RX Series Products
Phoseon
FireFly™
User Manual

March 2011

PN 26418 Rev. 1.0

Phoseon
FireFly™ - 4W
SOLID STATE UV CURING SYSTEM
USERS MANUAL
PN: 26418

Phoseon Technology, Inc.
7425 NW Evergreen Parkway
Hillsboro, OR 97124-5845
USA

For Technical Assistance Contact:
Phone +1 503 439 6446 • Fax +1 503 439 6408
Email: customerservice@phoseon.com
Home Page: www.phoseon.com

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Revision History

Revision	Nature of Change	Date
1.0	Initial Release	March 2011

Chapter 1

Introduction

Chapter Contents

Summary

This chapter provides a general introduction of the RX FireFly and its key characteristics and functions.

1 INTRODUCTION

Like all RX Series products the RX FireFly utilizes SLM™ technology which combines an array of light emitting semiconductor devices with high tech micro optics and micro cooling in a cost effective MOEMS (micro-opto-electro-mechanical system). SLM™ technology offers low cost of ownership, low energy consumption, increased productivity, long lifetime, as well as cooler operating temperature. The product's physical package is environmentally attractive with mercury and ozone free operation.

1.1 RX Series UV Curing System Components

RX FireFly UV Curing System requires the following components:

1.1.1 RX FireFly UV Light Source

The RX FireFly emits a narrow band of pure UV light between 380-420nm. Since there is no emission in the deep UV region of the spectrum, the RX FireFly does not produce ozone making it an environmentally friendly UV Curing System. See Section 2.3 for UV safety.

The product name which is shown on the product identification label will define the production configuration:

Example: FireFly™ 25x20AC395-4W
- 25 represents the UV emitting length in mm
- 20 represents the UV emitting width in mm
- AC defines unit as air-cooled
- 395 defines wavelength in nm
- 4W defines the factory set peak irradiance up to 4W/cm² measured at the UV emitting window

1.1.2 DC Power Supply

The RX FireFly utilizes standard off-the-shelf power supplies. Since RX Series products only require about 1/5 the electrical power of a traditional arc lamp; the power supply is compact and energy efficient. See the Site Requirements Section 3.3 for power supply specifications.

1.1.3 Air Cooling

The RX FireFly is an air-cooled product. The heat generated by the semiconductor devices is dissipated with proprietary thermal management technology with no excess heat to the substrate. Since SLM™ technology produces 1/10 of the heat generated by traditional arc lamps; the cooling requirements are significantly lower resulting in lower cost of operation. See the Site Requirements Section 3.4 for airflow specifications.

1.1.4 Control

The RX FireFly is controlled through simple voltages for easy integration. Since the semiconductor devices utilized in SLM™ technology can be turned on and off within a few milliseconds, there is no need for shutters and the Light Source can be enabled only when needed resulting in lower energy consumption and overall cost of operation. See the Setup Section 4.1.2 for PLC interface specifications.

Chapter 2

Safety

Chapter Contents

Summary

This chapter provides information regarding safe operation of the RX Series Light Source.

2 RX FireFly Safety

It is important that you familiarize yourself with the safety features that are incorporated into the machine to provide a safe working environment.

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

The yellow safety alert symbol indicates a 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.

2.1 Protective Guards

Phoseon Technology equipment is fitted with protective guards that fully enclose electrical mechanisms that may harm you or others during normal use. The fixed guards on Phoseon Technology equipment adhere to the appropriate international safety standards.

> **Note:** Do not operate the machine while any of the safety guards are open, loose, damaged or missing.

2.2 Safety Notices

Symbol	English description Safety Notices	German description Sicherheitshinweise	French description Consignes de Sécurite	Spanish description Notas de Seguridad	Japanese description 安全通知
	**Attention** Read manual for safety instructions	**Vorsicht** Bitte Vorsichtsmassnahmen in der Gebrauchsanleitung lesen	**Attention** Lisez les instructions de sécurité dans le manuel	**Atención** Lea el manual de Instrucciones de seguridad	**注意** 安全上の注意のためのマニュアルを読みなさい
	**UV Light** Read manual for safety instructions	**UV LICHT** Vorsichtsmassnahmen in der Gebrauchsanleitung lesen	**Lumière UV** Lisez les instructions de sécurité dans le manuel	**Luz UV** Lea el manual de Instrucciones de seguridad	**紫外線** 安全上の注意のためのマニュアルを読みなさい
	**Warning** RISK GROUP 3 UV EMITTED FROM THIS PRODUCT Avoid eye and skin exposure to unshielded product.	**Warnung** UV STRAHLUNG RISIKOGROUPE 3 VON DIESEM PRODUKT EMITTIER Vermeiden Augen und Haut Exposition von Produkt ohne ausreichenden Schutz.	**Avertissement** Rayonnement UV À Risque de Groupe 3 Évitez l'exposition d'oeil et de peau au produit non protégé.	**Advertencia** RADIACION UV DE RIESDGO GRUPO 3 EMITIDA POR ESTE PRODUCTO Evite la exposición de ojos y piel por el producto sin protección adecuada.	**注意** LED線照射からの紫外光にご注意下さい 安全設備をちゃんと設置してご使用下さい 照射機からの紫外光を直線に目視することや皮膚に直接照らすことをお控え下さい。

Table 2-1 Safety

Figure 2-1 RX FireFly Safety Label Placement

2.3 UV Safety

Phoseon makes high-intensity solid-state ultraviolet (UV) Light Sources for industrial curing applications. These applications require high radiance and irradiance to initiate desired chemical reactions.

CEI/IEC 62471 describes the photo-biological safety standards of lamps and LED systems. The actual source classification depends on usage, however, and when equipped with the proper interlocks and with limited viewing it is possible to make Phoseon sources safe for workers in the immediate vicinity.

Hazard Classification:
The classification scheme indicates only the potential risk. Depending upon use factors, time of exposure, and luminaire effects, these potential hazards may or may not actually become real hazards. Where the Light Source is intended for special applications, it should be evaluated and rated for the intended application. Distance specified in IEC 62471 for hazard classification is 200mm.

Risk groups defined in IEC 62471

Exempt means 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

Note: A portion of the RX Series UV Light Source will be visible and will be a strong visual stimulus.

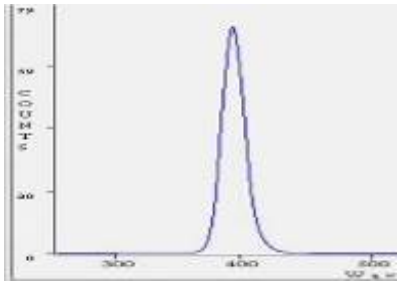


Figure 2-2 Spectral Distribution

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

Phoseon's Light Sources are classified as Risk Group 3 under IEC 62471 *when viewed directly* and *close-up*. However, when integrated into equipment, the risk is low to moderate or the Light Sources are exempt depending on specific integration schemes.

Therefore, it is important that you do not look directly at the UV Light Source without wearing UV safety goggles. For example: 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 absorbs 99.9% of UV radiation and visible light up to 532nm. Note: RX Series products emit 90% or more of the total UV light energy between 380-420nm.

As with all personal protective equipment, it is the employer's responsibility to conduct an on-site or workplace hazard assessment.

2.4 Integration of RX Series System

RX Series systems are designed so that they can be professionally installed into a final product. It is the responsibility of the installer to ensure that the final product housing the RX Series components complies with the requirements of all applicable directives for the product.

The RX Series Light Source and optional power supply, if purchased, is supplied as “open type” equipment. The RX Series system 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.

2.5 Restriction of Hazardous Substances (RoHS)

Phoseon Technology declares to the best of our knowledge, based on available information conducted to us, that the RX FireFly does 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)

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

Phoseon Technology has determined that their 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.

2.7 Product Recycling (WEEE)

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 2-3 Do Not Recycle Symbol

Chapter 3

Site Requirements

Chapter Contents

Summary

This chapter provides an overview of the site requirements for integrating an RX FireFly UV Light System.

3 Site Requirements

3.1 Footprint

3.1.1 Light Source Dimensions

RX FireFly	Size
Length (mm)	110
Width (mm)	68
Height (mm)	200

Table 3-1 Light Source Dimensions

3.1.2 Optional Power Supply Dimensions

Power Supply	SDR-480-48
Length (mm)	86
Width (mm)	125
Height (mm)	129

Table 3-2 Power Supply Dimensions

3.2 Weight

3.2.1 RX FireFly

- RX FireFly: 1 kg (2.2 lbs)

3.2.2 Optional Power Supply

- 480W: 1.6 kg (3.5 lbs)

3.3 Electrical

The RX FireFly requires a switching power supply with constant voltage output. The power supply tested by Phoseon for use with the RX FireFly systems is the Mean Well SDR-480-48 (see Appendix A). The Mean Well specifications can be used as a guideline for selecting a switching power supply with the following critical specifications:

- 48VDC +/- 1V delivered to the Light Source from constant voltage output source
- Minimum Watts delivered to the Light Source based on configuration (see Table 3-3)
- Maximum ripple should be on the order of 4V peak-to-peak

Product	Power Requirement	Voltage at the Light Source	Optional Mean Well Power Supply
RX FireFly 75x20	Up to 480W	+48±1VDC	SDR-480-48
RX FireFly 50x20	Up to 336W	+48±1VDC	SDR-480-48
RX FireFly 25x20	Up to 192W	+48±1VDC	SDR-480-48

Table 3-3 RX FireFly Power Requirements

3.4 Airflow

The RX FireFly has an internal cooling fan to properly cool the components. Do not restrict the airflow, it may be necessary to exhaust air to maintain proper airflow if the system is integrated.

- Minimum clearance of 50mm should be maintained for main air inlet and exhaust ports

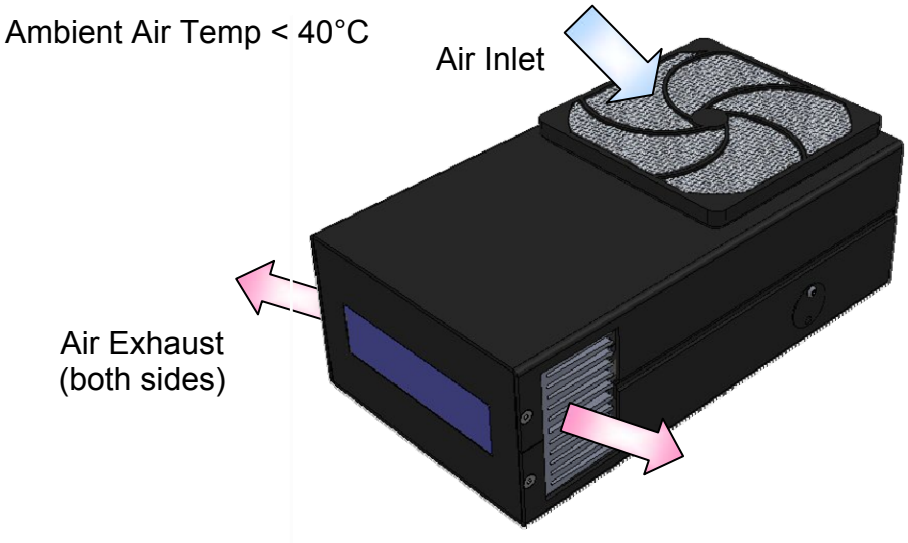


Figure 3-1 Airflow direction for RX FireFly

An optional air filter replacement is also available for the top air inlet, PN 25981, Multicomp PN MC32707, polyurethane foam, 45 ppi.

3.5 Environmental

3.5.1 Light Source

Light Source	RX FireFly
Operating Environment	Indoor Use Only
Operation Altitude	Up to 3000m*
Operating Temp (°C)	0 to 40
Storage (°C)	-20 to 85
Humidity RH non-condensing for temperatures up to 30°C	20 to 95%

Table 3-4 RX FireFly Environmental Specifications

* Power supply selected for integration should be consistent with intended altitude requirements.

This instrument has been designed for use in harsher industrial manufacturing environments with pollution degree 3.

3.5.2 Optional Power Supply

If using the optional Mean Well power supply, environmental specifications are shown below. Please refer to Appendix A for additional Mean Well power supply specifications.

Power Supply Model	SDR-480-48
Description	480W
Operating Environment	Indoor Use Only
Operating Altitude	Up to 2000m*
Operating Temp (°C)	-25 to 70**
Storage (°C)	-40 to 85
Humidity RH non-condensing	20 to 95%
Cooling	Forced air

Table 3-5 RX FireFly Optional Power Supply Environmental Specifications

* Note the power supply rated altitude is lower than the Light Source
** When operated above 70°C, see de-rating curve in Appendix

Power supply pollution degree rating should be consistent with end user's environmental conditions.

3.6 PLC Control

The Light Source can be controlled via a PLC (Programmable Logic Controller) using the 13W3 connector. For more information please refer to section 4.1.2 of this manual.

Chapter 4

Light Source Setup

Chapter Contents

Summary

This chapter of the manual will cover the steps required to setup the RX FireFly UV Light System.

4 Setup & Operation

The diagram below shows an overview of the components that will need to be setup for proper operation of the RX FireFly UV Light Source System.

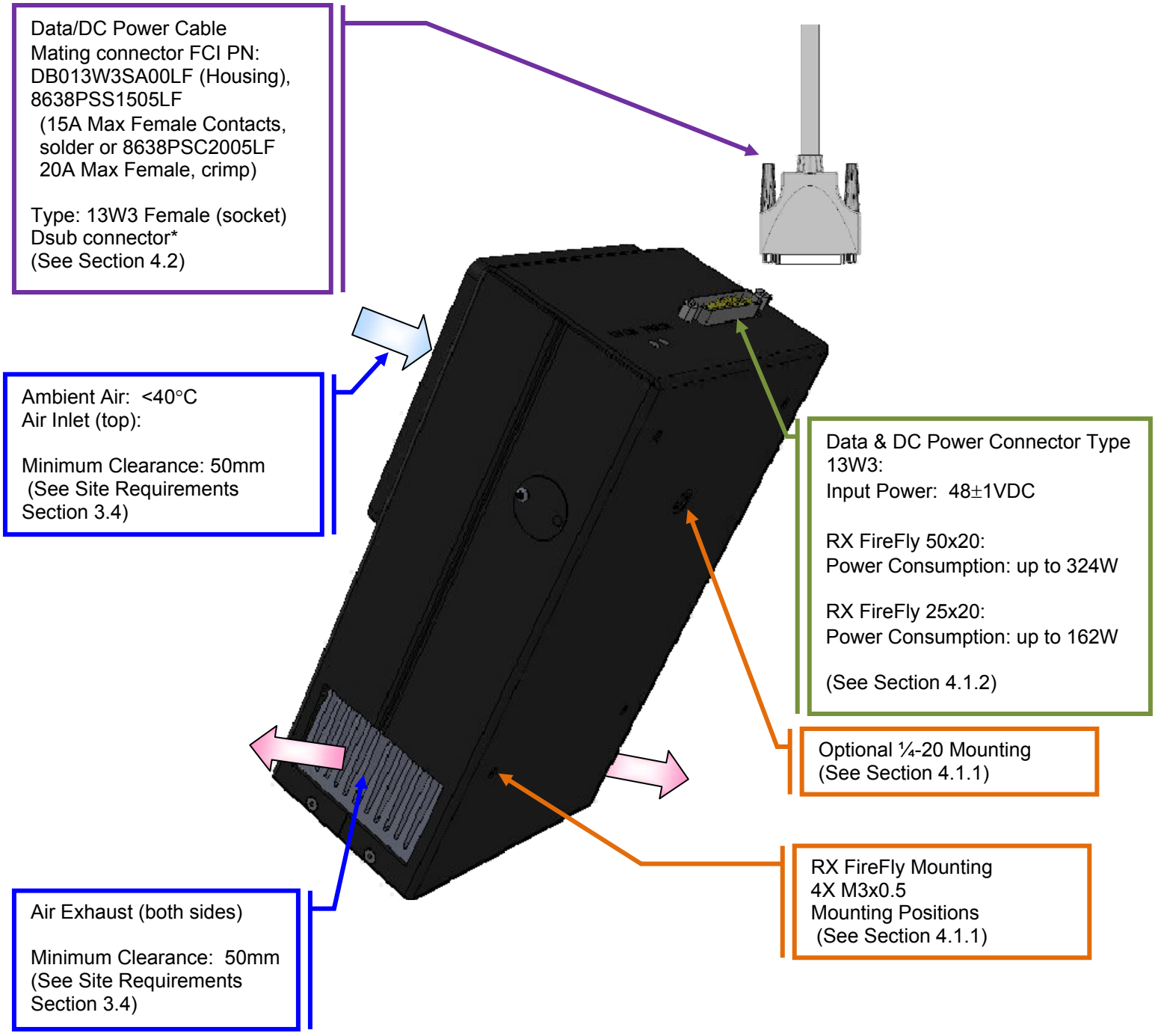


Figure 4-1 Diagram for RX FireFly System Setup

*Components shown with purple outline are options that are sold separately and are available from Phoseon.

4.1 RX FireFly Setup

An overview of the steps required to setup the RX FireFly UV Light System are shown below with detailed instructions for each step in the following sub-sections:

4.1.1 Mounting
4.1.2 PLC/Power Interface
4.1.3 Light Source Setup Scenarios

4.1.1 Mounting:

The RX FireFly can be mounted using the mounting holes located on the back of the unit as shown in the diagram below:

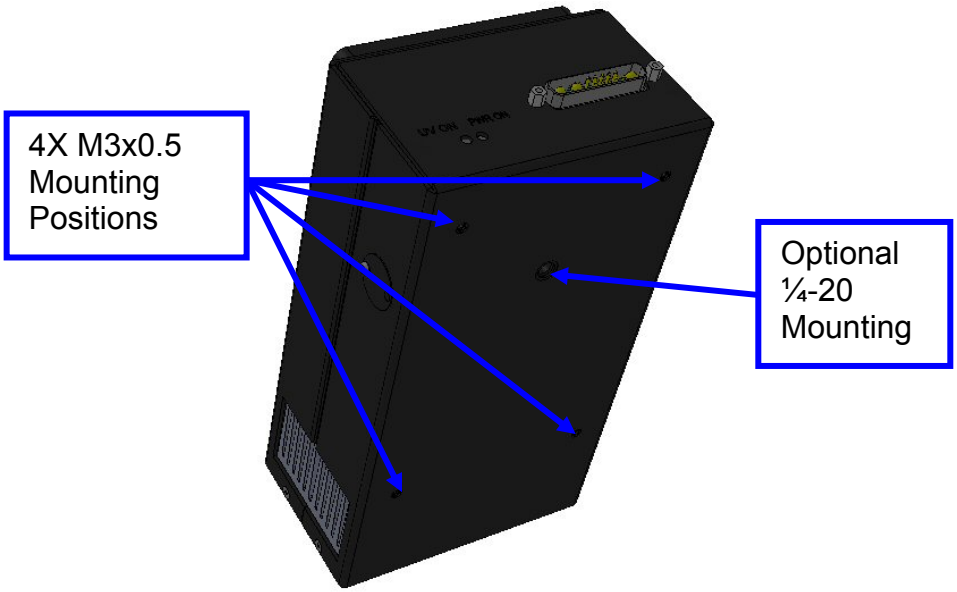


Figure 4-2 RX FireFly Mounting Holes

In order to assist users with process development, Phoseon offers an optional RX FireFly adjustable arm as shown below. The RX FireFly has a standard ¼-20 mounting hole as shown in the functional layout diagram (Figure 4-4) for ease of mounting with standard camera connections or optical bench.

Figure 4-3 RX FireFly Adjustable Arm Option

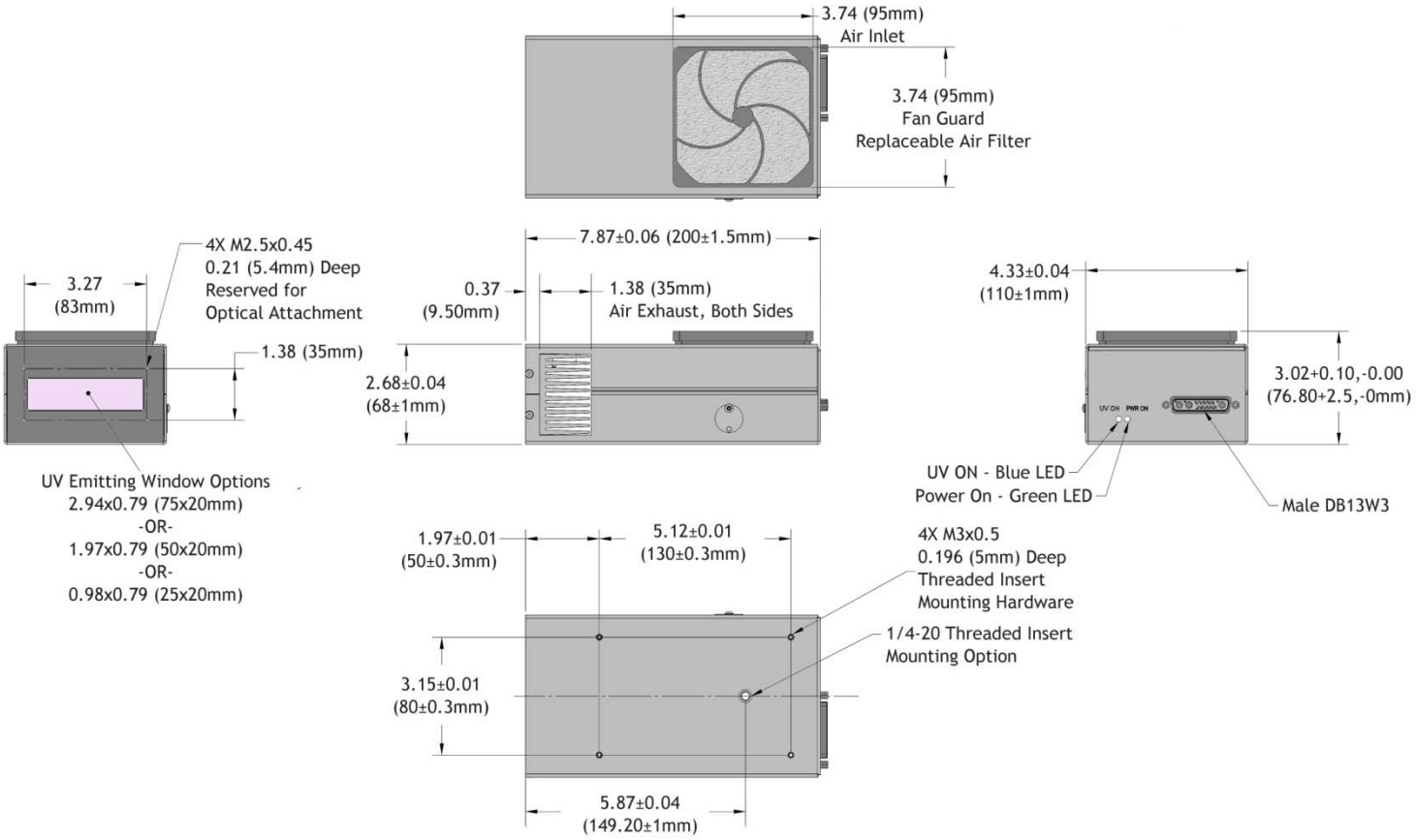


Figure 4-4 Design Layout of the RX FireFly-4W

4.1.2 PLC Interface

The DB13W3 connector is used to control the Light Source via a PLC and also provides power to the Light Source. The connector, as shown below is numbered with Pins 1-5 on the top row (right to left) and Pins 6-10 on the bottom row (right to left). Figure 4-5 shows the pin numbering on the RX FireFly connector and Table 4-1 shows the connector pin assignments.

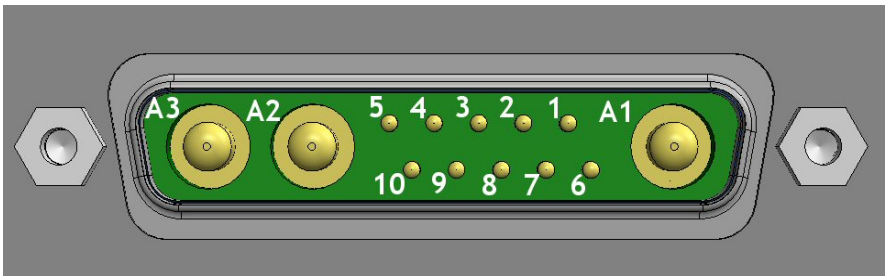


Figure 4-5 DB13W3 Connector Pin Number Diagram

Note: All input and output control signals; i.e. voltages, from the Light Source, must be referenced to the same common Ground as the 48VDC input power.

There is a connector located on the side of the RX FireFly, as shown below, that is for factory use ONLY. DO NOT connect to this connector.

Figure 4-6 RX FireFly Factory Use Only Connector

The 13W3 connector on the RX FireFly has the following interface:

Pin	Function	Input/ Output	Range (min/max)	Comments
1	Do Not Use	---	---	Do Not Use
2	INTENSITY CONTROL (Option 1)	I	0.0V to +5.0V	Input voltage is converted to required current to achieve desired intensity where 5V = 100% and 1.0V = 20%. A minimum voltage of 1.0V is required for proper Light Source operation. Note: Connect to Pin 6 for 100% Intensity (Zin = 10kΩ)
3	ENABLE HIGH	I	0.0V or +5.0V	TTL (transistor-transistor logic) Input: 0.0V to +0.4V = OFF (Open input will default to OFF) +3.5V to +5.0V = ON RX FireFly behavior if operated outside these specified voltages is not definite.
4	INTENSITY CONTROL (Option 2)	I	0.0V to +10.0V	Input voltage is converted to required current to achieve desired intensity where 10V = 100% and 2.0V = 20%. A minimum voltage of 2.0V is required for proper light source operation. (Z_{in} = 10kΩ)
5	THERMAL FAULT	O	0.0V or +5.0V	Open Collector TTL Output / TTL Input: 0.0V to +0.4V (Ground) = Fault +3.5V to +5.0V (open) = No Fault Sink Current Maximum = 5mA RX FireFly behavior if operated outside these specified voltages is not definite. Note: See Figure 4-7 for more details
6	Do Not Use	---	---	DO NOT USE; Except to connect directly to Pin 2 for 100% Intensity
7	INTERLOCK	I	0.0V or +5.0V	For use with external customer defined interlock circuit, if no interlock is present, defeat this feature by connecting one of the Ground pins to Pin 7 If interlock circuit is present, connect interlock to Pin 7 only. TTL (transistor-transistor logic) Input: 0.0V to +0.4V = UV Emission Allowed +3.5V to +5.0V = UV Emission Stopped RX FireFly behavior if operated outside these specified voltages is not definite. Note: Connect to Ground pin (Pin 8 or 10) if no interlock is used Refer to Operation Section 5.5 for implementation details
8, 10	Ground	---	0.0V	Ground
9	TEMPERATURE MONITOR	O	0.0V to +10.5V	Output is a voltage proportional to SLM heat sink temperature This value should not exceed approximately +8V Conversion Factor: 0.1V/˚C (Example 30˚C = 3.0V)
A1	+48VDC Power Input	I	+47V to +49V	+48VDC Power Input to power Light Source
A2	Ground	---	0.0V	+48VDC Return, Ground
A3	PE	---	0.0V	Protective Earth, Ground

Table 4-1 Pin Connections for the 13W3 Connector

The diagram below illustrates the circuitry involved if a fault should occur (pin 5).

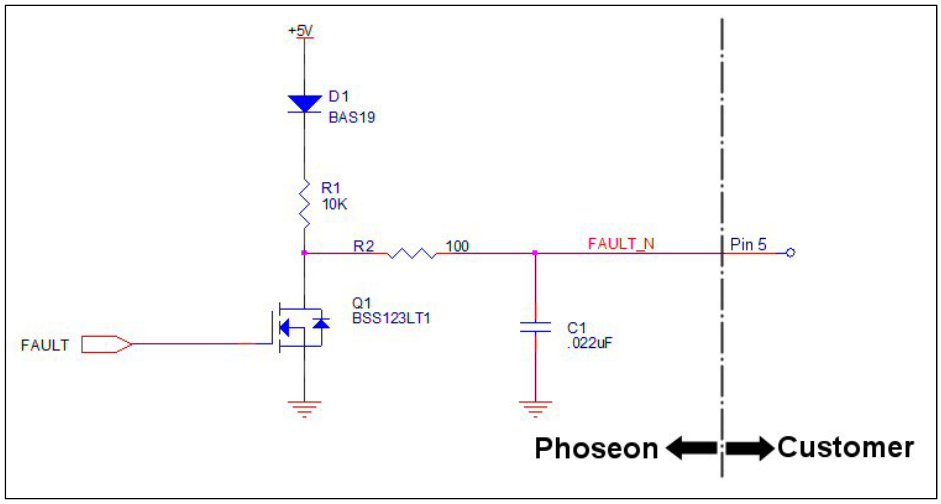


Figure 4-7 Fault (Open Collector Output) Diagram

4.1.3 Light Source Setup Scenarios

Setup Scenario #1 – On/Off at 100% Intensity

- No PLC – Simple On/Off Switch
- 100% Intensity Only
- No Fault or Temperature Monitoring
- No External Interlock

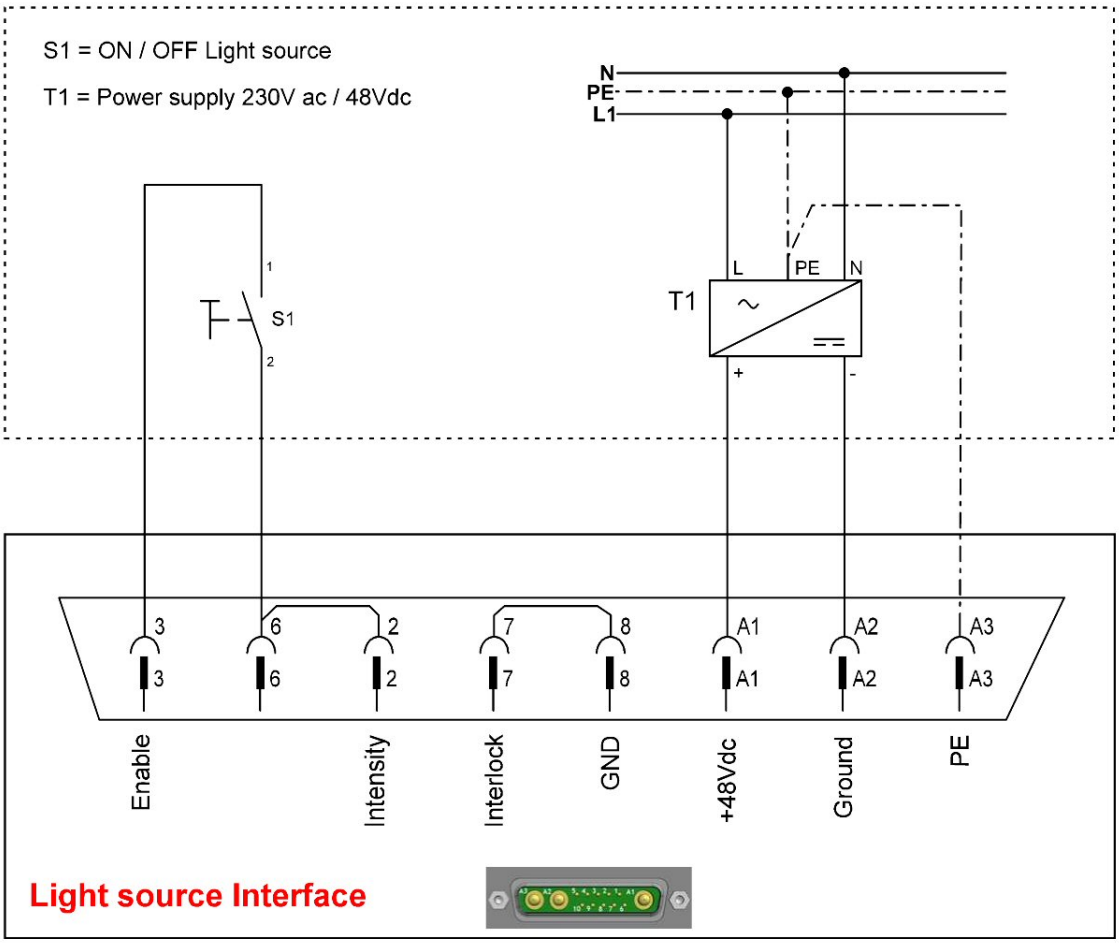


Figure 4-8 Light Source Setup Scenario #1

Setup Scenario #2 – On/Off with Intensity Control using PLC

- PLC Control
- Intensity Control 1-5V for 20-100% UV Output
- Temperature Monitoring
- No Fault Monitoring
- No External Interlock

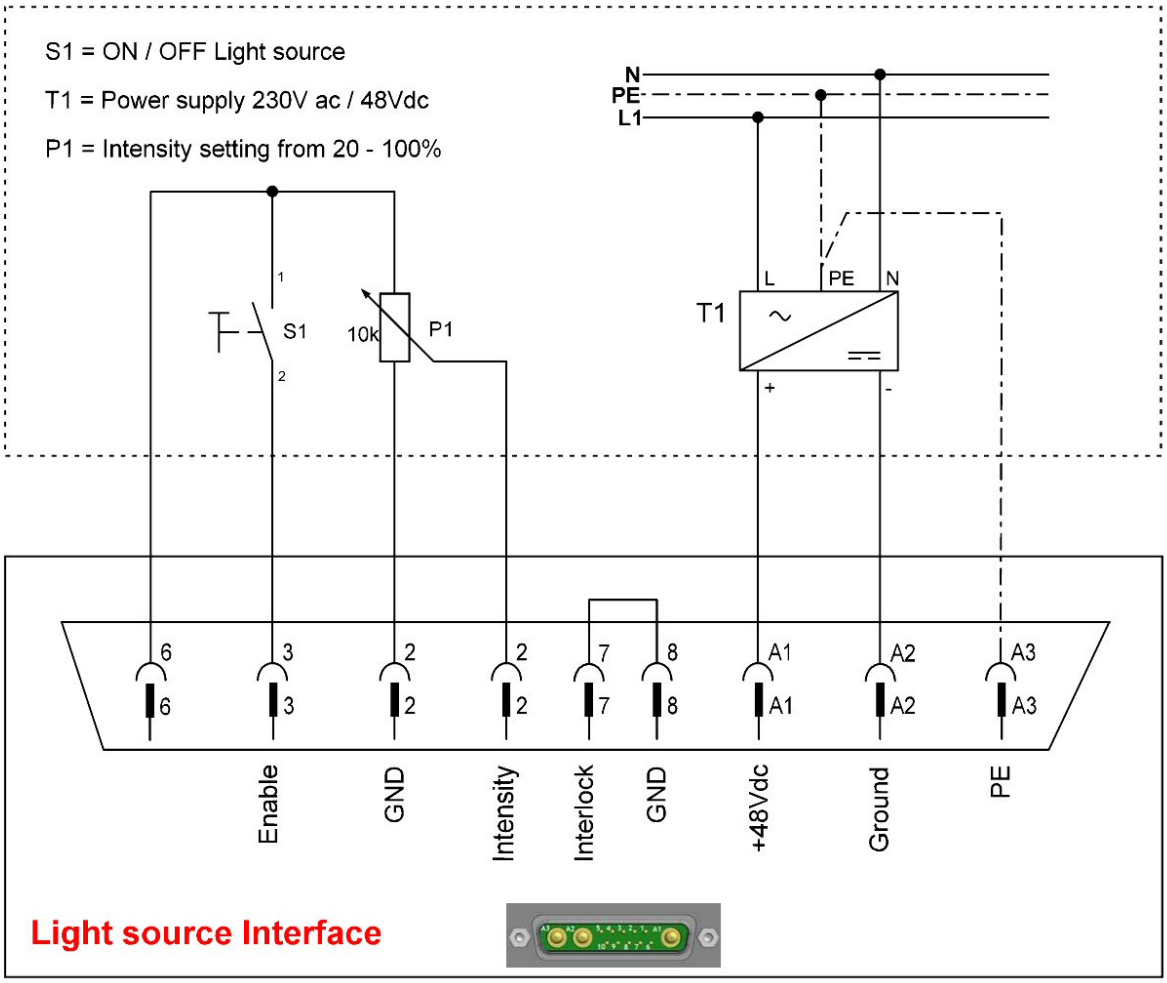
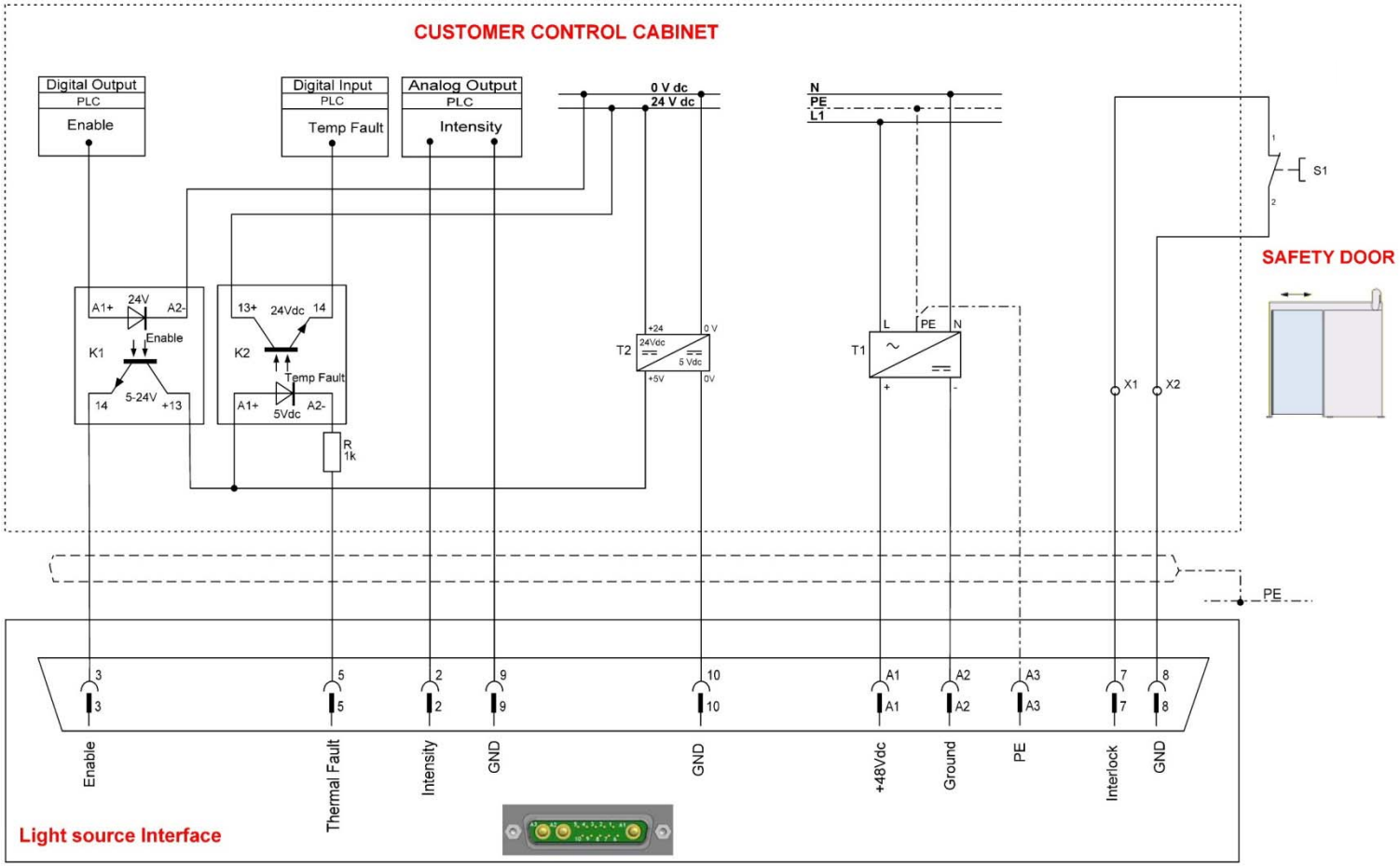


Figure 4-9 Light Source Setup Scenario #2

Setup Scenario #3 – On/Off with Intensity Control and feedback using PLC

- PLC Control
- Intensity Control 1-5V for 20-100% UV Output
- Temperature Monitoring
- Thermal and SLM Fault Monitoring
- External Interlock



S1 = Safety Door

T1 = Power supply 230V ac / 48Vdc

T2 = Power supply 24V ac / 5Vdc

K1 / K2=Optocoupler

Figure 4-10 Light Source Setup Scenario #3

4.2 DC Power/Data Cable Connections for the RX FireFly

The RX FireFly-4W Light Sources are connected to the power supply through a 13W3 type connector where Pins A1-A3 are for DC power input and pins 1-10 are for light source control through a PLC.

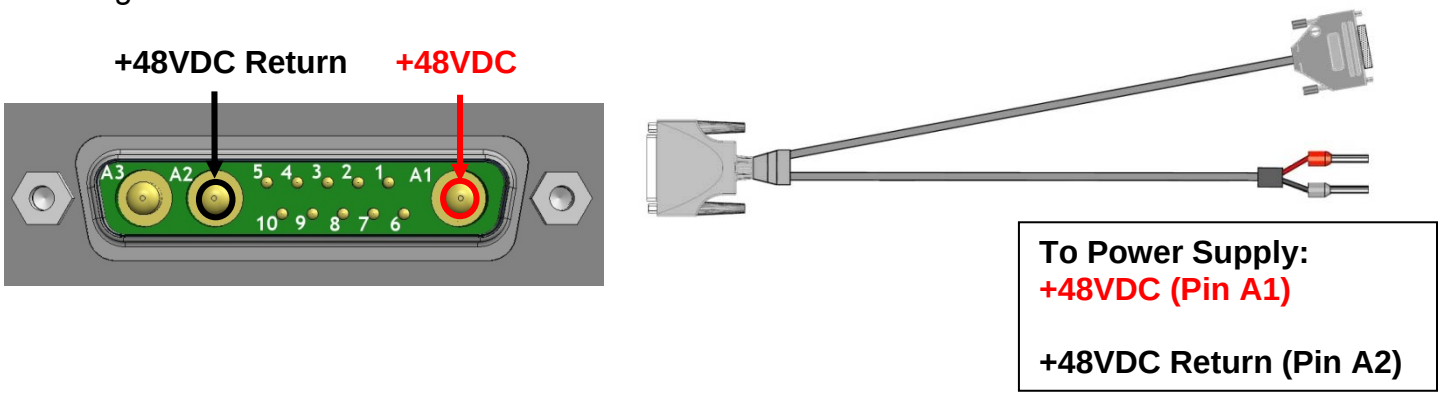


Figure 4-11 RX FireFly DC Connector and Cable

The mating DB13W3 connector is a 13W3 Female (socket) Dsub connector. FCI part numbers for the connector assembly are as follows: DB13W3SA00LF (Housing), 8638PSS1505LF (15A Max Female Contacts) and 8655MH2501LF (connector back shell).

If the DC Power/Data Y cable is purchased from Phoseon, the pin diagram of the DB15 is as follows:

Pin	Function	Input/ Output	Range (min/max)	Comments
1	Do Not Use	---	---	Do Not Use
2	INTENSITY CONTROL (Option 1)	I	0.0V to +5.0V	See Pin 2 on 13W3 Connector, Table 4-1Table 4-1
3	ENABLE HIGH	I	0.0V or +5.0V	See Pin 3 on 13W3 Connector, Table 4-1
4	INTENSITY CONTROL (Option 2)	I	0.0V to +10.0V	See Pin 4 on 13W3 Connector, Table 4-1
5	THERMAL FAULT	O	0.0V or +5.0V	See Pin 5 on 13W3 Connector, Table 4-1
6	Do Not Use	---	---	See Pin 6 on 13W3 Connector, Table 4-1
7	INTERLOCK	I	0.0V or +5.0V	See Pin 7 on 13W3 Connector, Table 4-1
8, 10, 14	Ground	---	0.0V	Ground
9, 11-13	Do Not Use	---	---	Do Not Use
15	TEMPERATURE MONITOR	O	0.0V to +10.5V	See Pin 9 on 13W3 Connector, Table 4-1

Table 4-2 DC Power/Data Y cable DB15 Pin Diagram

4.3 Rear Panel Indicators

The RX FireFly is designed with an indicator to tell the user when the unit is plugged in and UV Light Source is enabled.

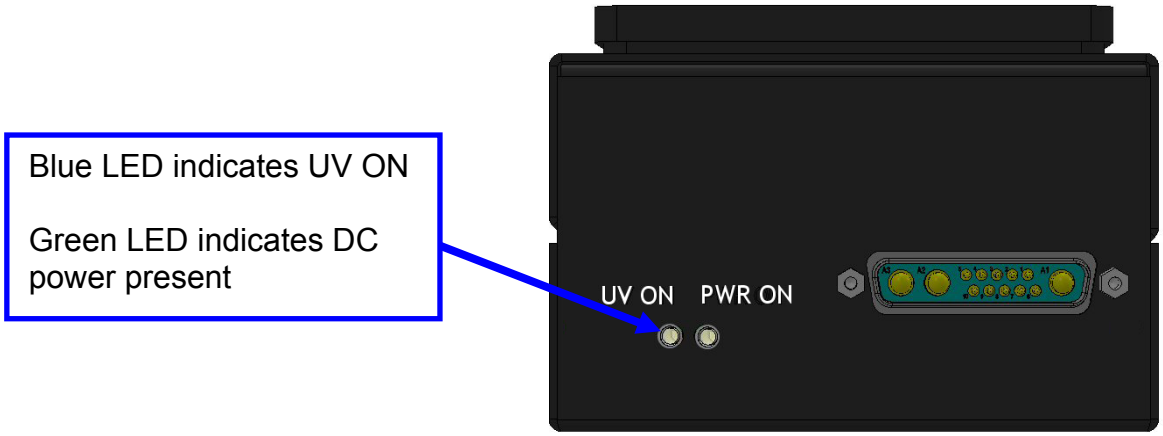


Figure 4-12 RX FireFly Indicator Lights

4.4 RX FireFly Power Supply Setup

As noted in Section 2.4, the RX Series Light Source and optional power supply if purchased is supplied as “open type” industrial equipment and is intended for installation within enclosures supplied in the field. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present, and appropriately designed to prevent personal injury resulting from accessibility to live parts.

> **Warning**: Only trained, qualified installers and service mechanics should install, start-up, and service this equipment.

An example power supply system setup using the Mean Well power supply is shown for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Phoseon Technology cannot assume responsibility or liability for actual use based on the examples and diagrams.

> **Note**: If supplying your own power supply, please ensure it meets the specifications in the Site Requirements Section 3.3.

4.4.1 Example Installation of Power Supply

The power supply used in this example has been functionally tested for use with Phoseon’s RX Series products. Specific product specifications for this power supply are provided in Appendix A for convenience. This example will cover the following:

4.4.1.1 Mounting
4.4.1.2 AC Power Cable Connection
4.4.1.3 DC Power Cable Connection
4.4.1.4 Verify DC Voltage

4.4.1.1 Mounting Mean Well Power Supply

Mount the power supply in a position where both the AC and DC power cords will not be stressed and airflow to the power supply will not be impeded.

Mounting information for the 480W power supply from Mean Well is provided by the vendor and shown in Appendix A. The dimensioned drawing is copied here for reference.

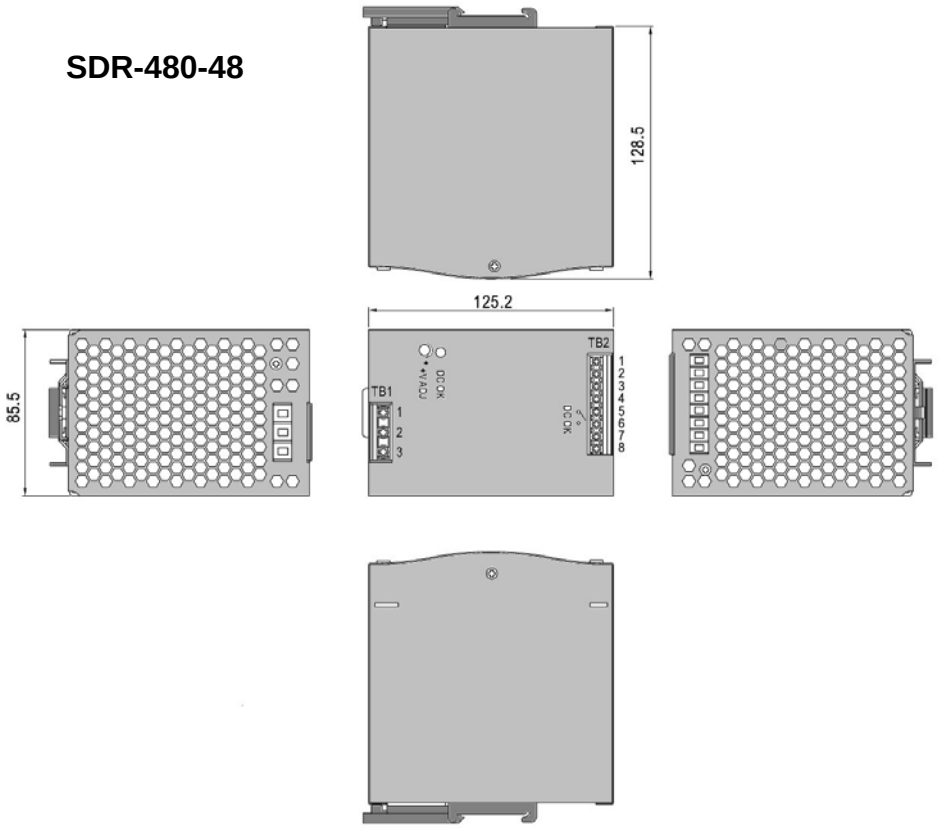


Figure 4-13 RX FireFly 480W Optional Power Supply Dimensions

4.4.1.2 Connecting AC Power Cable to Mean Well Power Supply

Connect the AC power cable to the power supply by connecting the AC power cord to the AC/L, AC/N, and Ground pins as shown in the example below.

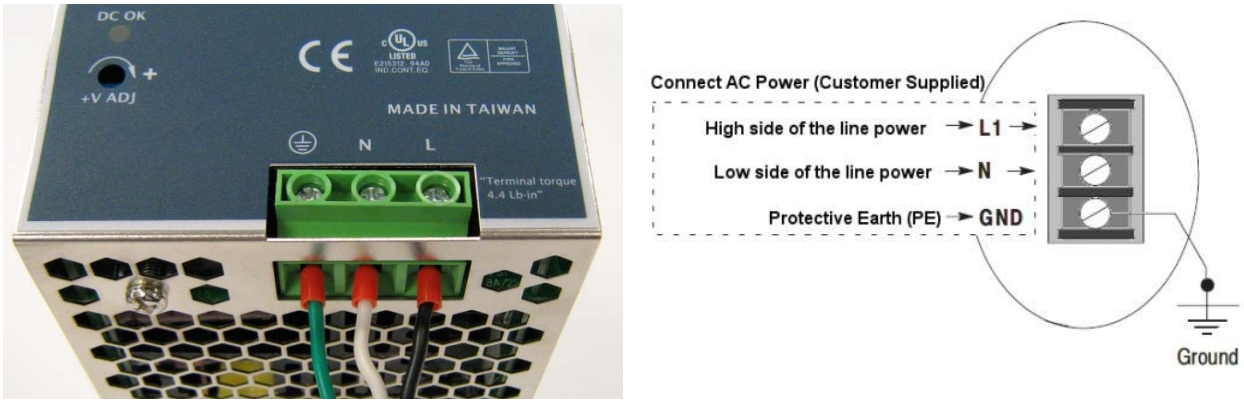


Figure 4-14 Power Supply AC Connection

> **Warning**: Do not connect or disconnect the AC Power Line to the Terminal Strip with power applied.

4.4.1.3 Connecting DC Power Cable to Mean Well Power Supply

The DC Power Cable connects the RX FireFly light source to the power supply. Connect the DC Cable to the power supply connecting the ferrule (either black ferrule or black wire) to DC output V- terminals and ferrule (either red ferrule or red wire) to DC Output V+ terminals, and the protective earth ground to the power supply chassis, as shown in the example below.

Figure 4-15 Power Supply DC Connections

> **Note:** Do not connect or disconnect the DC cable harness to the Light Source while power is applied.

4.4.1.4 Verify DC Voltage for Mean Well Power Supply

Check the voltage output of the power supply and verify it is set correctly (+48VDC measured at the Light Source). Adjust if necessary. If using the optional Mean Well power supply, the voltage can be adjusted using the potentiometer shown below.

Figure 4-16 Voltage Adjustment for the Optional 480W Power Supply

Chapter 5

Light Source Operation

Chapter Contents

Summary

This chapter of the manual will cover the steps required to operate the RX FireFly UV Light Source.

5 Light Source Operation

This section describes tips for operating the Light Source when integrated into equipment and covers the following:

5.1 On/Off Control

The RX FireFly is controlled through simple voltages. Since the semiconductor devices utilized in SLM™ technology can be turned on and off in less than 5ms, there is no need for shutters and the Light Source can be enabled only when needed.

RX FireFly can be turned on/off through the PLC enable circuitry at Pin 2; see Section 4.1.2.

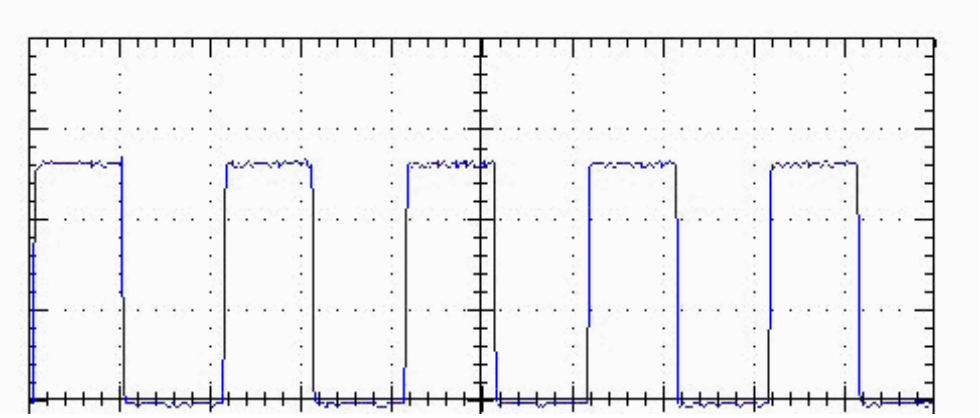


Figure 5-1 Instant On/Off

Note: When the Light Source is not needed (when not actively curing), turn off the Light Source to avoid the build-up of heat. Even if the surface of the Light Source is not heating up, the area around the Light Source (for example - any material held in close proximity to the emitting window without moving and surrounding air) can reach very high temperatures.

5.2 Irradiance vs. Distance

Phoseon RX Series Light Sources use optics to capture and direct the light to the work surface, but unlike arc lamps, Phoseon's Light Sources are area sources. Therefore, the optimum placement for the highest intensity will be closest to the UV emitting window. A typical distance from the RX FireFly to the substrate is 3-5mm. Phoseon does not use reflectors that require positioning the Light Source several inches away from the material.

The UV light from the emitting window of the RX FireFly does diverge with distance, so the peak irradiance will decrease as a function of distance from the protective glass.

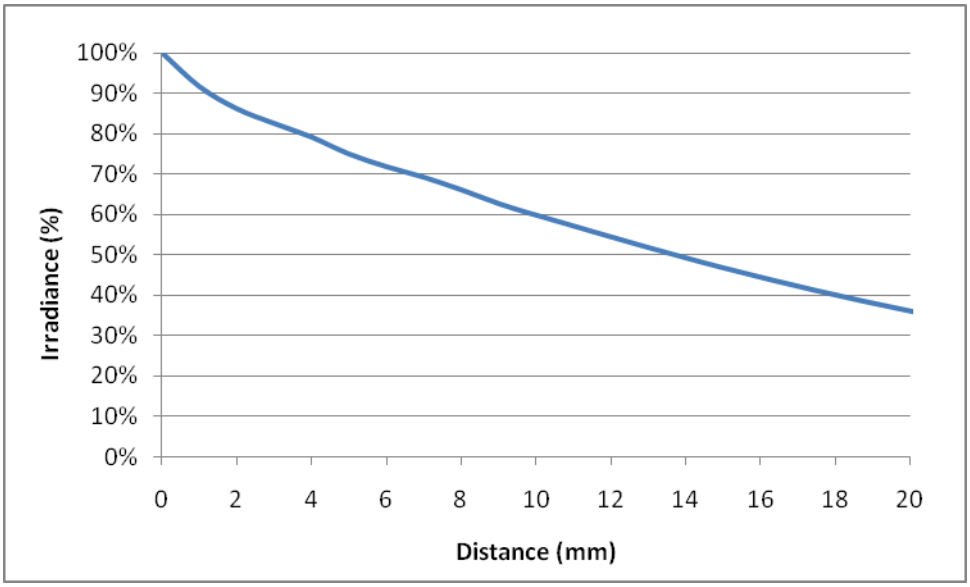


Figure 5-2 Irradiance as a Function of Distance

5.3 Irradiance vs. Temperature

The performance of the RX FireFly, which is an air cooled system, will be directly impacted by the temperature of the ambient air. Irradiance will decrease slightly as the ambient air increases.

A temperature switch has been integrated into the light source to shut down the emission of UV light when the light source has exceeded a safe operating temperature. The light source will shut off to prevent a thermal run away condition and a Thermal Fault signal will be output (Pin 5) see Figure 4-1.

> **Note:** When a temperature fault occurs, the light source will shut off automatically. The light source will turn back on automatically when the operating temperature has returned to an acceptable value.

Do not exceed the air temperature specifications as indicated in the site requirements Section 3.5.1.

5.4 Irradiance – Total UV Power

Phoseon's RX Series products utilizing SLM™ technology deliver high peak irradiance over a large area generating the highest total UV Power. The total UV power produced by the RX FireFly is a function of the area of the emitting window and peak irradiance. An RX FireFly 395nm system will output up to 60W of UV Power between the wavelength range of 380-420nm.

5.5 Connecting an Interlock

The RX FireFly has the capability to support a customer supplied interlock circuit. This is useful for situations where the function of the Light Source is tied to an enclosure or distance above a conveyor, where the UV emission should be stopped when a door is opened or if the Light Source is raised a specified distance above a conveyor. An external interlock circuit is not required for Light Source operation. If no interlock is present, simply connect Pin 7 to any Ground pin (Pin 8 or 10) to disable this feature.

Chapter 6

Service

Chapter Contents

Summary

This chapter describes service items associated with the RX FireFly Light Source

6 Service

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

6.1 Cleaning Glass

The emitter glass on the light source should be cleaned on an as needed basis. For light cleaning please use general purpose glass cleaner or Isopropyl Alcohol and a soft cloth. DO NOT submerge the light source or spray cleaning solution directly onto the light source.

If the material cannot be removed with glass cleaner or Isopropyl Alcohol, then a ceramic utility scraper (similar to the one shown below) can be used to carefully scrape the material off of the glass.

Figure 6-1 - Ceramic Utility Scraper for Glass Cleaning

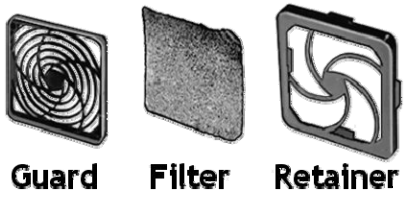
Please note, it is the employer's responsibility to provide proper PPE (personal protective equipment) when working with hazardous chemicals or sharp equipment.

6.2 Air Filter Replacement

Clean the fan filter on an as-needed basis. The time interval will vary depending on the environment where the unit is installed.

1. Turn off the power to the Light Source and disconnect the power cord.
2. Remove the retainer and filter (no tools required) and soak the filter in hot soapy water.

Note: Do not use abrasive scouring powders to clean the air filter. Never spray liquid into the fan filter while installed on the Light Source.



3. If needed, wipe the fan guard and retainer down with dry paper towels.
4. After drying the filter, place it back into the fan guard and secure the filter in place with the retainer.
5. Reconnect main power cord.
6. The Light Source can then be powered on.

6.3 RX FireFly – Troubleshooting Guide

Symptom	Component	Action or Cause
No Light is emitted from Light Source	Power Supply	Check that AC and DC cables are wired correctly to power supply: - See Appendix A in User Manual - Check that power supply is plugged in to AC outlet and turned on
	Light Source with PLC Control	Check wiring to DB13W3 connector (see Table 4-1) - Green light on - Pin 7 (interlock) must be tied to Ground (Pin 8 or 10)
	Over-temp	If Light Source has thermally tripped, no light will be emitted until the Light Source returns to a safe operating temperature (see Airflow Section 3.4). Note that the fans will continue to operate if the Light Source has thermally tripped.

Table 6-1 Troubleshooting Guide

Chapter 7

Warranty Policy

Chapter Contents

Summary

Phoseon Technology warranties our product under normal use. See Warranty Policy for further details.

7 Warranty Policy

7.1 Warranty Policy

Thank you for purchasing a quality Phoseon Technology product. Supplier warrants that all equipment shall be free from defects in material and workmanship if properly installed, stored, maintained and operated by Buyer under normal use with competent supervision for a period of one (1) year from date of shipment to Buyer (see Terms & Conditions for full warranty specifications). Phoseon Technology will repair or replace, at its option, any defective parts when returned freight pre-paid by Buyer to Phoseon. Equipment damaged in transit, abused, misused, operated on incorrect power sources, or on which the factory seals have been broken (evidencing unauthorized intrusion), shall be excluded from warranty coverage. Determination of the suitability of the product or fitness to a particular purpose lies solely with the Buyer. Phoseon assumes no liability for any incidental or consequential damages or expense.

Equipment may not be returned, whether for warranty or other purposes, without prior authorization and issuance of a Returned Material Authorization Number by Phoseon Technology.

Phoseon Technology assumes no expense or liability for repairs made outside its facility without written consent or for any labor costs which are incurred.

If repair of equipment is required but return of such equipment to Phoseon Technology is not feasible, then by mutual consent of Phoseon and purchaser, an authorized Phoseon service representative will be sent to the purchaser's plant to effect necessary repairs. The purchaser will be charged for the representative's time and expenses.

Any repairs or alternations, including use of non-Phoseon parts, made by the user of this product without Phoseon's prior written consent shall void all warranties provided by Phoseon Technology and such warranties shall cease to be in effect. No allowance will be granted for such repairs or alterations. No person, agent, representative, or distributor is authorized to give any warranties on behalf of Phoseon Technology, or to accept for Phoseon Technology any other liability in connection with any Phoseon products.

This warranty excludes consumables such as fuses without regard to whether any claimed defects were discoverable or latent on the date of shipment.

The following are the standard product specifications unless otherwise agreed upon: Measurements to be taken at the output of the protective glass while operating continuously (maximum (peak) over output area):

RX FireLine: 125, 150, 225, 300 - 8W/cm^2
RX FireFly: 1.5W/cm^2 - 4W/cm^2
RX StarFire MAX: 75, 150, 300 - 4W/cm^2
RX StarFire: 100 - 2W/cm^2
RX StarFire: 150 - 1.75W/cm^2
RX FireFlex: 75 - 8W/cm^2
RX FireJet: 225 - 7W/cm²

Note: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. If the equipment is not used in a manner as explicitly stated in the manual, then this shall be deemed to be misuse and will invalidate any warranty claim.

7.2 Procedure for Warranty Claims

1. Obtain RMA Number from Phoseon Technology.
   Equipment may not be returned, whether for warranty or other purposes, without prior authorization and issuance by Phoseon Technology of a Returned Material Authorization Number.
   Please call +1.503.439.6446 or send email to customerservice@phoseon.com to request an RMA number.
   Serial number of unit is required.
2. All Products being returned for warranty repair must be sent back to Phoseon Technology in original or comparable packaging (see below). Phoseon Technology shall not be responsible for items being exchanged that are lost or damaged in transit. Postage and handling charges both to and from Phoseon Technology must be paid the customer. We strongly recommend that you FULLY INSURE THE PACKAGE.
3. Phoseon will inspect non-functioning product to determine cause of failure. Loss of or damage to the covered product due to abuse, mishandling, improper packaging by you, alteration, accident, electrical current fluctuations or failure to follow operating, maintenance or environmental instructions prescribed in the covered product's User Manual is subject to a fee.
4. Replacement components are functionally tested before shipping.
5. A new or refurbished component, at Phoseon Technology's sole discretion, will be sent to the customer at the customer's expense.
6. Replacement components will be covered by the balance of the time remaining on the customer's original limited warranty or 90 days whichever is longer (unless otherwise specified).

7.3 General Packing Instructions

If possible, original packaging materials should be reused for return shipment to Phoseon Technology. If Phoseon Technology's packaging materials are not used, equivalent packaging, as outlined in the following sections, is to be used.

Power Supply:
Box: Bursting Test: 24kg/cm^2 (350lbs/sq in)
Gross Weight Limit: 70kg (155lbs)
Fills: Rigid high density Styrofoam or cardboard fills as required to ensure power supply does not shift in box during shipment. Note: Packaging materials should not push against connectors or controls.

RX Series UV Light Source:
Box: Bursting Test: 24kg/cm^2 (350lbs/sq in)
Gross Weight Limit: 70kg (155lbs)
Fills: Rigid high density Styrofoam as required ensuring power supply does not shift in box during shipment. Note: Packaging materials should not push against glass or connectors or controls.

Appendix

Appendix Contents

Summary

The appendix provide data specifications to related items of the RX FireFly

Appendix A

Mean Well USA Model SDR-480-48

MEAN WELL

480W Single Output Industrial DIN RAIL with PFC Function **SDR-480 series**

■ Features :

- High efficiency 94% and low power dissipation
- 150% peak load capability
- Built-in active PFC function, PF>0.94
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Cooling by free air convection
- Built-in constant current limiting circuit
- Can be installed on DIN rail TS-35/7.5 or 15
- UL 508(industrial control equipment)approved
- EN61000-6-2(EN50082-2) industrial immunity level
- Built-in DC OK relay contact
- 100% full load burn-in test
- 150% peak load capability
- 3 years warranty

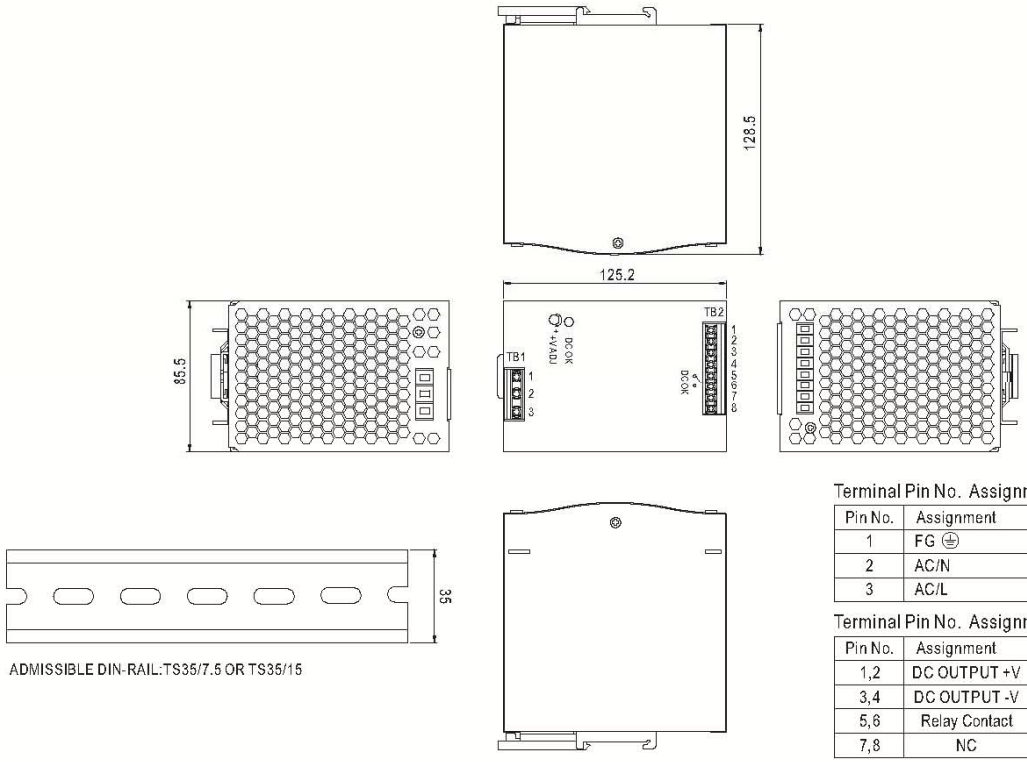
SPECIFICATION

MODEL		SDR-480-24	SDR-480-48
OUTPUT	DC VOLTAGE	24V	48V
	RATED CURRENT	20A	10A
	CURRENT RANGE	0 ~ 20A	0 ~ 10A
	RATED POWER	480W	480W
	PEAK CURRENT	30A	15A
	PEAK POWER Note.6	720W (3sec.)	
	RIPPLE & NOISE (max.) Note.2	100mVp-p	120mVp-p
	VOLTAGE ADJ. RANGE	24 ~ 28V	48 ~ 55V
	VOLTAGE TOLERANCE Note.3	±1.2%	±1.0%
	LINE REGULATION	±0.5%	±0.5%
	LOAD REGULATION	±1.0%	±1.0%
	SETUP, RISE TIME	1500ms, 150ms/230VAC 3000ms, 150ms/115VAC at full load	
	HOLD UP TIME (Typ.)	14ms/230VAC at full load	
INPUT	VOLTAGE RANGE Note.7	90 ~ 264VAC 127 ~ 370VDC	
	FREQUENCY RANGE	47 ~ 63Hz	
	POWER FACTOR (Typ.)	0.94/230VAC 0.99/115VAC at full load	
	EFFICIENCY (Typ.)	94%	
	AC CURRENT (Typ.)	5A/115VAC 2.5A/230VAC	
	INRUSH CURRENT (Typ.)	40A/115VAC 80A/230VAC	
	LEAKAGE CURRENT	<0.8mA / 240VAC	
PROTECTION	OVERLOAD	Normally works within 110 ~ 150% rated output power for more than 3 seconds and then shut down o/p voltage with auto-recovery	
		>150% rated power, constant current limiting with auto-recovery within 2 seconds and may cause to shut down if over 2 seconds	
	OVER VOLTAGE	29 ~ 33V	56 ~ 65V
		Protection type : Shut down o/p voltage with auto-recovery or re-power on to recovery	
	OVER TEMPERATURE	105℃±5℃ (TSW : detect on heatsink of power switch)	
		Protection type : Shut down o/p voltage, recovers automatically after temperature goes down	
FUNCTION	DC OK REALY CONTACT RATINGS (max.)	60Vdc/0.3A, 30Vdc/1A, 30Vac/0.5A resistive load	
ENVIRONMENT	WORKING TEMP. Note.5	-25 ~ +70℃ (Refer to output load derating curve)	
	WORKING HUMIDITY	20 ~ 95% RH non-condensing	
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH	
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)	
	VIBRATION	Component:10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes; Mounting: Compliance to IEC60068-2-6	
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL508, TUV EN60950-1 approved	
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC O/P-DC OK:0.5KVAC	
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:>100M Ohms / 500VDC / 25℃/ 70% RH	
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B	
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3	
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11, ENV50204, EN55024, EN61000-6-2 (EN50082-2), EN61204-3, heavy industry level, criteria A , SEMI F47, GL approved	
OTHERS	MTBF	112.9Khrs min. MIL-HDBK-217F (25℃)	
	DIMENSION	85.5*125.2*128.5mm (W*H*D)	
	PACKING	1.6Kg; 8pcs/13.8Kg/0.9CUFT	
NOTE	1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. 5. Installation clearances : 40mm on top, 20mm on the bottom, 5mm on the left and right side are recommended when loaded permanently with full power. In case the adjacent device is a heat source, 15mm clearance is recommended. 6. 3 seconds peak power max. and the average output power should not exceed the rate power. 7. Derating may be needed under low input voltage. Please check the derating curve for more details.	

File Name:SDR-480-SPEC 2010-12-07

■ Mechanical Specification

Case No.984A Unit:mm



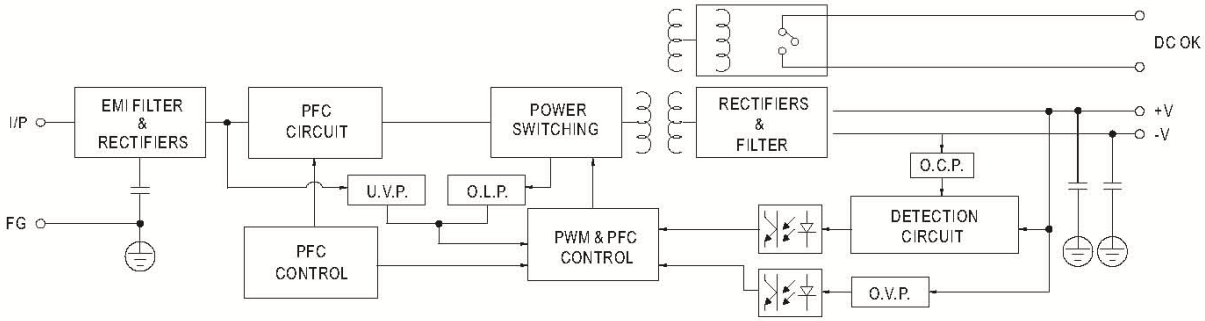
Terminal Pin No. Assignment (TB1)

Pin No.	Assignment
1	FG ⏚
2	AC/N
3	AC/L

Terminal Pin No. Assignment (TB2)

Pin No.	Assignment
1,2	DC OUTPUT +V
3,4	DC OUTPUT -V
5,6	Relay Contact
7,8	NC

■ Block Diagram



■ DC OK Relay Contact

Contact Close	PSU turns on / DC OK.
Contact Open	PSU turns off / DC Fail.
Contact Ratings (max.)	30V/1A resistive load.

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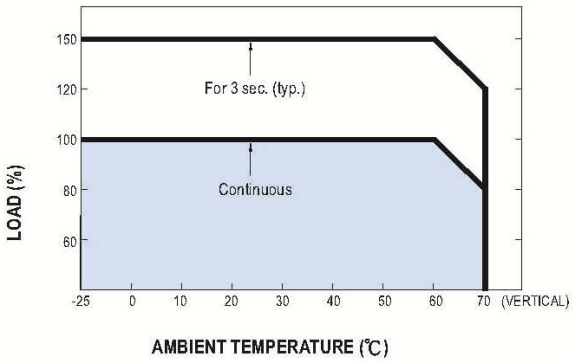
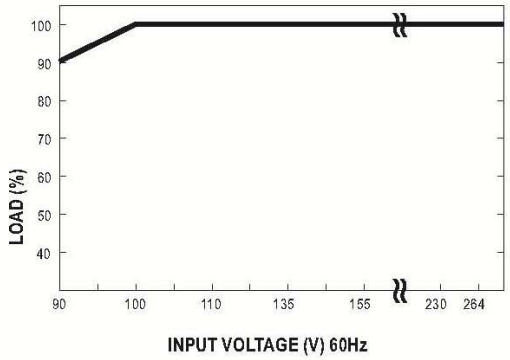
■ Peak Loading

■ Derating Curve



■ Output derating VS input voltage



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