Name**	**Input/Output**	**Range (Min/Max)**	**Detailed Function Description**
1	LAMP ENABLE1	Input	0V / 5V, max 24V	Normally low, high to enable
2	LAMP ENABLE2	Input	0V / 5V, max 24V	Normally low, high to enable
3	LAMP FAULT 1	Output	0V / 24V	Normally high, low = Fault
4	LAMP FAULT 2	Output	0V / 24V	Normally high, low = Fault
5	NC	-	-	-
6	INTERLOCK	Input	0V / 24V	Normally high, low to allow enable
7	LAMP TEMP 1	Output	0V / 12V	Temperature = 0.1V per ºC
8	LAMP TEMP 2	Output	0V / 12V	Temperature = 0.1V per ºC
9	Ground	-	0VDC	Circuit Ground

Mechanical Installation

Refer to the Control Drawings for the specific FireJet FJ801 light source or controller for detailed dimensions and mounting point information. Make special note of the following information listed on the Control Drawing:

- Quantity and size of mounting hardware
- Maximum depth of mounting hardware

Refer to the Product Specifications document for the following information:

- DC power/Data connector (manufacturer and model)
- DC power/Data connector Pinout

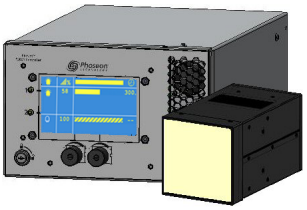
CAUTION: The light source may be damaged if these specifications are not followed.

FireJet™ FJ801 Area Curing Solution

Product Specifications

Phoseon UV LED SLM™ Technology

Air Cooled



Phoseon Technology is the world leader in providing UV LED solutions for commercial and industrial applications. Phoseon's products deliver superior performance and real-world reliability for UV curing of adhesives, coatings and inks.

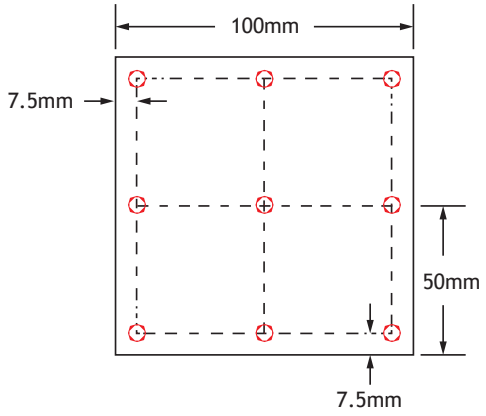
Phoseon's patented Semiconductor Light Matrix (SLM™) technology encapsulates LEDs, arrays, optics and cooling to maximize UV LED curing performance. The FJ801 Area Curing Solution consists of UV light source, controller, and cables. It is optimized for electronic manufacturing production lines with large area curing applications, such as micro speakers, camera modules, and flat panel displays.

Performance

	365nm	385nm	395nm	405nm
Peak Irradiance*	1.2 W/cm²	1.7 W/cm²	1.7 W/cm²	1.7 W/cm²
Total Output Power*	120W	170W	170W	170W
UV Footprint	100mm x 100mm			
Uniformity*	>85%			
Noise Level⁺	<77dBA			

*At the working distance of 10mm from substrate to light source glass. Uniformity is measured at nine different spots, shown below.

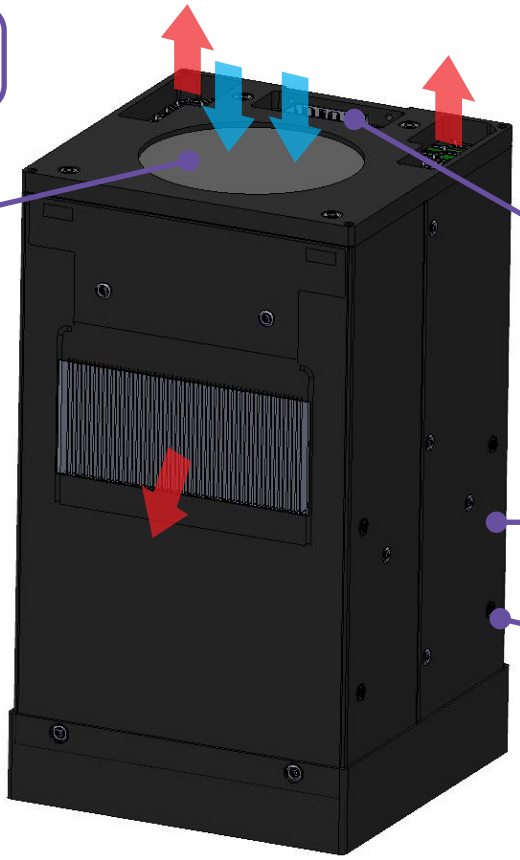
⁺Noise level is measured 1m from the lamp.



Light Source Setup

Air Flow: Intake (blue arrows)/Exhaust (red arrows)
Minimum clearance: 50mm

Replaceable Air Filter Kit:
PN 38910 Kit of 5 filters



Controller Mating Connector:
DB-15, Male
DB-15 cables must be fully populated Male-to-Female (minimum 20AWG wire for up to 10m)

Scalable on three sides (all sides except side with Exhaust)

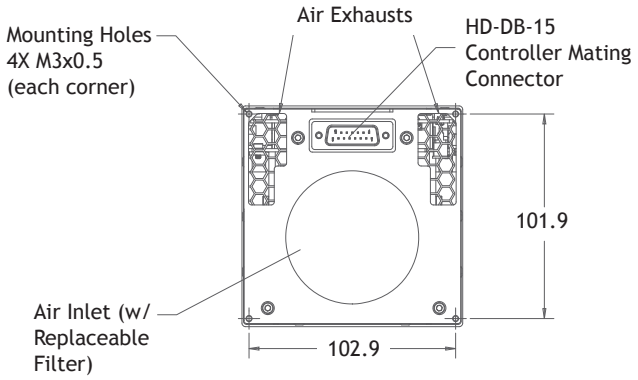
Mounting: 4X M3x0.5 Mounting Positions (See the Dimensions section for location details).

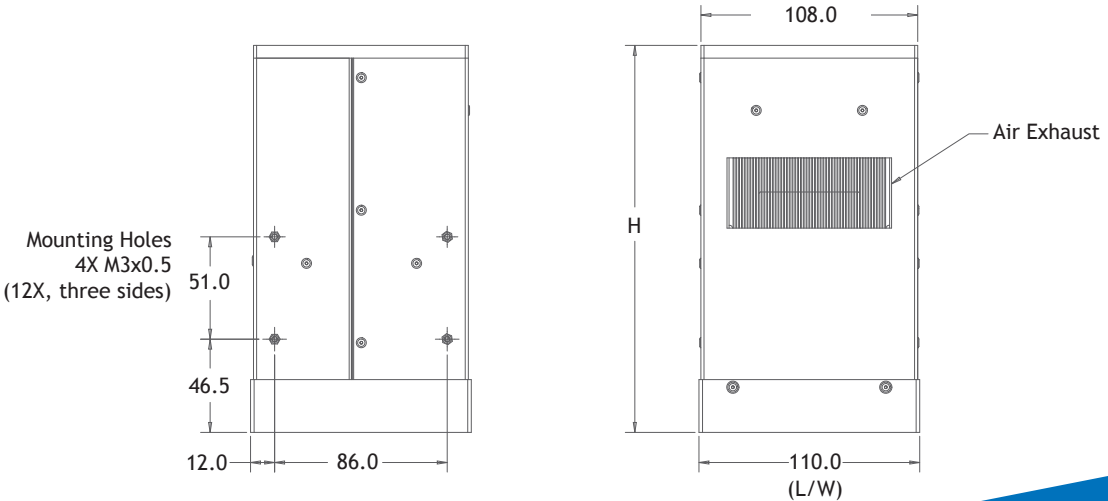
Equipment Type:
Electrical industrial process-control equipment
Operating Environment:
Indoor, Dry Location Use Only (Pollution Degree 2 as defined in EN61010-1)
Temperature: 10 to 40°C
Humidity: up to 80% non-condensing for temperatures up to 30°C
Altitude: Up to 3000m
Storage Temperature: -20°C to 85°C

Light Source Dimensions

Units of measurement: mm

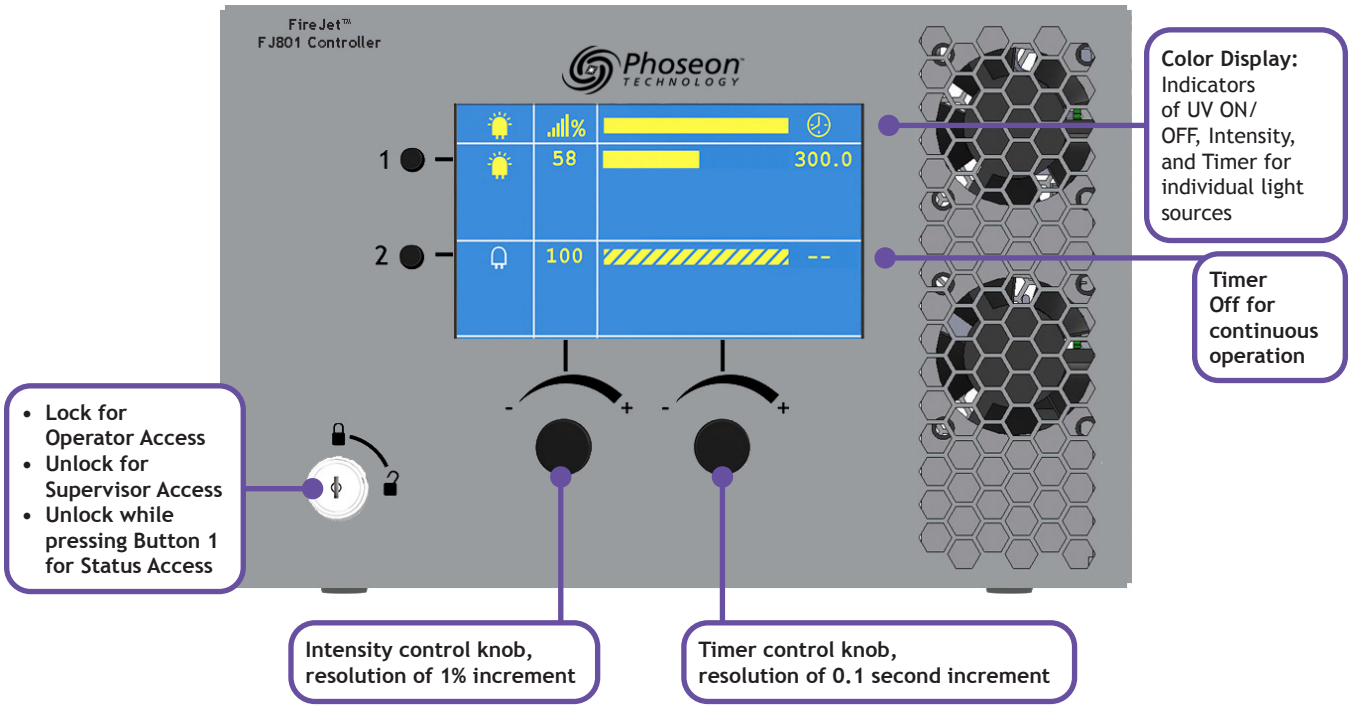
FJ801 Light Source	
UV Emitting Window	100x100
L	110
W	110
H	193
Weight (kg)	1.4

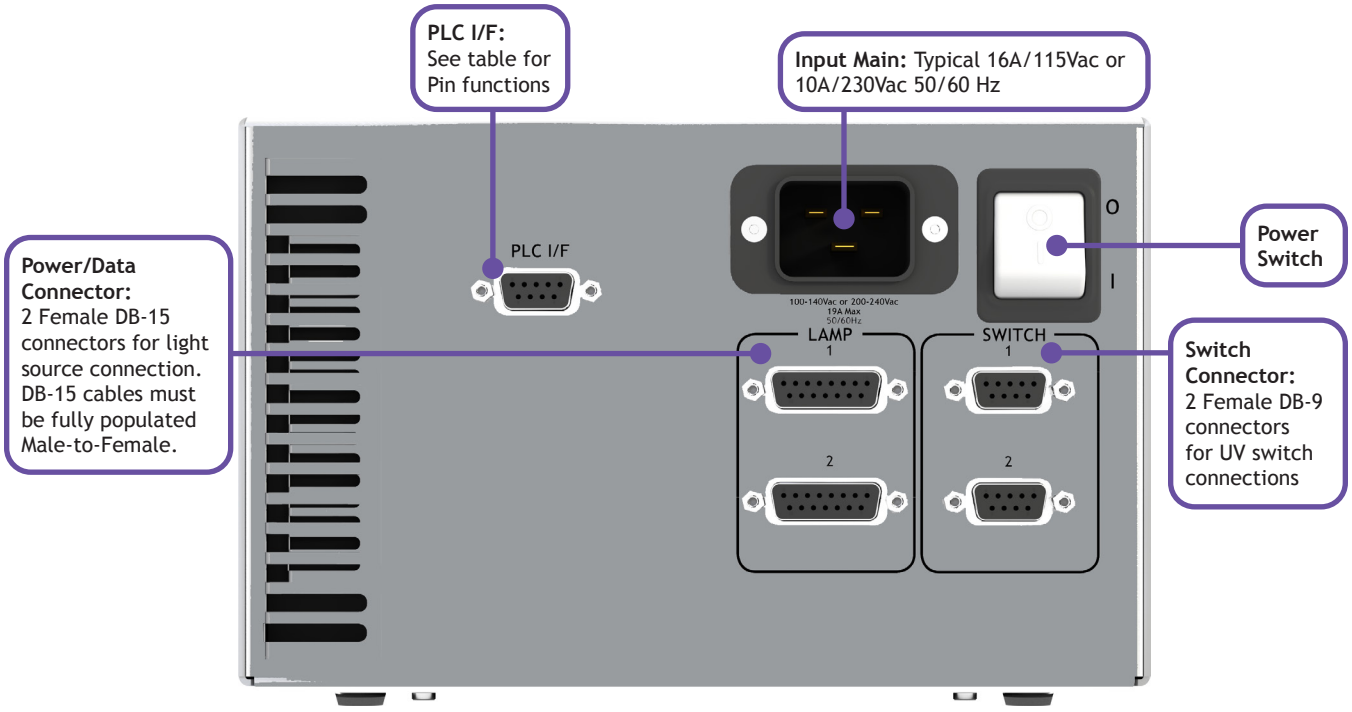




Controller Setup

- Intuitive graphical interface
  - On/off/fault
  - UV Timer: 0.1 to 600.0 sec, continuous
  - Intensity Control: 5% to 100%
- Individual control for up to 2 light sources
- 3 Access Levels: Operator, Supervisor and Status
- Fault signal output for line notification
- Manual/automatic external control available



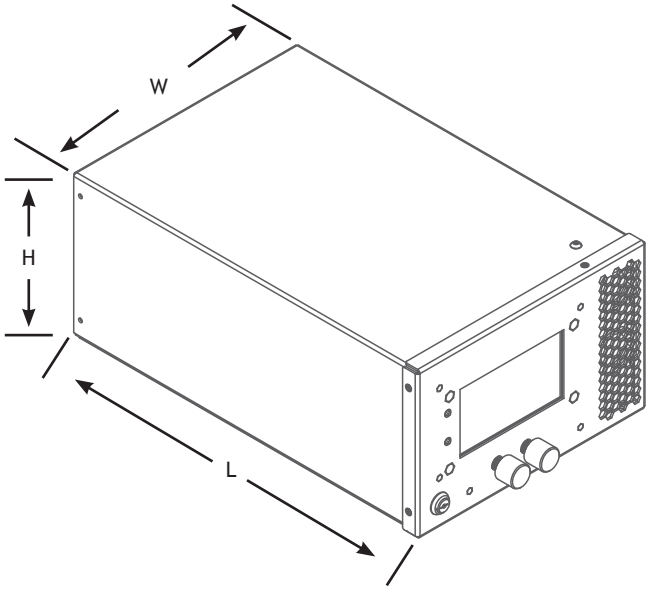


Controller Dimensions

Units of measurement: mm

FJ801 Controller	
L	336
L*	362
W	217
H	139
Weight (kg)	3.6

*Length, including Intensity & Timer Control knobs on front and Power Switch on back.

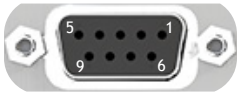


Cables & Connectors

Power/Data Cable	Connect Light Source to Controller
• **Connectors**	DB-15 connectors, Male-to-Female
• **Length**	1.5-meter, 3-meter, 7.5-meter, 10-meter
• **Gauge**	20 AWG
Power Cord	**Connects Controller to AC Outlet**
• **Connector**	Various wall options with C19 power cord to Controller
• **Length**	2.5-meter
• **Gauge**	14 AWG
Switch Input	**Connects External Input to Controller**
• **Connector**	DB-9 connector, Female

DB-9 Switch Pinout (Female)

Pin Number	Pin Name	Input/Output	Range (Min/Max)	Detailed Function Description
1 to 6, 8	N/C	-	-	-
7	Single Light Source Enable	Output	0V / 5V, max 24V	Normally high, low to enable
8	N/C	-	-	-
9	Ground	-	0VDC	Circuit Ground



Switch Connector

PLC I/F

Pin Number	Pin Name	Input/Output	Range (Min/Max)	Detailed Function Description
1	LAMP ENABLE1	Input	0V / 5V, max 24V	Normally low, high to enable
2	LAMP ENABLE2	Input	0V / 5V, max 24V	Normally low, high to enable
3	LAMP FAULT 1	Output	0V / 24V	Normally high, low = Fault
4	LAMP FAULT 2	Output	0V / 24V	Normally high, low = Fault
5	NC	-	-	-
6*	INTERLOCK	Input	0V / 24V	Normally high, low to allow enable
7	LAMP TEMP 1	Output	0V / 12V	Temperature = 0.1V per ˚C
8	LAMP TEMP 2	Output	0V / 12V	Temperature = 0.1V per ˚C
9	Ground	-	0VDC	Circuit Ground

*Interlock - Pin 6 must be shorted to Ground to allow enable. Connect the Interlock Connector at the PLC I/F connector to immediately disable the interlock and allow lamp ready mode.

Interlock **Connector**

FireJet™ FJ800 Area Curing Solution

Technical Note

Scaling Multiple Light Sources

Multiple FireJet™ FJ800 light sources can be scaled in all directions to create large uniform curing area. A single controller can provide power and control for up to six light sources. For systems using more than six light sources, additional controllers and mounting brackets are required. Exercise caution when aligning and securing light sources together to avoid chipping the emitting window.

Scaling Alignment

1. There are 4 mounting holes on the top of each FJ800 light source (see Figure 1).
2. As shown in Figure 2, use scaling brackets and M3x0.5x4mm screws (Scaling Brackets Kit, PN 30694) to align neighboring light sources. Each scaling bracket, with 2 mounting screws, will align 2 light sources.
3. Figure 3 shows an example of scaling 4 light sources for a 200mmx200mm curing area.

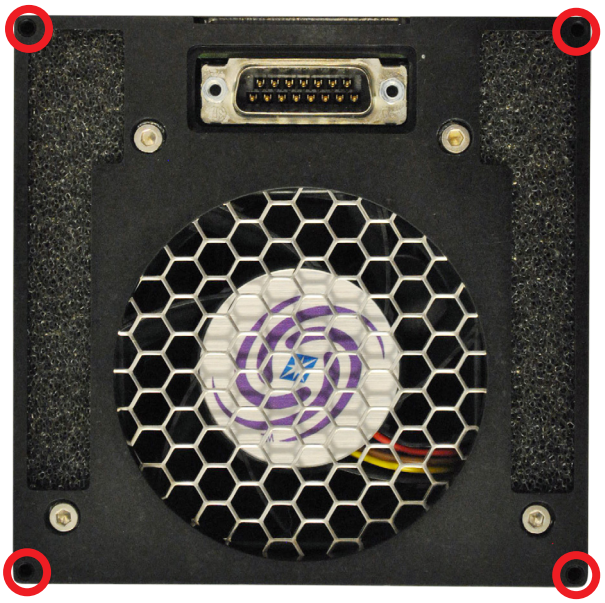


Figure 1: Mounting Holes

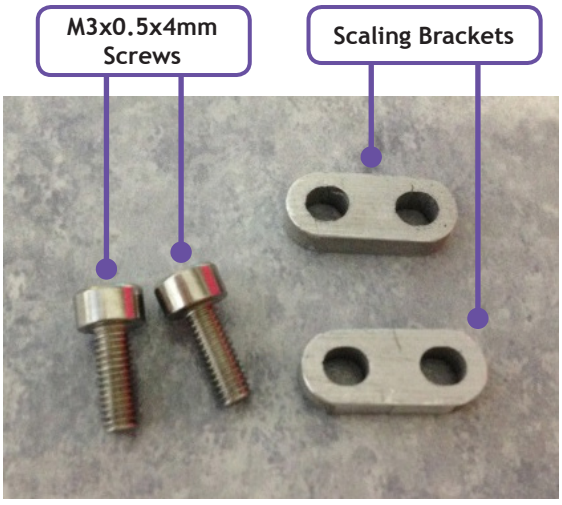


Figure 2: Mounting Screws and Mounting Tabs

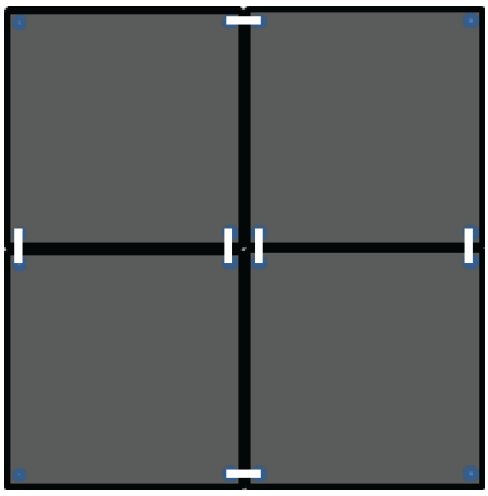


Figure 3: Scaling 4 Light Sources

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PN 30756 Rev 3.0
December 2017

REVISIONS						
REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
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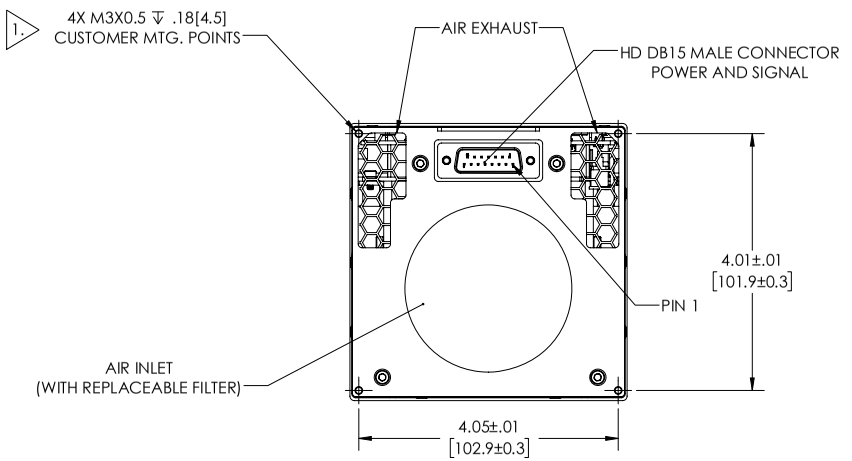

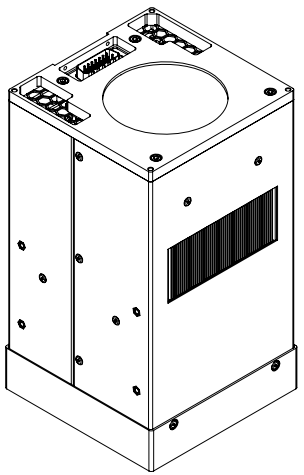

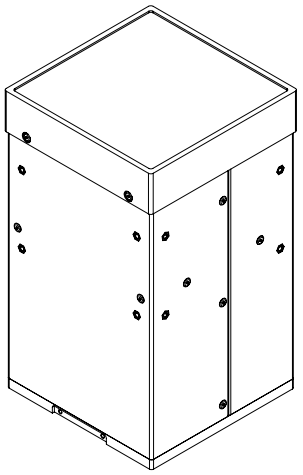

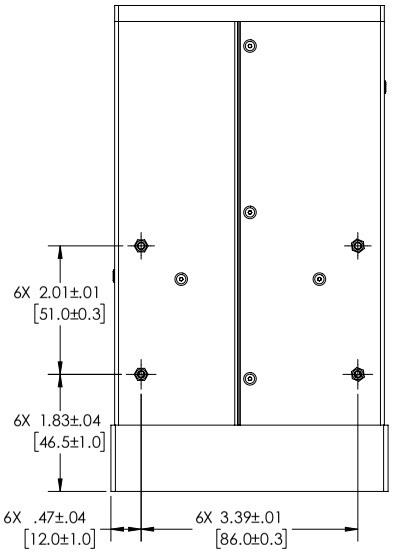

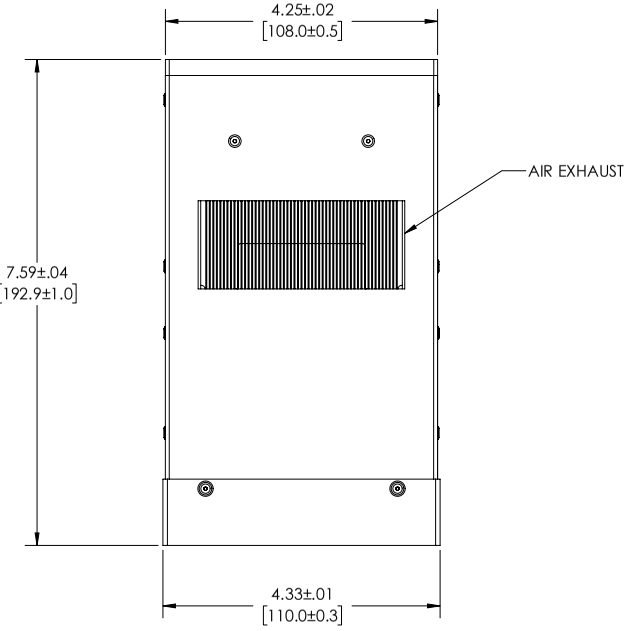

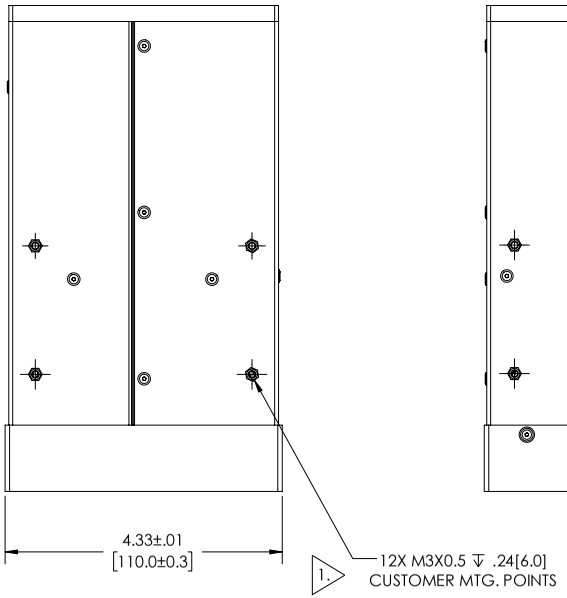

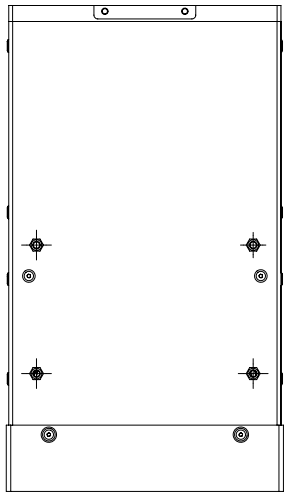

NOTES:

1. MAXIMUM SCREW TORQUE 6 in-lb [0.68 N-m]
2. REFERENCE DOCUMENTS:
   38348 - SPEC SHEET, FIREJET FJ801
   38349 - USER MANUAL, FIREJET FJ801
3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

3RD ANGLE VIEW | MATERIAL: N/A | FINISH: N/A | TITLE: CONTROL DRAWING, FJ801, LAMP

DIM UNITS: IN (mm)

Phoseon TECHNOLOGY

PART NUMBER: 38417 | REV. 1

ISSUED BY: A. Farias | ISSUE DATE: 7/10/2019

3D DATABASE: N/A

ASME/ANSI Y14.X | EGF-44275-01 | SCALE: 1.2 | SIZE: C | SHEET 1 OF 1

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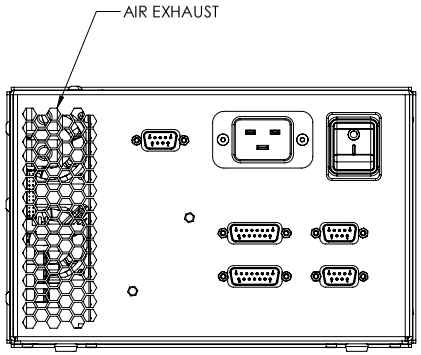

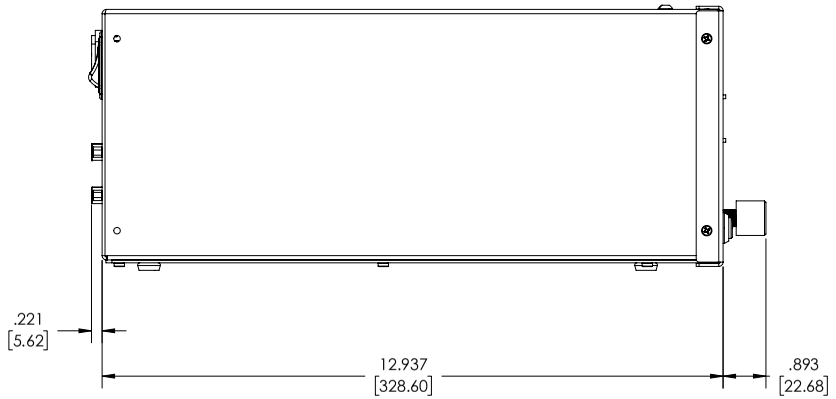

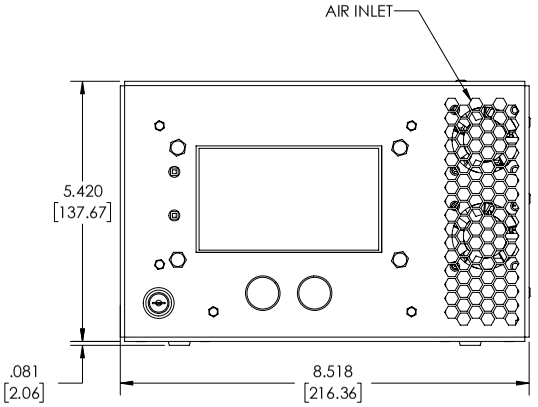

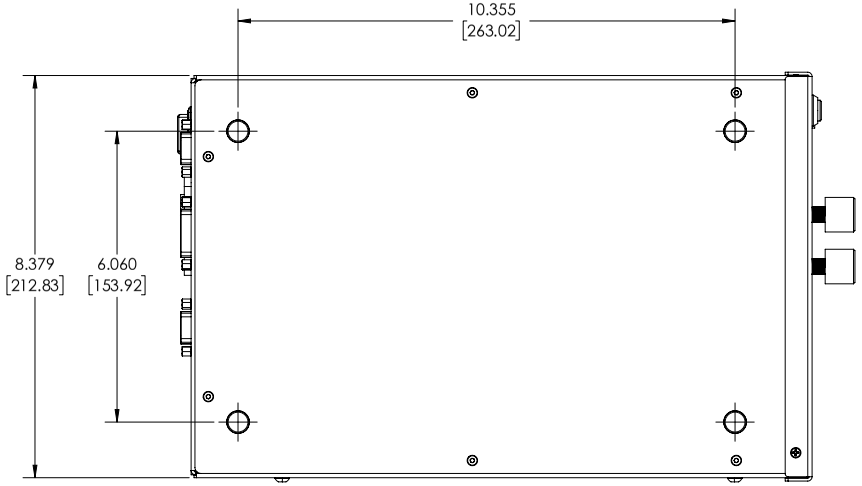

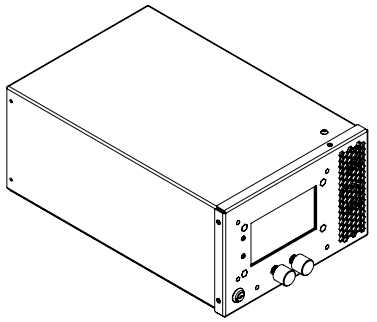

NOTES:

1. REFERENCE DOCUMENTS:

   38348 - SPEC SHEET, FIREJET FJ801
   38349 - USER MANUAL, FIREJET FJ801

2. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

3RD ANGLE VIEW | MATERIAL: N/A | FINISH: N/A | TITLE: CONTROL DRAWING, FJ801, CONTROLLER

DIM UNITS: IN [mm]

Phoseon TECHNOLOGY

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ASME/ANSI Y14.X | EGF-44275-01 | SCALE: 1.2 | SIZE: C | SHEET 1 OF 1

Reducing Light Reflection

Technical Note

Overview

One of the many benefits of UV LED technology is divergent light, meaning there is no focal point of the light output. This creates a longer exposure time for media traveling under the light source, and therefore typically higher dose for curing the adhesive, coating, ink or other UV curable material.

When the light source is mounted adjacent to a print head, there may be a concern when using very sensitive inks that light could reflect off the media into the print head and begin curing prematurely. This document describes techniques to reduce reflected light.

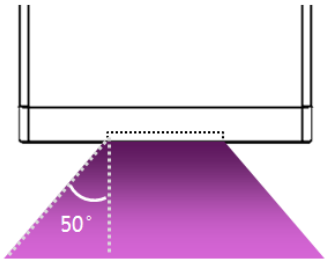
Note:

- The types of print media (surface roughness, reflectivity, color, etc.) will change the behavior and amount of any UV light reflection
- Increasing or decreasing the distance of the light source to the media changes the peak intensity of the UV and may affect cure speed
- Uses of recommendations in this document are done solely at the user's risk; Phoseon claims no responsibility for damage of any inkjet components

Light Output Angle

The typical half angle of light output from Phoseon UV LED light sources with a 20mm wide emitting window is approximately 50° from the edge of the glass.

For products with a 10mm wide emitting window, the half angle varies depending on the type of optic; please refer to the Optics Option Technical Note for more information regarding the shape of the light output.



Half Angle for 20mm products ~50°

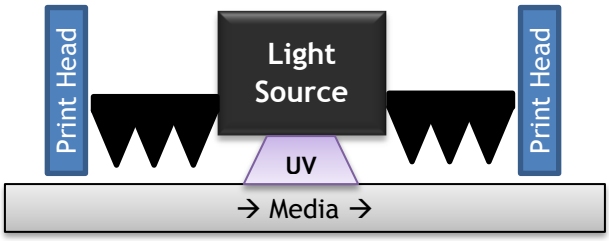
Reducing Light Reflection

To reduce the light reflection, the following techniques can be used:

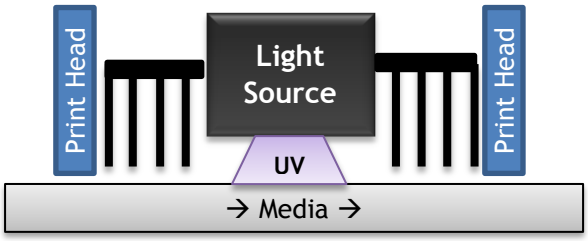
- Use materials around the light source that absorb or do not reflect UV (examples below) and avoid materials that are good UV reflectors such as bare Aluminum
  - Black anodized or black painted materials
  - Optical absorption and anti-reflective coatings
  - Thorlabs blackout materials, e.g. black metal foil (http://www.thorlabs.com)
  - Steel
- Increase surface roughness of materials between the light source and print head
  - Avoid smooth surfaces, which are good reflectors
  - Bead blasting or other roughening techniques reduce reflection of flat surfaces
- Use light traps or a baffles between the light source and print heads
  - Saw-tooth forms and straight-fins are good for capturing any reflected light
  - Increase number of grooves and increase depth of baffles
- Keep the light source close to the surface to reduce light spread

Light Baffle Examples (not to scale)

Adding a light baffle creates a surface to catch the reflected light beams and prevents them from reflecting (bouncing) off of other materials in the system and reduces the light spread.



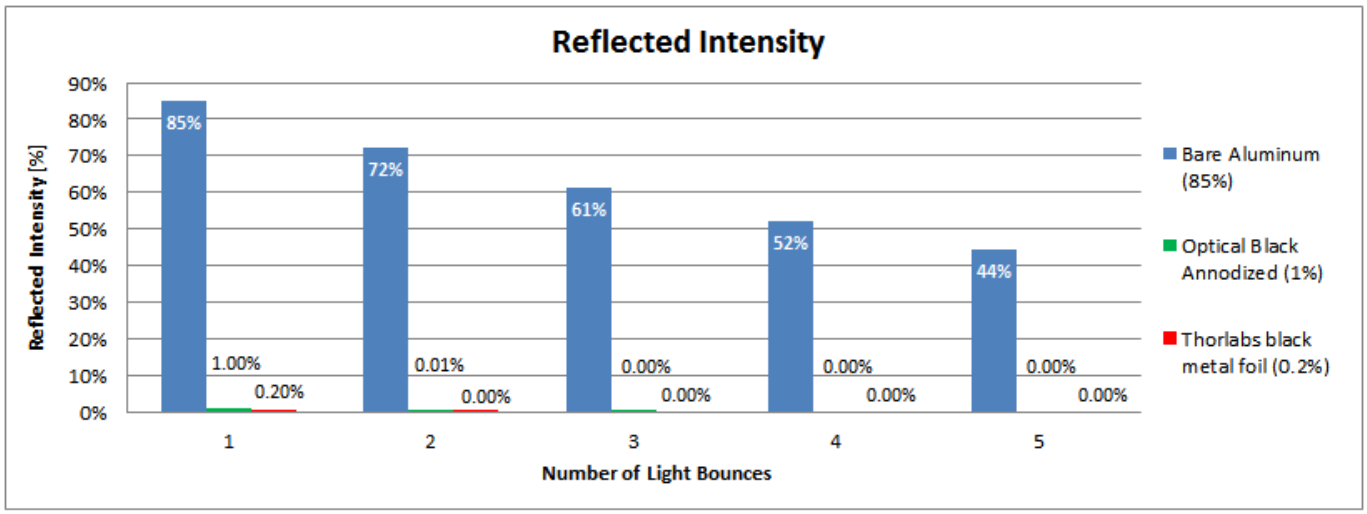
Saw-tooth form light baffle



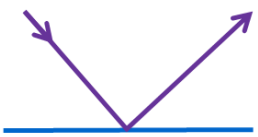
Straight-fin light baffle

Materials

As stated above, avoid reflective materials such as bare Aluminum, as it has a UV reflectivity rating of 85%, whereas a surface that has been anodized optical black has a UV reflectivity rating of 1% and the Thorlabs black metal foil has a rating of 0.2% (see chart below). The intensity of the light will decrease every time it reflects (or 'bounces') off of a surface.



The surface finish of the material also affects how the light spreads. A specular surface is a smooth, mirror-like finish that allows a light beam to remain intact as it reflects off of the surface. A diffuse surface is a rough, textured finish that scatters the beam, causing the beam to reflect in many different directions. An example of a specular surface could be a mirror or polished metal. An example of a diffuse surface could be paper or textured paint.



Specular Surface

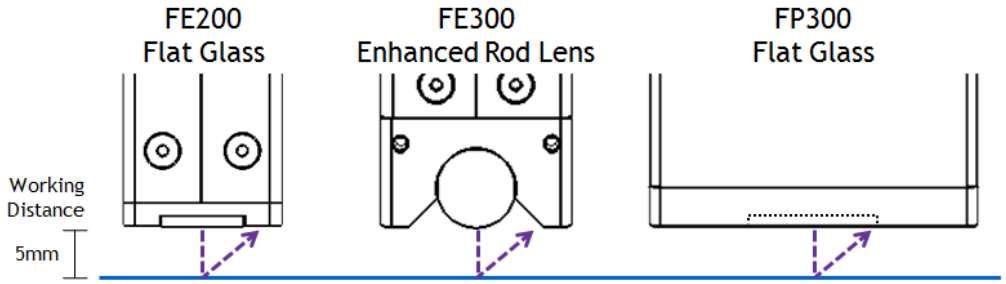
Diffuse Surface

Light Reflection Examples

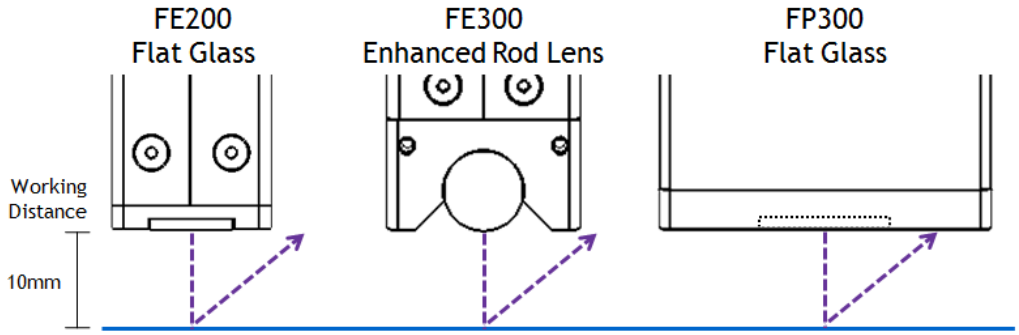
When curing with a reflective surface, like bare or polished aluminum, the size of the window frame and the working distance from the emitting window to the media, will affect how much light is allowed to reflect past the light source. Adding a light catch or shield that extends past the light source will catch some of this reflected light.

The amount of reflected light from a light source will vary based on the setup including:

- The peak intensity of the light source: directly correlates to the intensity of the reflected light, especially on a specular surface
- The type of window frame and optic: a focused light like the FE300 concentrates the light into a smaller area on the surface, where the FE200 Flat Glass and FP300 allows the light to spread due to the half-angle of the light output
- The working distance height between the light source and media: a larger working distance allows more room for the light to reflect past the emitting window frame
- The type of media surface: a highly reflective specular surface will reflect light more intensely than a non-reflective diffuse surface



Phoseon Product Examples at 5mm Working Distance

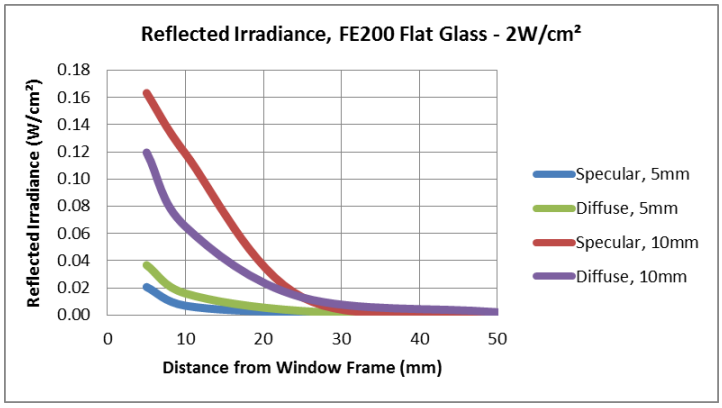


Phoseon Product Examples at 10mm Working Distance

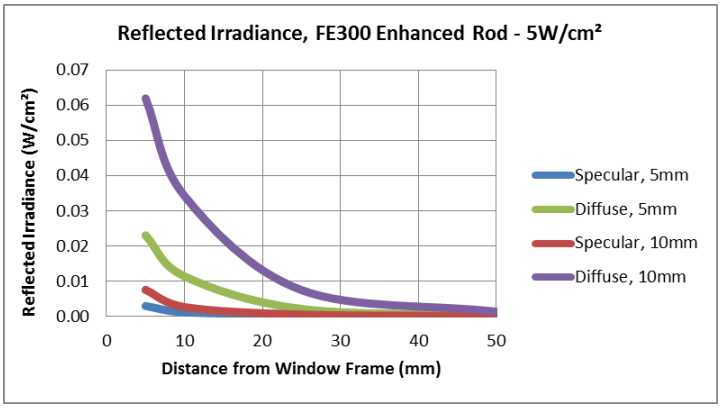
The charts below illustrate the irradiance values of reflected light with 3 different light sources; the FE200-2W/cm² with Flat Glass, the FE300-5W/cm² with Enhanced Rod Lens, and an FP300-20W/cm².

- The media is shown as a worst-case scenario with 100% reflectivity, meaning the media is not absorbing any of the UV energy, even if it is a specular or diffuse surface
  - For comparison, bare aluminum is 85% reflective as shown in the previous chart
  - In actual use, most surfaces will absorb some of the UV energy, which is either used to kick off a UV reaction (inks, coatings, or adhesives), or turns into heat
- The media is shown in two forms: a specular (smooth) surface and a diffuse (rough) surface

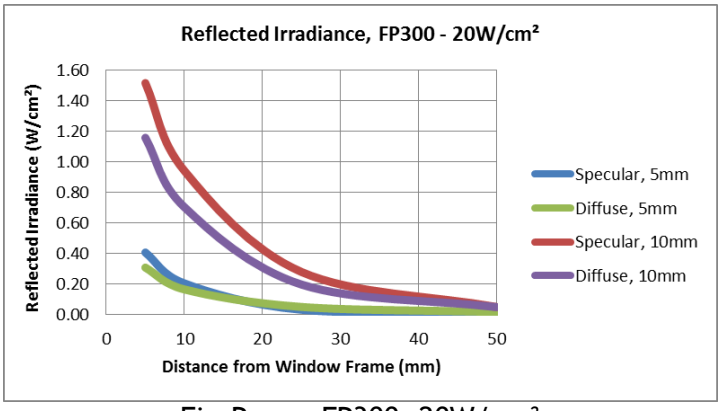
- Each media type is shown at two different working distances: 5mm and 10mm from the emitting window to the media
- The point of measurement for the reflected light is on the same plane as the emitting window at varying distances away from the edge of the light source (window frame, not the glass)



FireEdge FE200 Flat Glass, 2W/cm²



FireEdge FE300 Enhanced Rod, 5W/cm²



FirePower FP300, 20W/cm²

Observations from the charts above:

- The intensity of the light reflections from the FE200 are 10x less than the FP300, due to the difference in peak intensities (2W/cm² versus 20W/cm²)
- The FE300 has less intense light reflections and less specular reflection than the FE200 due to the Enhanced Rod Lens creating a narrower light output
- Other Phoseon products with 20mm emitting windows will have similar reflected irradiance patterns to the FP300, but the distance from the emitting window is different due to the width of the window frames

Operation

System Setup and Controller Configuration

Controller Front Panel, Rear Panel and User Interface

The controller display shows the status of up to two connected FJ801 light sources. The rows labeled 1 and 2 correspond to the light sources connected to the DB-15 connectors labeled 1 and 2 on the controller's rear panel. A blue background indicates that the light source is connected. A gray background indicates that no light source is connected to that position. In the diagram below both light sources are connected.

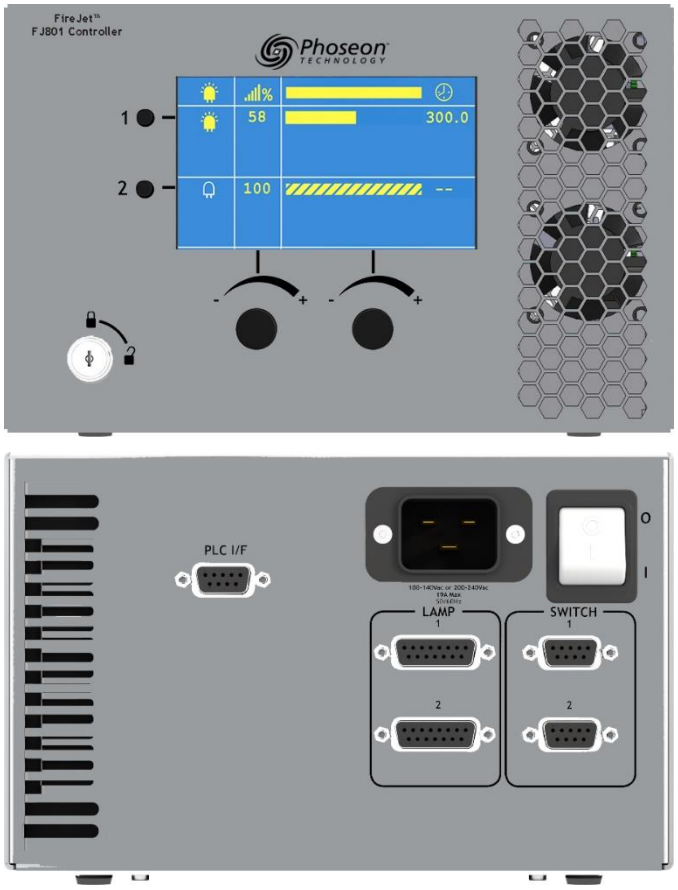


Figure 3.1: Controller Front and Rear Panel Example

The three vertical columns in the display indicate the following:

- Column 1 indicates whether the light source UV is enabled ( ) or disabled ( ). The light source UV is enabled when it receives a trigger from the controller. The trigger comes from either a remote switch connected to the rear panel of the controller, a logic high signal connected to the rear panel PLC I/F connector, or from the corresponding button on the front panel.
- Column 2 indicates the intensity setting in percent. The range is 5% to 100%.
- Column 3 indicates the automatic timer setting. The range of the automatic timer is from 0.1 second to 600.0 seconds. When the light source is triggered, the timer will begin counting down. When the timer reaches zero the light source UV is disabled automatically. The timer can also be set for continuous operation. In this case, the light source UV remains enabled until the remote switch is turned off,

the signal on the PLC I/F connector is opened or goes low, or the front panel button is pressed.

The controller display example in Figure 3.1 shows the following:

- Light source 1 is connected and the UV is enabled. The intensity is set for 58% and the automatic timer has 300.0 seconds left.
- Light source 2 is connected and the UV is disabled. The intensity is set for 100% and the automatic timer is set for continuous operation.

Enabling the Light Source UV

The FJ801 light source UV is enabled (turned on) by any of the following:

- Shorting Pins 7 & 9 on the rear panel DB-9 switch connectors: Disconnect Pins 7 & 9 to disable the UV. This is normally achieved by wiring a Single Pole Single Throw (SPST) toggle switch to Pins 7 & 9.
- At I/F connectors: pulling Pin 1 high enables light source 1, pulling Pin 2 enables light source 2. Pulling Pins 1 and 2 low, or letting them float, will disable the light sources.
- Pressing the buttons on the front panel (while in Operator mode): Pressing the button again while the UV is enabled will disable the UV. Note that the UV is enabled or disabled when the button is released, not when the button is pressed.

NOTE: When the controller is first powered on all light sources UV are disabled, regardless of the position of any connected switches or machine interface state. Similarly, when a light source is first connected to the controller its UV will be disabled regardless of the position of its switch or machine interface state.

There is a defined hierarchy among the three methods of enabling the UV:

- The front panel buttons have the lowest priority. They are over-ridden by the rear panel switch and PLC I/F controls.
- If Pins 7 & 9 are shorted on the rear panel DB-9 switch connector, the UV for that light source is enabled regardless of the state of the Pin on the PLC I/F connector. Pressing the front panel buttons has no effect.
- If a Pin on the PLC I/F connector is pulled high, the UV for that light source is enabled regardless of whether Pins 7 & 9 on the rear panel switch connector are shorted or open. Pressing the front panel buttons has no effect.

Front Panel Button	Rear Panel DB-9 Switch	Rear Panel PLC I/F	Light Source UV
Pressed and Released	High (Open)/Disable	Low (Open)/Disable	Toggles On/Off
No Effect	Low (Closed)/Enable	No Effect	On
No Effect	No Effect	High (Closed)/Enable	On

Fault Indicators

The FJ801 system continuously monitors the condition of all connected light sources. If a fault condition is detected on any light source, the background color of that light source changes to red, a warning symbol replaces the UV icon, and the message “FAULT n” is displayed.

When a fault is detected on Lamp 1, Pin 3 on the rear panel PLC I/F connector is pulled low; when a fault is detected on Lamp 2, Pin 4 is pulled low. This can be used to trigger an external fault indicator.

Figure 3.2 shows a fault condition detected in light source 2. Table 4.1, in the Service section of this manual, summarizes the fault conditions.

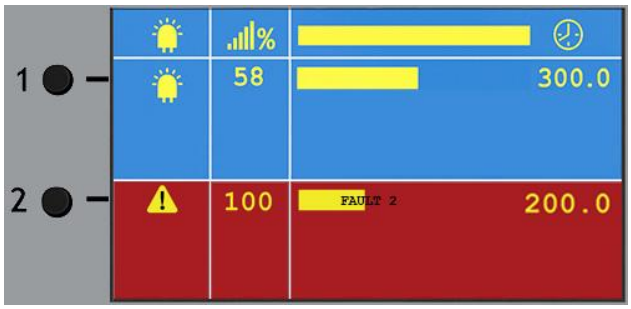


Figure 3.2: Fault Condition Example

Controller Operation and Setup

The FJ801 controller has four different modes of operation:

Operator Mode

The controller is in Operator Mode when the front panel key switch is in the locked (🔒) position. This is the normal mode for FJ801 system operation. When in this mode, the Intensity and Timer settings are “locked” and cannot be changed. The light source UV can be enabled and disabled from the remote switches, the PLC I/F, or the front panel buttons.

Supervisor Mode

The controller is in Supervisor mode when the front panel key switch is in the unlocked (🔓) position. This mode is indicated by the word “SUPERVISOR” appearing in the header row and a yellow triangle marker appearing on the left side of the display. The marker indicates which light source settings are adjustable with the front panel knobs.

Supervisor mode is used to change the Intensity and Timer settings. The settings are changed by rotating the knobs below the display. The left knob changes the Intensity and the right knob changes the Timer. The marker determines which light source settings are adjustable.

In Figure 3.3, the marker is in row 1 indicating settings for light source 1 will be changed by the knobs. To move the marker to a different row, press the front panel button corresponding to that row. Those light source’s settings can now be changed.

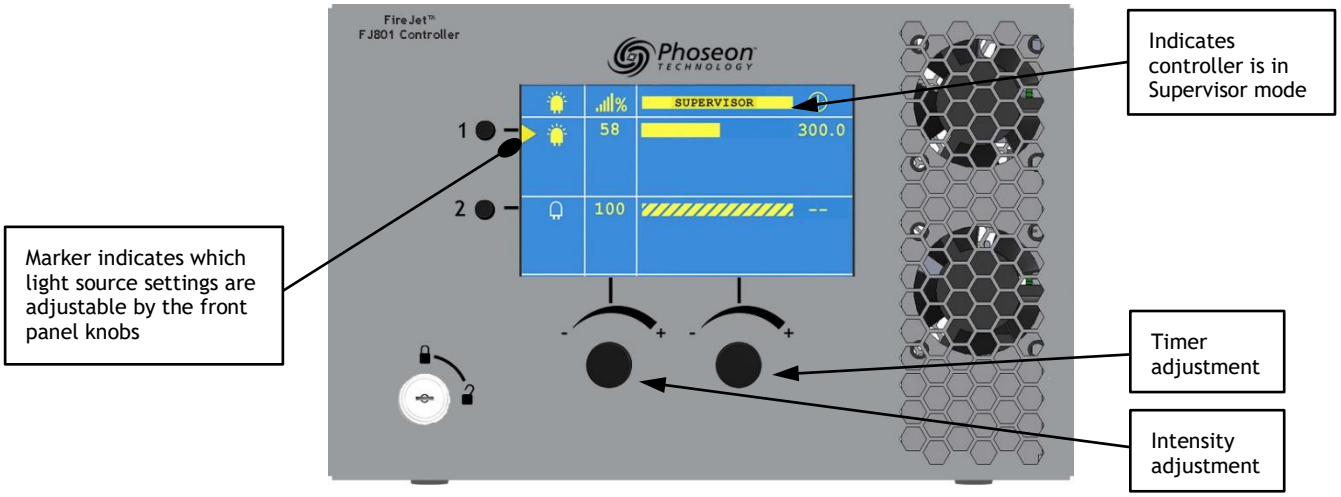


Figure 3.3: Supervisor Mode Example

Light source settings may be changed regardless of whether the light source is physically connected. This allows changing settings before the light source is installed.

NOTE: If a light source's UV is enabled, it is not possible to change that light source's settings. The light source UV must first be disabled before changing its settings. While in Supervisor mode, turning off a light source's UV must be done with an external switch connected to the rear panel switch connector or through the PLC I/F. Alternately, exit Supervisor mode to disable the UV with the front panel button, then re-enter Supervisor mode.

NOTE: When the controller is powered off, all new settings are stored in non-volatile memory.

Setting the Intensity

Turn the left knob clockwise to increase the Intensity setting. Turn the left knob counter-clockwise to decrease the Intensity setting. The range is 5% to 100% in 1% increments.

Setting the Timer

The Timer, as shown in Figure 3.4, has a range of 0.1 to 600.0 seconds. Setting the Timer changes both the length of the Timer bar as well as the number displayed.

When the light source UV is enabled, the Timer numbers begin counting down, and the Timer bar graphically shows the countdown status. The bar outline remains fixed at the original Timer setting, but the filled portion of the bar shrinks in proportion to the countdown.

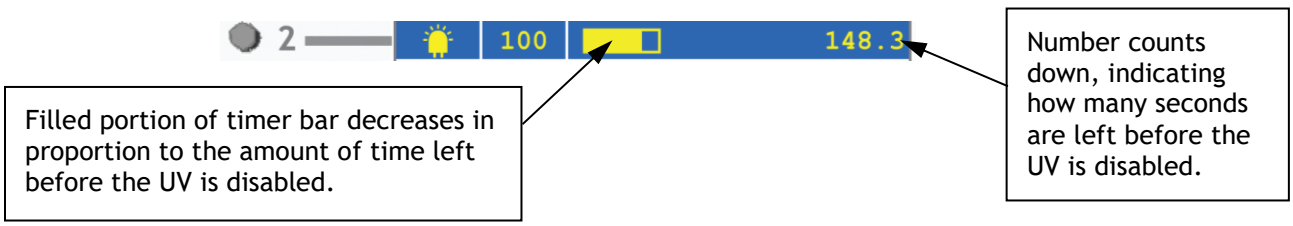
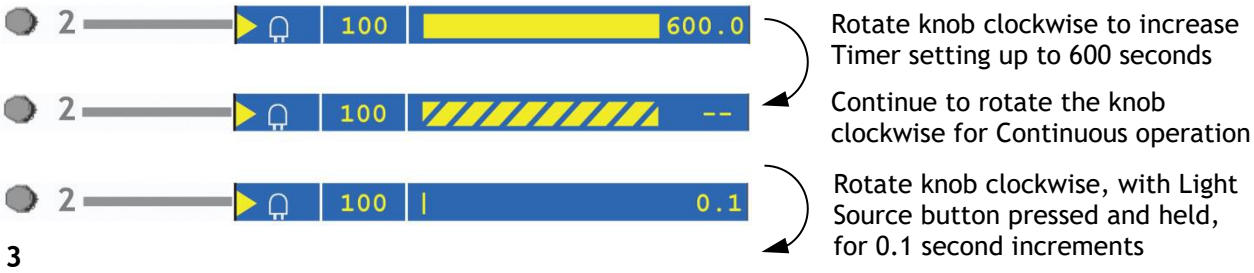


Figure 3.4: Controller Timer

When setting the Timer, rotating the knob clockwise increases the Timer setting in 10 second increments. This allows quick adjustment across the full 0.1 to 600.0 second range. To fine tune the Timer setting, press and hold the Light Source button while turning the knob to change the setting in 0.1 second increments. Once the Timer setting

reaches 600.0 seconds, rotating the knob further clockwise sets the Timer for continuous operation. This is indicated by a change in appearance of the Timer bar. When the Timer is set for continuous operation it does not countdown. The light source UV remains continuously enabled until turned off by the remote switch, the PLC signal, or the front panel button.

For convenience, turning the knob clockwise from the continuous operation setting will wrap the Timer setting back to 10 seconds or back to 0.1 seconds if the light source button is pressed and held while turning the knob.



3.5: Controller Timer Controls

Similarly, rotating the knob counter-clockwise from a setting of 10.0 seconds or less will set the Timer for continuous operation. Rotating the knob counter-clockwise from the continuous operation setting will wrap the Timer setting back to 600.0 seconds.

Group Light Sources for Scaled Operation

FJ801 light sources are scalable in both the X and Y directions. When two FJ801 light sources are scaled (mounted side-by-side), larger curing areas are achieved.

Note: The FJ801 is scalable on three sides (all sides except the side with exhaust vent)

When light sources are scaled, it may be necessary to control the light sources as if they are a single light source. This is achieved in the FJ801 controller by configuring the two light sources as a Group.

To group the two lamps, press and hold the Lamp 2 button, while in Operator mode. While holding the button, turn the Operator/Supervisor key to Supervisor. “Link” will appear for both lamps, as shown in Figure 3.6.

3.5: Grouped (Linked) Light Sources

Notes:

- The Intensity and Timer settings of the Lamp 1 are automatically applied to Lamp 2 in the Group.
- To *ungroup* the two lamps, press and hold the Lamp 2 button, while in Operator mode. While holding the button, turn the Operator/Supervisor key to Supervisor. “Link” will disappear for both lamps. Note that initially the ungrouped light sources will still have the same settings, but they can now be changed individually.

Irradiance as a Function of Distance

The UV emission from the FJ801 UV light source diverges with distance away from the window glass. However it is important to note that as the distance between the media and the emitting window increases, the total energy (dose) delivered by the light source remains constant. Peak irradiance decreases as the working distance increases, but it is offset by an increase in the exposure area (light footprint), keeping the dose constant.

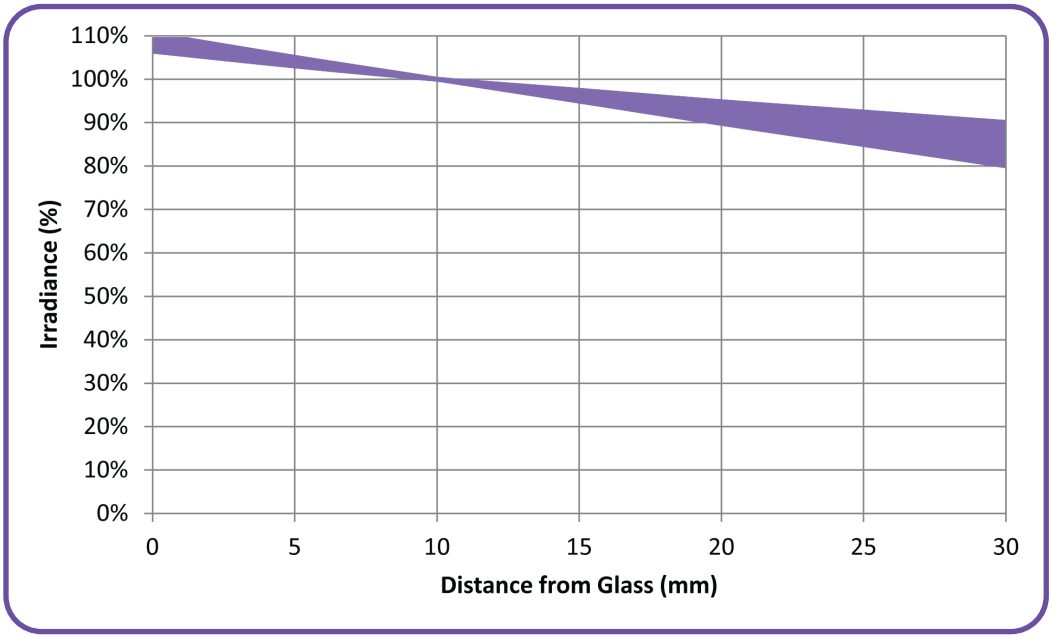


Figure 3.11: Irradiance as a Function of Distance

Service

For further details contact Phoseon Technology by phone at +1.503.439.6446 or email at customerservice@phoseon.com.

Troubleshooting Guide

Table 4.1: Troubleshooting Guide

Symptom	Light Source State	Probable Cause	Action Needed
Controller displays “FAULT 1”	UV off, Fan on	Light source internal component failure	Light source not field serviceable. Contact Phoseon.
Controller displays “FAULT 2”	UV off, Fan on Fault clears if internal temperature drops below a safe value	Excessive light source temperature detected by hardware circuit	Check light source ambient conditions. Maximum ambient temperature is 40°C. Air intake and exhaust ports on light source must have 50mm clearance.
Controller displays “FAULT 3”	UV off, Fan on Fault clears if internal temperature drops below a safe value	Excessive light source temperature detected by firmware	Check light source ambient conditions. Maximum ambient temperature is 40°C. Air intake and exhaust ports on light source must have 50mm clearance.
Controller displays “FAULT 4”	UV on, Fan on	Light source internal component failure	**Power off controller immediately to turn UV off.** Light source not field serviceable. Contact Phoseon.
Controller displays “FAULT 5”	UV off, Fan off Fault clears if DC voltage recovers	Excessive DC voltage applied to light source	Replace connecting DB-15 cable between controller and light source with a known good cable to verify if the original cable is defective. Controller may need servicing. Contact Phoseon.
Controller displays “FAULT 6”	UV off, Fan off Fault clears if DC voltage recovers	Insufficient DC voltage applied to light source	Replace connecting DB-15 cable between controller and light source with a known good cable to verify if the original cable is defective. Controller may need servicing. Contact Phoseon.
Controller displays “FAULT 11”	UV off, Fan on	Too many excessive light source temperature faults	Check light source ambient conditions. Maximum ambient temperature is 40°C. Controller must be power cycled to clear this fault.
Controller display is blank	All light sources UV off. All fans off	Power Connection	Check the power cord on the controller. Check the outlet the power cord is connected to for proper voltage and current capability.
		Controller circuit breaker	Cycle the power switch on the rear of the controller to reset the circuit breaker.
		Controller internal power supply	Controller not field serviceable. Contact Phoseon.
	All light sources function normally	Controller internal component failure	Controller not field serviceable. Contact Phoseon.

Symptom	Light Source State	Probable Cause	Action Needed
Controller indicates Light source is connected but the Light source cannot be enabled	UV off, Fan off	Controller is in Service mode.	Turn front panel key switch to the locked position (Operator mode).
Controller erroneously indicates light source is not connected	UV off, Fan off	Light source cable	Check the DB-15 cable for proper connection to both the controller and Light source. Replace the cable with a known good cable to verify if the original cable is defective.
		Light source internal component failure	Replace the light source with a known good light source to verify if the original light source is defective. Light source not field serviceable. Contact Phoseon.
		Controller internal fuse blown.	An internal fuse may need replacing. Contact Phoseon for more information.
Front Panel buttons do not enable / disable Light source	UV on, Fan On	Remote switch or PLC is currently controlling light source.	None. Light source is operating normally. The remote switch or PLC lines override the front panel buttons.

Window Cleaning Instructions

User Guide

Phoseon requires inspecting and cleaning the emitting window of the light source for any debris or UV material on a regular basis, up to daily if needed, to maintain the quality of UV light output.

Note: Do not submerge the light source or spray any liquid directly onto the light source.

The materials needed to properly clean the Phoseon light source, can be purchased from most home improvement supply stores, paint stores, or auto-body repair shops.

Materials Needed:

- Dry Paper Towels
- Razor Blade and Handle
- IPA Pre-moistened Wipe
- Gloves: Vinyl and Sharp Resistant (i.e. Kevlar)
- Sharps Disposal Container

Instructions:

1. Disconnect DC Power from the light source.

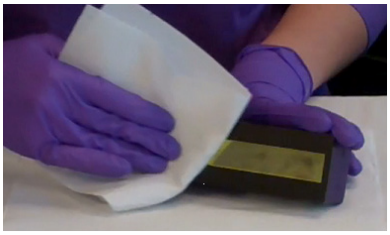
   CAUTION: Wearing vinyl gloves is recommended to avoid getting any uncured UV material on the skin.

2. Wipe down the glass with a dry paper towel to remove any uncured UV material.
3. Carefully scrape large debris off the window using the sharp edge of the razor.

   CAUTION: Wear sharp-resistant gloves.

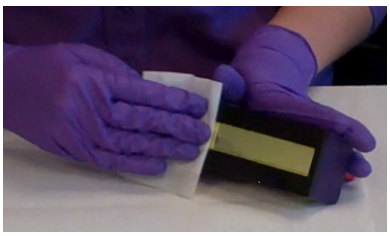
   Note: If the razor needs to be replaced, dispose of the razor blade in a properly marked sharps container.

4. Use the pre-moistened IPA wipe to remove any remaining dust or debris left on the window during the cleaning process.
5. Repeat steps 2 through 5 until the window is clear of all contaminants.
6. If needed, use a dry paper towel to wipe down the light source.



Wipe Glass

Scrape with Razor



Wipe with IPA

info@phoseon.com
www.phoseon.com

27182 Rev 7.0
February 2017

Declaration of Conformity (CE)

Product Identification

Brand	Phoseon						
Product Family	**Product Models**						
FireEdge™	75x5 FE100 80x10 FE200 75x10 FE300 75x10 FE400 80x10 FE410 80x10	FE100 120x10 FE200 110x10 FE300 110x10 FE400 120x10 FE410 120x10	FE100 180x10 FE400 160x10 FE410 160x10	FE100 240x10 FE400 180x10 FE410 180x10	 FE400 240x10 FE410 240x10		
FireFlex™	75x50	150x50	225x50				
FireFly	25x10 50x20 FF200 25x20	25x20 75x20 FF200 50x20	25x25 150x20				
FireJet™	225x20 ONE 75x20 FJ100 75x20 FJ100 G2 75x20 FJ240 75x40 FJ601 225x20 FJ605 300x20 FJ800 100x100 FJ801 100x100	 ONE 150x20 FJ100 150x20 FJ100 G2 150x20 FJ200 150x20 FJ240 150x40 FJ601 300x20 FJ605 375x20	 FJ50 225x20 ONE 225x20 FJ100 225x20 FJ100 G2 225x20 FJ200 225x20 FJ200SLD 225x20 FJ228 225x20 FJ240 225x40 FJ601 375x20 FJ605 450x20	 ONE 300x20 FJ100 300x20 FJ100 G2 300x20 FJ200 300x20 FJ240 300x40 FJ601 450x20 FJ605 525x20	 ONE 375x20 FJ100 375x20 FJ100 G2 375x20 FJ200 375x20 FJ240 375x40 FJ601 525x20 FJ605 600x20	 FJ605 675x20	
FireLine™	125x20 350x20 FL200 75x10 FL400 125x20 FL400SLD 125x20 FL440 125x40	150x20 450x20 FL200 125x10 FL400 150x20 FL400SLD 150x20 FL440 150x40	225x20 550x20 FL400 225x20 FL400SLD 225x20 FL440 225x40	300x20 675x20 FL400 250x20 FL400SLD 250x20 FL440 250x40	 FL400 300x20 FL400SLD 300x20 FL440 300x40		
FirePower™	FP200 150x20 FP300 150x20 FP501 300x20 FP601 300x20	FP200 225x20 FP300 225x20 FP501 350x20 FP601 350x20	FP200 300x20 FP300 300x20 FP501 450x20 FP601 375x20	FP200 350x20 FP300 350x20 FP501 525x20 FP601 450x20	FP200 450x20 FP300 450x20 FP501 600x20 FP601 525x20	FP300 900x20 FP501 700x20 FP601 600x20	 FP601 675x20
KeyPro™ Explorer	25x10						
StarFire™	100x20	150x20					
StarFire MAX™	75x20	150x20	225x20	300x20			

Manufacturer

Name: Excelitas Technologies
Address: 7425 NE Evergreen Parkway, Hillsboro, Oregon 97124-5845
Country: United States of America

Means of Conformity

Excelitas Technologies declares that the product listed as a result of its design and construction is in conformity with the essential requirements and provisions of the following Council Directives and standards:

Applicable Directives:

- 2014/35/EU (Low Voltage Directive)
- 2014/30/EU (Electromagnetic Compatibility)
- 2011/65/EU (RoHS2)

Standards Used to Verify Compliance:

- EN 61010-1:2010/A1:2019/AC:2019-04/A1:2019
- EN 62471 (2008) IEC 62471 (2006)
- EN 61326-1 (2013)

Signature

Signature (electronic): Rob Gomeau

Name: Rob Gomeau, Director of Operations

Place : Hillsboro, OR