UV LED Fiber Curing System

Generation 8, User Manual

Revision: 1

July 2024

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Contact Phoseon Sales for a Return Material Authorization (RMA)

Table of Content

Overview and Safety

UV LED Fiber Curing System Components

Phoseon's UV LED Enclosed Fiber Curing System consists of the following components:

- Protective enclosure containing:
  - UV LED Light Source
    - Either the air-cooled FireJet™ FJ228 Light Source
    - ***or*** the water-cooled FirePower™ FP300 Light Source
  - Fiber Reflector Unit (FRU)
- DC Power Supply
- Control System

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

- FireJet is the product family
- FJ228 225x20 is the model number
  - 225 indicates the UV emitting length in mm
  - 20 indicates the UV emitting width in mm
- Configuration information follows the model number
  - AC defines the unit as air cooled
  - 395 defines wavelength in nm
  - 25W defines the peak irradiance in W/cm^2 [1]

Figure 1.1: Product Label Placement

Note: Current specification on product label may vary based on product configuration.

CAUTION: **The enclosure may become a hot surface during operation.**

[1] This is the irradiance at the UV LED Light source window. The irradiance at the fiber is ~2.75x higher.

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

Refer to the following documents for detailed information regarding integration into a fiber production process.

Table 2.1: Enclosed Fiber Curing System Documentation

	FireJet FJ228 Air-Cooled	FirePower FP300 Water-Cooled
Product Specifications	54616	
Control Drawing	39014	39056
Installation Accessories	35619	
DC Power/Data Cable	35036 (5 meter) 34614 (10 meter) 35584 (15 meter)	
Water Cooling Requirements	N/A	28384
FRU Maintenance Guide	54617	
Window Cleaning Instructions	27182	
Declaration of Conformity	29321	

Optional Power Supply	**Mean Well** **www.meanwell.com** RSP-2400-48

With the exception of the 3rd party power supplies, the above documents are included in this manual.

If using the optional power supply, or any 3rd party power supply, refer to the manufacturer's website for up to date dimensions and specifications. Particularly note any derating needed for operation in the target environment.

Electrical

The Enclosed Fiber Curing System requires a switching power supply with constant voltage output. The power supplies tested by Phoseon for use with the systems are listed in the table above. The Mean Well specifications can be used as a guideline for selecting a switching power supply with the following critical specifications:

48VDC +/- 4V delivered to the light source from constant voltage output source.

1200W to 2064W minimum delivered to the light source based on configuration (see 54616 Product Specifications).

Maximum ripple should be less than 4V peak-to-peak.

A power supply should be used that provides a Safety Extra Low Voltage (SELV) output and that is certified by a notified body and/or CE marked.

Requirements for Multiple Fiber Curing Systems

Power requirements are based on the individual modules when stacked end-to-end. For example, two Enclosed Fiber Curing Systems may be stacked to create an overall 450mm curing length. Each module will have a dedicated DC power input based on the requirements defined above.

Figure 2.1: Stacking Enclosed Fiber Curing Systems

Mechanical Installation

Refer to the Control Drawing for the specific model 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 and DC Power/Data cable drawings 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.

Integrated Mounting Hardware

The Generation 8 Fiber Curing System incorporates integrated mounting hardware compatible with most existing draw towers. This makes installation straightforward, often with no additional brackets or hardware needed.

Figure 2.2: Integrated Mounting Hardware

The alignment bushings on the side of the enclosure are spaced 250mm apart. These bushings fit over alignment pins on the tower mounting plate. The bushings bear the weight of the lamp and align the center of the reflector opening to the fiber draw line. The captive mounting bolts in the enclosure line up with M8 threaded holes and secure the lamp to the tower mounting plate.

Alignment bushings are located on both sides of the lamp, and the M8 captive screws are easily removed and inserted from the opposite side. This allows the lamp to be mounted in either direction on the tower.

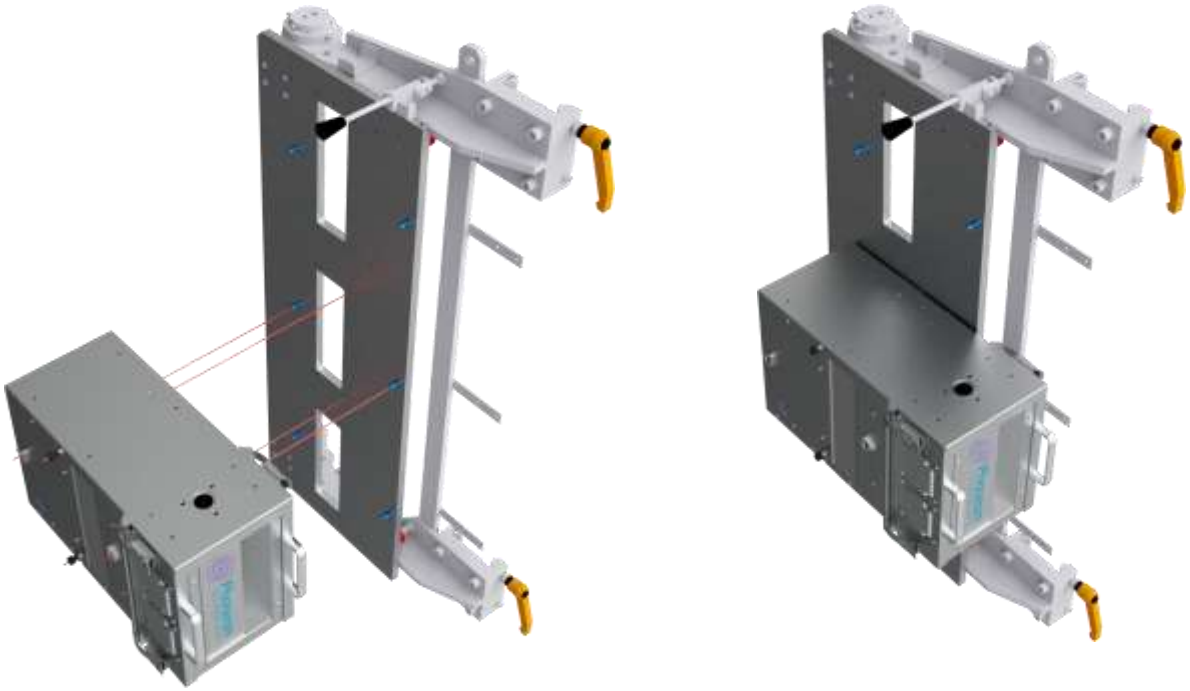


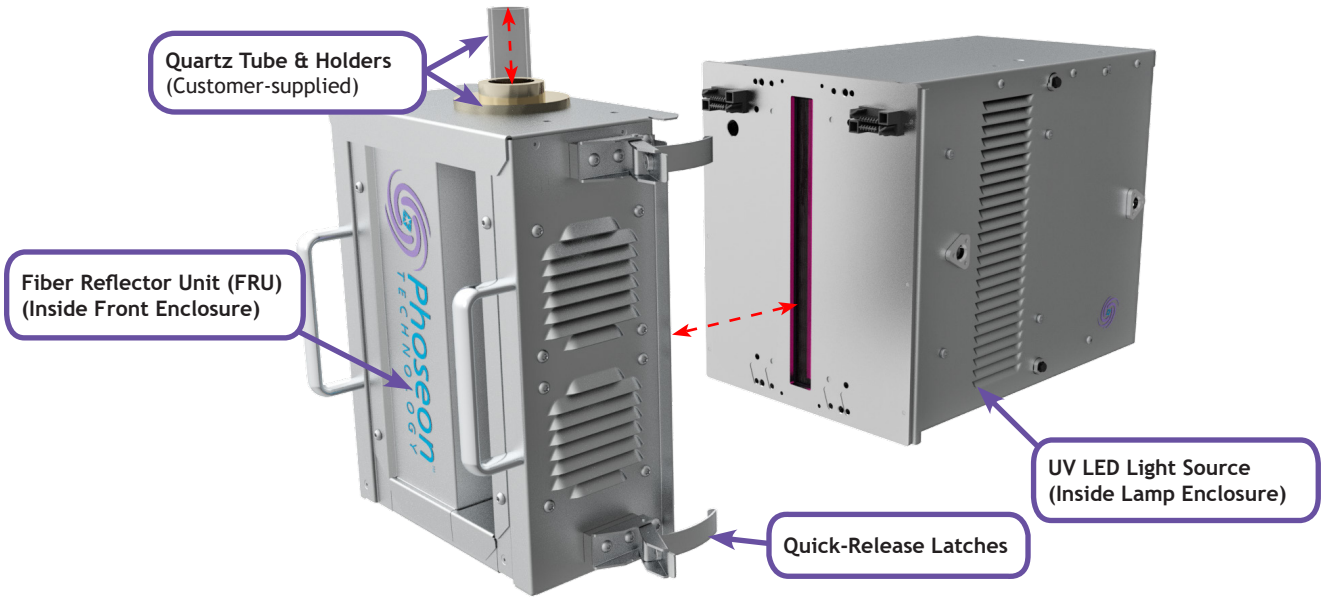
Figure 2.3: Alignment pins shown in false blue color. Tower mounting system courtesy of Nextrom.

Enclosed Fiber Curing System

Generation 8, Product Specifications

Phoseon UV LED SLM™ Technology

The 8th Generation Fiber Curing System features a high-efficiency reflector for improved irradiance at the fiber. Mounting hardware integrated into the enclosure makes retrofitting onto existing towers easier than ever. The field proven, fiber optimized UV LED light source remains unchanged. Together they provide concentrated UV light energy within a tight cylinder at the fiber draw line, creating ultra-high intensity for maximum curing at the highest speed.



Performance

The Fiber Curing System includes an optimized version of the air-cooled FireJet™ FJ228 or water-cooled FirePower™ FP300 UV LED light source.

	FJ228 365nm	FJ228 385, 395nm	FP300 365nm	FP300 395nm
Peak Irradiance	10W/cm^2	25W/cm^2	12W/cm^2	30W/cm^2
Emitting Window (mm)	225x20	225x20	225x20	225x20
48V Power In (Max)	1000W / 25A	2064W / 43A	1500W / 32A	1920W / 40A
Cooling Capacity (Typical)			1233W	1233W
Cooling Capacity (Max)			1425W	1425W
Water Flow Rate (Min)			6LPM	6LPM
Pressure Drop (Typical)			0.19 Bar	0.19 Bar

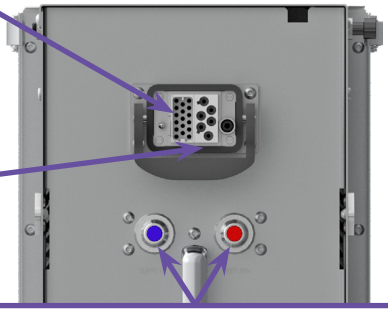
Systems Components & Setup

PLC Interface: (See below)
Data Cable
Mating Connector: Phoenix Contact 1414357
Crimp Terminals: Phoenix Contact 1663394

DC Input Power: 48±4Vdc
DC Power Cable
Mating Connector: Phoenix Contact 1414369
Crimp Terminals: Phoenix Contact 1663705

Operating Environment:
Indoor Use Only
Temperature: 10˚C to 50˚C
Humidity: <80% non-condensing for temperatures up to 30˚C
Altitude: Up to 3000m
Storage Temperature: -20 to 85˚C

Quick Disconnect Water Fittings
Mating Connector Kits:
37438 - 3/8" Polytube Fitting (CPC LQ6D13008BLU/RED)
36465 - 1/2" Barb Fitting (CPC LQ6D17008BLU/RED)
Hose fittings are necessary to operate water-cooled lamps and can be sourced from Excelitas or external vendors.



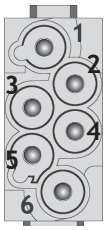
Water-Cooled Rear Panel

Air-Cooled Rear Panel

DC Power Pinout

The male 6-pin connector feeds +48Vdc power to the UV LED Light Source and cooling fans.

1	+48Vdc	2	+48Vdc
3	48V Return	4	48V Return
5	+48Vdc	6	48V Return



PLC Interface

The male 17-pin connector is used to control the UV LED Light Source via PLC.

1 **No Connection**

2 **Intensity Control:** (Voltage Input)
0.1V = 1% of full power (FJ228)
1V = 10% of full power (FP300)
10V = 100% of full power
Internal load is 100kΩ

3 **Enable High:** (24V Logic Input)
0 to 6V (ground/open input) = OFF
or 16 to 24V = ON
Internal load is 125kΩ

4* **Do Not Use (Factory Use Only)**

5 **Lamp Ready (FJ228) or**
Thermal Fault (FP300):
(24V Logic Output)
0 to 6V (ground) = Not Ready/Fault *or*
16 to 24V (open) = Ready/No Fault
Resistive load must be >3kΩ

6* **Do Not Use (Factory Use Only)**

7+ **Interlock:** (24V Logic Input)
0 to 6V = UV Emission Allowed or
16 to 24V = UV Emission Stopped
Internal load is 10kΩ

8 **Ground**

9 **Ground**

10 **Ground**

11 **Fault:** (24V Logic Output)
0 to 6 (ground) = Fault or
16 to 24V (open) = No Fault
Resistive load must be >3kΩ

12 **RS485 Communication:** Serial -

13 **RS485 Communication:** Serial +

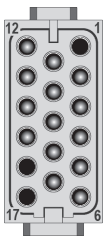
14 **Ground**

15 **Temperature Monitor:** (Voltage Output)
Voltage proportional to internal lamp temperature 0.1V = 1˚C

16 **No Connection**

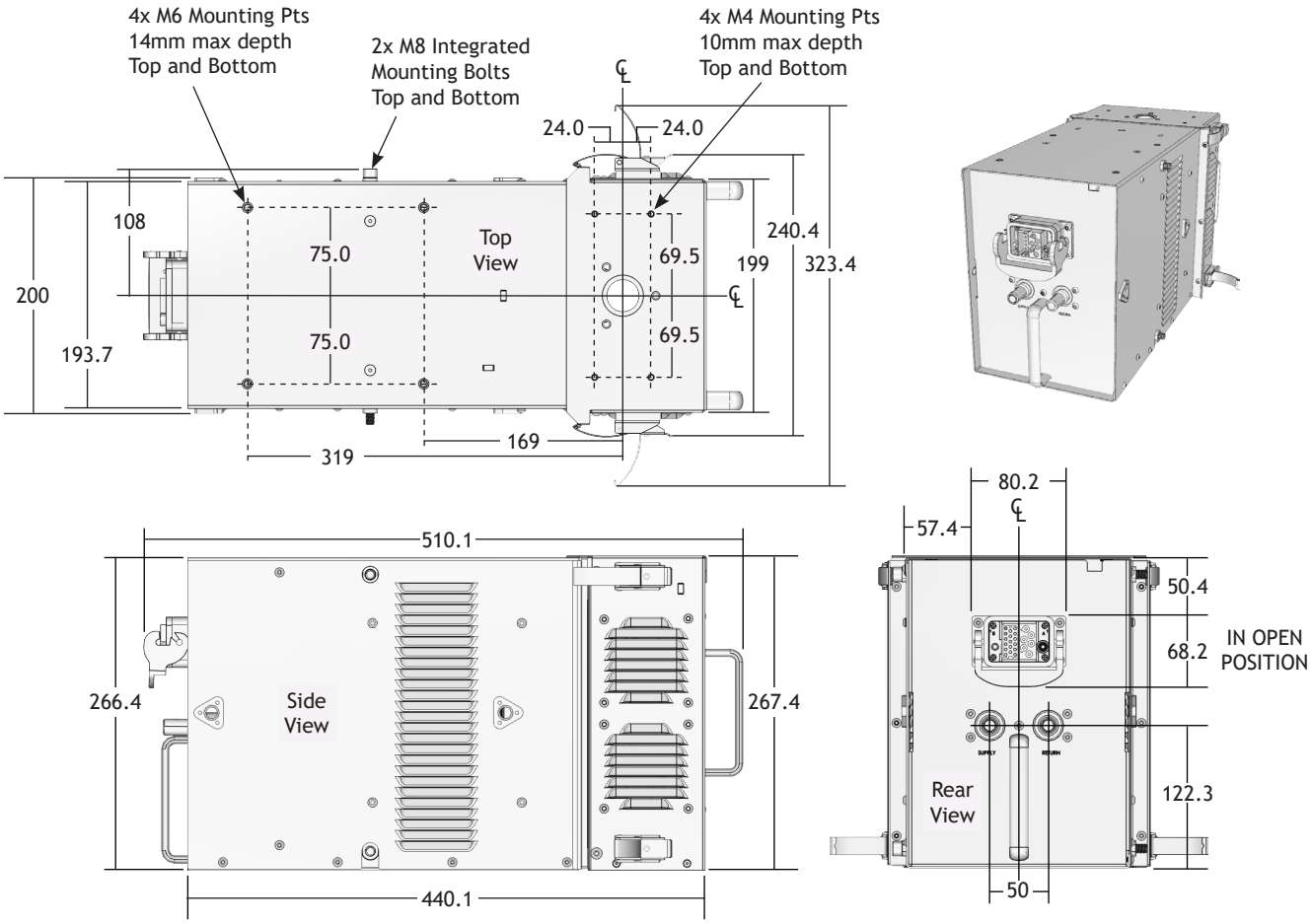
17 **No Connection**

Pins may be tied together to control multiple light sources from a single DB-15 interface with the following exceptions:
* Leave these Pins open (unconnected).
\+ The interlock Pins must not be tied together across multiple light sources. Each interlock must be connected to independent circuits.



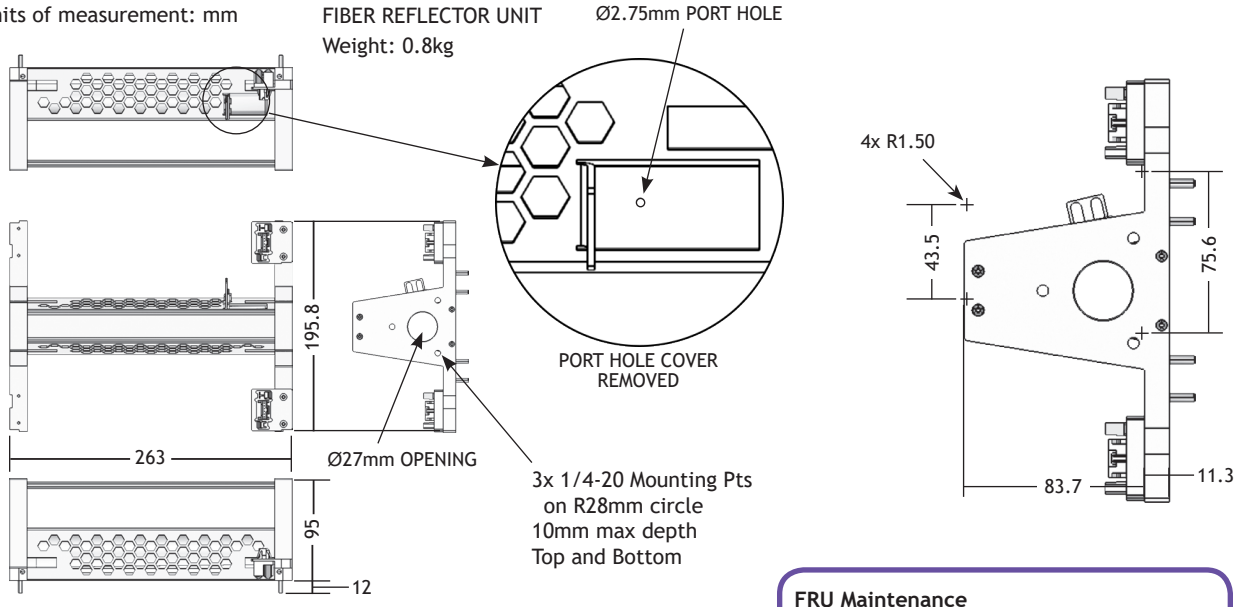
Dimensions (Enclosure)

Units of measurement: mm



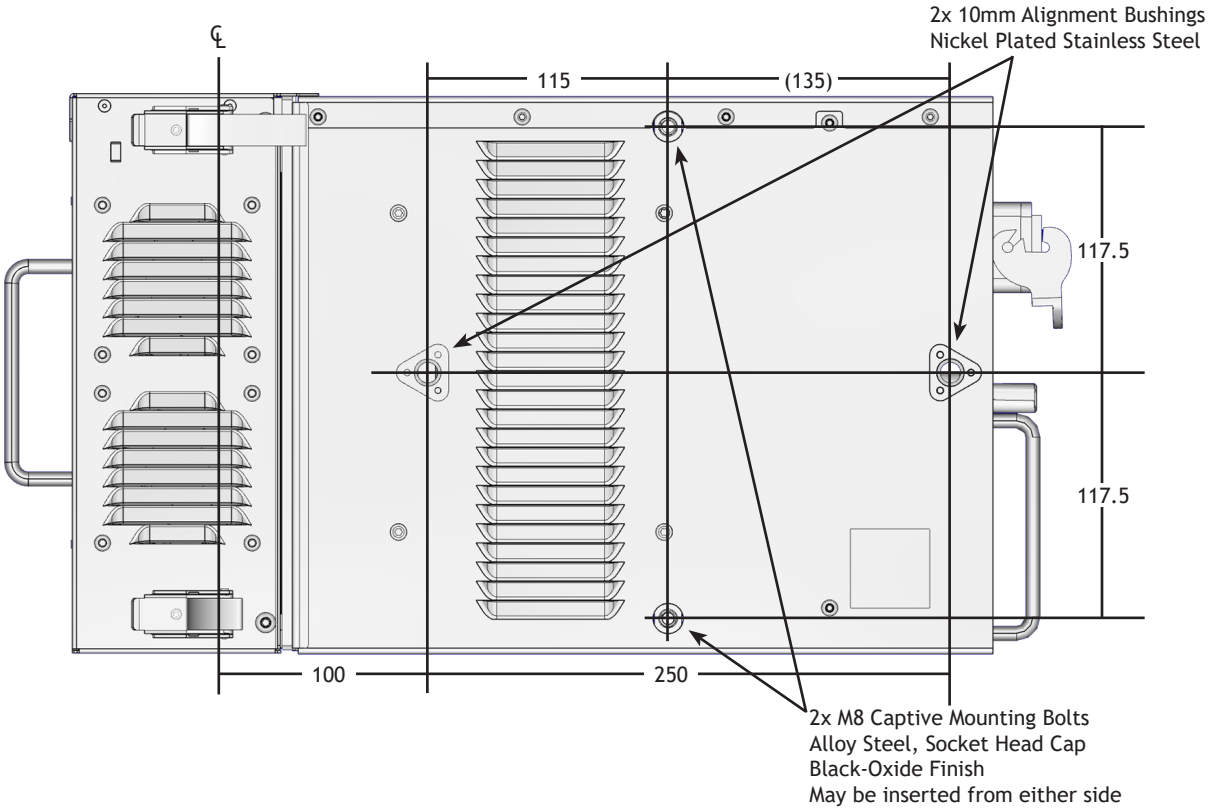
Dimensions (Internal Fiber Reflector Unit)

Units of measurement: mm



FRU Maintenance
Refer to *39804 Fiber Reflector Maintenance*

Integrated Mounting Hardware



Ordering Information

FJ228 GEN7 FIBER SYSTEM		FP300 GEN7 FIBER SYSTEM	
Item	Description	Item	Description
54407 54374	Config, FJ228 225x20AC395-25W Fib Enc G8 FG, FJ228 225x20AC395-25W Fib Enc G8	54408 54375	Config, FP300 225x20WC395-30W Fib Enc G8 FG, FP300 225x20WC395-30W Fib Enc G8
54404 54371	Config, FJ228 225x20AC365-10W Fib Enc G8 FG, FJ228 225x20AC365-10W Fib Enc G8	54405 54372	Config, FP300 225x20WC365-12W Fib Enc G8 FG, FP300 225x20WC365-12W Fib Enc G8
54406 54373	Config, FJ228 225x20AC385-25W Fib Enc G8 FG, FJ228 225x20AC385-25W Fib Enc G8		

Item	AVAILABLE ACCESSORIES Description
35036	Cable, DC/Data, Fiber Enc, 5m - Connects Fiber System to 48Vdc Power and Control System
34614	Cable, DC/Data, Fiber Enc, 10m - Connects Fiber System to 48Vdc Power and Control System
35584	Cable, DC/Data, Fiber Enc, 15m - Connects Fiber System to 48Vdc Power and Control System
30107	Control Box - Provides UV Enable and Intensity Control (refer to *30477 Spec Sheet, Control Box, Gen3*)
29973	Alignment Puck - Aids in centering the Fiber Reflector Unit to the fiber draw line
53314	Assy, G8 Fiber Reflector Unit - Replacement Fiber Reflector Unit, Complete Assembly
54600	Kit, G8 Fiber Reflector, 4 pk - Internal Reflector for FRU repair (refer to *54617 User Manual, Fiber Refl Maintenance*)
34432	Kit, FRU Protective Glass, 4 pk - Protective Glass for FRU repair (refer to *54617 User Manual, Fiber Refl Maintenance*)
37643	Kit, G8 Fiber Reflector Fixture - Assembly fixture for FRU repair (refer to *54617 User Manual, Fiber Refl Maintenance*)
29879	Power Supply, 48V, 2400W, 50A
36465	Kit, Water Fitting, LQ6, ½" barb, Fiber (CPC LQ6D17008BLU/RED, 2 hose clamps)
37438	Kit, Water Fitting, LQ6, 3/8" PTF, Fiber (CPC LQ6D13008BLU/RED)

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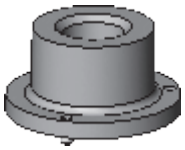
UV LED Fiber Curing System

Installation Accessories

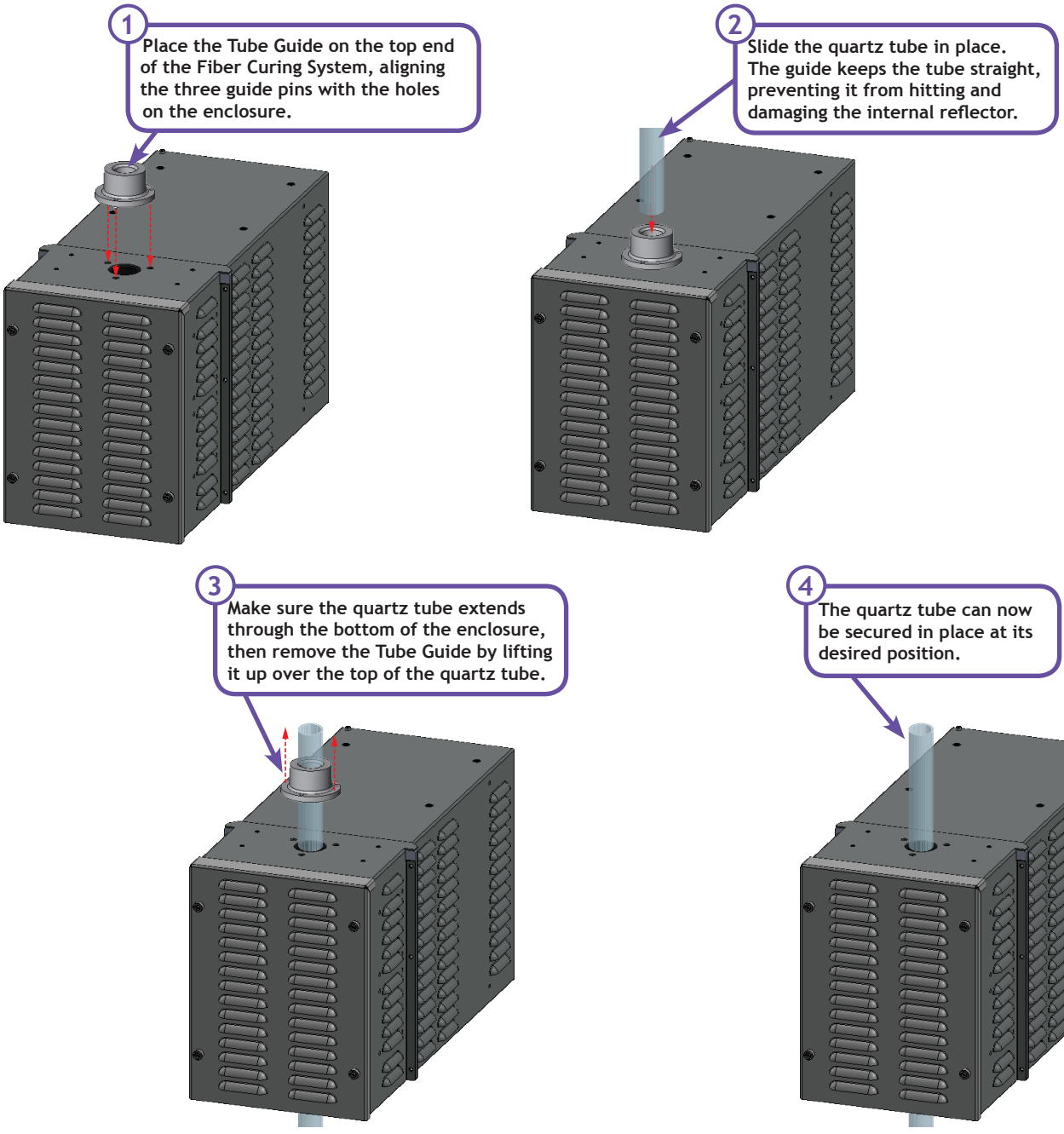
Quartz Tube Installation Guide

Phoseon's Fiber Curing System consists of a UV LED light source and a Fiber Reflector Unit (FRU) housed within a protective enclosure. The FRU has a 27mm diameter opening to accommodate quartz tubes with an outside diameter up to 26mm. When installing the quartz tube, care must be taken to avoid hitting the internal reflector material. To help avoid this, Phoseon offers an easy to use Tube Guide.



Tube Guide

The Tube Guide is available for tubes with different-sized outer diameters. Contact Phoseon for ordering the correct version based on the quartz tube size used. Follow these steps when installing the quartz tube through one or more curing systems.

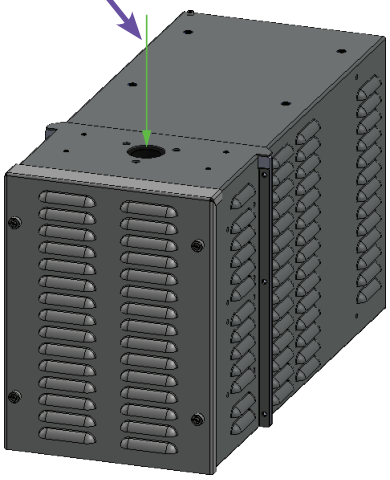


Alignment Puck

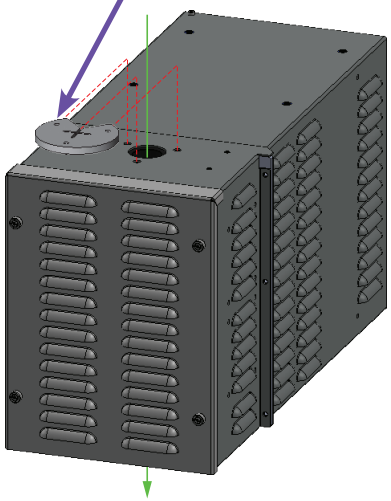
For optimum curing performance, the Curing System is positioned such that the fiber optic cable passes through the center of the reflector. An Alignment Puck is available from Phoseon to aid in positioning the CUring System to the fiber draw line.

Alignment Puck

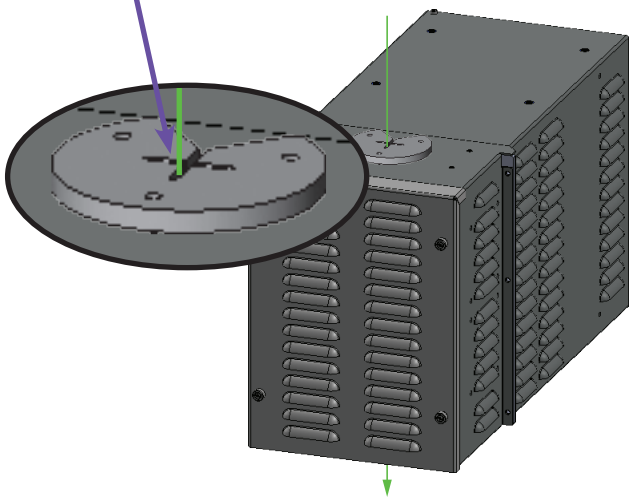
1 Roughly position the Fiber Curing System. Drop a plumb line through the opening at the fiber draw line.



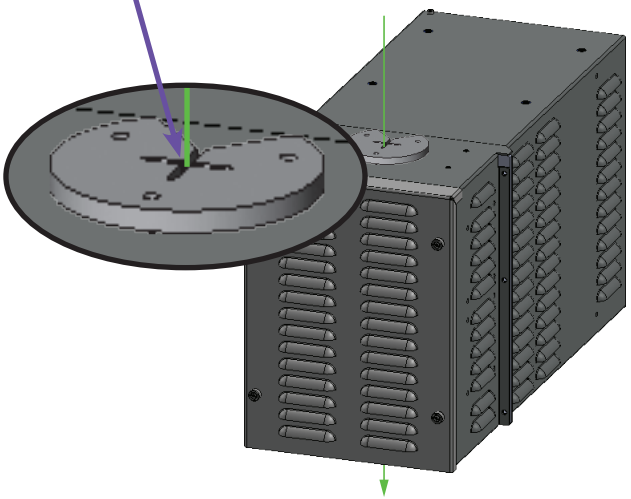
2 Slide the Alignment Puck into position. The three guide pins on the bottom of the Alignment Puck fit into the holes on the enclosure.



3 The slots in the Alignment Puck are 2.5mm wide. Adjust the position of the Fiber Curing System to center the plumb line with the Alignment Puck.



4 When the Fiber Curing System is properly positioned, the plumb line will go through the exact center of the Alignment Puck slots.



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35619 Rev 1.0
November 2017

NOTES:
UNLESS OTHERWISE SPECIFIED

1. CABLE ASSEMBLY SHALL BE ASSEMBLED PER COMPONENT MANUFACTURER'S RECOMMENDED PROCEDURES. ALL CRIMPED WIRE TERMINATIONS SHALL PASS MANUFACTURER'S CRIMP HEIGHT AND PULL TEST REQUIREMENTS.

2. TOLERANCE:
   DIMENSIONS LESS THAN 3.00 [76.2mm] SHALL BE: .XX = +/- .10 [2.5mm]
   DIMENSIONS BETWEEN 3.00 [76.2mm] AND 12.00 [304.8mm] SHALL BE: .XX = +/- .25 [6.4mm].
   DIMENSIONS BETWEEN 12.01 [304.8mm] AND 36.00 [914.4mm] SHALL BE: .XX = +/- .50 [12.8mm] .
   ALL DIMENSIONS GREATER THAN 36.00 [914.4mm] SHALL BE +/- 1% OF SPECIFICED LENGTH.

3. TEST CABLE ASSEMBLY CONTINUITY FROM PIN TO PIN.

4. THE CLAMP-ON-FERRITE MUST FIT FIRMLY AROUND THE CABLE ASSEMBLY. A TIE WRAP OR HEAT SHRINK TUBING OR A NYLON SPACER CAN BE USED UNDER THE CLAMP-ON-FERRITE.

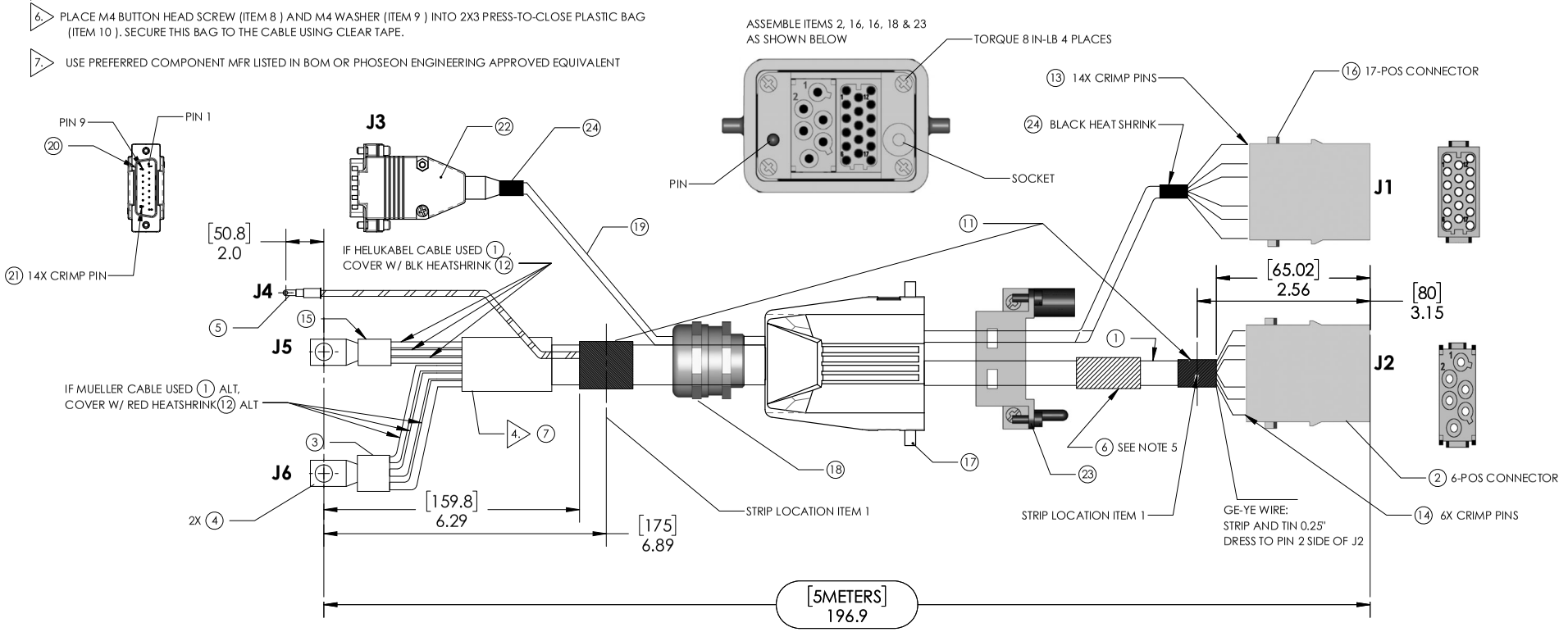
5. PART MARKING: LABEL WITH PHOSEON PART NUMBER AND REVISION WHERE SHOWN.

6. PLACE M4 BUTTON HEAD SCREW (ITEM 8) AND M4 WASHER (ITEM 9) INTO 2X3 PRESS-TO-CLOSE PLASTIC BAG (ITEM 10). SECURE THIS BAG TO THE CABLE USING CLEAR TAPE.

7. USE PREFERRED COMPONENT MFR LISTED IN BOM OR PHOSEON ENGINEERING APPROVED EQUIVALENT

REVISIONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE BASED ON 34614 REV 3	EK	6/20/2017	2385	EK	
2	UPDATED MFR'S PART NUMBER FOR ITEMS 2 AND 16	EK	6/21/2017	2385	EK	
3	CORRECT DESCRIPTION FOR ITEM 4 (FROM 5/16 TO 3/8"). ADD ALTERNATE FOR ITEM 14. REMOVE HEAT SHRINK FROM WIRES GOING INTO J2	EK	11/6/2017	2546	EK	
4	ADD ALTERNATE FOR ITEM 1	EK	11/14/2017	2557	EK	
5	REPLACE ITEM 17. PRIOR PHOENIX COMPONENT DISCONTINUED. ADD NOTE 7. CONVERT DRAWING FORMAT TO SOLIDWORKS TEMPLATE. ADD ALT HEATSHRINK ITEM 12 FOR ALT CABLE ITEM 1	DVF	9/10/2020	3722	EK	9/17/2020



3RD ANGLE VIEW	MATERIAL: SEE BOM	FINISH: NONE	TITLE: CABLE DC DATA 5M FIBER ENC
DIM UNITS: IN [mm] TOLERANCES UNLESS OTHERWISE SPECIFIED X.X: ±0.020 [0.5] X.XX: ±0.010 [0.25] X.XXX: ±0.005 [0.13] ANGLE: ±1°	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.	Phoseon TECHNOLOGY	PART NUMBER: 35036 REV.5 ISSUED BY: D. FARMER ISSUE DATE: 3/20/2018 3D DATABASE: 35036 - Cable DC Data 5M Fiber Enc.STEP ASME/ANSI Y14.X | EGF-44274-01 | SCALE: 1:1 | SIZE B | SHEET 1 OF 2

NETLIST		
	CF240-03-14	**MUELLER 1031007**
INT CTRL	J1-2 --- White --- J3-2	
ENABLE	J1-3 --- Brown --- J3-3	
BL	J1-4 --- Green --- J3-4	
LAMP RDY	J1-5 --- Yellow --- J3-5	
VREF	J1-6 --- Gray --- J3-6	
INTERLOCK	J1-7 --- Pink --- J3-7	
GND	J1-8 --- Blue --- J3-8	
GND	J1-9 --- Red --- J3-9	
GND	J1-10 --- Black --- J3-10	
FAULT	J1-11 --- Violet --- J3-11	
RS485 -	J1-12 --- Gray/Pink --- J3-12	
RS485 +	J1-13 --- Red/Blue --- J3-13	
GND	J1-14 --- White/Green --- J3-14	
TEMP OUT	J1-15 --- Brown/Green --- J3-15	
+48V		J2-1 --- Wire1 --- J6
+48V		J2-2 --- Wire2 --- J6
48V RTN		J2-3 --- Wire3 --- J5
PE		ST --- Green/Yellow --- J4
48V RTN		J2-4 --- Wire4 --- J5
+48V		J2-5 --- Wire5 --- J6
48V RTN		J2-6 --- Wire6 --- J5

#	PHOSEON PN	MANUFACTURER	MFG PN	DESCRIPTION	QTY.	
1	(26944)	HELUKABEL	89931	CABLE, 7-COND, 12 AWG, RED W/GND	197"	
	(35631)	MUELLER (ALTERNATE)	2601207	CABLE, 7-COND, 12 AWG, BLK W/GND	197"	
2	(34717)	PHOENIX	1414369	Module, 6-Pin, Female, 16A, PH	1	7.
3	(27695)	3M	EPS-300, 1/2", RED	TUBING, HEATSHRINK, 1/2", RED, W/ ADHESIVE	2"	
4	(27010)	MCMASTER	6926K53	TERM, CRIMP, RING, 4 AWG, 3/8" STUD, CU, TIN PLATE	2	
5	(10659)	MOLEX	190700145	TERM, CRIMP, RING, 10-12 AWG, #8 STUD, YELLOW	1	
6	(10568)	HELLERMAN TYTON	TAG9L-105 (WHITE)	LABEL, SELF-LAMINATING, 1 X 3/4	1	
7	(19709)	DIGI-KEY (STEWARD)	28A2024-0A2	FERRITE, TUBE BOX CLAMPON, 0.5", BLACK	1	
8	(18205)	MCMASTER	92095A188	SCREW, M4X6MM, BUTTON, SS	1	
9	(15240)	MCMASTER	93925A250	WASHER, M4, INTERNAL TOOTH, LOCK	1	
10	(20322)	MCMASTER	1959T11	BAG, 2 X 3, ZIP LOCK	1	
11	(15821)	3M	EPS-300, 3/4", BLK	TUBING, HEATSHRINK, 3/4", BLK, W/ ADHESIVE	5"	
12	(26363)	3M	EPS-301, 3/16" BLK	TUBING, HEATSHRINK, 3/16", BLK	3"	
	(34735)	3M (ALTERNATE)	EPS-301, 3/16" RED	TUBING, HEATSHRINK, 3/16", RED	3"	
13	(34718)	PHOENIX	1663394	Contact, Female Socket, 22-26AWG, Crimp	14	
14	(34719)	PHOENIX	1663695	Contact, Female Socket, 12AWG, Crimp	6	
	(35583)	PHOENIX (ALTERNATE)	1663705	Contact, Female Socket, 11-12AWG, Crimp	6	7.
15	(27696)	3M	EPS-300 1/2 BLACK	EPS-300 1/2 BLACK	5"	
16	(34720)	PHOENIX	1414357	Module, 17-Pin, Female, 10A, PH	1	
17	(50269)	PHOENIX	1412567	Housing, B6, Single Latch, PH	1	5
18	(32571)	PHOENIX	1646010	Cable Gland, M32, 19-27mm	1	
19	(27087)	IGUS	CF240-02-14	Cable, 14-Cond, Shielded, 24AWG	197"	
20	(34724)	NORCOMP	170-015-173L000	Conn, DB15, Male, Crimp Pin, No H/W	1	
21	(34725)	NORCOMP	170-101-170L001	Contact, Male Pin, 24-28AWG, Crimp	14	
22	(26128)	NORCOMP	979-015-030R121	Conn, Backshell, DB15	1	
23	(34743)	PHOENIX	1417403	Frame, Carrier, B6, PH	1	
		PHOENIX	1417398			
24	(15546)	3M	EPS-300 3/8" BLACK	TUBING, HEATSHRINK, 3/8" BLK, w/ADHESIVE	2"	

3RD ANGLE VIEW

MATERIAL: FINISH:

TITLE: CABLE DC DATA 5M FIBER ENC

DIM UNITS: IN [mm]
TOLERANCES UNLESS OTHERWISE SPECIFIED
X.X: ±0.020 [0.5]
X.XX: ±0.010 [0.25]
X.XXX: ±0.005 [0.13]
ANGLE: ±1°

Phoseon TECHNOLOGY

PART NUMBER: 35036 REV. 5

ISSUED BY: D. FARMER ISSUE DATE: 3/20/2018

3D DATABASE: 35036 - Cable DC Data 5M Fiber Enc.STEP

ASME/ANSI Y14.X | EGF-44274-01 | SCALE: 1:1 | SIZE: B | SHEET 2 OF 2

NOTES:
UNLESS OTHERWISE SPECIFIED

1. CABLE ASSEMBLY SHALL BE ASSEMBLED PER COMPONENT MANUFACTURER'S RECOMMENDED PROCEDURES. ALL CRIMPED WIRE TERMINATIONS SHALL PASS MANUFACTURER'S CRIMP HEIGHT AND PULL TEST REQUIREMENTS.

2. TOLERANCE:
   DIMENSIONS LESS THAN 3.00 [76.2mm] SHALL BE: .XX = +/- .10 [2.5mm]
   DIMENSIONS BETWEEN 3.00 [76.2mm] AND 12.00 [304.8mm] SHALL BE: .XX = +/- .25 [6.4mm].
   DIMENSIONS BETWEEN 12.01 [304.8mm] AND 36.00 [914.4mm] SHALL BE: .XX = +/- .50 [12.8mm] .
   ALL DIMENSIONS GREATER THAN 36.00 [914.4mm] SHALL BE +/- 1% OF SPECIFICED LENGTH.

3. TEST CABLE ASSEMBLY CONTINUITY FROM PIN TO PIN.

4. THE CLAMP-ON-FERRITE MUST FIT FIRMLY AROUND THE CABLE ASSEMBLY. A TIE WRAP OR HEAT SHRINK TUBING OR A NYLON SPACER CAN BE USED UNDER THE CLAMP-ON-FERRITE.

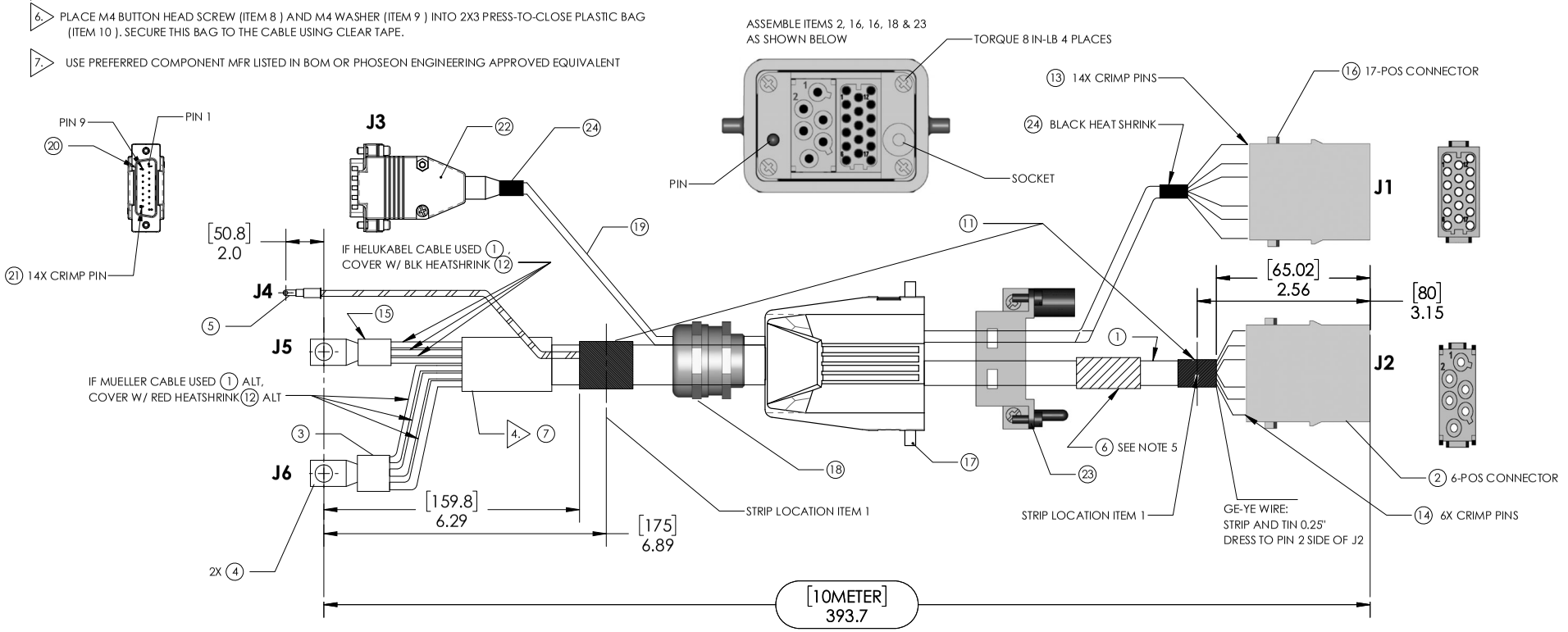
5. PART MARKING: LABEL WITH PHOSEON PART NUMBER AND REVISION WHERE SHOWN.

6. PLACE M4 BUTTON HEAD SCREW (ITEM 8) AND M4 WASHER (ITEM 9) INTO 2X3 PRESS-TO-CLOSE PLASTIC BAG (ITEM 10). SECURE THIS BAG TO THE CABLE USING CLEAR TAPE.

7. USE PREFERRED COMPONENT MFR LISTED IN BOM OR PHOSEON ENGINEERING APPROVED EQUIVALENT

REVISIONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
2	ADD MULTIPLE PHOSOEN PNS. UPDATE ITEM 17 & 18 MFR PNS. ADD ITEM 23 AND NOTE TO ASSEMBLE ITEMS 2,16,17,18 & 23. ADD ITEM 24. ADD NOTE TO DRESS GRN/YE WIRE TO PIN 2 SIDE OF J2 CONNECTOR.	EK	4/24/2017	2351	EK	
3	REMOVE A & B LABELS FROM IMAGE OF ASSEMBLED CONNECTOR. REFERENCE PIN AND SOCKET COMPONENETS. ADD TORQUE SPEC TO ASSEMBLED CONNECTOR. ADD ALTERNATE SOURCE FOR ITEM 23	EK	6/15/2017	2385	EK	
4	UPDATE MFR PN FOR ITEMS 2 & 16	EK	6/21/2017	2385	EK	
5	CORRECT DESCRIPTOIN FOR ITEM 4. ADD ALTERNATE FOR ITEM 14. REMOVE HEAT SHRINK FROM WIRES GOING INTO J2	EK	10/26/2017	2532	EK	
6	ADD ALTERNATE FOR ITEM 1	EK	11/14/2017	2557	EK	
7	REPLACE ITEM 17. PRIOR PHOENIX COMPONENT DISCONTINUED. ADD NOTE 7. CONVERT DRAWING FORMAT TO SOLIDWORKS TEMPLATE. ADD ALT HEATSHRINK ITEM 12 FOR ALT CABLE ITEM 1	DVF	9/10/2020	3722	EK	9/17/2020



3RD ANGLE VIEW	MATERIAL: SEE BOM	FINISH: NONE	TITLE: CABLE DC DATA 10M FIBER ENC
DIM UNITS: IN [mm] TOLERANCES UNLESS OTHERWISE SPECIFIED X.X: ±0.020 [0.5] X.XX: ±0.010 [0.25] X.XXX: ±0.005 [0.13] ANGLE: ±1°	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.	Phoseon TECHNOLOGY	PART NUMBER: 34614 REV.7 ISSUED BY: D. FARMER ISSUE DATE: 3/20/2018 3D DATABASE: 34614 - Cable DC Data 10M Fiber Enc.STEP ASME/ANSI Y14.X | EGF-44274-01 | SCALE: 1:1 | SIZE B | SHEET 1 OF 2

NETLIST		
	CF240-03-14	**MUELLER 1031007**
INT CTRL	J1-2 --- White --- J3-2	
ENABLE	J1-3 --- Brown --- J3-3	
BL	J1-4 --- Green --- J3-4	
LAMP RDY	J1-5 --- Yellow --- J3-5	
VREF	J1-6 --- Gray --- J3-6	
INTERLOCK	J1-7 --- Pink --- J3-7	
GND	J1-8 --- Blue --- J3-8	
GND	J1-9 --- Red --- J3-9	
GND	J1-10 --- Black --- J3-10	
FAULT	J1-11 --- Violet --- J3-11	
RS485 -	J1-12 --- Gray/Pink --- J3-12	
RS485 +	J1-13 --- Red/Blue --- J3-13	
GND	J1-14 --- White/Green --- J3-14	
TEMP OUT	J1-15 --- Brown/Green --- J3-15	
+48V		J2-1 --- Wire1 --- J6
+48V		J2-2 --- Wire2 --- J6
48V RTN		J2-3 --- Wire3 --- J5
PE		ST --- Green/Yellow --- J4
48V RTN		J2-4 --- Wire4 --- J5
+48V		J2-5 --- Wire5 --- J6
48V RTN		J2-6 --- Wire6 --- J5

#	PHOSEON PN	MANUFACTURER	MFG PN	DESCRIPTION	QTY.	
1	(26944)	HELUKABEL	89931	CABLE, 7-COND, 12 AWG, RED W/GND	395"	
	(35631)	MUELLER (ALTERNATE)	2601207	CABLE, 7-COND, 12 AWG, BLK W/GND	395"	
2	(34717)	PHOENIX	1414369	Module, 6-Pin, Female, 16A, PH	1	7.
3	(27695)	3M	EPS-300, 1/2", RED	TUBING, HEATSHRINK, 1/2", RED, W/ ADHESIVE	2"	
4	(27010)	MCMASTER	6926K53	TERM, CRIMP, RING, 4 AWG, 3/8" STUD, CU, TIN PLATE	2	
5	(10659)	MOLEX	190700145	TERM, CRIMP, RING, 10-12 AWG, #8 STUD, YELLOW	1	
6	(10568)	HELLERMAN TYTON	TAG9L-105 (WHITE)	LABEL, SELF-LAMINATING, 1 X 3/4	1	
7	(19709)	DIGI-KEY (STEWARD)	28A2024-0A2	FERRITE, TUBE BOX CLAMPON, 0.5", BLACK	1	
8	(18205)	MCMASTER	92095A188	SCREW, M4X6MM, BUTTON, SS	1	
9	(15240)	MCMASTER	93925A250	WASHER, M4, INTERNAL TOOTH, LOCK	1	
10	(20322)	MCMASTER	1959T11	BAG, 2 X 3, ZIP LOCK	1	
11	(15821)	3M	EPS-300, 3/4", BLK	TUBING, HEATSHRINK, 3/4", BLK, W/ ADHESIVE	5"	
12	(26363)	3M	EPS-301, 3/16" BLK	TUBING, HEATSHRINK, 3/16", BLK	3"	
	(34735)	3M (ALTERNATE)	EPS-301, 3/16" RED	TUBING, HEATSHRINK, 3/16", RED	3"	
13	(34718)	PHOENIX	1663394	Contact, Female Socket, 22-26AWG, Crimp	14	
14	(34719)	PHOENIX	1663695	Contact, Female Socket, 12AWG, Crimp	6	
	(35583)	PHOENIX (ALTERNATE)	1663705	Contact, Female Socket, 11-12AWG, Crimp	6	7.
15	(27696)	3M	EPS-300 1/2 BLACK	EPS-300 1/2 BLACK	5"	
16	(34720)	PHOENIX	1414357	Module, 17-Pin, Female, 10A, PH	1	
17	(50269)	PHOENIX	1412567	Housing, B6, Single Latch, PH	1	7.
18	(32571)	PHOENIX	1646010	Cable Gland, M32, 19-27mm	1	
19	(27087)	IGUS	CF240-02-14	Cable, 14-Cond, Shielded, 24AWG	395"	
20	(34724)	NORCOMP	170-015-173L000	Conn, DB15, Male, Crimp Pin, No H/W	1	
21	(34725)	NORCOMP	170-101-170L001	Contact, Male Pin, 24-28AWG, Crimp	14	
22	(26128)	NORCOMP	979-015-030R121	Conn, Backshell, DB15	1	
23	(34743)	PHOENIX	1417403	Frame, Carrier, B6, PH	1	
		PHOENIX	1417398			
24	(15546)	3M	EPS-300 3/8" BLACK	TUBING, HEATSHRINK, 3/8" BLK, w/ADHESIVE	2"	

3RD ANGLE VIEW

MATERIAL: FINISH:

TITLE: CABLE DC DATA 10M FIBER ENC

DIM UNITS: IN [mm]
TOLERANCES UNLESS OTHERWISE SPECIFIED
X.X: ±0.020 [0.5]
X.XX: ±0.010 [0.25]
X.XXX: ±0.005 [0.13]
ANGLE: ±1°

Phoseon TECHNOLOGY

PART NUMBER: 34614 REV. 7

ISSUED BY: D. FARMER ISSUE DATE: 3/20/2018

3D DATABASE: 34614 - Cable DC Data 10M Fiber Enc.STEP

ASME/ANSI Y14.X | EGF-44274-01 | SCALE: 1:1 | SIZE: B | SHEET 2 OF 2

NOTES:
UNLESS OTHERWISE SPECIFIED

1. CABLE ASSEMBLY SHALL BE ASSEMBLED PER COMPONENT MANUFACTURER'S RECOMMENDED PROCEDURES. ALL CRIMPED WIRE TERMINATIONS SHALL PASS MANUFACTURER'S CRIMP HEIGHT AND PULL TEST REQUIREMENTS.

2. TOLERANCE:
   DIMENSIONS LESS THAN 3.00 [76.2mm] SHALL BE: .XX = +/- .10 [2.5mm]
   DIMENSIONS BETWEEN 3.00 [76.2mm] AND 12.00 [304.8mm] SHALL BE: .XX = +/- .25 [6.4mm].
   DIMENSIONS BETWEEN 12.01 [304.8mm] AND 36.00 [914.4mm] SHALL BE: .XX = +/- .50 [12.8mm] .
   ALL DIMENSIONS GREATER THAN 36.00 [914.4mm] SHALL BE +/- 1% OF SPECIFICED LENGTH.

3. TEST CABLE ASSEMBLY CONTINUITY FROM PIN TO PIN.

4. THE CLAMP-ON-FERRITE MUST FIT FIRMLY AROUND THE CABLE ASSEMBLY. A TIE WRAP OR HEAT SHRINK TUBING OR A NYLON SPACER CAN BE USED UNDER THE CLAMP-ON-FERRITE.

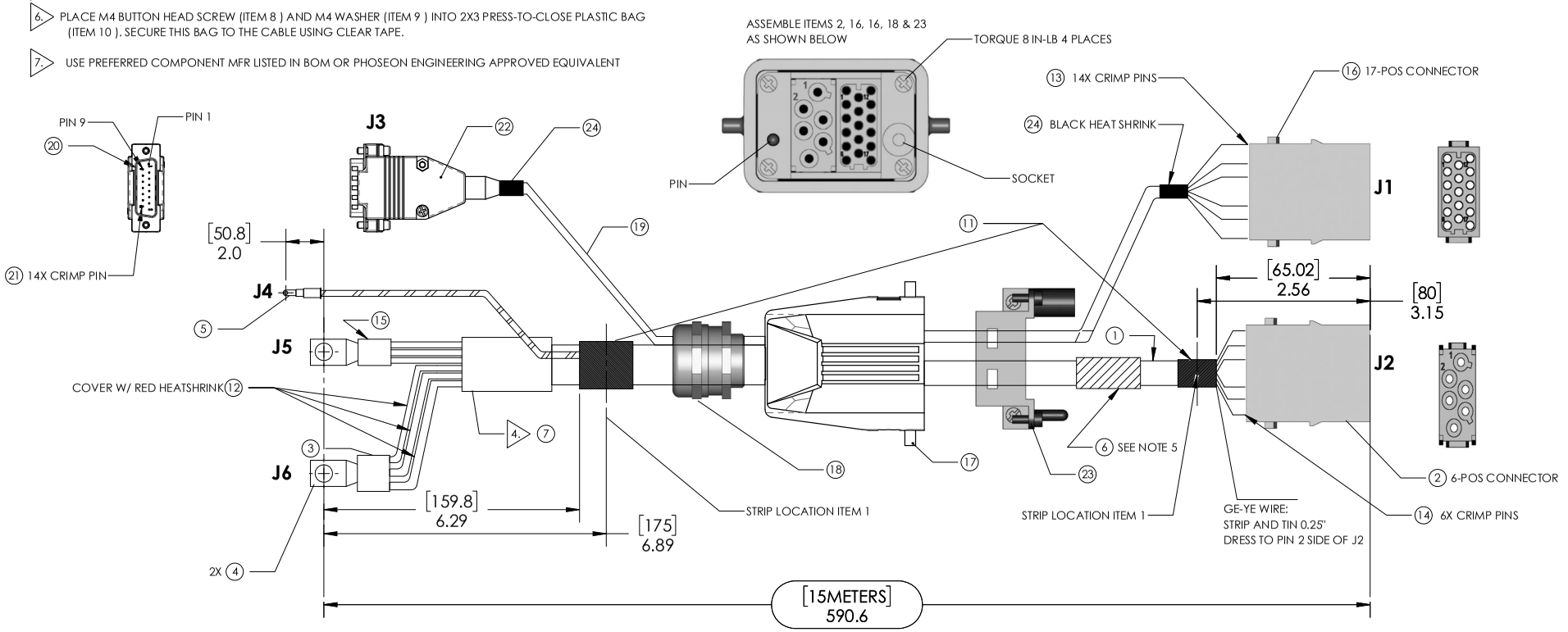
5. PART MARKING: LABEL WITH PHOSEON PART NUMBER AND REVISION WHERE SHOWN.

6. PLACE M4 BUTTON HEAD SCREW (ITEM 8) AND M4 WASHER (ITEM 9) INTO 2X3 PRESS-TO-CLOSE PLASTIC BAG (ITEM 10). SECURE THIS BAG TO THE CABLE USING CLEAR TAPE.

7. USE PREFERRED COMPONENT MFR LISTED IN BOM OR PHOSEON ENGINEERING APPROVED EQUIVALENT

REVISIONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	EK	10/25/2017	2532	EK	
2	CORRECT ITEM 19 QTY	EK	11/14/2017	2557	EK	
3	REPLACE ITEM 17. PRIOR PHOENIX COMPONENT DISCONTINUED. ADD NOTE 7. CONVERT DRAWING FORMAT TO SOLIDWORKS TEMPLATE	DVF	9/10/2020	3722	EK	9/17/2020
4	UPDATE ITEM 19 CABLE TO CORRECT LENGTH	DVF	9/29/2020	3774		9/29/2020



3RD ANGLE VIEW

MATERIAL: SEE BOM

FINISH: NONE

TITLE: CABLE DC DATA 15M FIBER ENC

DIM UNITS: IN [mm]
TOLERANCES UNLESS OTHERWISE SPECIFIED
X.X: ±0.020 [0.5]
X.XX: ±0.010 [0.25]
X.XXX: ±0.005 [0.13]
ANGLE: ±1°

Phoseon TECHNOLOGY

PART NUMBER: 35584 REV.4

ISSUED BY: D. FARMER ISSUE DATE: 3/20/2018

3D DATABASE: 35584 - Cable DC Data 15M Fiber Enc.STEP

ASME/ANSI Y14.X | EGF-44274-01 | SCALE: 1:1 | SIZE B | SHEET 1 OF 2

NETLIST		
	CF240-03-14	**MUELLER 1031007**
INT CTRL	J1-2 --- White --- J3-2	
ENABLE	J1-3 --- Brown --- J3-3	
BL	J1-4 --- Green --- J3-4	
LAMP RDY	J1-5 --- Yellow --- J3-5	
VREF	J1-6 --- Gray --- J3-6	
INTERLOCK	J1-7 --- Pink --- J3-7	
GND	J1-8 --- Blue --- J3-8	
GND	J1-9 --- Red --- J3-9	
GND	J1-10 --- Black --- J3-10	
FAULT	J1-11 --- Violet --- J3-11	
RS485 -	J1-12 --- Gray/Pink --- J3-12	
RS485 +	J1-13 --- Red/Blue --- J3-13	
GND	J1-14 --- White/Green --- J3-14	
TEMP OUT	J1-15 --- Brown/Green --- J3-15	
+48V		J2-1 --- Wire1 --- J6
+48V		J2-2 --- Wire2 --- J6
48V RTN		J2-3 --- Wire3 --- J5
PE		ST --- Green/Yellow --- J4
48V RTN		J2-4 --- Wire4 --- J5
+48V		J2-5 --- Wire5 --- J6
48V RTN		J2-6 --- Wire6 --- J5

7.

#	PHOSEON PN	MANUFACTURER	MFG PN	DESCRIPTION	QTY.
1	(35061)	MUELLER	1031007	CABLE, 7-COND, 10 AWG, BLK W/GND	592"
2	(34717)	PHOENIX	1414369	Module, 6-Pin, Female, 16A, PH	1
3	(27695)	3M	EPS-300, 1/2", RED	TUBING, HEATSHRINK, 1/2", RED, W/ ADHESIVE	2"
4	(27010)	MCMASTER	6926K53	TERM, CRIMP, RING, 4 AWG, 3/8" STUD, CU, TIN PLATE	2
5	(10659)	MOLEX	190700145	TERM, CRIMP, RING, 10-12 AWG, #8 STUD, YELLOW	1
6	(10568)	HELLERMAN TYTON	TAG9L-105 (WHITE)	LABEL, SELF-LAMINATING, 1 X 3/4	1
7	(19709)	DIGI-KEY (STEWARD)	28A2024-0A2	FERRITE, TUBE BOX CLAMPON, 0.5", BLACK	1
8	(18205)	MCMASTER	92095A188	SCREW, M4X6MM, BUTTON, SS	1
9	(15240)	MCMASTER	93925A250	WASHER, M4, INTERNAL TOOTH, LOCK	1
10	(20322)	MCMASTER	1959T11	BAG, 2 X 3, ZIP LOCK	1
11	(15821)	3M	EPS-300, 3/4", BLK	TUBING, HEATSHRINK, 3/4", BLK, W/ ADHESIVE	5"
12	(34735)	3M	EPS-301, 3/16" RED	TUBING, HEATSHRINK, 3/16", RED	3"
13	(34718)	PHOENIX	1663394	Contact, Female Socket, 22-26AWG, Crimp	14
14	(35583)	PHOENIX	1663705	Contact, Female Socket, 11-12AWG, Crimp	6
15	(27696)	3M	EPS-300 1/2 BLACK	EPS-300 1/2 BLACK	5"
16	(34720)	PHOENIX	1414357	Module, 17-Pin, Female, 10A, PH	1
17	(50269)	PHOENIX	1412567	Housing, B6, Single Latch, PH	1
18	(32571)	PHOENIX	1646010	Cable Gland, M32, 19-27mm	1
19	(27087)	IGUS	CF240-02-14	Cable, 14-Cond, Shielded, 24AWG	592"
20	(34724)	NORCOMP	170-015-173L000	Conn, DB15, Male, Crimp Pin, No H/W	1
21	(34725)	NORCOMP	170-101-170L001	Contact, Male Pin, 24-28AWG, Crimp	14
22	(26128)	NORCOMP	979-015-030R121	Conn, Backshell, DB15	1
23	(34743)	PHOENIX	1417403	Frame, Carrier, B6, PH	1
		PHOENIX	1417398		
24	(15546)	3M	EPS-300 3/8" BLACK	TUBING, HEATSHRINK, 3/8" BLK, w/ADHESIVE	2"

3

3RD ANGLE VIEW

MATERIAL:

FINISH:

TITLE: CABLE DC DATA 15M FIBER ENC

DIM UNITS: IN [mm]
TOLERANCES UNLESS OTHERWISE SPECIFIED
X.X: ±0.020 [0.5]
X.XX: ±0.010 [0.25]
X.XXX: ±0.005 [0.13]
ANGLE: ±1°

Phoseon TECHNOLOGY

PART NUMBER: 35584 REV. 4

ISSUED BY: D. FARMER ISSUE DATE: 3/20/2018

3D DATABASE: 35584 - Cable DC Data 15M Fiber Enc.STEP

ASME/ANSI Y14.X | EGF-44274-01 | SCALE: 1:1 | SIZE: B | SHEET 2 OF 2

Air Flow

The Enclosed Fiber Curing System has internal cooling fans and air vents to properly cool the components. Do not restrict the airflow.

- Minimum clearance of 50mm should be maintained for the front, back and sides of the enclosure.

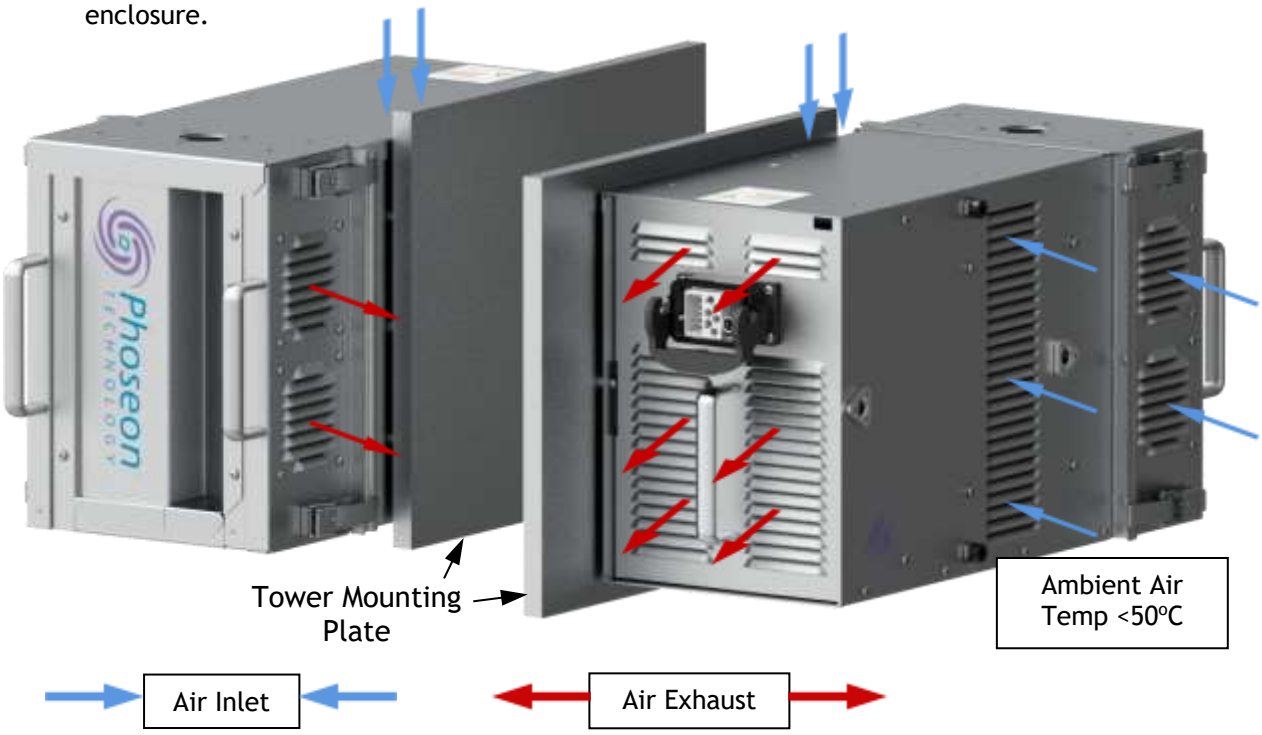


Figure 2.2: Air Flow Directions for FJ228 Enclosed Fiber System

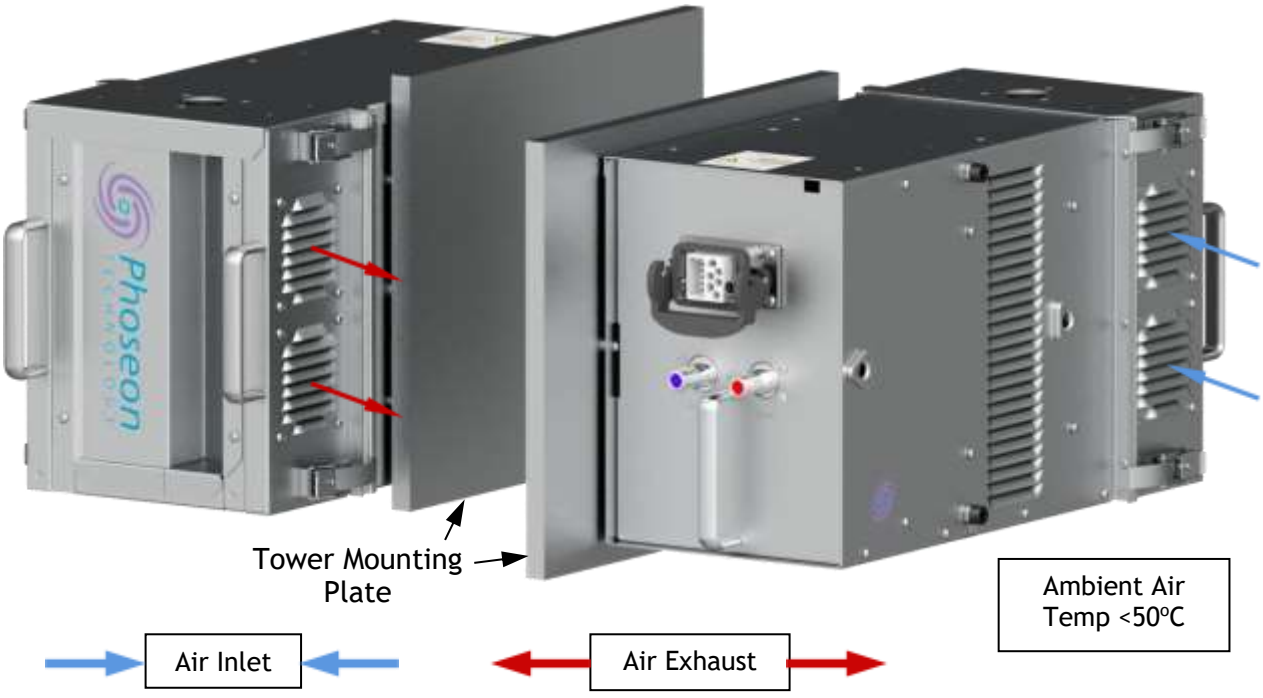


Figure 2.3: Air Flow Directions for FP300 Enclosed Fiber System

PLC & RS485 Control

The UV LED light source inside the enclosure can be controlled via a Programmable Logic Controller (PLC) using the male 17-pin connector on the rear panel (See 54616 Product Specifications).

The UV LED light source can also be controlled via the RS485 interface on the male 17-pin connector (See 28027 FireJet FJ200 RS485 Control Manual or 27779 FirePower FP300 RS485 Control Manual).

Connecting an Interlock

The Fiber Curing System has the capability to support a customer supplied interlock circuit. This is useful for situations where the function of the UV LED light source is tied to a protective barrier or gate, where the UV emission should be stopped when the barrier or gate is opened. An external interlock circuit is not required for light source operation. If no interlock is present, simply connect Pin 7 on the PLC Interface connector to Ground to disable this feature.

If the UV LED light source is connected to an external customer defined interlock circuit, then this circuit should be tied to Pin 7. When +16V to +24V is applied to Pin 7 (or the Pin is open), the UV emission is stopped. When 0V to +6V is applied to Pin 7, UV emission is allowed per the enable and intensity settings of the other Pins.

Note: If applied voltages are outside the regions defined, for example applied voltage is between 6V and 16V, the behavior of the UV LED light source is not defined.

The front cover of the enclosure is tied to the interlock. UV emission is stopped when the front cover is removed.

Connecting Multiple Fiber Curing Systems

If multiple Fiber Curing Systems are used and controlled together, the following Pins can be "AND" tied together so that one control interface can be used to control all the light sources in unison:

- Pin 2 (Intensity Control)
- Pin 3 (Enable)
- Pin 5 (Lamp Ready)
- Pins 8,9,10 & 14 (Grounds)
- Pin 11 (Fault)
- Pin 15 (Temperature Monitor)

CAUTION: DO NOT tie together Pins 4, 6, or 7

Note: It is not recommended to tie the RS485 lines (Pins 12 & 13) together.

Note: Pins 1, 16 and 17 are open, and not connected to the UV LED light source.

Operation

On/Off Control

The output of the UV LED light source is enabled and disabled through a simple PLC level voltage on the rear connector and is turned on and off electronically. The light source does not require external shutters and is enabled only when needed.

Intensity Control

The intensity of the UV output is controlled through an analog voltage on Pin 2 of the PLC Interface connector. The valid range of this voltage is 1 to 10Vdc for the FP300 and 0.1 to 10Vdc for the FJ228. 10Vdc corresponds to 100% output irradiance and UV power and 0.1Vdc corresponds to 1% output irradiance and UV power.

The output of the UV LED light source varies linearly across the intensity control voltage range. Below 1Vdc for the FP300 and below 0.1Vdc for the FJ228, the output irradiance is held constant at the minimum value. If zero UV output is desired, the Enable line should be pulled low.

Lamp Ready & Fault Feedback Output

The status of the UV LED light source is given by the state of the Lamp Ready or Thermal Fault (Pin 5) and Fault Feedback (Pin 11) lines on the 17-pin rear connector. Both the Lamp Ready/Thermal Fault and Fault Feedback are high when the UV LED light source is in the Ready state, meaning the UV output may be enabled through the Enable line. If any of these lines are low, the UV LED light source is in a fault state, indicating the UV output may not enable.

A fault state is caused by one or more of the following conditions:

- The DC power supply is turned off
- The DC power supply is providing a voltage too low for proper operation
- The UV LED light source is in thermal shutoff due to excessive internal temperatures
- An error has been detected in the current drive to the LED array

Refer to the Troubleshooting Guide later in this manual for help identifying the cause of the fault state.

Monitoring Temperature

The performance of the FJ228, which is an air-cooled system, will be directly impacted by the temperature of the ambient air in the environment where the light source is being operated. Irradiance will increase slightly at cooler operating temperatures, for example at initial system start up, and decreases slightly with warmer operating temperatures.

For the FP300, which is a water-cooled system, the cooling water temperature and flow rate must meet the specifications listed in the 35453 Product Specifications and 28384 Water Cooling Requirements.

A temperature monitoring device has been integrated into the UV LED light sources to help monitor the light source temperature during operation. The device, inside the unit, outputs a voltage signal of 0 to 10.5VDC to Pin 15 which corresponds to 100mV per degree Celsius. For example, a reading of 2.55V equates to 25.5˚C.

Phoseon recommends that the customer monitor the temperature through the 17-pin PLC Interface connector (Pin 15). If the reported temperature changes by more than 10 to 15 degrees from steady state operating conditions, this could indicate a problem and the environmental conditions should be inspected. See Troubleshooting Guide for more information.

In addition to monitoring the system temperature, a separate 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.

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. A maximum of five thermal cycles are allowed. After this the light source must be reset by disconnecting the DC power. After any thermal shutdown has occurred, determine and correct the cause before returning to normal operation of the system.

Water Cooling Requirements

Technical Note

Overview

Phoseon offers several water-cooled light sources. Water cooling is the most efficient way to remove excess heat from any device. Water cooling is a closed system, consisting of water channels internal to the light source, an external cooler or chiller, and the water lines connecting the two. The cooling water runs through the light source to transfer heat away from the UV LEDs, and the chiller or cooler then removes the excess heat from the water before it is circulated back to the light source.

Proper setup and regular maintenance of the water cooling system is a requirement of the Phoseon warranty. Failure to follow the requirements listed below can result in permanent damage to the light source. This document supersedes any recommendations or requirements in the Cooling Water or Water Condensation Hazard sections of the product manuals.

Warranty Requirements

The following requirements must be met to maintain the optimum performance of the light source. Failure to meet these requirements voids the warranty.

The water chiller must meet the flow rate and cooling capacity requirements of the Phoseon light source. Flow rates and cooling capacities are listed on the product specification sheets and in the OEM manuals.

- **Use distilled water only.** Do not use tap water or deionized water. They are harmful to the cooling system.
- **Use an anti-corrosion additive.** Water is very corrosive to metals, so protection against corrosion is essential.
- **Avoid conditions that cause condensation** to form on the water lines and inside the light source.
- **Use a flow switch** or other safeguard to insure the light source is not enabled without cooling water.

See below for additional details on these requirements.

Water Preparation

Use distilled water only

The minerals typically found in tap water are detrimental to the cooling system, and in extreme cases will cause complete blocking of the water channels inside the light source. Do not use deionized water in the cooling system. Deionized water is extremely corrosive, and will quickly degrade the water channels.

Use an anti-corrosive additive

Anti-corrosion additives are required to keep the water channels clear. Using distilled water alone reduces, but does not eliminate, the build-up of deposits in the channels due to galvanic corrosion. A convenient way to add anti-corrosion ingredients to the water cooling system is through the use of readily available coolants (anti-freezes). Most coolants contain proprietary anti-corrosion additives which are effective in preventing deposits. Simply verify that the coolant is specified to provide protection for multiple metals, including copper, aluminum and brass.

Phoseon has tested:

DowFrost™ Heat Transfer Fluid

- Concentration of Propylene Glycol: 96% before dilution
- Coolant/Distilled water mix: 25%-30% concentration, remainder distilled water

Coolant requirements:

- Type: DowFrost™ Heat Transfer Fluid or equivalent
- Concentration of Propylene Glycol: 96% before dilution
- Coolant/Distilled water mix: 25%-30% concentration, remainder distilled water
- Protection for multiple metals, including copper, aluminum and brass

Propylene glycol based coolant is also classified as non-toxic and is available worldwide. In addition, a coolant mixture of at least 25%, as required by Phoseon, eliminates the need for an algaecide. However, do not use a mixture of more than 30% coolant, as it will reduce the cooling capacity by too great an amount.

In some environments, a 25% to 30% concentration of coolant produces foam in the cooling water, lowering the cooling efficiency. If foam is present in the cooling water, an alternative is a 20% concentration along with an algaecide.

Phoseon has tested:

PolyScience Lab Algicide

General purpose lab algaecide.

- Dosage: 20 drops/gal
- 8 oz. (treats 400 gallons)

Be aware that the chiller manufacturer may require specific additives in order to remain under their warranty. Always check with the chiller manufacturer before using a coolant.

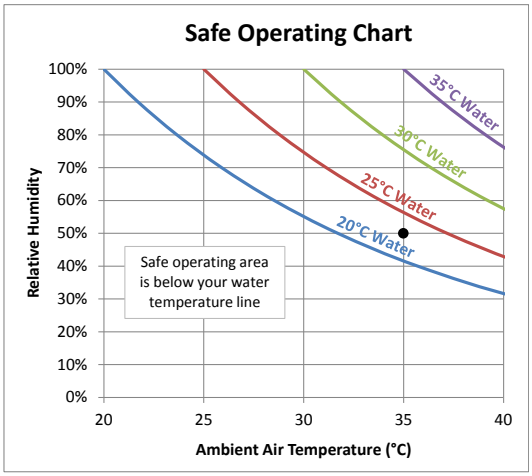
Understanding Condensation

Condensation must be avoided under all conditions. If water collects inside the light source or other equipment, permanent damage will result. It is therefore important to be aware of ambient conditions that lead to condensation.

Dew point

Condensation occurs when humid air makes contact with a colder surface. If the surface is cold enough, the air cools to the point where it can no longer hold its water vapor. This causes liquid water to form on the surface.

The temperature at which condensation occurs is known as the dew point. For any combination of ambient air temperature and relative humidity the dew point is predictable. Therefore the conditions under which condensation occurs can be avoided.



Note: Output irradiance will decrease <2% for every 10°C rise in water temperature. All Phoseon light sources are set at the factory using 30°C cooling water.

Risk conditions

Phoseon water cooled products are specified for operation with a water temperature of 20 - 35°C. Refer to the Safe Operating Chart at right. On this chart the water temperature lines indicate where the dew point matches the water temperature. Any combination of relative humidity and ambient temperature that is above a given water temperature line represents a condition where condensation can occur.

Phoseon recommends using a higher water temperature of 30 to 35°C to reduce the risk of condensation. As an example suppose the ambient conditions are 35°C and 50% RH, shown as a black dot on the chart. If the cooling water temperature is 20°C there is a risk of condensation. In this case increasing the water temperature to 25°C or higher will avoid condensation.

Look at your water lines for a quick way to determine if your current conditions are causing condensation. If the water lines coming from the chiller are forming condensation, increase the water temperature to eliminate condensation. Note that in extreme conditions, it may be necessary to reduce the ambient temperature and/or reduce the relative humidity to eliminate condensation.

Operating Requirements

Avoid conditions that cause condensation

The chart at right lists the operating environment specifications for Phoseon water-cooled light sources. Select a water temperature based on your maximum ambient air temperature and relative humidity. In addition, it is good practice to turn off the cooling water whenever the UV output is turned off for more than a few minutes. This allows the water channels to adjust to the ambient air temperature, reducing the chances of condensation.

Operating Environment	
Ambient Temp	10 to 40°C
Water Temp	20 to 35°C
Max Relative Humidity	Varies (See below)
w/ 35°C Water	<80% RH up to 37°C ambient <70% RH up to 40°C ambient
w/ 30°C Water	<80% RH up to 32°C ambient <55% RH up to 40°C ambient
w/ 25°C Water	<80% RH up to 27°C ambient <40% RH up to 40°C ambient
w/ 20°C Water	<80% RH up to 22°C ambient <25% RH up to 40°C ambient

Use a flow switch

As an added safety measure, the use of a water flow switch is required. A flow switch inserted at chiller's water path output will guard against enabling the UV output when the water flow is off. The output of a flow switch is a simple contact closure. By choosing a switch that matches the light source's Interlock or UV Override control pin function, the UV output is disabled when no water is flowing. The flow switch may be replaced by an equivalent function in an integrated control system.

Phoseon has tested:

Gems Sensors
Flow Switch part number:
129661 Normally open with no flow (3.7LPM)
129667 Normally closed with no flow (3.7LPM)
129666 Normally closed with no flow (1.9LPM)

Service

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

Troubleshooting Guide, FJ228 Air-Cooled

Table 4.1: Troubleshooting Guide, FJ228 Air-Cooled

Note: Green LED is located on the PCBA, visible through air exhaust.

Symptom (FJ228 Air-Cooled)	Green LED	p5 Lamp Ready	p7 Interlock	p11 Fault Status	p15 Temperature Output	Root Cause	Recommended Action	RS485 Logging
Lamp Ready, No Active Faults, Not Enabled	On	Hi	Lo	Hi	X	No Fault	Apply +24V on Pin 3 to enable. If control signals are in question, isolate the lamp from the control system, and connect Pin 3 directly to Pin 6. If lamp operates, then it is not receiving the correct enable signal from the controller.	No FW log entry
Lamp Not Ready, No Active Faults UV OFF if Enabled	Off	Lo	Hi	Hi	X	Interlock is Open	Connect Pin 7 to ground	No FW log entry
Lamp Not Ready, No Active Faults UV ON if Enabled	Off	Lo	Lo	Hi	X	Over Voltage, Input Voltage > 53V	Adjust DC power input to lamp (48±1VDC) **Note:** fault is not logged for first 10 seconds when DC power is applied, fault response is within 1 second of detection after the initial 10 seconds.	Event Code 5:Flt-inputV_hi

Symptom (FJ228 Air-Cooled)	Green LED	p5 Lamp Ready	p7 Interlock	p11 Fault Status	p15 Temperature Output	Root Cause	Recommended Action	RS485 Logging
Lamp Not Ready, No Active Faults UV ON if Enabled (continued)	Off	Lo	Lo	Hi	X	Over Voltage, Input Voltage < 43V	Adjust DC power input to lamp (48±1VDC) **Note:** fault is not logged for first 10 seconds when DC power is applied, fault response is within 1 second of detection after the initial 10 seconds.	Even Code 6:Flt-inputV_lo
Lamp Not Ready, Active Fault UV OFF if Enabled	Off	Lo	Lo	Lo	>11	LM35 Temperature Sensor, FW controlled: Over temperature > 110˚C	DO NOT SHUT-OFF DC Power Ensure air inlet and exhaust have at least 50mm clearance. Ensure ambient air temperature is ≤50˚C, and filters are not clogged. Fault status will clear and UV will turn on (if enabled) when the light source cools down to ≤ 4.0V on Pin 15. However, if five or more thermal cycles have occurred the DC power must be cycled off and back on to re-enable the UV output.	Event Code 3:Flt-FW_overtemp
						Airpax Temperature sensor, HW switch: Over temperature > 110˚C		Event Code 2:Flt-temp_intrlck
Lamp Not Ready Active Fault UV Off or Only Partially On if Enabled	Off	Lo	Lo	Lo	<11	Blown Fuse	Shut off DC power Contact Phoseon	Event Code 1:Flt-blown_fuse
Lamp Not Ready Active Fault UV On When Not enabled DC Current Drawn When Not Enabled						False Current Detected		Event Code 4:Flt-False_I

Troubleshooting Guide, FP300 Water-Cooled

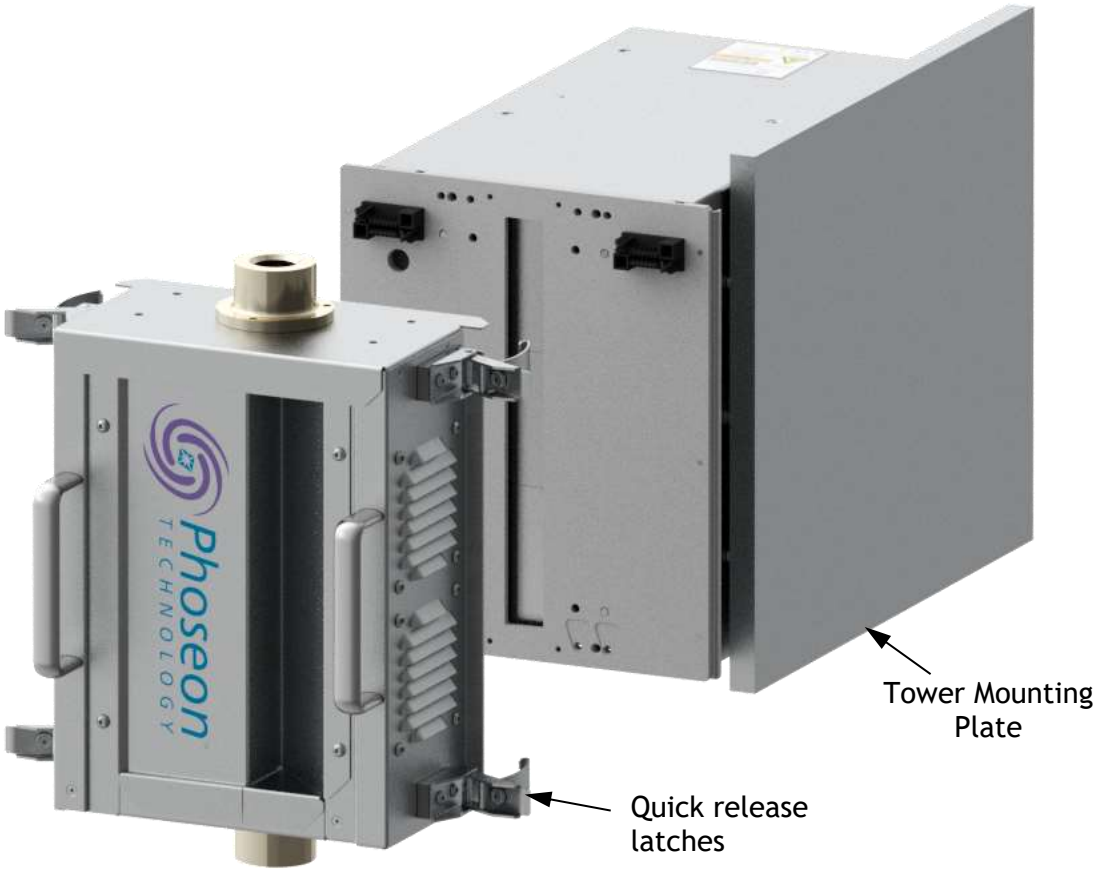
Table 4.2: Troubleshooting Guide, FP300 Water-Cooled

Symptom (FP300 Water-Cooled)	p5 Thermal Fault	p7 Interlock	p11 SLM Fault	p15 Temperature Output	Root Cause	Recommended Action	RS485 Logging
No Thermal or SLM Faults, Not Enabled	Hi	Lo	Hi	X	No Fault	Apply +24V on Pin 3 to enable. If control signals are in question, isolate the lamp from the control system, and connect Pin 3 directly to Pin 6. If lamp operates, then it is not receiving the correct enable signal from the controller.	No FW log entry
No Thermal or SLM Faults, UV OFF if Enabled	Hi	Hi	Hi	X	Interlock is Open	Connect Pin 7 to ground	No FW log entry
No Thermal Fault, SLM Fault, UV ON if Enabled	Hi	Lo	Lo	X	Over Voltage, Input Voltage > 53V	Adjust DC power input to lamp (48±1VDC) **Note:** input voltage is checked only once, 10 seconds after power is applied.	Event Code 5:Flt-inputV_hi
					Under Voltage, Input Voltage < 43V	Adjust DC power input to lamp (48±1VDC) **Note:** input voltage is checked only once, 10 seconds after power is applied.	Even Code 6:Flt-inputV_lo

Symptom (FP300 Water-Cooled)	p5 Thermal Fault	p7 Interlock	p11 SLM Fault	p15 Temperature Output	Root Cause	Recommended Action	RS485 Logging
Thermal Fault, No SLM Fault, UV OFF if Enabled	Lo	Lo	Hi	>6	LM35 Temperature Sensor, FW controlled: Over temperature > 60˚C	Ensure cooling water is flowing. Check for at least 6LPM water flow rate. Check for proper chiller operation, with water temperature between 20-35˚C. Fault status will clear and UV will turn on (if enabled) when the light source has cooled down to ≤ 4.5V on Pin 15. However, if five or more thermal cycles have occurred the DC power must be cycled off and back on to re-enable the UV output.	Event Code 3:Flt-FW_overtemp
					Airpax Temperature sensor, HW switch: Over temperature > 60˚C		Event Code 2:Flt-temp_intrlck
No Thermal Fault, SLM Fault, UV Off or Only Partially On if Enabled	Hi	Lo	Lo	<6	Blown Fuse	Shut off DC power Contact Phoseon	Event Code 1:Flt-blown_fuse
No Thermal Fault, SLM Fault, UV On When Not enabled. DC Current Drawn When Not Enabled					False Current Detected		Event Code 4:Flt-False_I

Inspecting the Fiber Reflector Unit (FRU)

The Fiber Reflector Unit is easily removed for inspection and maintenance.



Remove the Front Enclosure. The Front Enclosure is held in place with four quick release latches.

Note: When the Front Enclosure is removed the UV emission is automatically shut off.

Caution: The Fiber Reflector Unit (FRU) may be hot. Allow 10 minutes after the UV emission is shut off for the FRU to cool to a safe handling temperature.

Refer to 54617 User Manual, Fiber Refl Maintenance G7 on the following pages for details on removing the FRU from the Front Enclosure.

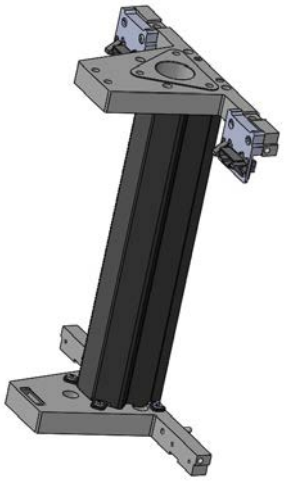
Inspect the following:

- If foreign material is present on the glass it must be cleaned or replaced. Refer to 27182 Window Cleaning Instructions or 54617 User Manual, Fiber Refl Maintenance G7.
- If foreign material or scratches are present on the internal reflector it must be replaced. Either replace the entire FRU, or follow the 54617 User Manual, Fiber Refl Maintenance G7 to replace internal reflector.

UV LED Fiber Curing System

Generation 8, FRU Maintenance Guide

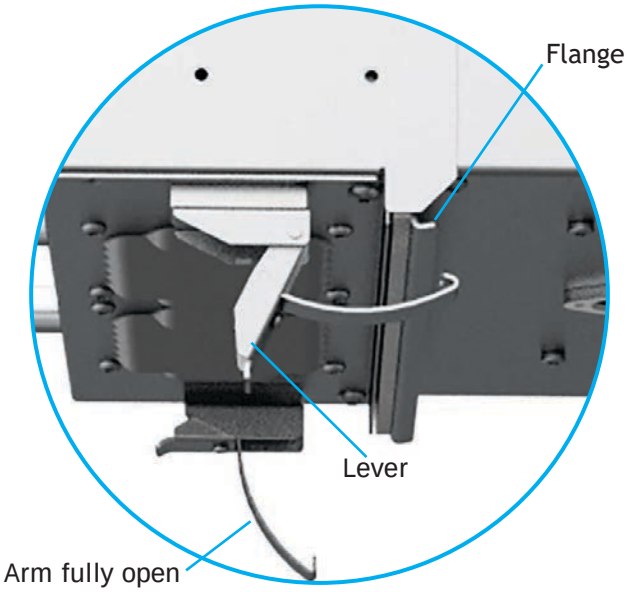
Phoseon UV LED Fiber Reflector Unit (FRU)



Phoseon's Fiber Curing System consists of a patented high intensity UV LED light source along with a patented Fiber Reflector Unit (FRU) which directs the UV energy around the circumference of the fiber. Regular inspection and maintenance of the FRU and its components helps insure optimal system performance. The same FRU is used in Generation 6 & 7 systems while Generation 8 has a new architecture.

Removal of Front Enclosure

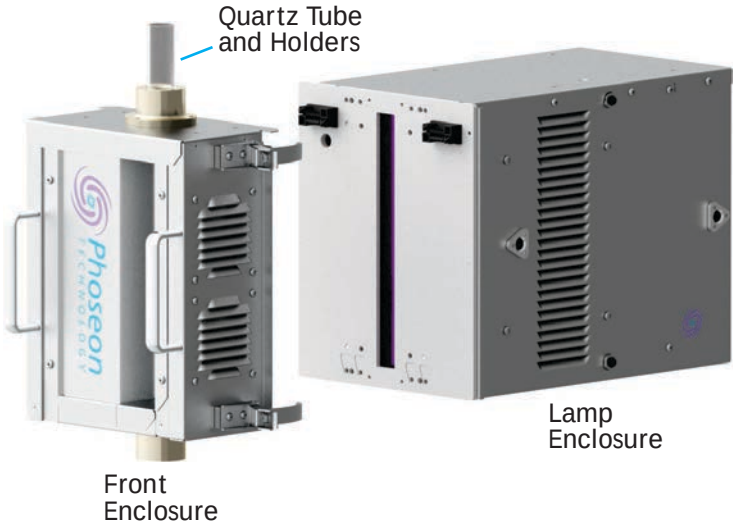
If the internal reflectors or protective glass within the FRU becomes dirty, coated or damaged, they are cleaned or replaced by disassembling then reassembling the FRU. To access the FRU, the Front Enclosure is first removed from the Lamp Enclosure.



Four quick-release latches hold the Front Enclosure to the Lamp Enclosure. Open each latch by first pulling the lever up. This allows the latch arm to clear the flange. The lever is then placed back in the down position with the arm in the fully open position.

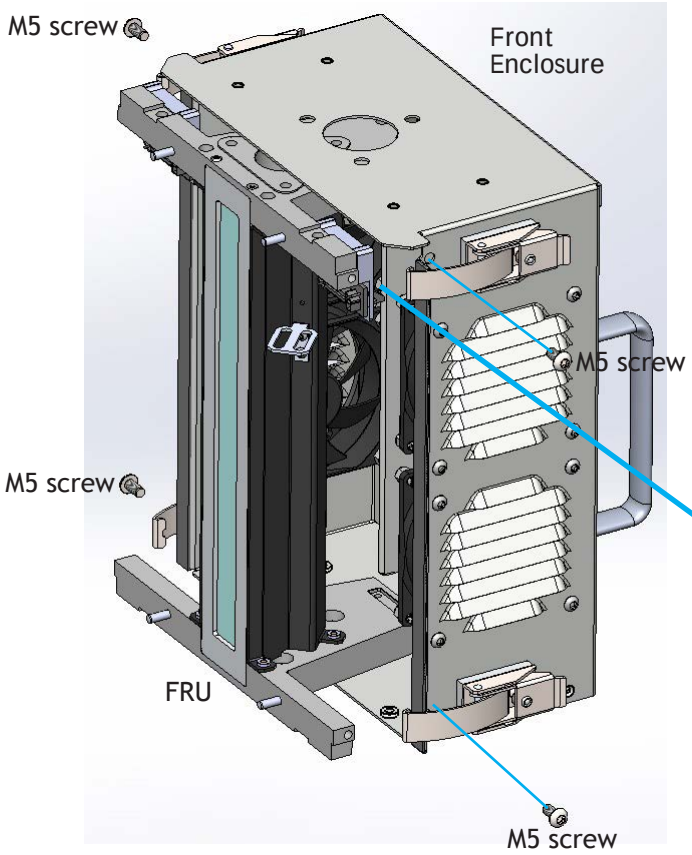
With all four latches in the open position, the Front Enclosure is removed from the Lamp Enclosure.

The quartz tube and holders should be removed from Front Enclosure at this time.



Removal of FRU from Front Enclosure

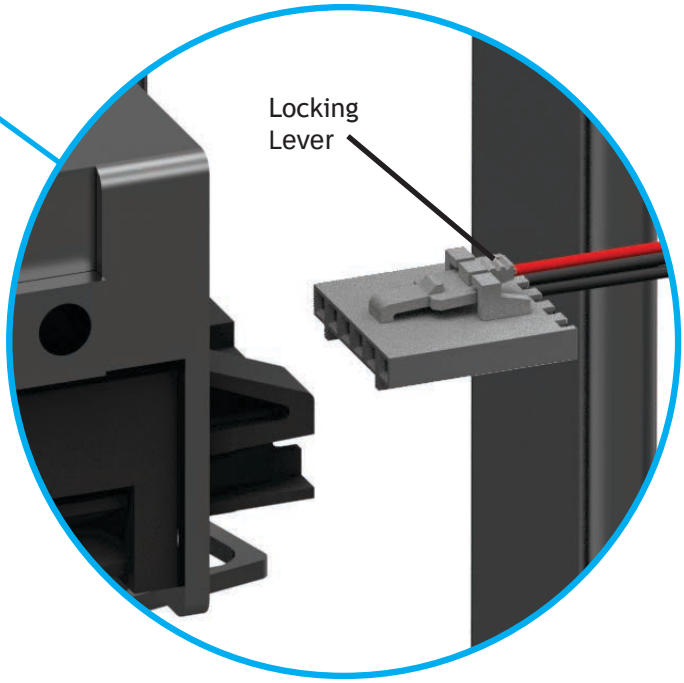
With the Front Enclosure removed from the Lamp Enclosure, the FRU is removed for service and repair.



Remove the four M5 Torx head screws that hold the FRU to the Front Enclosure, using a T20 Torx driver.

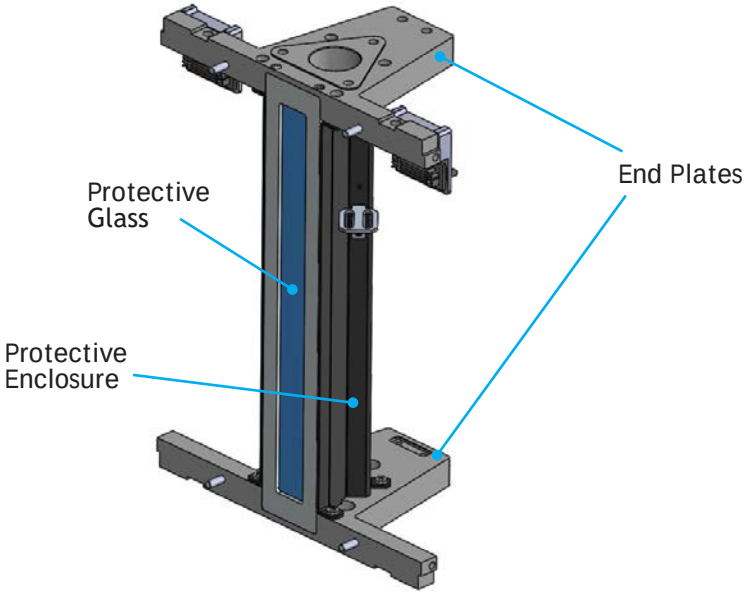
Slide the FRU in the direction shown about 25mm (1 inch).

At the top of the FRU there are two wire assemblies. On each wire assembly, press the locking lever on the connector and slide it free from the FRU.



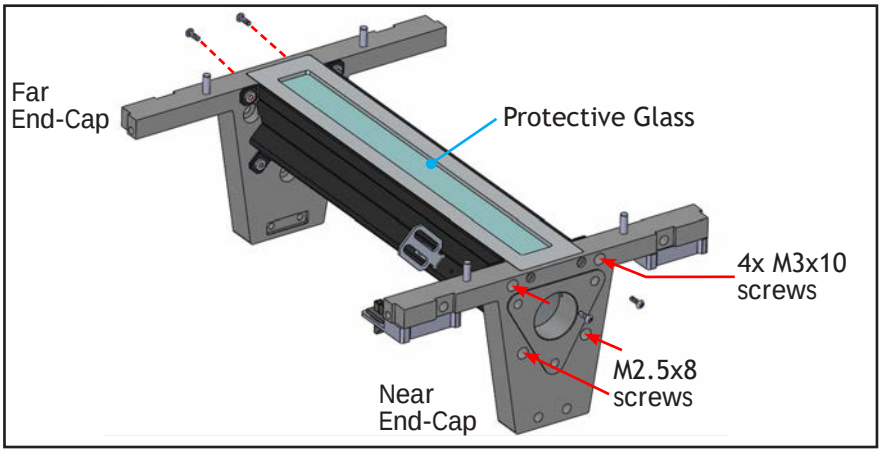
Once the wire assemblies have been disconnected, the FRU is removed completely from the Front Enclosure.

Fiber Reflector Unit (FRU)



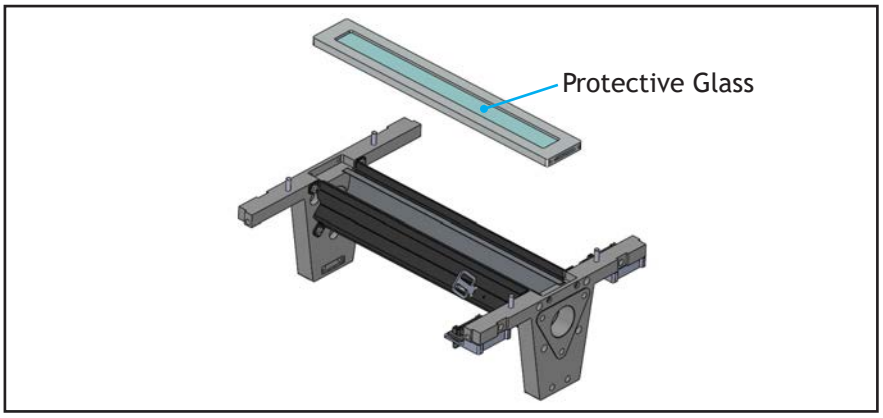
Disassembly and Inspection of FRU Components

If the internal reflectors or protective glass within the FRU becomes dirty, coated or damaged, they are cleaned or replaced by disassembling then reassembling the FRU.

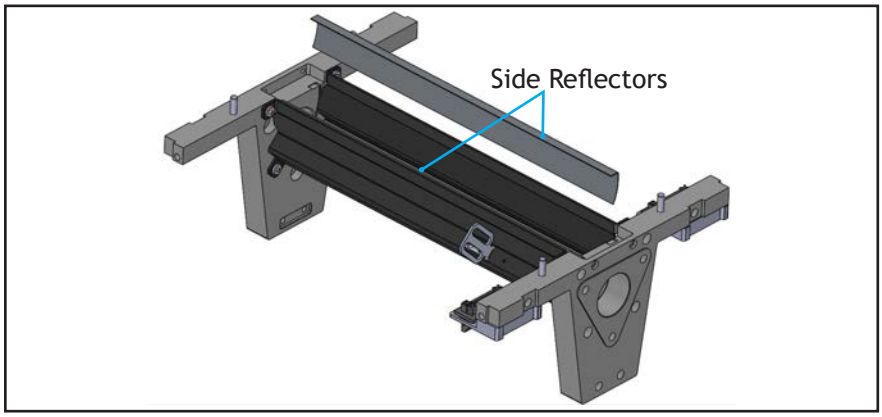


Remove the four M2.5x8 screws on both end caps using a T8 Torx driver.

Loosen (but do not remove) the four M3x10 screws on the Near End Plate. This is necessary to allow enough space to access the protective glass frame.

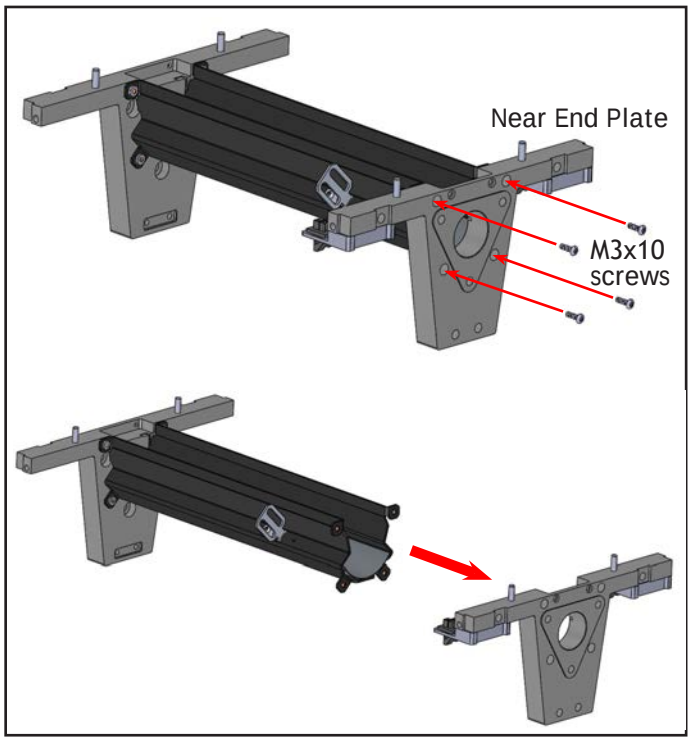


Carefully lift the Protective Glass up and out of the assembly. At this time, inspect the glass for debris or cured material. If necessary, slide it out of the frame and clean with a flat razor and IPA using a soft cloth.
In the event that residue cannot be removed, replace the glass.

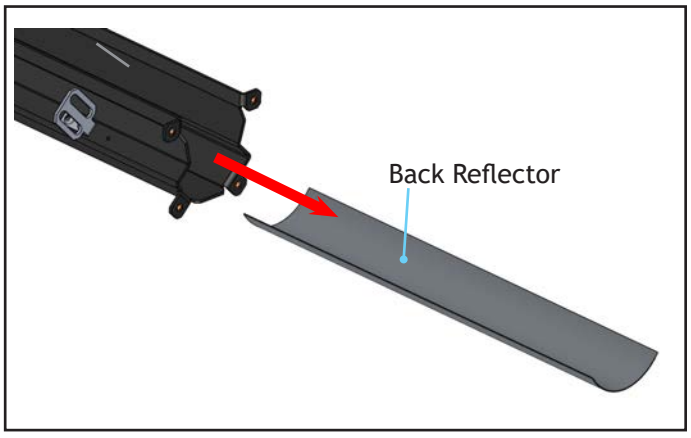


To clean the Side Reflectors, slide them upward out of their tracks and clean them in the same manner as the Protective Glass. Be careful not to scratch the inside surface of the reflectors.

Reassembly of FRU Components



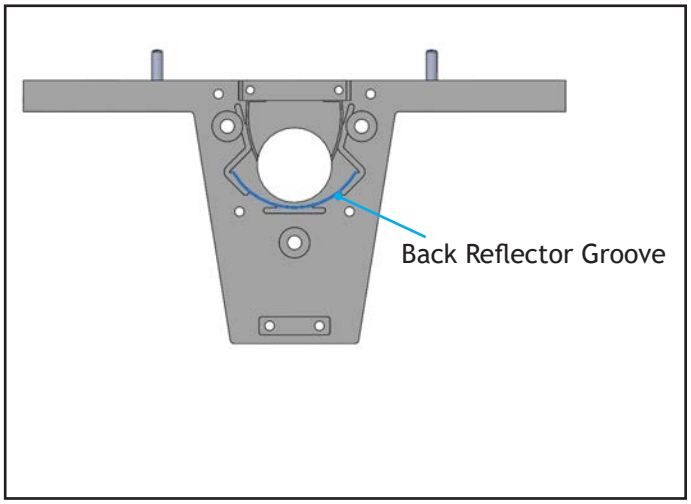
To clean the Back Reflector, remove the four M3x10 screws and carefully pull the Near End Plate free.



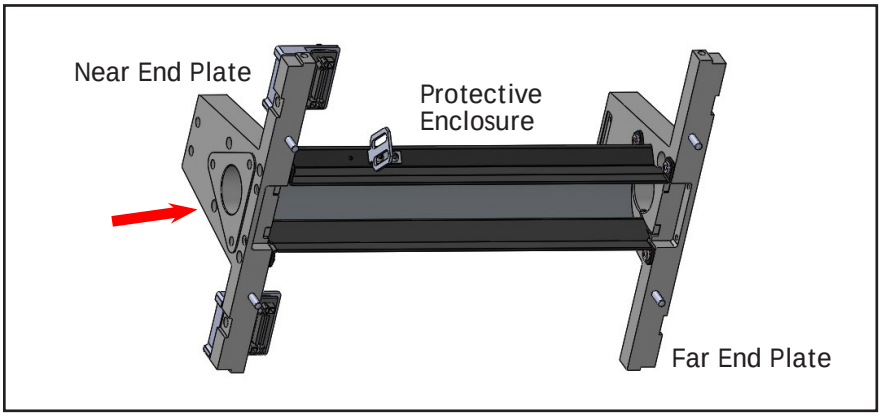
Gently slide the Back Reflector out of the Protective Enclosure and clean as before.

If either the Side or Back Reflectors are too dirty to clean, replace them with new ones.

CAUTION: If replacing reflectors, first make sure to remove the clear plastic film that protects the inner surface. Failure to remove this plastic film may result in a fire when the FRU is reinstalled onto the UV light source and the light is turned on.



To reassemble the FRU, reverse the previous steps. When reinstalling the Back Reflector, be careful not to bend it and make sure that it is fully seated in the curved groove machined in the End Plate (shown here in false blue).

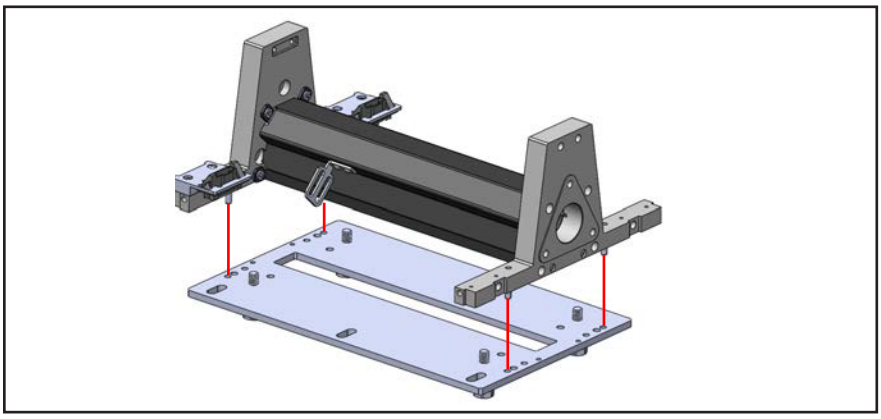


Re-seating the Near End Plate is easiest with the assembly standing vertically with the Far End Plate at the base. Gently press down until the Protective Enclosure snugly fits into the Near End Plate.

After this, begin reinstalling screws in the reverse order shown in the Disassembly Instructions.

Apply a small amount of Loctite® 242 to each M2.5 and M3 screw. Do not tighten screws fully into ***after*** reinstalling the Protective Glass.

Tighten screws in a “X” pattern using a T8 Torx driver.



To verify correct reassembly, place the FRU on the Fiber Reflector Fixture (PN 37643). Ensure that the dowel pins on the End Plates fit into the holes indicated. Remove and rotate the assembly 180°, then reinsert. When properly assembled, the FRU will align to the fixture in either orientation.

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.

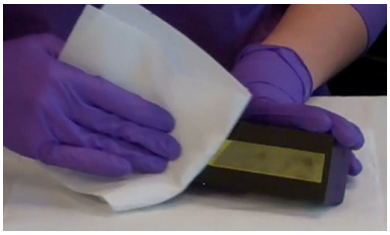
   CAUTION: Wearing vinyl gloves is recommended to avoid getting any uncured UV material on the skin.

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.

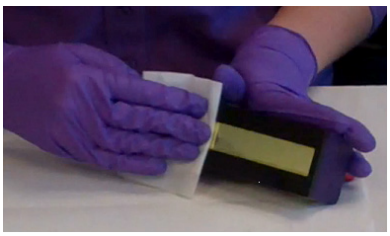
   Note: If the razor needs to be replaced, dispose of the razor blade in a properly marked sharps container.

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

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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