



FireEdge™ FE400 Solid State UV LED Curing System

User Manual

Revision: 7
January 2020

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Overview & Safety

UV Curing System Components

The FireEdge FE400™ system consists of the following components:

- FireEdge FE400 Light Source
- Electronic Control (PLC)
- DC Power Supply

The product label on the FireEdge FE400 light source identifies the production model and configuration. See the example (pictured right):

- FireEdge is the product family
- FE400 80x10 is the model number
 - 80 indicates the UV emitting length in mm
 - 10 represents the UV emitting width in mm
- Configuration information follows the model number
 - AC defines unit as air-cooled
 - 395 defines wavelength in nm
- 8W defines the peak irradiance in W/cm^2

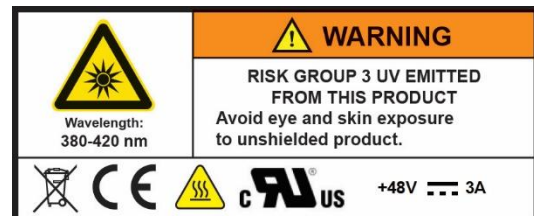
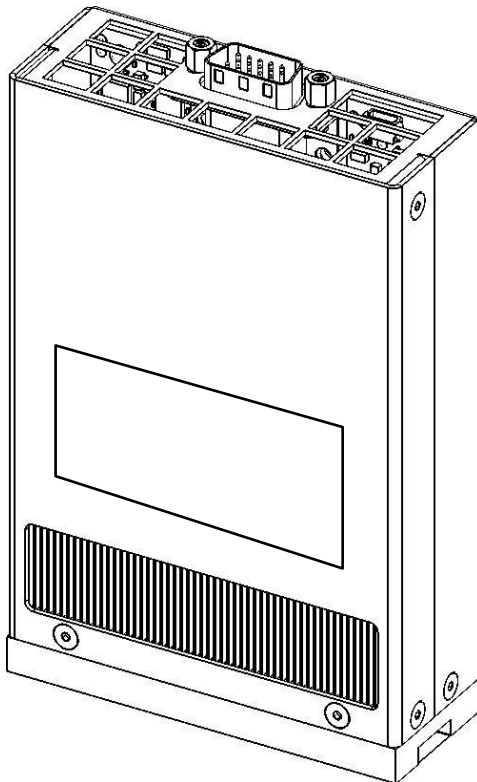


Figure 1.1: Safety Label Placement (safety label on back of product)

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

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

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	French Description	Italian Description	German Description	Spanish Description	Dutch Description	Polish Description
	Safety Notices	Consignes de Sécurité	Avvertenze sulla sicurezza	Sicherheits-hinweise	Notas de Seguridad	Veiligheids-aanduidingen	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 Vorsichtsmaßnahmen in der Gebrauchsanleitung lesen	Atención Lea el manual de Instrucciones de seguridad	Opgelet Lees handleiding voor veiligheidsvoorschriften	Uwaga Zapoznaj się z zaleceniami bezpieczeństwa 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 Vorsichtsmaßnahmen in der Gebrauchsanleitung lesen	Luz UV Lea el manual de Instrucciones de seguridad	UV-licht Lees handleiding voor veiligheidsvoorschriften	Promieniowa- nie UV Zapoznaj się z zaleceniami bezpieczeństwa 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 PROMIENIOWANIE UV Unikać wystawiania skóry i oczu na działanie nieosłoniętego 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.

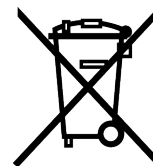


Figure 1.1: Do Not Dispose in Trash Symbol

Setup & Installation

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

Table 2.1: FireEdge FE400 Documentation

FireEdge FE400	80x10	120x10	160x10	180x10	240x10
Product Specification	33855				
Tech Note, FE400 Hub	33853				
Tech Note, Optics Options	33854				
Tech Note, Using FireEdge™ FE400 Replaceable Cover Glass	34770				
Control Drawings	Basic Flat: 33826	Basic Flat: 33828	Basic Flat: 33830	Basic Flat: 33832	Basic Flat: 33834
	Advanced Flat: 33843	Advanced Flat: 33845	Advanced Flat: 33847	Advanced Flat: 33849	Advanced Flat: 33851
	Basic Rod: 33827	Basic Rod: 33829	Basic Rod: 33831	Basic Rod: 33833	Basic Rod: 33835
	Advanced Rod: 33844	Advanced Rod: 33846	Advanced Rod: 33848	Advanced Rod: 33850	Advanced Rod: 33852
Light Source Control/Power Cable, 2m/5m/10m	33641/33612/33613				
Hub Light Source Cable, 2m/5m/10m	33616/33617/33618				
Hub Control Cable, 1.5m/3.1m/7.6m	19288/20131/33682				
Power Supply Hub Cable, 2m/5m/10m	25838/33614/33615				
Reducing Light Reflection	28658				
Window Cleaning Instructions	27182				
Declaration of Conformity	29259				
Optional Power Supply	Mean Well www.meanwell.com				
	RSP-320-48		RSP-480-48		

With the exception of the 3rd party power supplies, the above documents are included in this manual and also available as individual documents on the Phoseon Customer Resource Center (CRC) website at www.phoseon-support.com.

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 FireEdge FE400 requires a switching power supply with constant voltage output. The power supplies tested by Phoseon for use with the FireEdge FE400 systems are the Mean Well RSP-series power supplies. 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.
- Maximum ripple should be less than 4V peak-to-peak.
- Refer to 33855 Product Specifications for input power requirements.

A power supply should be used that provides a non-hazardous, safety isolated, Safety Extra Low Voltage (SELV) output certified by a notified body and/or CE marked.

Requirements for Multiple FireEdge FE400 Modules

A Hub is available for the FE400, when multiple light sources are used within a system. See *33853 Hub Tech Note* for more details. Alternatively, the control signals on the DB-15 connector may be daisy-chained and controlled by a PLC for up to 10 light sources. When scaling end-to-end, ensure the mounting bracket takes the tolerance stack into account.

Mechanical Installation

Refer to the Control Drawing for the specific FireEdge FE400 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 33855 Product Specifications for information about Data and DC Power Connector model and pinout.

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

FireEdge™ FE400

Product Specifications



SLM™, TargetCure™, WhisperCure™ Technologies

Phoseon's patented technologies encapsulate LEDs, arrays, optics and cooling to maximize UV LED curing performance. The FireEdge™ FE400 UV LED light source provides high output power in an extremely compact mechanical package for high-speed pinning and full cure applications. The FE400 UV LED source is CE, UL, RoHS, and REACH compliant.

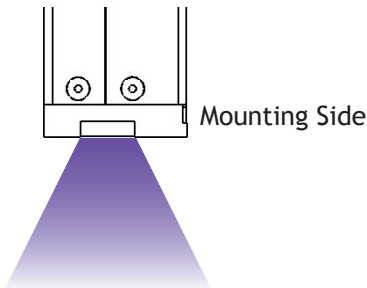


Performance

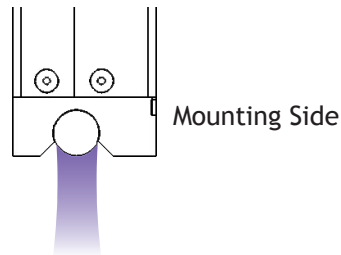
	365nm					385, 395, 405nm				
Peak Irradiance*	4W/cm ²					8W/cm ²				
Emitting Window (mm)	80x10	120x10	160x10	180x10	240x10	80x10	120x10	160x10	180x10	240x10
48Vdc Power In (Typical)	85W 1.8A	130W 2.7A	170W 3.6A	195W 4.0A	255W 5.3A	130W 2.7A	200W 4.2A	265W 5.6A	295W 6.2A	395W 8.3A
48Vdc Power In (Maximum)	95W 2.0A	145W 3.0A	190W 4.0A	215W 4.5A	285W 6.0A	145W 3.0A	220W 4.6A	295W 6.2A	330W 6.9A	440W 9.2A

*Peak Irradiance is expected to drop by 10% after replaceable cover glass is mounted.

Available Optics

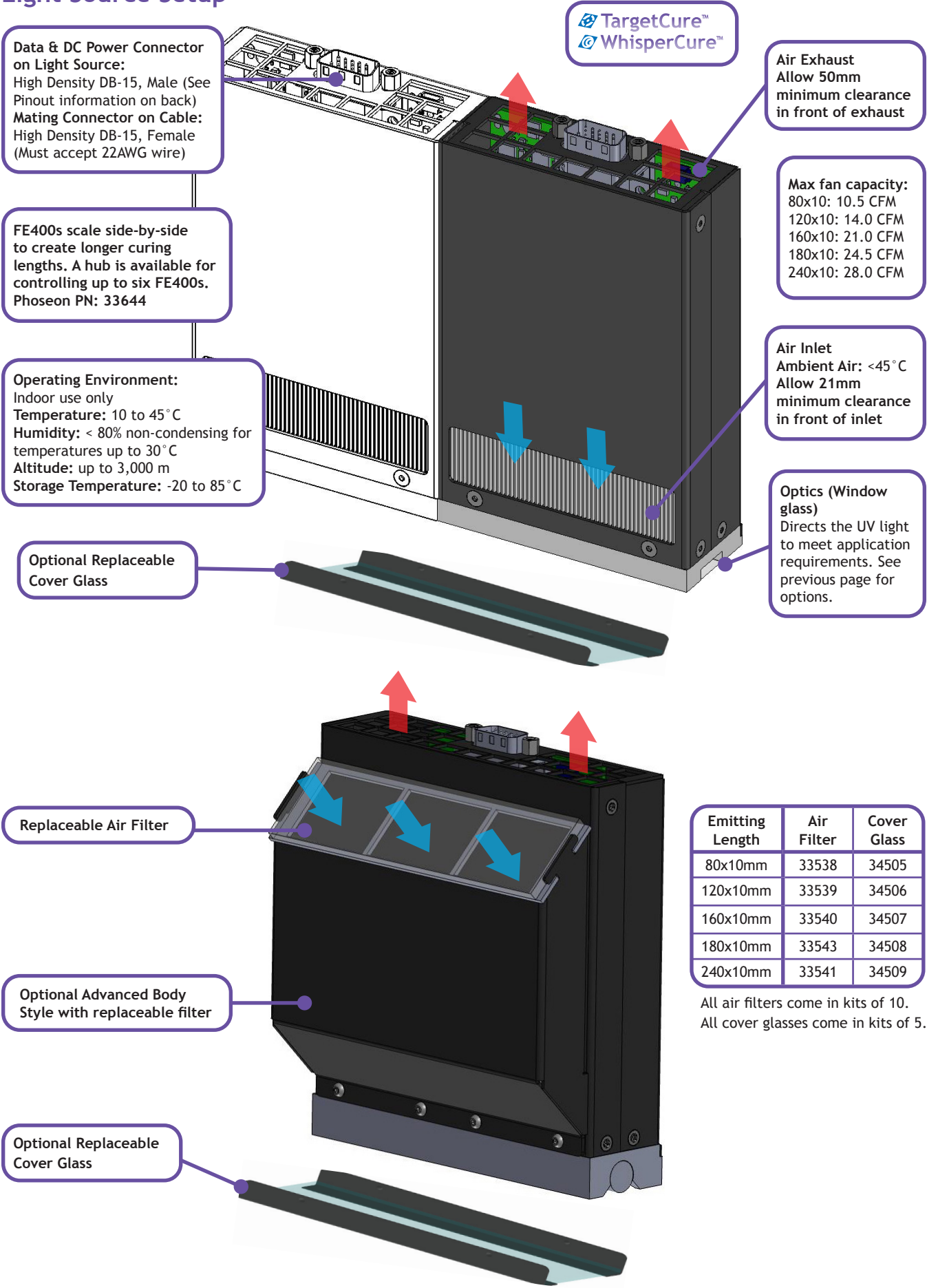


Flat Glass
Wide footprint for
maximum dwell time



Rod Lens
Minimum light spread reduces
stray light effects

Light Source Setup

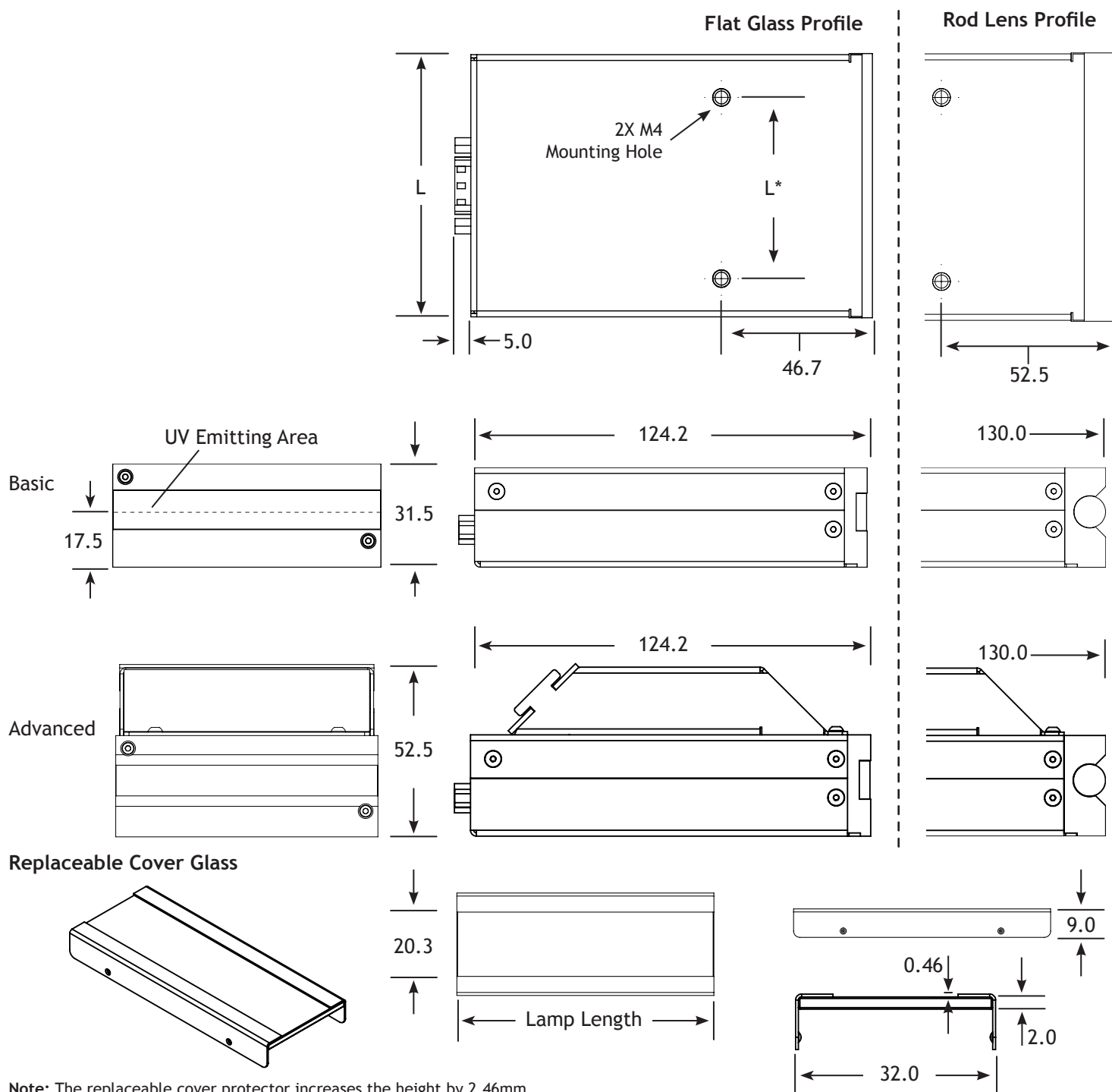


Dimensions

Units of measurement: mm

FireEdge FE400										
UV Emitting Window (mm)	80x10		120x10		160x10		180x10		240x10	
Body Style	Basic	Advanced	Basic	Advanced	Basic	Advanced	Basic	Advanced	Basic	Advanced
L	81.6		121.6		161.6		181.6		241.6	
L*	56.0				116.0					
Weight (kg)										
Flat Glass	0.28	0.31	0.36	0.40	0.49	0.54	0.55	0.61	0.69	0.77
Rod Lens	0.31	0.34	0.42	0.46	0.57	0.62	0.63	0.69	0.79	0.87

L* is the distance between mounting screw holes.



Note: The replaceable cover protector increases the height by 2.46mm.

PLC Interface

2 Intensity Control: (Voltage Input)

0.5V = 5% of full power, 10V = 100% of full power

The internal resistive load on this Pin is 11k Ω

3 Enable High: (24V PLC Input)

0 to 4V (ground/open input) = OFF or 16 to 24V = ON

Refer to pin equivalent circuit for internal resistive load.

4 Low Intensity Mode (24V PLC Input)

0 to 4V (ground/open input) = OFF (Default Mode)

or 16 to 24V = ON (Low Intensity Mode)

In Low Intensity Mode the Peak Irradiance is reduced by a factor of 10

The internal resistive load on this Pin is 200k Ω .

	Pin 2 Intensity Control	
	0.5V (5%)	10V (100%)
Default Mode	400 mW/cm ²	8.0 W/cm ²
Low Intensity Mode	40 mW/cm ²	800 mW/cm ²

5 Lamp Ready:

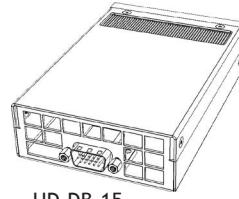
0 to 4V = Not Ready or 16 to 24V = Lamp Ready

The external resistive load on this Pin must be >3k Ω

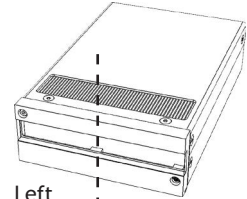
The NOT Ready state is triggered by:

Insufficient DC Input voltage

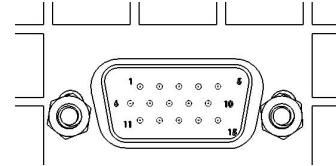
Excessive internal temperature



HD-DB-15
Connector



Left
SLM
Right
SLM



7 Disable Left SLM™ (24V PLC Input)

0 to 4V (ground/open input) = OFF (Default Mode)

or 16 to 24V = ON (SLM Disabled)

Refer to pin equivalent circuit for internal resistive load.

13 Disable Right SLM™ (24V PLC Input)

0 to 4V (ground/open input) = OFF (Default Mode)

or 16 to 24V = ON (SLM Disabled)

Refer to pin equivalent circuit for internal resistive load.

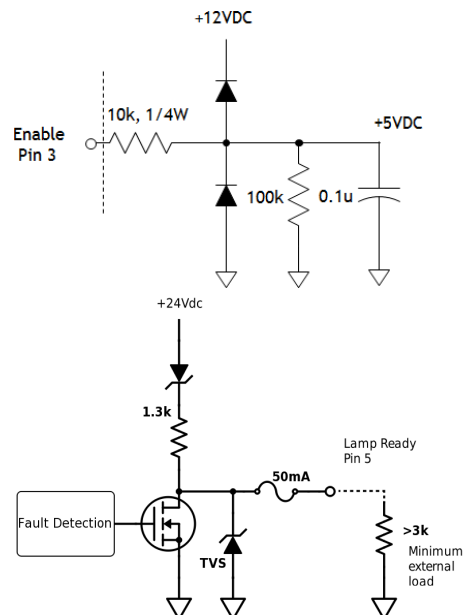
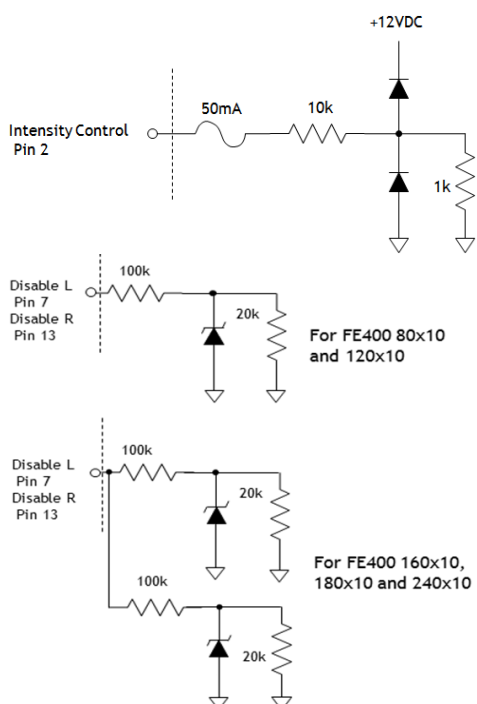
1, 6, 11, 12 +48Vdc Input

8, 9, 10, 14, 15 Ground (+48Vdc Return)

Notes: Low Intensity, Disable Left SLM, and Disable Right SLM are light source configuration switches. Phoseon does not recommend dynamic switching of these lines. Allow at least 250ms for the mode to enable or disable.

For Disabling/Enabling half the light source: 80mm, 120mm, 160mm, and 240mm lamps have the capability to Disable/Enable exactly half the length of the light source; 180mm lamp has a 60/120 split.

The equivalent circuits inside the FE400 UV light source are shown below:



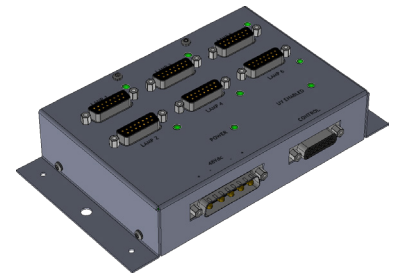
FireEdge™ Hub

Technical Note

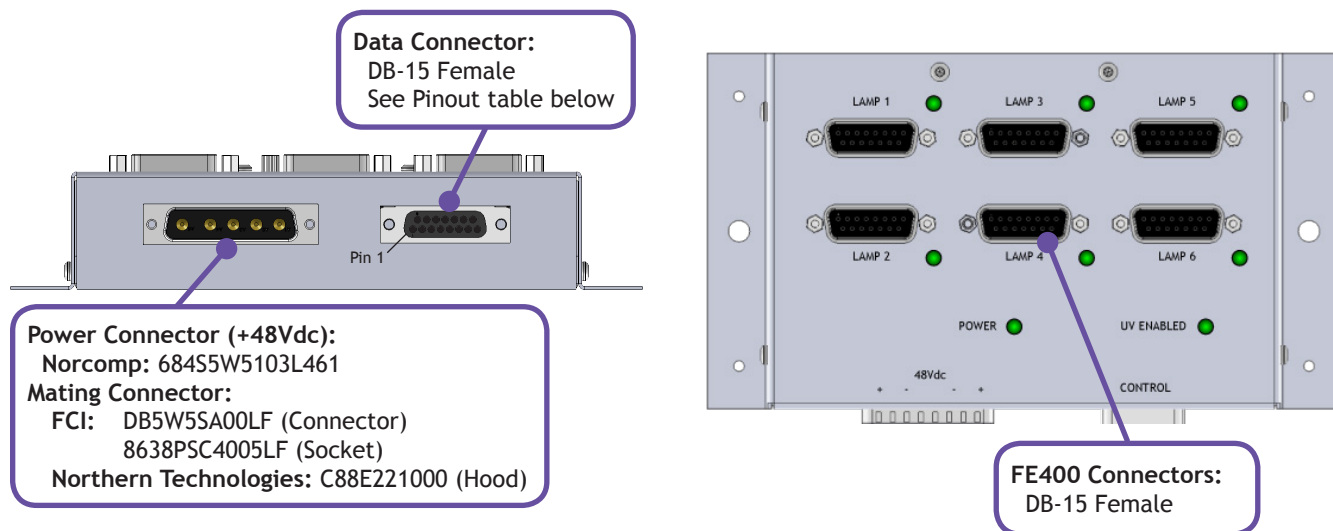


The FireEdge™ Hub, which works with the FireEdge FE100, FE400 and FE410, is an available accessory for simplifying wiring and integration when multiple LED light sources are used in a system. The Hub provides a single input power connector and control connector for up to six LED light sources. Light sources connected to the Hub act as a single unit, responding to common control signals.

The Hub also provides system feedback. The light source LEDs indicate the status of individual connected light source. The Power LED indicates when the proper DC voltage is connected ($48\text{Vdc} \pm 1\text{Vdc}$), and the UV-enabled LED indicates when the connected light sources have been enabled.



Connections



Data Connector

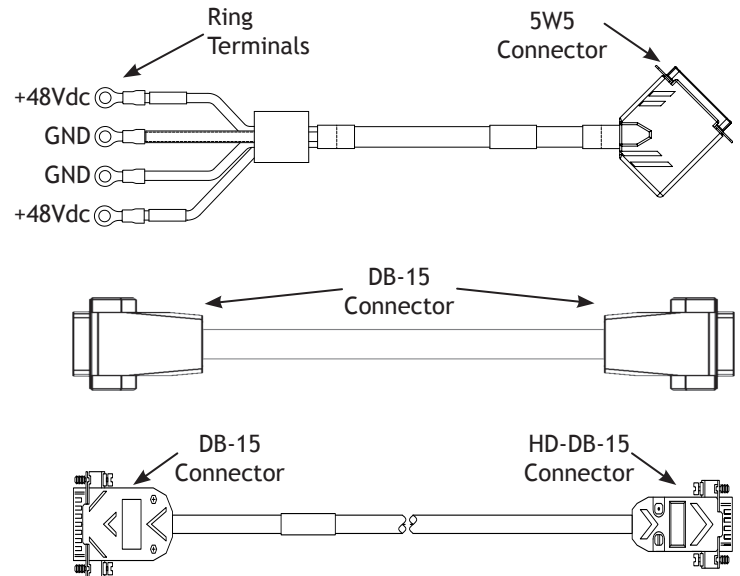
1 - Lamp 1 Ready	5 - Global Lamp Ready	9 - Ground	13 - Disable Right SLM
2 - Intensity Control	6 - +48Vdc	10 - Ground	14 - Lamp 4 Ready
3 - Enable High	7 - Disable Left SLM	11 - Lamp 2 Ready	15 - Lamp 5 Ready
4 - Low Intensity Mode	8 - Lamp 6 Ready	12 - Lamp 3 Ready	

- **Lamp *n* Ready** - 24V PLC Output, 0 to 4Vdc = Not Ready (fault detected) or 16 to 24Vdc = Ready
- **Intensity Control** - Analog voltage input (0.5-10Vdc), 0.5Vdc = 5%, 10Vdc = 100% of full intensity
- **Enable High** - 24V PLC Input, 0 to 4Vdc (ground/open input) = UV OFF or 16-24Vdc = UV ON
- **Low Intensity Mode** - 24V PLC Input, 0 to 4Vdc (ground/open input) = 8W/cm² at 100% intensity or 16-24Vdc = 800mW/cm² at 100% intensity
- **Global Lamp Ready** - 24V PLC Output, 0 to 4Vdc if *any* connected FE400 is Not Ready or 16 to 24Vdc if *all* connected FE400s are Ready
- **Disable Left SLM** - 24V PLC Input, 0 to 4Vdc (ground/open input) = Left SLM follows the Enable High line or 16 to 24Vdc = Left SLM is always OFF
- **Disable Right SLM** - 24V PLC Input, 0 to 4Vdc (ground/open input) = Right SLM follows the Enable High line or 16 to 24Vdc = Right SLM is always OFF

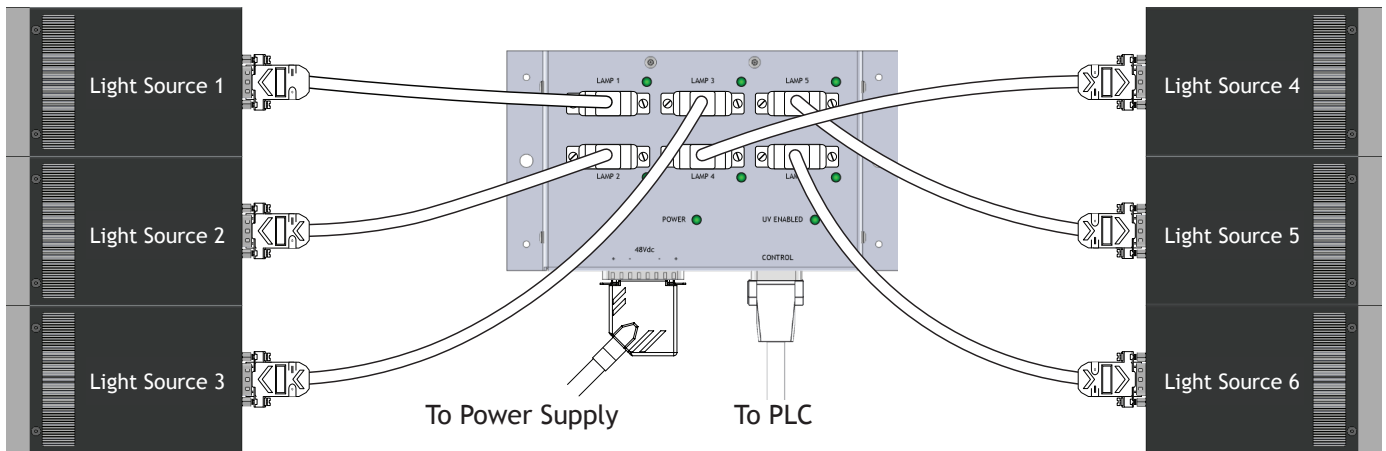
Hub Cables

The Hub requires three connecting cables:

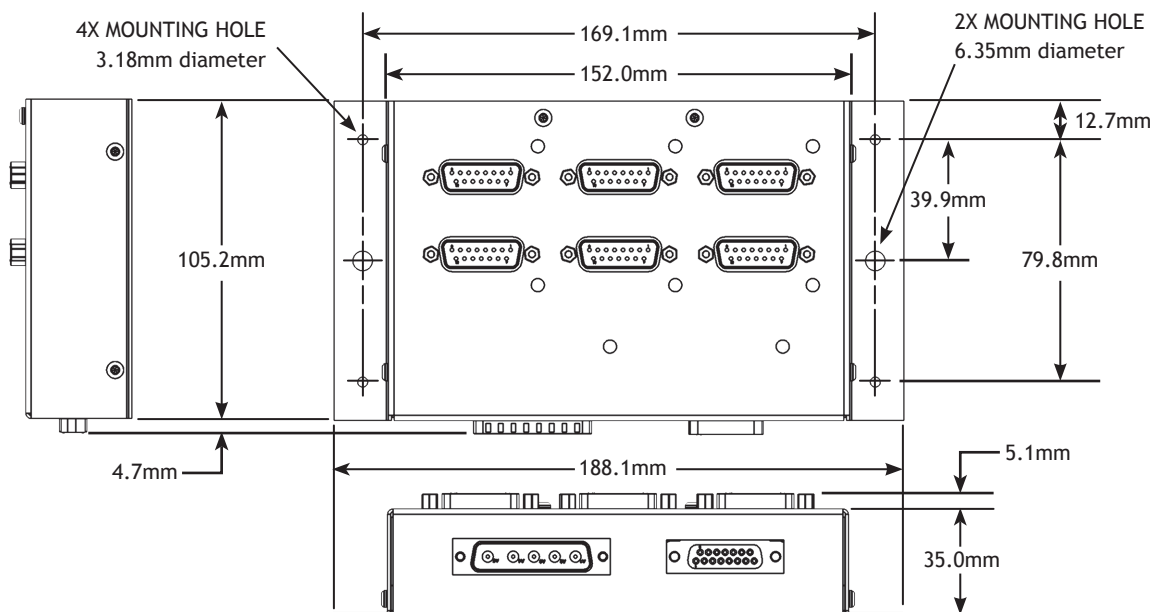
- **Hub Power Cable** for connection to the system power supply. This cable has ring terminals for connecting to the +48Vdc power supply and a 5W5 connector for connecting to the Hub. This cable uses 10AWG wire.
- **Hub Control Cable** for connecting the control system to the Hub. This is a DB-15 Male-to-Male cable using 26AWG wire.
- **Hub Light Source Cable** for connecting each light source to the Hub. This is a DB-15 Male to HD-DB-15 Female cable using 22AWG wire.



Wiring Diagram



Hub Dimensions



FireEdge™ FE400

Optics Options

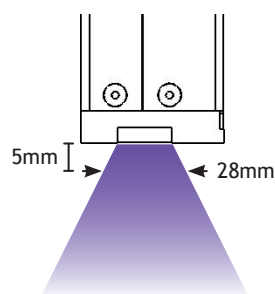
Technical Note



Overview

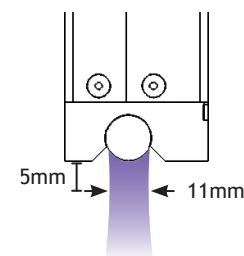
The FireEdge™ FE400 UV LED curing sources are available with different optics options for providing specific application curing performance. When curing UV material peak irradiance, total energy (dose), and dwell time affect the curing process. Additionally, the working distance from the UV source to the material surface and the reflective properties of the substrate need to be considered to ensure optimum results.

Available Optics



Flat Glass (Standard Optic)*

The Flat Glass minimizes reflective losses, yielding the highest total UV output power (maximum dose). The design also achieves the widest light footprint for maximum dwell time and the flat window surface provides for simple cleaning.



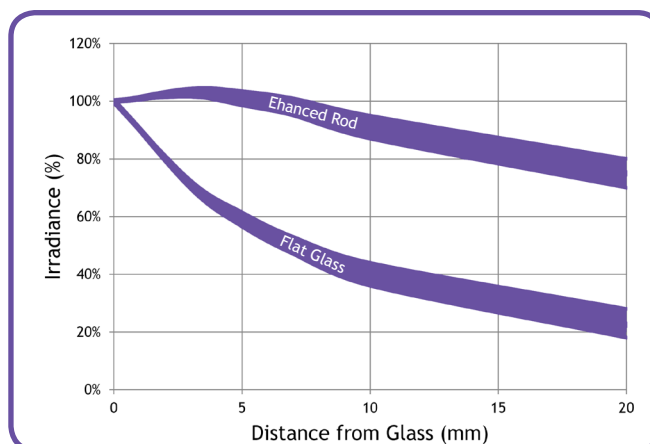
Enhanced Rod (Available Option)*

The Enhanced Rod Lens minimizes the effects of stray UV light by reducing the emitting angle. The Rod Lens design reduces the drop in peak irradiance as the working distance increases. The window frame design further reduces stray light reflections from the substrate.

***Must specify optics at time of order; cannot be changed in field.**

Performance

	Flat Glass		Enhanced Rod	
	365nm	395nm	365nm	395nm
Peak Irradiance	4.0W/cm ²	8.0W/cm ²	4.0W/cm ²	8.0W/cm ²
Light Output Width (at 5mm)	28mm		11mm	



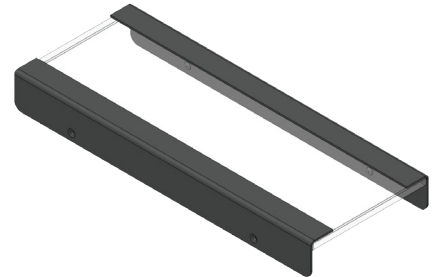
Using FireEdge FE400™ Replaceable Cover Glass



Technical Note

Phoseon's latest product FireEdge™ FE400 UV LED light source provides high output power in a compact mechanical package for high-speed pinning and full cure applications. A replaceable cover glass can clip onto the window frame for optical glass protection as well as easy maintenance.

Users can easily slide in the cover glass from the front of the lamp. The cover glass can be fixed onto both flat and rod lenses. Without using screws/latches, the dimples designed on the cover glass help to maintain a stable contact of it to the window frame.

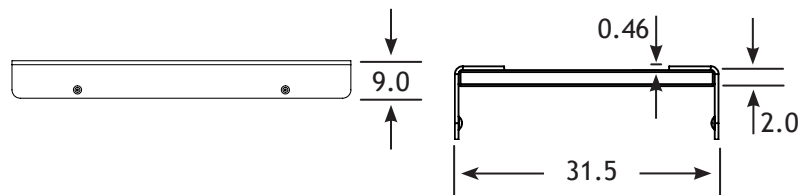
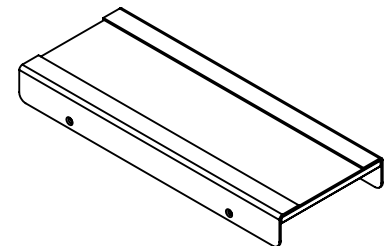
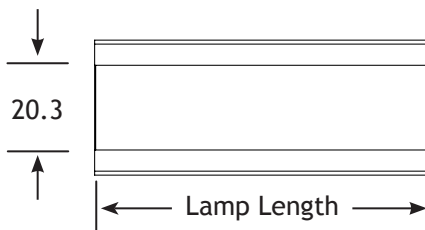


The peak irradiance is expected to drop by 10% after the replaceable cover glass is added. However, the cone angle (i.e. beam angle/beam spread) won't be changed.

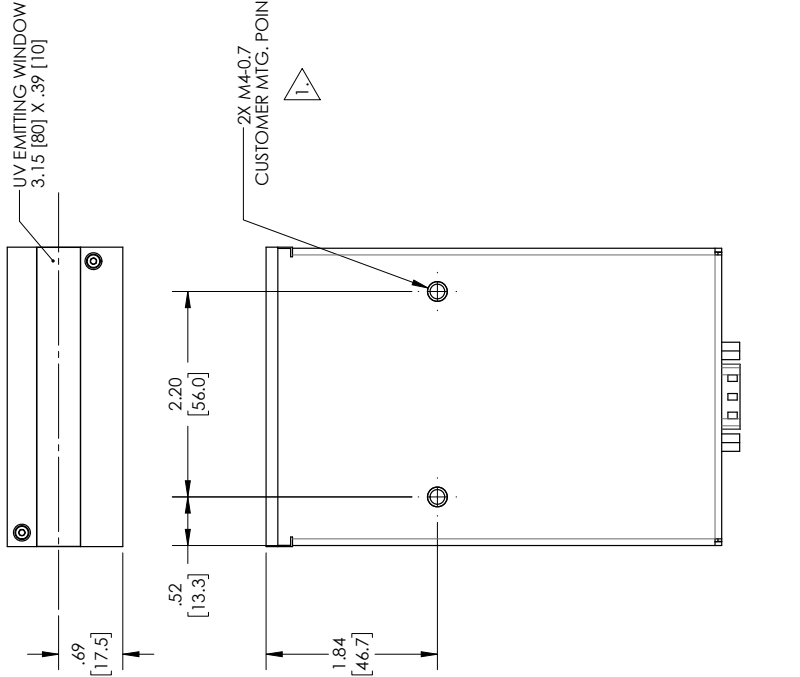
Table below summarizes the part numbers of FE400 optional replaceable cover glass for different lamp sizes.

Units of measurement: mm

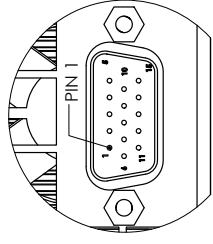
Part Number	Length
34505	80
34506	120
34507	160
34508	180
34509	240



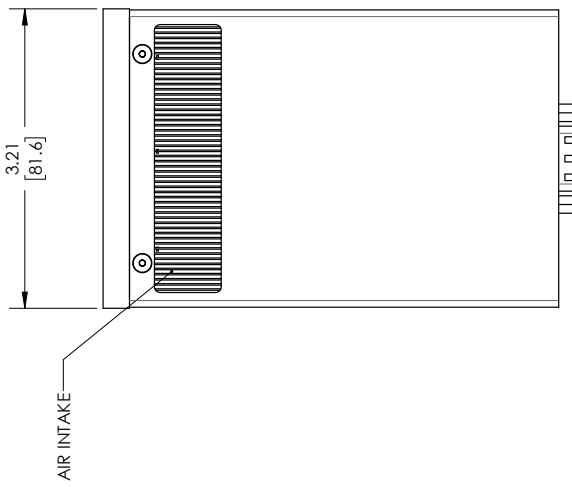
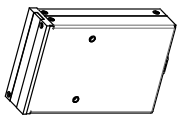
REVISONS					
REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED DATE
1	INITIAL RELEASE	BS	9/22/2016	2074	GM 9/23/2016
2	ADD FE410 MODEL (NOTE 2)	AF	01/31/2019	3113	DF 2/1/2019



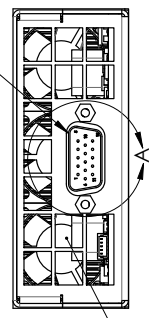
- NOTES:
- 1. MOUNTING HARDWARE:
1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)
 - 2. REFERENCE DOCUMENTS:
2.1 33855 SPEC SHEET, FireEdge® FE400
2.2 37448 SPEC SHEET, FireEdge® FE410
 - 3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.



DETAIL A
SCALE 1.5 : 1



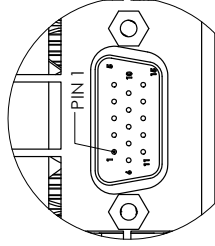
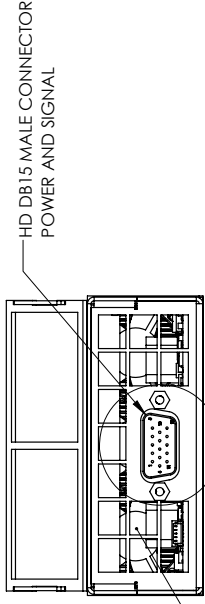
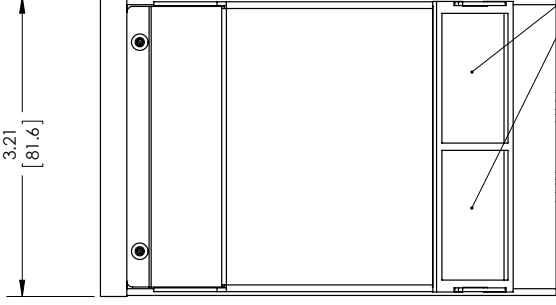
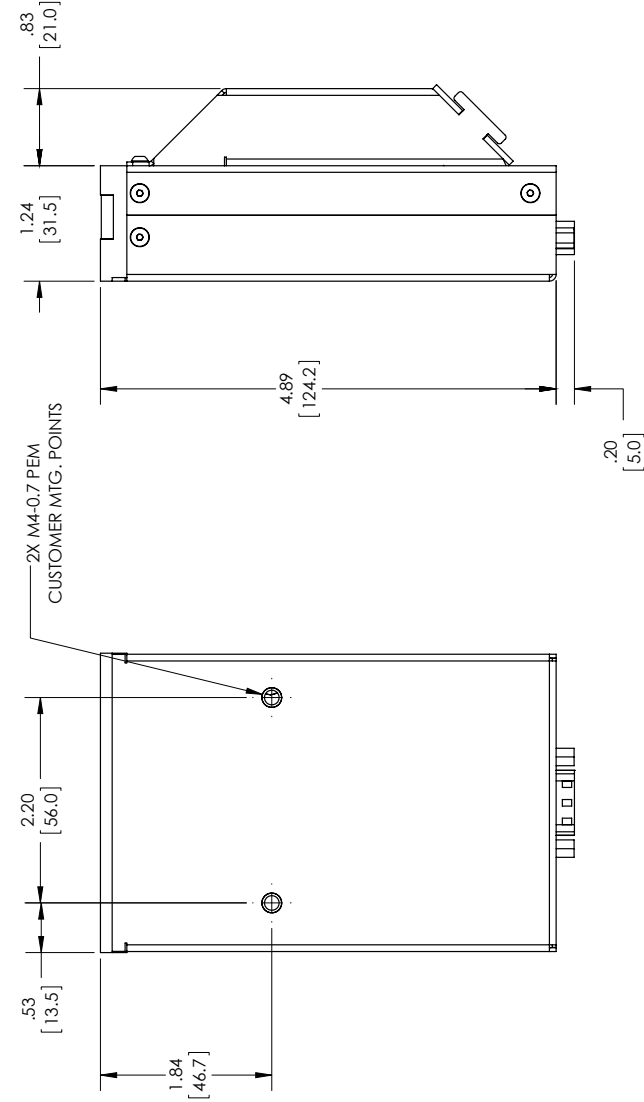
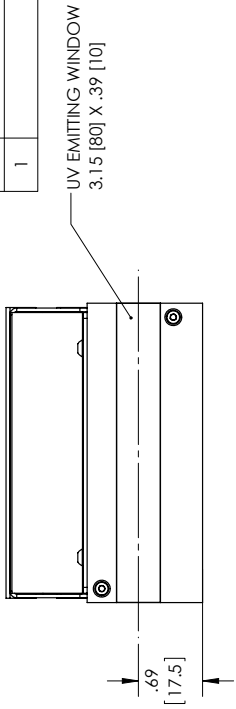
HD DB15 MALE CONNECTOR
POWER AND SIGNAL



3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/410 80X10 BASIC FLAT GLASS
Phoseon TECHNOLOGY			
PROPRIETARY AND CONFIDENTIAL THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY, ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.			
DIM. UNITS: IN [mm]		PART NUMBER: 33826, 37494	REV. 2
		ISSUED BY: ALEX FARAS	ISSUE DATE: 1/31/2019
		3D DATABASE: N/A	ASME/ANSI Y14.5, EGF-44274-01
		SCALE: 3/4 SIZE B SHEET 1 OF 1	

REVISONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	BS	9/22/2016	2074	GM	9/23/2016



NOTES:

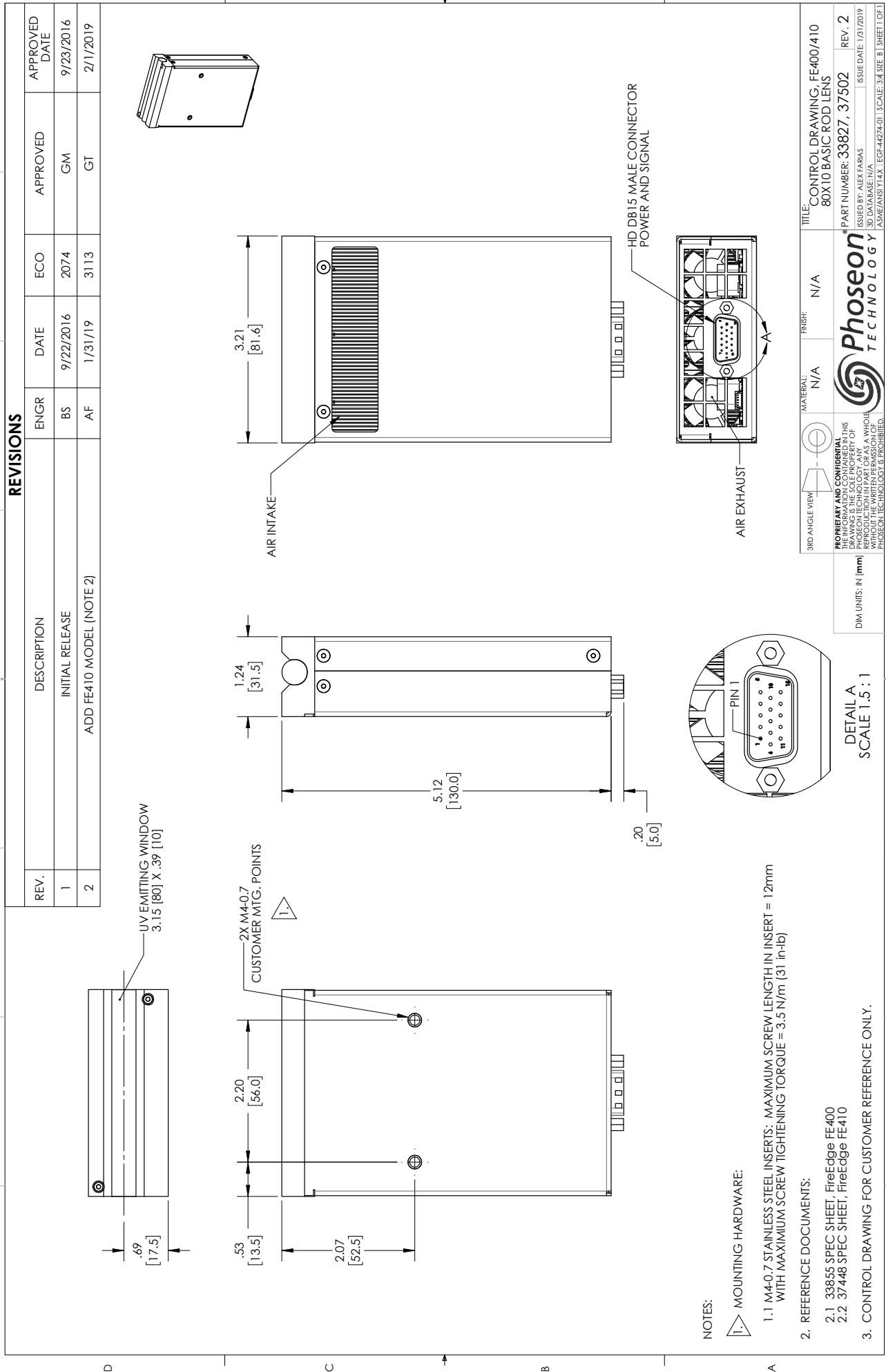
1. MOUNTING HARDWARE:
1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

2. REFERENCE DOCUMENTS:

- 2.1 33855 SPEC SHEET, FireEdge FE400

3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400 80X10 ADV, FLAT GLASS
Phoseon TECHNOLOGY			
PART NUMBER: 33843			
ISSUED BY: BRAD SCARDINO			
3D DATABASE:			
ASME/ANSI Y14.5, EGF-44274-01 SCALE: 1:1 SIZE: B SHEET 1 OF 1			

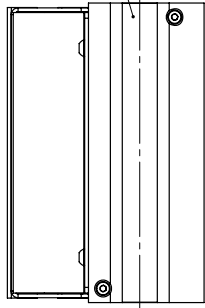
DETAIL A
SCALE 6:4



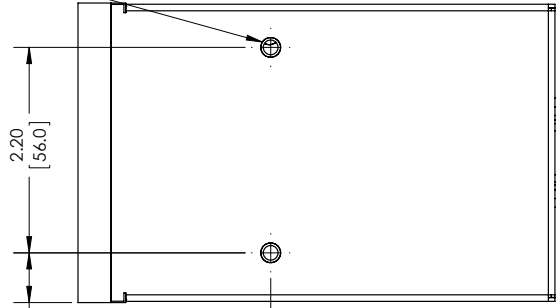
3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/410 80X10 BASIC ROD LENS
PROPRIETARY AND CONFIDENTIAL THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY, ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.	Phoseon TECHNOLOGY		
DIM UNITS: IN [mm]	PART NUMBER: 33827, 37502 REV. 2 ISSUED BY: ALEX FARIAS 3D DATABASE: N/A ASME/ANSI Y14.5, EGF-44274-01 SCALE: 3/4 SIZE B1 SHEET 1 OF 1		

REVISONS

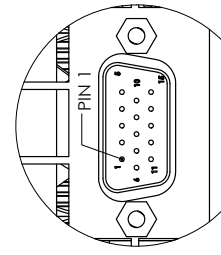
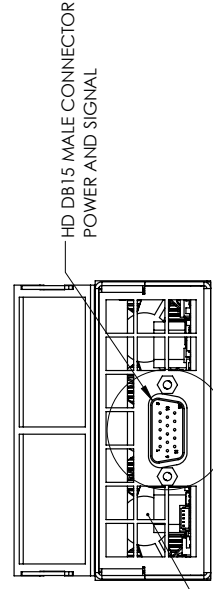
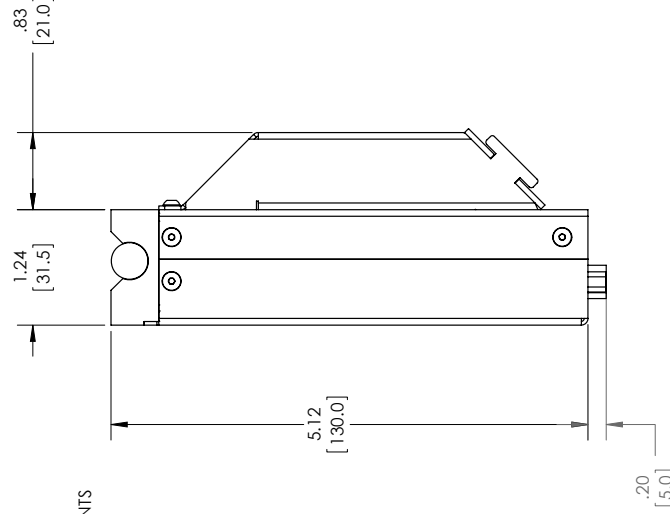
REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	BS	9/22/2016	2074	GM	9/23/2016



UV EMITTING WINDOW
3.15 [80] X .39 [10]



2X M4-0.7 PEM
CUSTOMER MTG. POINTS



DETAIL A
SCALE 6:4

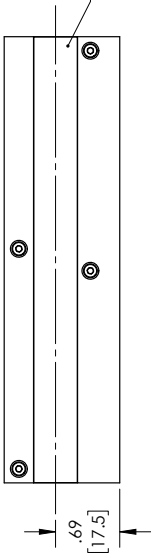
NOTES:

1. MOUNTING HARDWARE:
1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)
2. REFERENCE DOCUMENTS:
2.1 33855 SPEC SHEET, FireEdge FE400

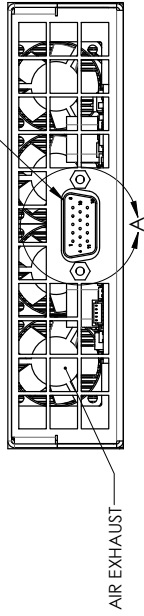
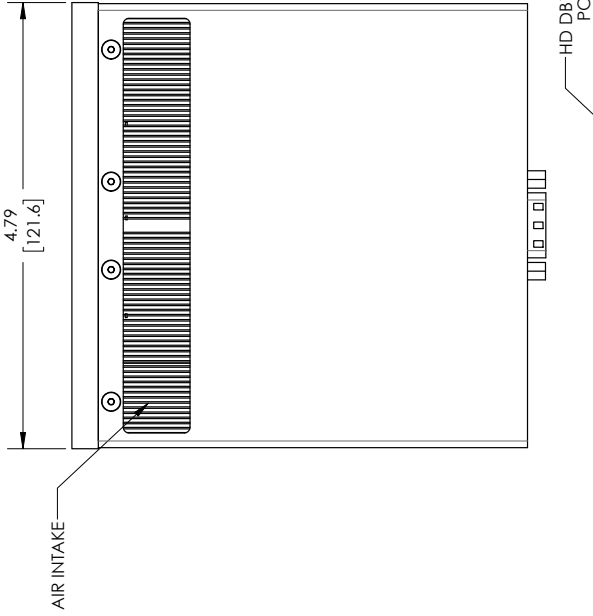
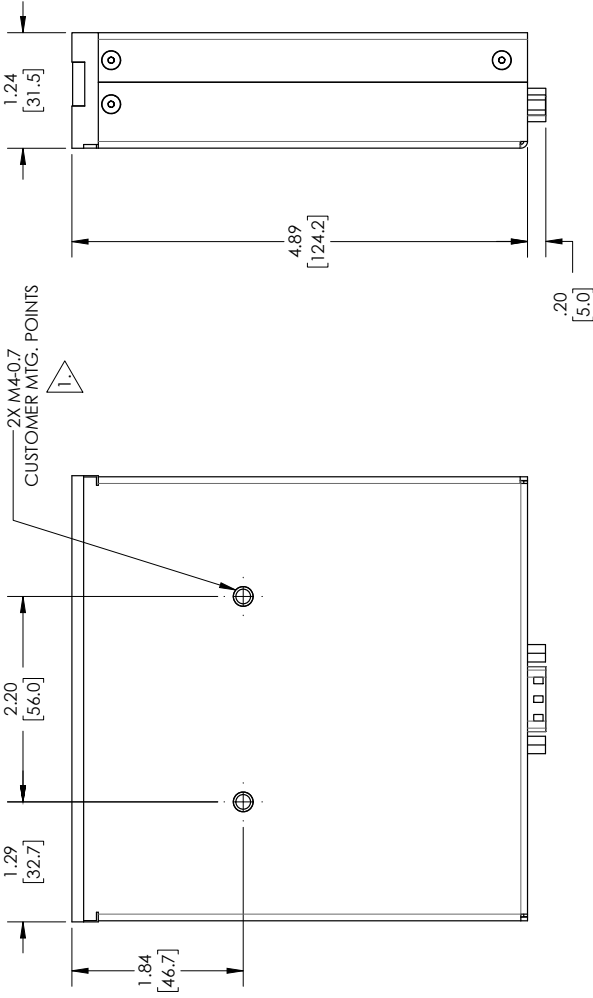
3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400 80X10 ADV. ROD LENS
PROPRIETARY AND CONFIDENTIAL THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY, ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.			
DATE: 9/22/2016 DRAWN BY: BRAD SCARDINO CHECKED BY: BRAD SCARDINO ISSUED BY: BRAD SCARDINO 3D DATABASE: ASME/ANSI Y14.5, EGF-44274-01 SCALE: 1:1 SIZE: B SHEET 1 OF 1	PART NUMBER: 33844 REV. 1 ISSUE DATE: 9/16/2016		

REVISONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	GLM	09/19/16	2074	BS	09/23/16
2	ADD FE410 MODEL (NOTE 2)	AF	1/28/2019	3113	DF	1/31/2019



2X M4-0.7
CUSTOMER MTG. POINTS



NOTES:

1. MOUNTING HARDWARE:

1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

2. REFERENCE DOCUMENTS:

2.1 33855 SPEC SHEET, FireEdge FE400
2.2 37448 SPEC SHEET, FireEdge FE410

3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

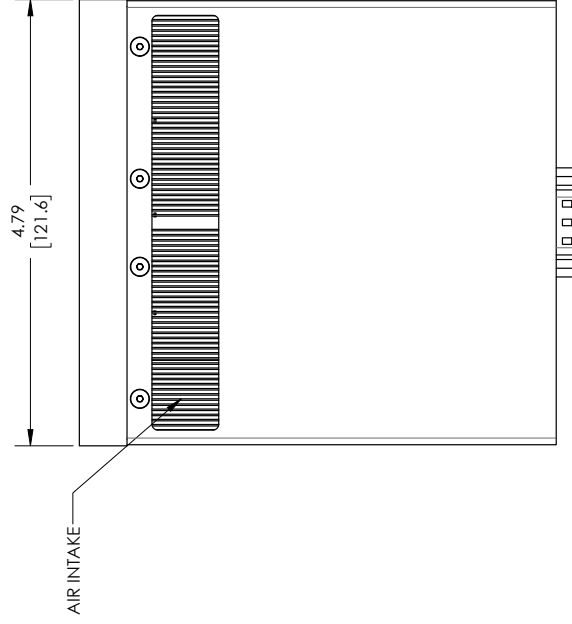
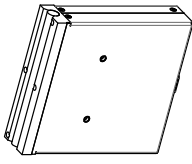
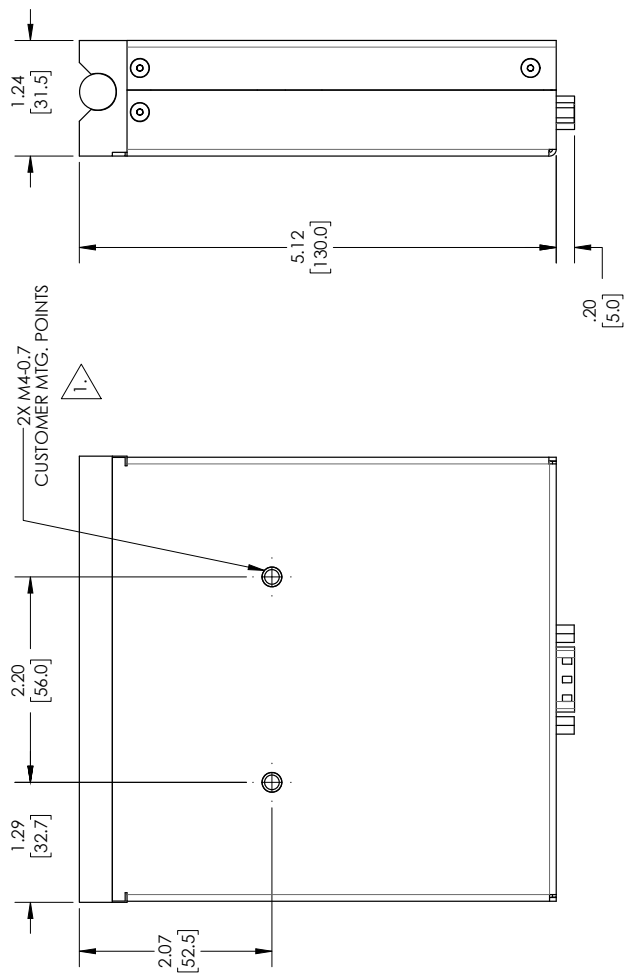
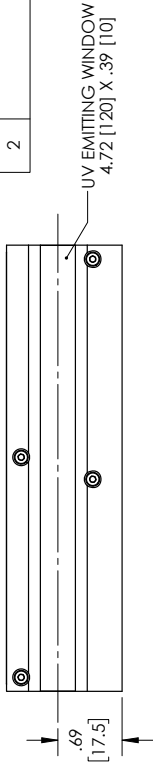
3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/410 120X10 BASIC FLAT GLASS
Phoseon TECHNOLOGY			
PART NUMBER: 33828, 37495			
ISSUED BY: ALEX FARAS			
3D DATABASE: N/A			
ASME/ANSI Y14.5 EGT 442/4-01 SCALE: 3/4 SIZE B SHEET 1 OF 1			

DETAIL A
SCALE 1.5 : 1

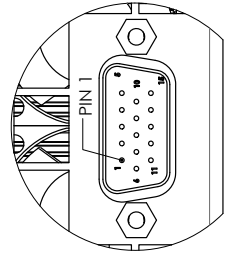
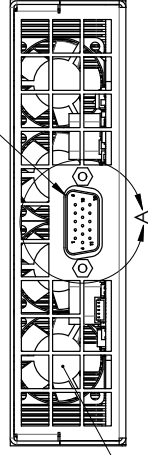
DIM UNITS: IN [mm]

REVISONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	GLM	09/16/16	2074	BS	09/23/16
2	ADD FE410 MODEL (NOTE 2)	AF	1/28/2019	3113	GT	1/31/2019



HD DB1.5 MALE CONNECTOR
POWER AND SIGNAL



DETAIL A
SCALE 1.5:1

NOTES:

1. MOUNTING HARDWARE:

1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

2. REFERENCE DOCUMENTS:

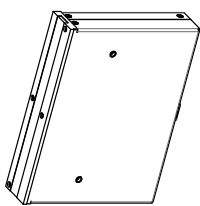
2.1 33855 SPEC SHEET, FireEdge FE400
2.2 37448 SPEC SHEET, FireEdge FE410

3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

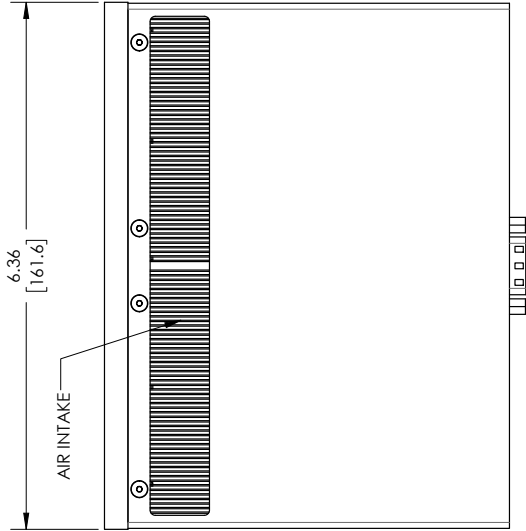
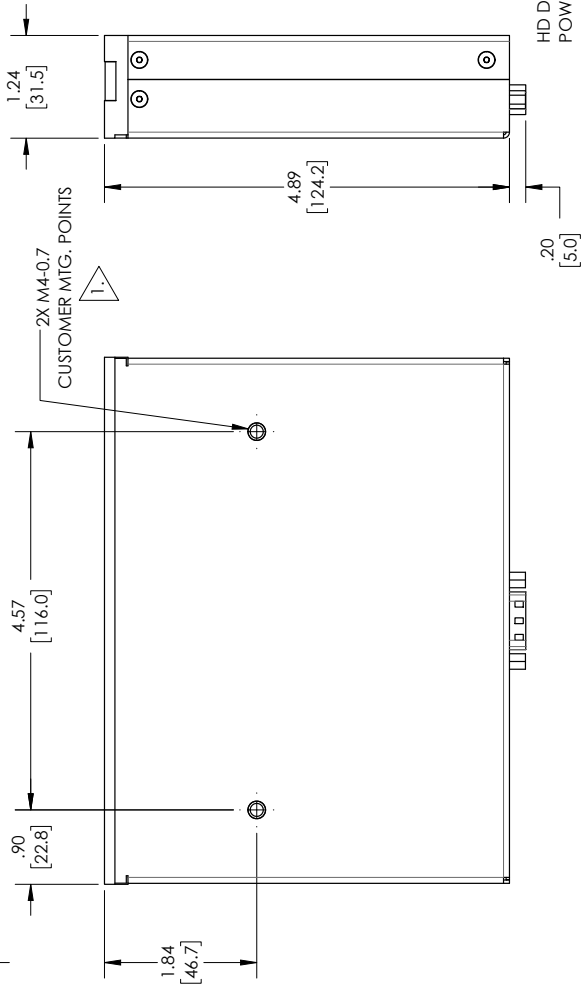
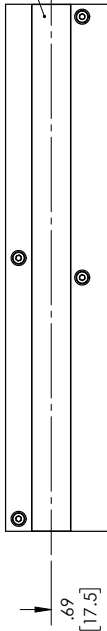
3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/FE410 120X10 BASIC ROD LENS
PROPRIETARY AND CONFIDENTIAL THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY, ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.		PART NUMBER: 33829, 37503 REV. 2 ISSUED BY: ALEX FARAS 3D DATABASE N/A ASME/ANSI Y14X, EGF-44274-01 SCALE: 3/4 SIZE B SHEET 1 OF 1	

DIM UNITS: IN [mm]

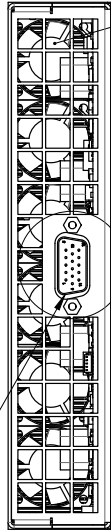
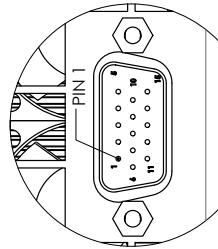
REVISONS					
REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED DATE
1	INITIAL RELEASE	BS	9/22/2016	2074	9/23/2016
2	ADD FE410 MODEL (NOTE 2)	AF	1/29/2019	3113	2/4/2019



UV EMITTING WINDOW
6.30 [160] X .39 [10]



HD DB15 MALE CONNECTOR
POWER AND SIGNAL



NOTES:

1. MOUNTING HARDWARE:

1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

2. REFERENCE DOCUMENTS:

2.1 33855 SPEC SHEET, FireEdge FE400
2.2 37448 SPEC SHEET, FireEdge FE410

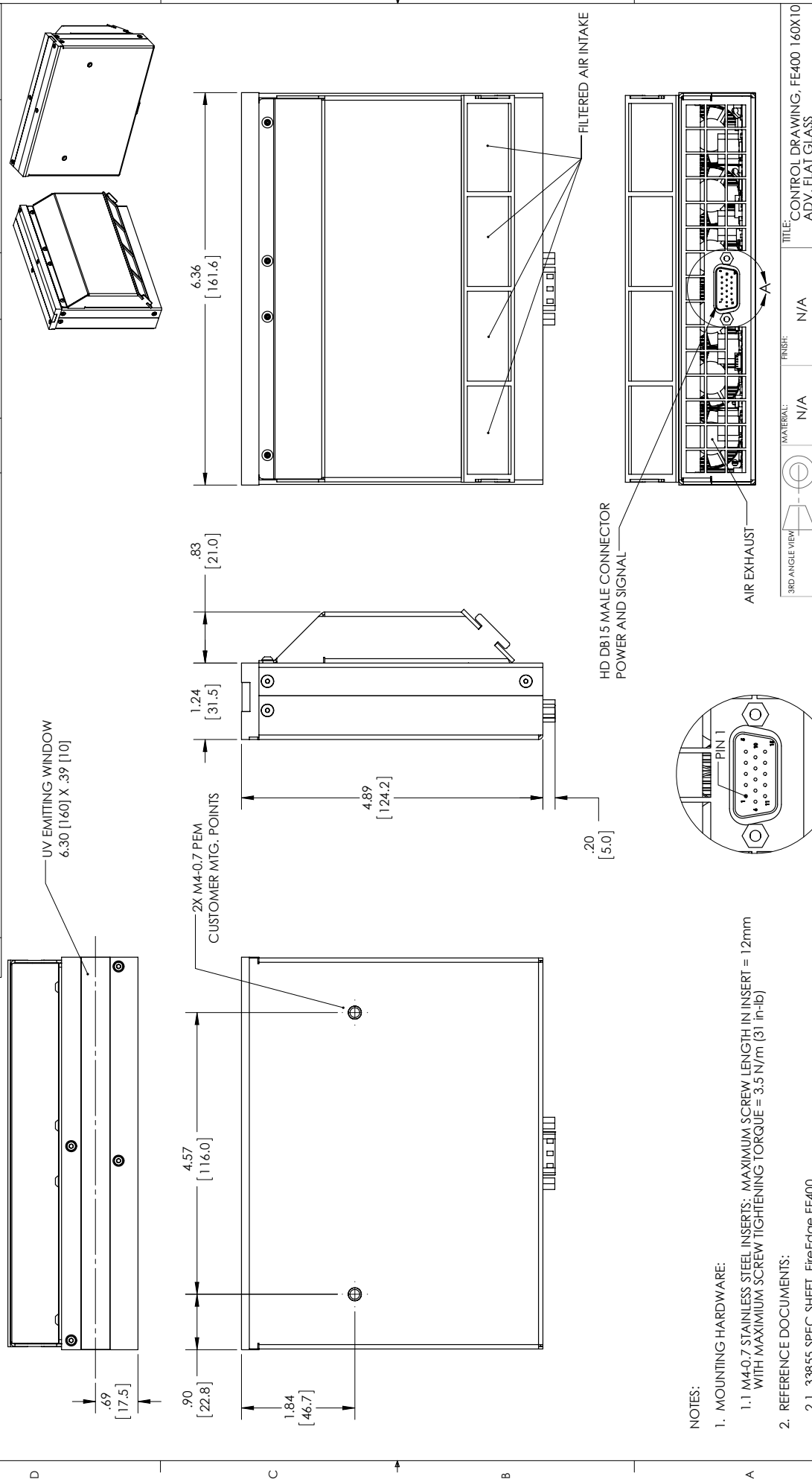
3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

DETAIL A
SCALE 1.5: 1

3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/410 160X10 BASIC FLAT GLASS
PROPRIETARY AND CONFIDENTIAL THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY, ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.			PART NUMBER: 33830, 37496 REV. 2 ISSUED BY: ALEX FARIAS 30 DATABASE N/A ASME/ANSI Y14.5, EGF-44274-01 SCALE: 2:3 SIZE B1 SHEET 1 OF 1

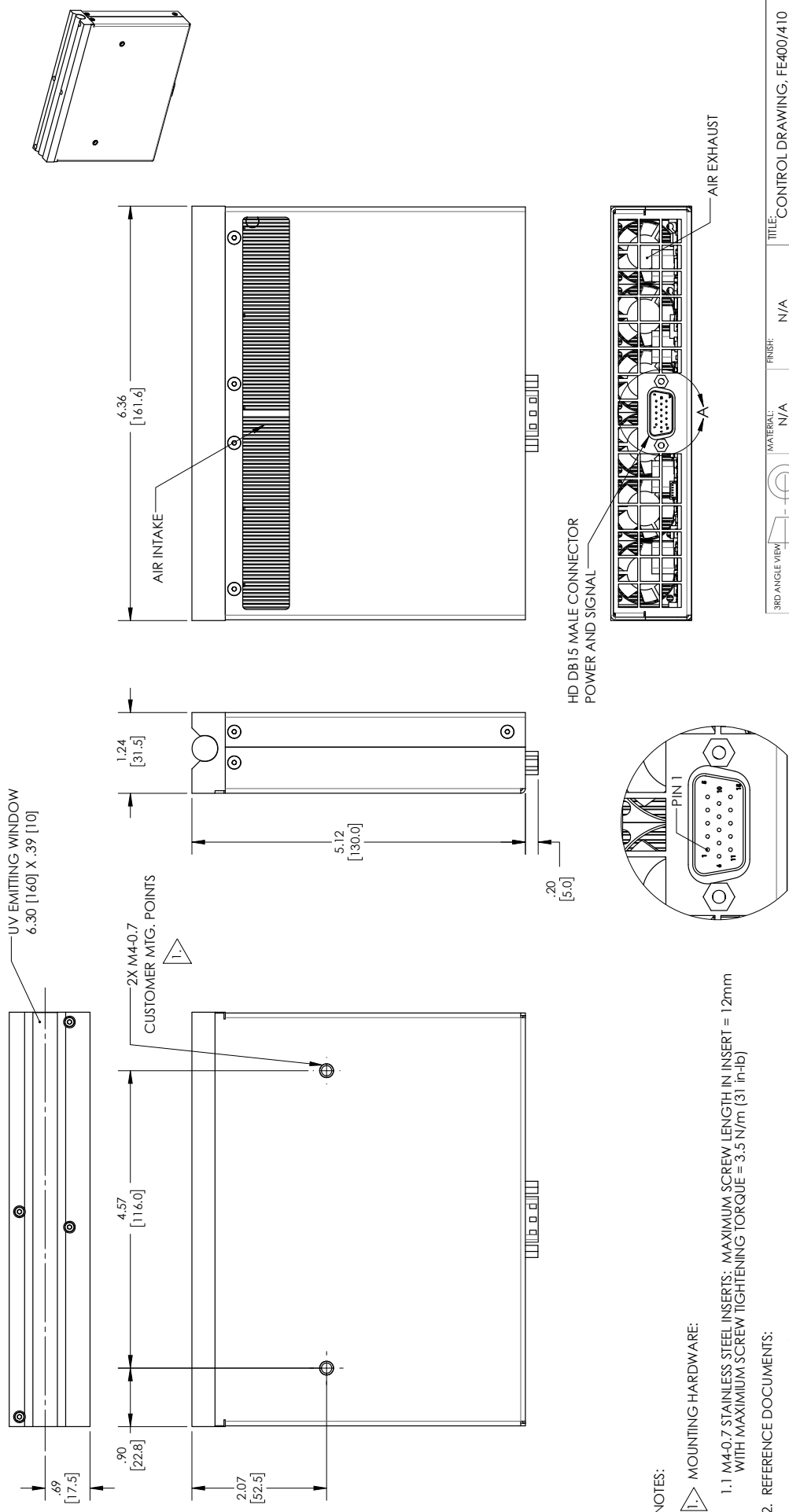
DIM UNITS: IN [mm]

REVISONS					APPROVED DATE	
REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	BS	9/22/2016	2074	GM	9/23/2016



NOTES:		TITLE: CONTROL DRAWING, FE400 160X10 ADV, FLAT GLASS		PART NUMBER: 33847		REV. 1	
1. MOUNTING HARDWARE:		MATERIAL: N/A		ISSUED BY: BRAD SCARDINO		ISSUE DATE: 9/16/2016	
1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)		FINISH: N/A		30 DATABASE:		ASME/ANSI Y14.X EGF 44274-01 SCALE: 1:1 SIZE B1 SHEET 1 OF 1	
2. REFERENCE DOCUMENTS:		3RD ANGLE VIEW		PHOSEON TECHNOLOGY		PHOSEON TECHNOLOGY IS PROHIBITED FROM REPRODUCING OR TRANSMITTING THIS DRAWING OR THE CONTENTS OF THIS DRAWING IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY.	
2.1 33855 SPEC SHEET, FireEdge FE400		PHOSEON TECHNOLOGY		PHOSEON TECHNOLOGY IS PROHIBITED FROM REPRODUCING OR TRANSMITTING THIS DRAWING OR THE CONTENTS OF THIS DRAWING IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY.		PHOSEON TECHNOLOGY IS PROHIBITED FROM REPRODUCING OR TRANSMITTING THIS DRAWING OR THE CONTENTS OF THIS DRAWING IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY.	

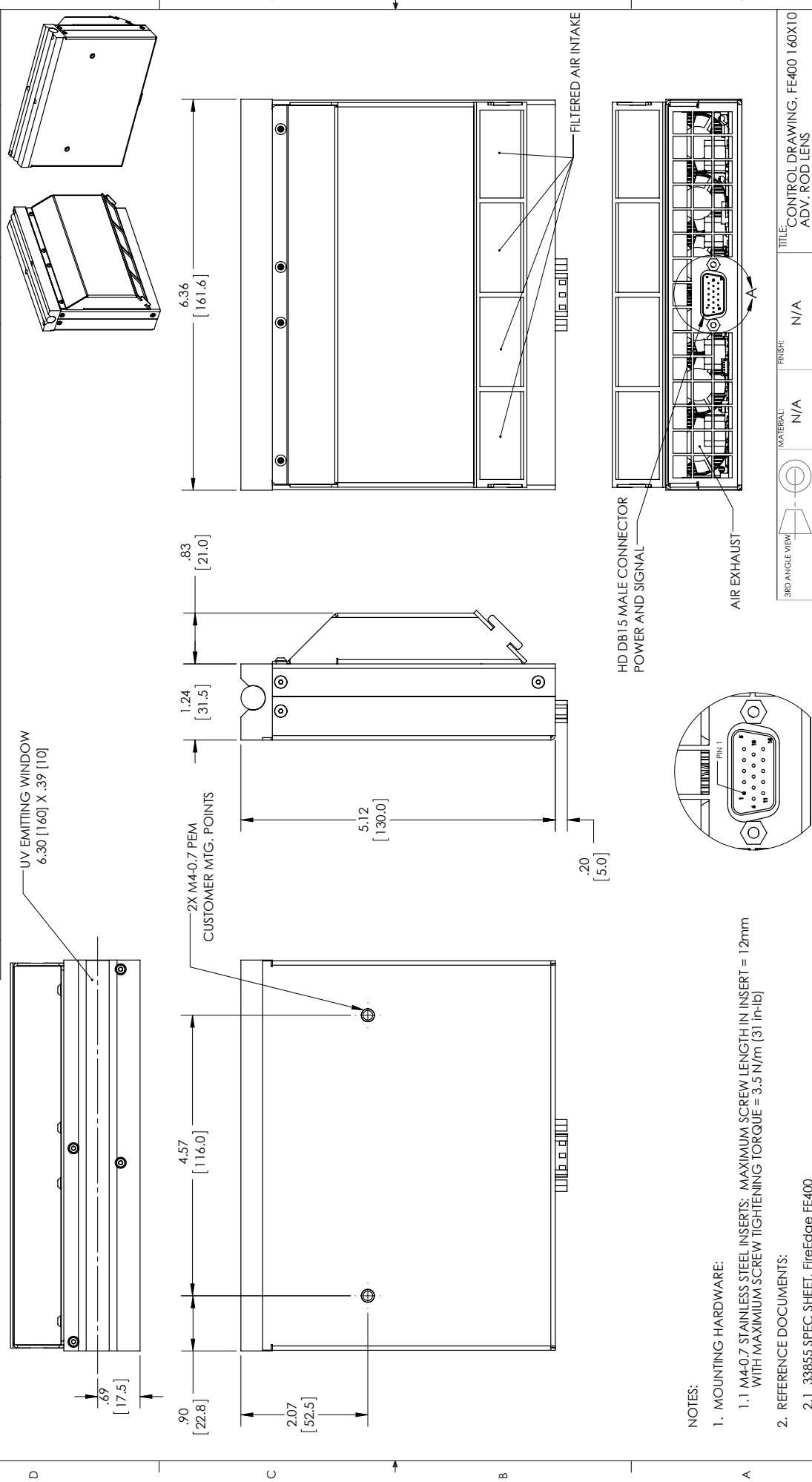
REVISONS					
REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED DATE
1	INITIAL RELEASE	BS	9/22/2016	2074	9/23/2016
2	ADD FE410 MODEL (NOTE 2)	AF	1/29/2019	3113	2/4/2019



3RD ANGLE VIEW		FRUIT: N/A		MATERIAL: N/A		FINISH: N/A		TITLE: CONTROL DRAWING, FE400/410 160X10 BASIC ROD LENS	
DIM UNITS: IN [mm]		Phoseon TECHNOLOGY		PART NUMBER: 33831, 37504		REV. 2		ISSUED BY: ALEX FARAS	
PROPRIETARY AND CONFIDENTIAL		THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY, ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.		3D DATABASE: N/A		ISSUE DATE: 1/29/2019		ASME/ANSI Y14.5, EGF-44274-01 SCALE: 2:3 SIZE B SHEET 1 OF 1	

REVISIONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	BS	9/22/2016	2074	GM	9/23/2016



3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400 160X10 ADV. ROD LENS
PHOSEON TECHNOLOGY			PART NUMBER: 33848
ISSUED BY: BRAD SCARDINO			ISSUE DATE: 9/16/2016
3D DATABASE:			ASME/ANSI Y14.5 EGF 44274-01 SCALE: 1:1 SIZE B SHEET 1 OF 1

DETAIL A
SCALE 2:1.5

NOTES:

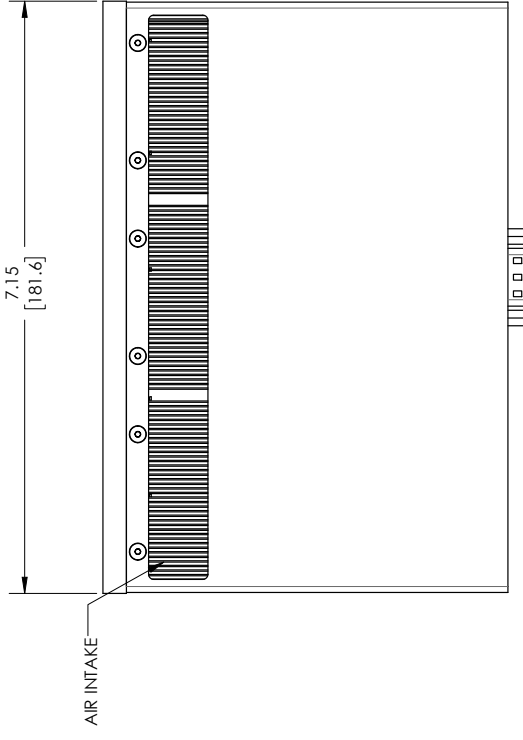
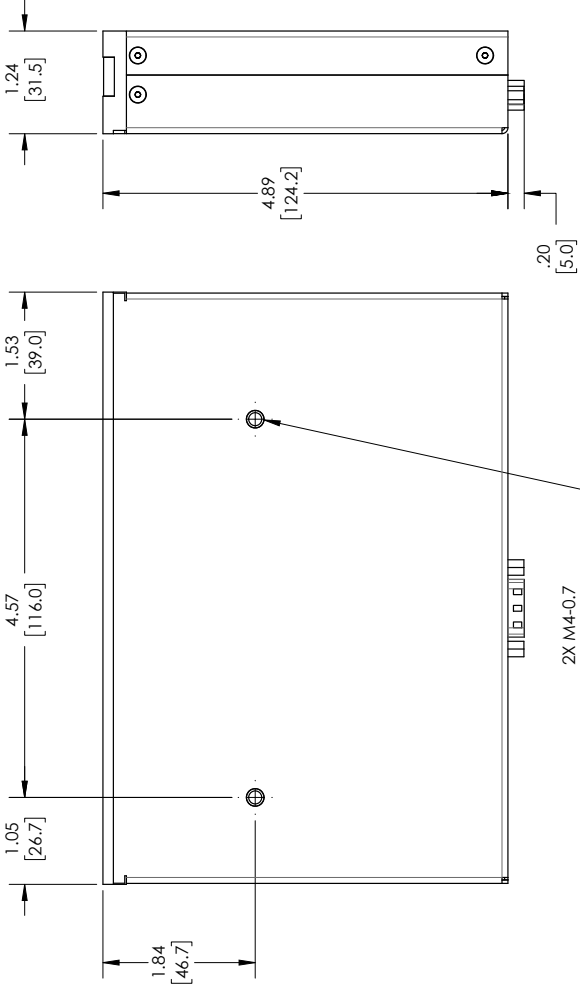
1. MOUNTING HARDWARE:

1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

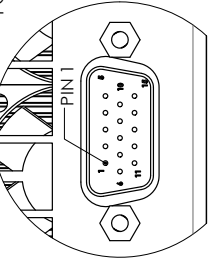
2. REFERENCE DOCUMENTS:

2.1 33855 SPEC SHEET, FireEdge FE400

REVISONS					
REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED DATE
2	ADD DIMENSION TO INDICATE MTG. HOLES ARE NOT CENTERED	GLM	3/17/2017	2297	3/17/2017
3	ADD FE410 MODEL (NOTE 2)	AF	1/29/2019	3113	2/1/2019



HD DB15 MALE CONNECTOR
POWER AND SIGNAL



NOTES:

1. MOUNTING HARDWARE:

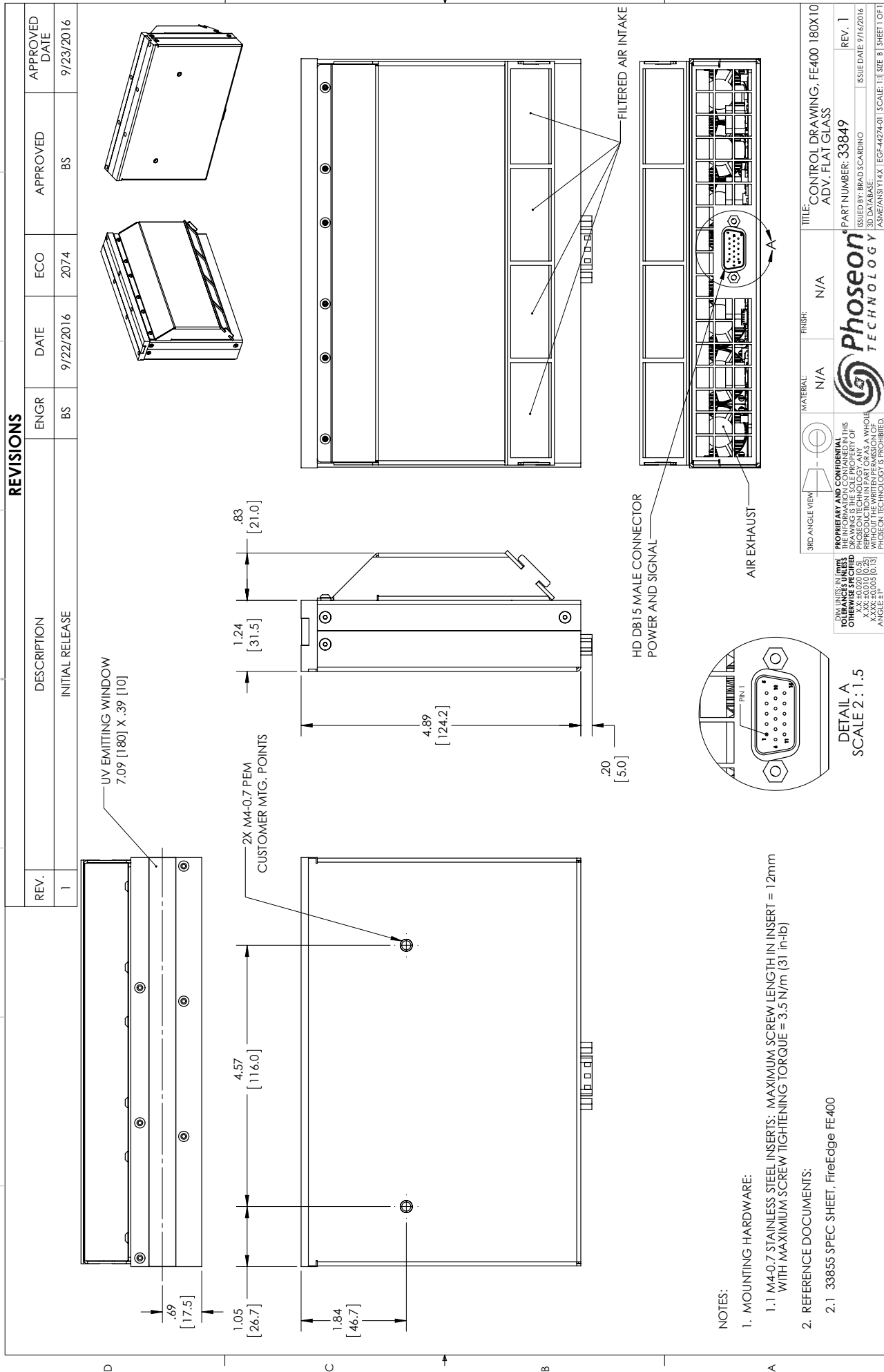
1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

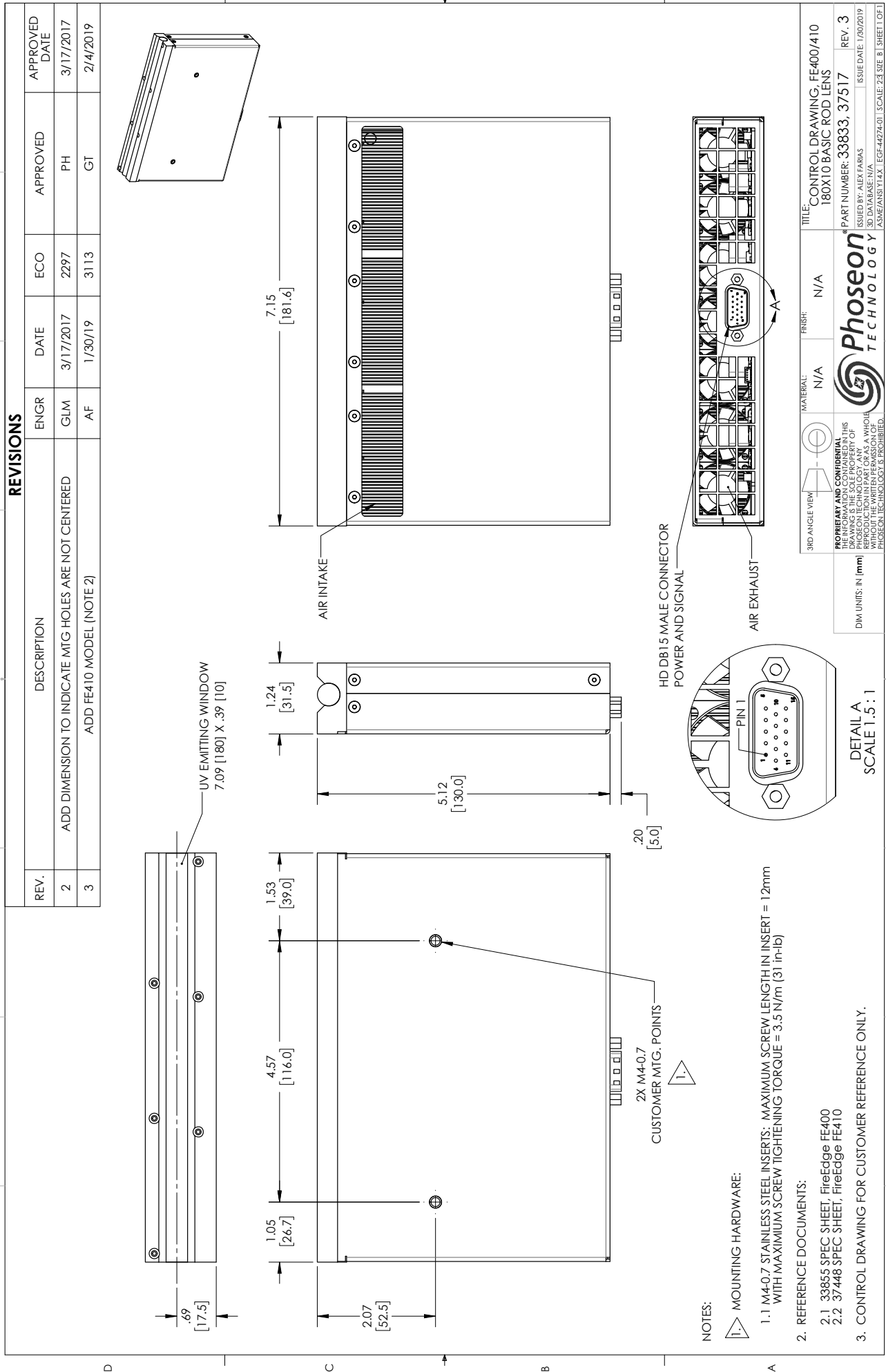
2. REFERENCE DOCUMENTS:

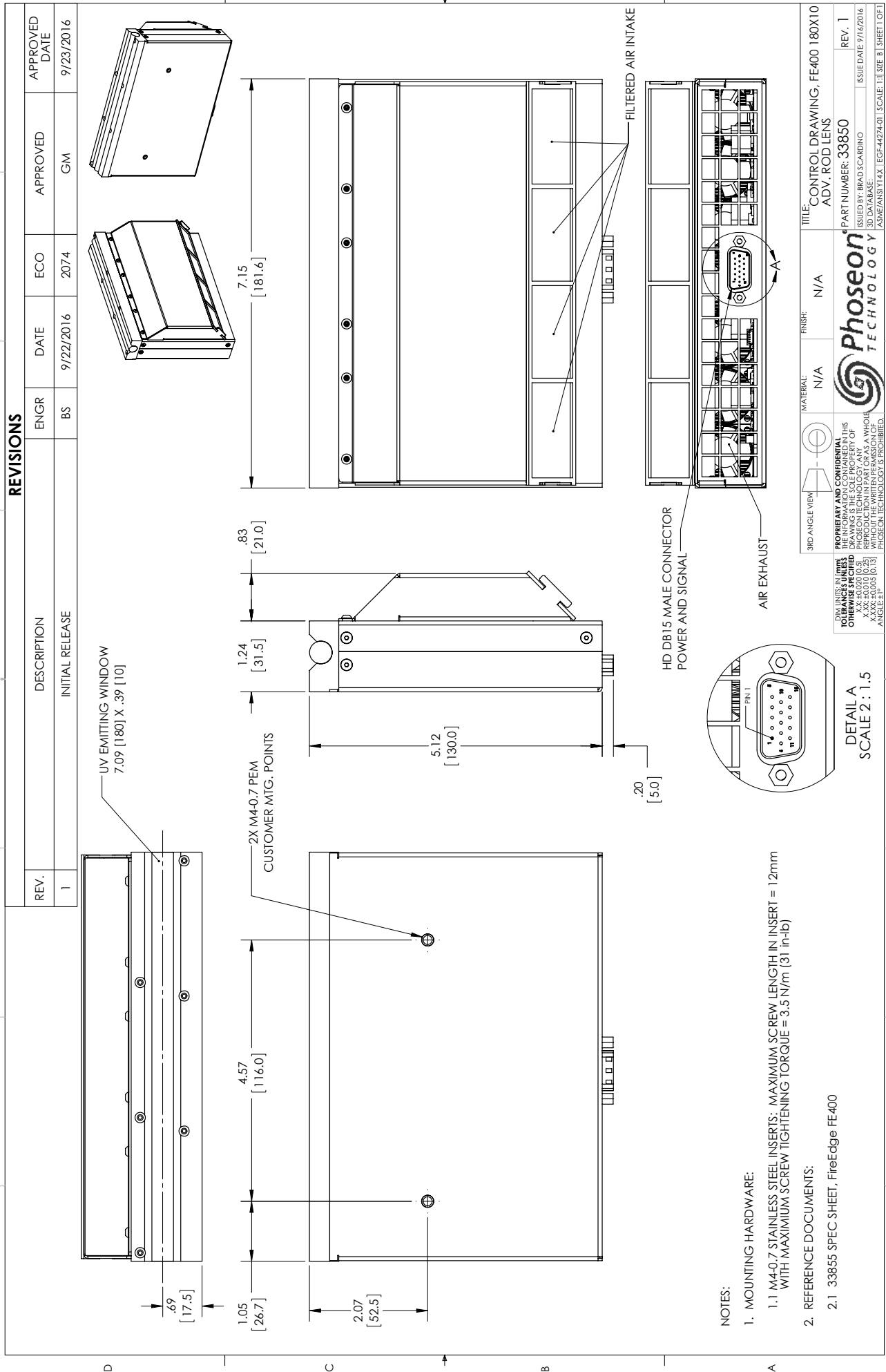
2.1 33855 SPEC SHEET, FireEdge FE400
2.2 37448 SPEC SHEET, FireEdge FE410

3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/410 180X10 BASIC FLAT GLASS
Phoseon TECHNOLOGY			
DIM UNITS: IN [mm]		PART NUMBER: 33832, 37515 REV. 3 ISSUED BY: ALEX FARAS 3D DATABASE N/A ASME/ANSI Y14.5 EGF-44274-01 SCALE: 2:3 SIZE B1 SHEET 1 OF 1	







NOTES:

1. MOUNTING HARDWARE:

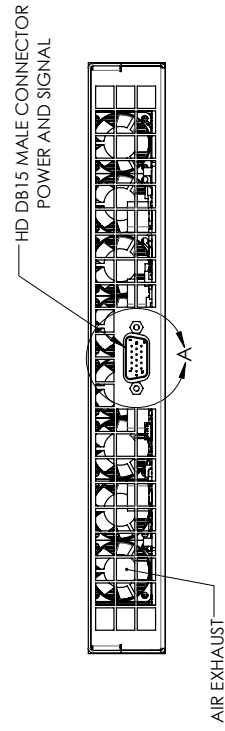
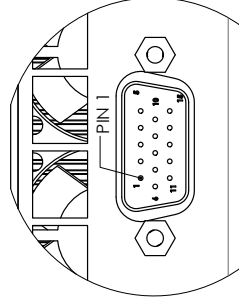
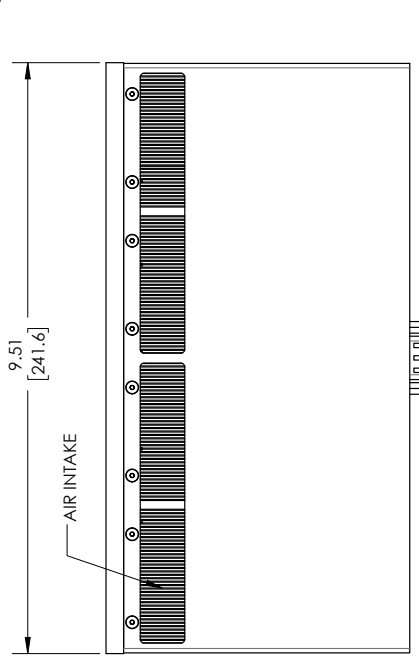
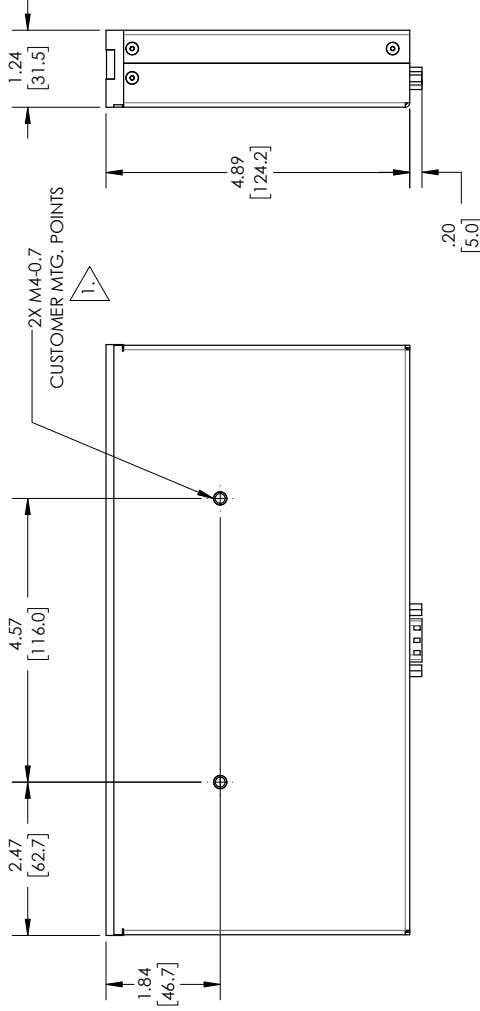
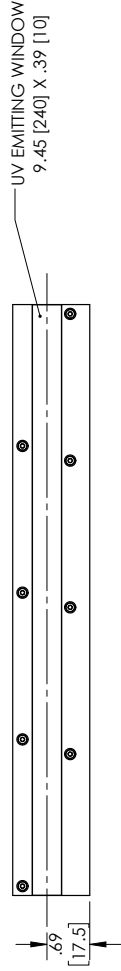
1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

2. REFERENCE DOCUMENTS:

2.1 33855 SPEC SHEET, FireEdge FE400

REVISONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	GLM	09/19/16	2074	BS	09/23/16
2	ADD FE410 MODEL (NOTE 2)	AF	1/30/19	3113	DF	2/1/2019



NOTES:

1. MOUNTING HARDWARE:

1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

2. REFERENCE DOCUMENTS:

2.1 33855 SPEC SHEET, FireEdge FE400
2.2 37448 SPEC SHEET, FireEdge FE410

3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/410 240X10 BASIC FLAT GLASS
DIM UNITS: IN [mm]		PART NUMBER: 33834, 37497	
PROPRIETARY AND CONFIDENTIAL: THIS DRAWING IS THE SOLE PROPERTY OF PHOSEON TECHNOLOGY, ANY REUSE OR REPRODUCTION WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.		ISSUED BY: ALEX FARIAS 3D DATABASE: N/A ASME/ANSI Y14.5, EGF-44274-01	

DETAIL A
SCALE 1.5:1

DIM UNITS: IN [mm]

Phoseon
TECHNOLOGY

REV. 2
ISSUE DATE: 1/30/2019

CONTROL DRAWING, FE400/410
240X10 BASIC FLAT GLASS

PART NUMBER: 33834, 37497

ISSUED BY: ALEX FARIAS
3D DATABASE: N/A

ASME/ANSI Y14.5, EGF-44274-01

SCALE 1.5:1

DETAIL A

REFERENCE DOCUMENTS:

2.1 33855 SPEC SHEET, FireEdge FE400
2.2 37448 SPEC SHEET, FireEdge FE410

3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

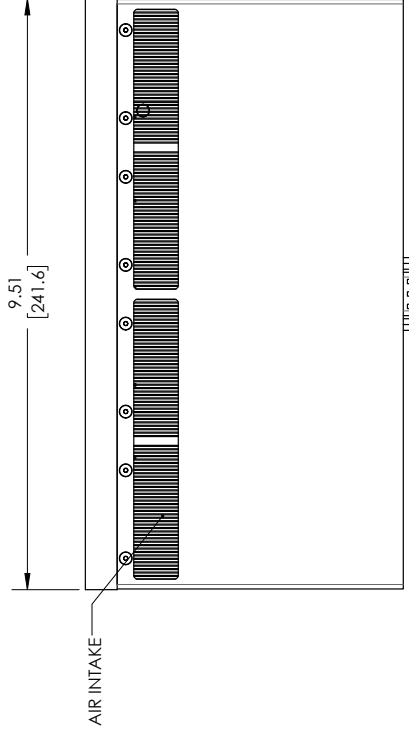
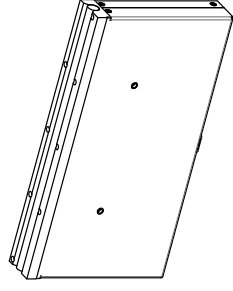
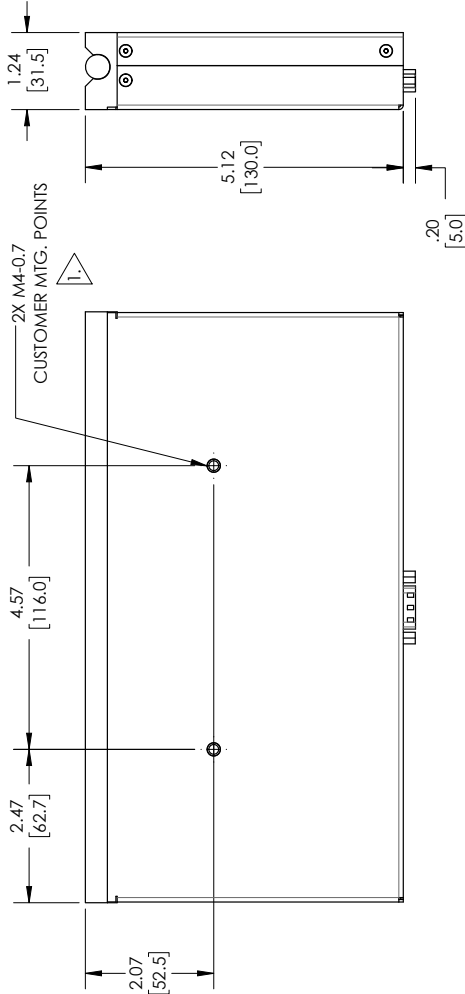
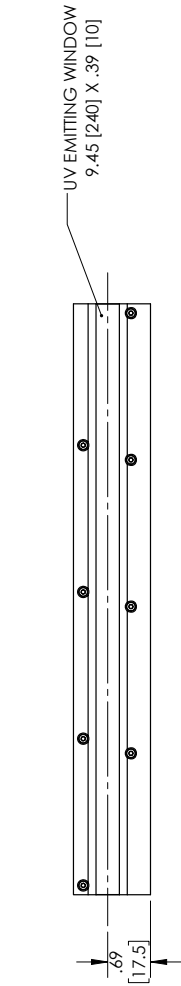
MOUNTING HARDWARE:

1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

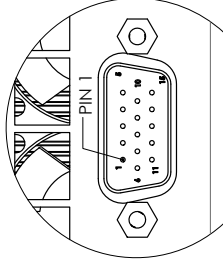
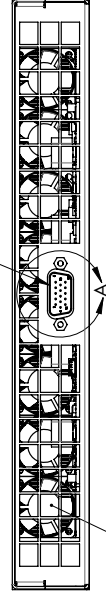
NOTES:

REVISONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	GLM	09/19/16	2074	BS	09/23/16
2	ADD FE410 MODEL (NOTE 2)	AF	1/31/2019	3113	GT	1/31/2019



HD DB15 MALE CONNECTOR
POWER AND SIGNAL



NOTES:

1. MOUNTING HARDWARE:

1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)

2. REFERENCE DOCUMENTS:

2.1 33855 SPEC SHEET, FireEdge FE400
2.2 3/448 SPEC SHEET, FireEdge FE410

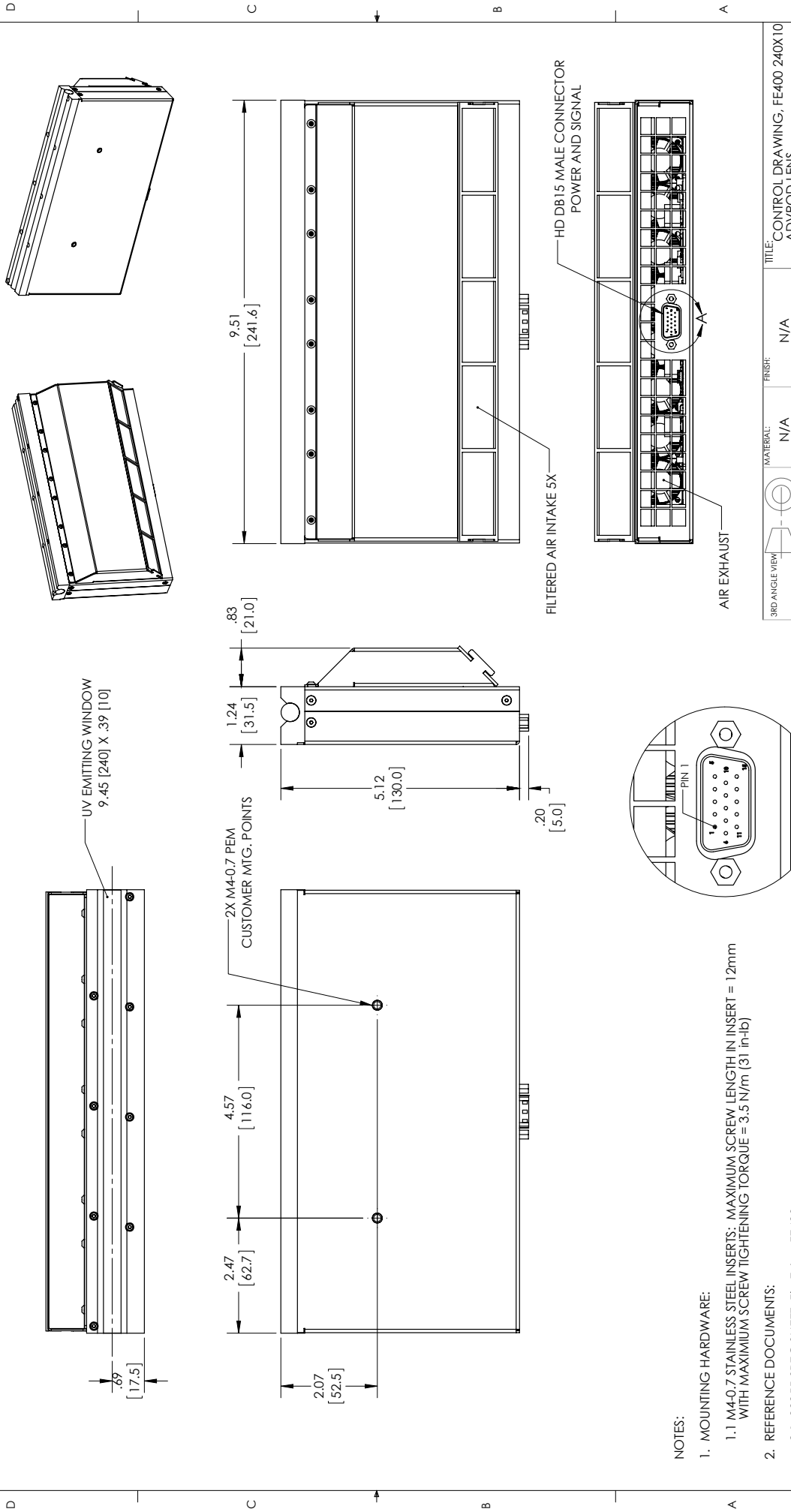
3. CONTROL DRAWING FOR CUSTOMER REFERENCE ONLY.

3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400/410 240X10 BASIC ROD LENS
DIM UNITS: IN [mm]		PART NUMBER: 33835, 37505	
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ISSUED BY: ALEX FARRAS		ISSUE DATE: 1/31/2019	
3D DATABASE N/A		ASME/ANSI Y14.5, EGF-44274-01 SCALE: 1:2 SIZE B SHEET 1 OF 1	

DETAIL A
SCALE 1.5 : 1

REVISIONS

REV.	DESCRIPTION	ENGR	DATE	ECO	APPROVED	APPROVED DATE
1	INITIAL RELEASE	GLM	09/19/16	2074	BS	09/23/16



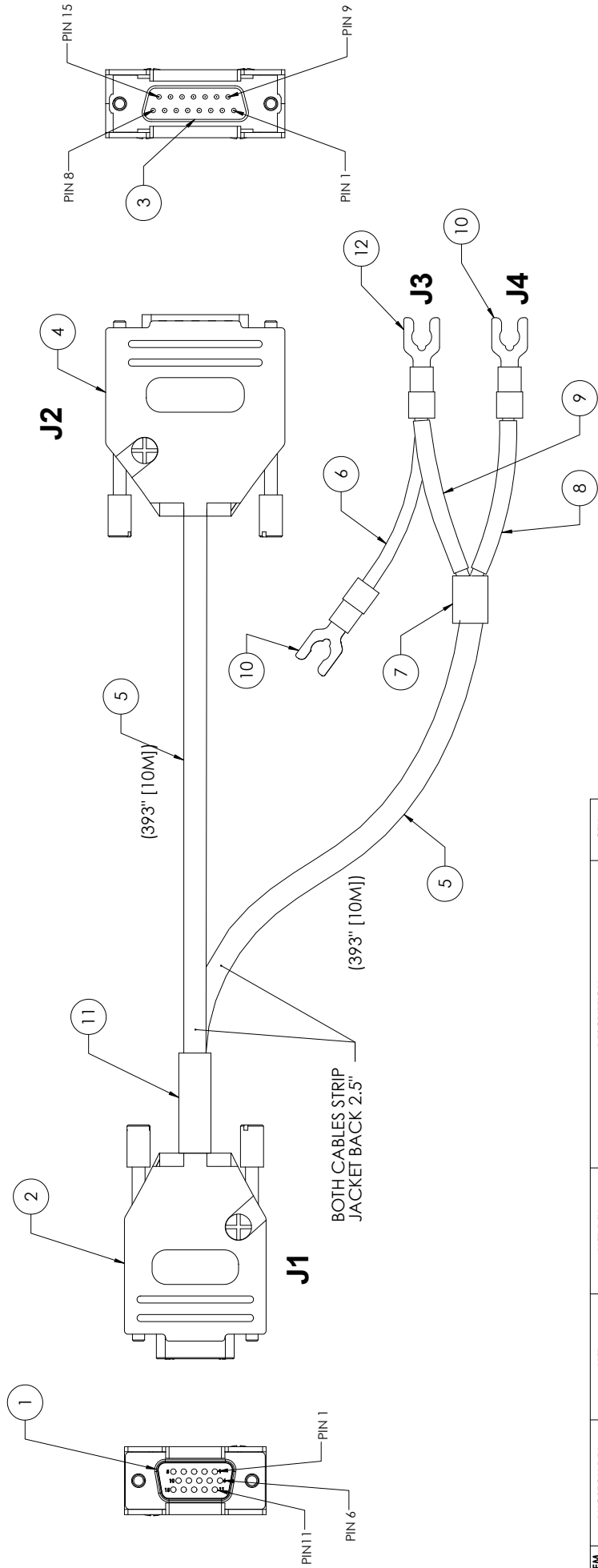
NOTES:

1. MOUNTING HARDWARE:
1.1 M4-0.7 STAINLESS STEEL INSERTS: MAXIMUM SCREW LENGTH IN INSERT = 12mm
WITH MAXIMUM SCREW TIGHTENING TORQUE = 3.5 N/m (31 in-lb)
2. REFERENCE DOCUMENTS:
2.1 33855 SPEC SHEET, FireEdge FE400

3RD ANGLE VIEW	MATERIAL: N/A	FINISH: N/A	TITLE: CONTROL DRAWING, FE400 240X10 ADVROD LENS
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DRAWING NUMBER: 33855		REV. 1	
ISSUED BY: G. MCKENZIE		ISSUE DATE: 9/16/2016	
ASME/ANSI Y14.5 EGF 442/4-01 SCALE: 1:1 SIZE B SHEET 1 OF 1			

NETLIST			
FROM	SIGNAL NAME	COLOR	TO
J1-1	+48V	PINK	J4
J1-2	INTENSITY CTRL	BLUE	J2-2
J1-3	ENABLE	WHITE	J2-3
J1-4	LOW POWER	BROWN	J2-4
J1-5	LAMP READY	GREEN	J2-5
J1-6	+48V	RED, RED	J2-6, J4
J1-7	DISABLE LEFT	PINK	J2-7
J1-8	GND	BLACK	J3
J1-9	GND	BLACK	J2-9
J1-10	GND	GREEN	J3
J1-11	+48V	YELLOW	J4
J1-12	BLUE	BLUE	J4
J1-13	DISABLE RIGHT	YELLOW	J2-13
J1-14	GND	WHITE	J3
J1-15	GND	BROWN	J3

REVISIONS				
REV.	DESCRIPTION	ENGR	DATE	ECO APPROVED APPROVED DATE
1	INITIAL RELEASE	GLM	08/19/16	2033 EK 09/01/16
2	CORRECTED WIRE COLOR, WAS WHITE	GLM	9/22/2016	2088 EK 09/26/16



ITEM NO.	PHOSEON P/N	MFR	MFR P/N	DESCRIPTION	QTY
1	33673	FCT	CT09-15S	Conn. HD, DB15, Female, 22 AWG, Solder Cup	1
2	20132	NORCOMP INC.	970-009-030R121	Backshell, DB9, Die Cast, Nickel	1
3	18177	NORCOMP INC.	171-015-103L001	Conn. DB15, Male, 20 AWG, Solder Cup, Nickel	1
4	26128	NORCOMP INC.	970-015-030R121	Backshell, DB15, Die Cast, Nickel	1
5	33668	Igus	CF240-03-10	Cable, 10 Conductor, 22 AWG, Shield, PVC	786"
6	10514	ALPHA WIRE	3075 GY005	Wire, 18 AWG, Green/ Yellow, 600v, PVC	2.00' ±.25
7	15546	3M	EPS-300 3/8"	Tubing, Heatshrink, 3/8" Black	1.00' ±.10
8	20056	3M	FP-301 3/16" RD	Heatshrink, 3/16", Red	2.00' ±.10
9	26363	3M	FP-301 3/16" BL	Tubing, Heatshrink, 3/16" 100 blk	2.00' ±.10
10	15750	MOLEX	19099-0032	Conn. Crimp Snap Spade, #8, 14-16 AWG	2
11	29130	3M	FP301-1/2" BLACK	TUBING, HEATSHRINK, 1/2"DIA., BLACK	3.00±.10
12	19531	MOLEX	19099-0048	Conn. Snap Spade, #8, 10-12AWG	1

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. NOT TO SCALE
2. TEST CABLE ASSEMBLY CONTINUITY FROM PIN TO PIN.
3. GRAY AND VIOLET CONDUCTORS NOT USED.



3RD ANGLE VIEW	ARTIFACT	INSIDE	TITLE
SEE BOM	NONE		CABLE, EXT PWR/DATA, DB15, 10M, FE400

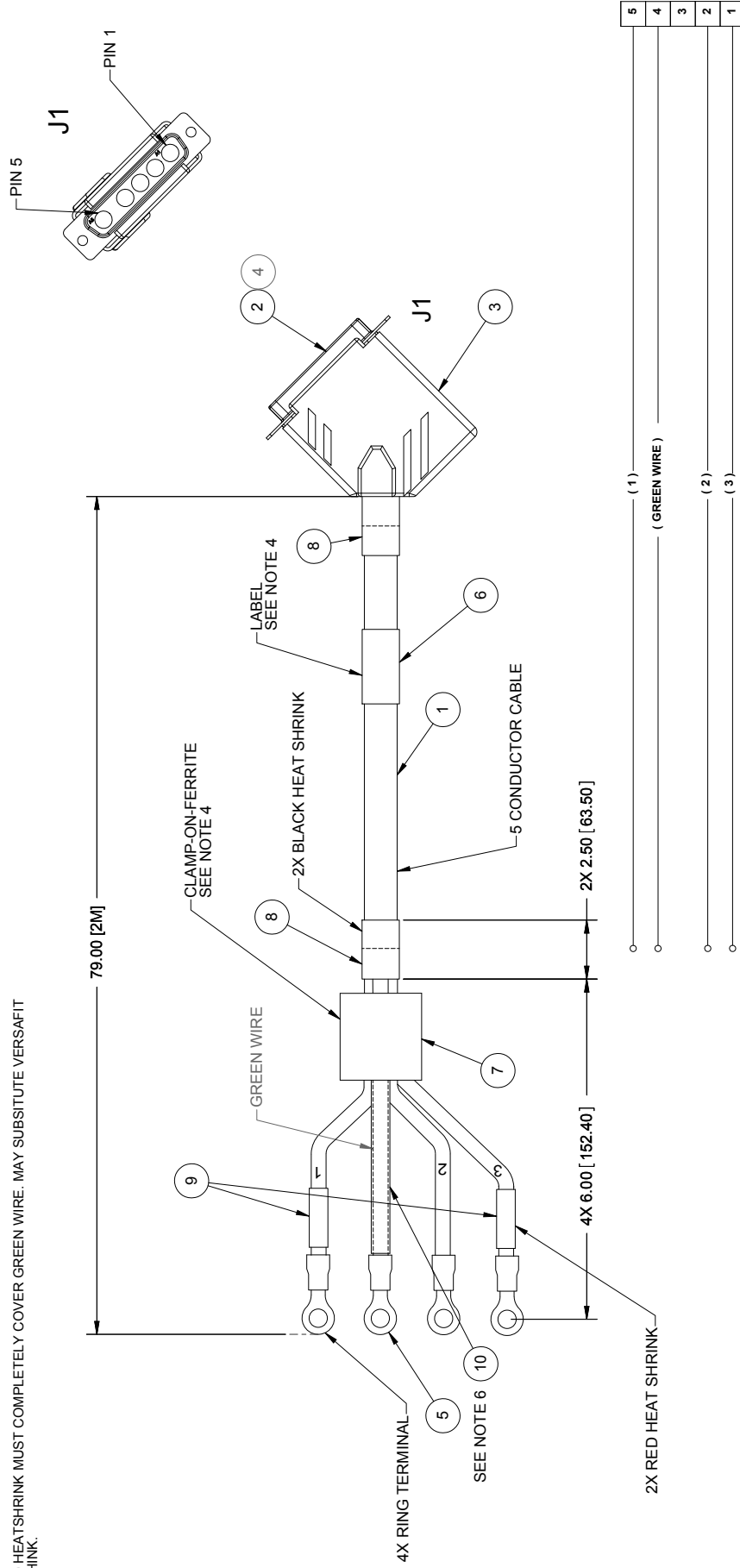
360 ANGLE VIEW		MATERIAL: SEE BOM	FINISH: NONE	TITLE: CABLE EXT PWR/DATA, DB15, 10M FE400	PART NUMBER: 33613 REV. 2
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NOTES: UNLESS OTHERWISE SPECIFIED.

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: $XX \pm .4$, [0.25mm]
 - DIMENSIONS BETWEEN 3.00 [76.2mm] AND 12.00 [304.8mm] SHALL BE: $XX \pm .4$, [0.25 [6.4mm]
 - DIMENSIONS BETWEEN 12.01 [304.8mm] AND 36.00 [914.4mm] SHALL BE: $XX \pm .4$, [0.25 [12.8mm]
 - DIMENSIONS GREATER THAN 36.00 [914.4mm] SHALL BE: $XX \pm .4$, [0.25 [12.8mm]

- ### 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. ITEM 10 HEATSHRINK MUST COMPLETELY COVER GREEN WIRE. MAY SUBSTITUTE VERSAFIT HEATSHINK.



Item	Phoseon P/N	Qty	UseA's	Title	Manufacturer	Mfr P/N
1	20340	79	inch	Cable, 5-conductor, 10AWG	IGUS	CF130US-60-05
2	25903	1	each	Connector, Plug, DB 5W5	FCI	DB5W5SAOOLF
3	26026	1	set	Connector Shells with Jack screws installed	Northem Technology	C88E221000
4	25902	4	each	Contact, Female 5W5	FCI	8638PSC4005LF
5	10674	4	each	Terminal, Crimp, ring, 10-12 awg, 5/16", RoHS	Molex/ Waldom	19070-0136
6	10568	1	each	Label, self laminating, 1 x 3/4	Helleimann Tylon	TAG9L-105
7	19709	1	each	Ferrite Tube Box Clampon .500" BLK	Steward	28A-2024-0A2
8	15821	5	inch	Tubing, heatshrink, 3/4", black, adhesive	3M	EPS-300 3/4"
9	26363	4	inch	Tubing, heatshrink, 3/16", red	3M	FP-301 3/16" RD 250"
10	20056	AR	inch	Tubing, heatshrink, 3/16", black	3M	FP-301 3/16" BLK 250"

EX-200
PROPRIETARY AND CONFIDENTIAL

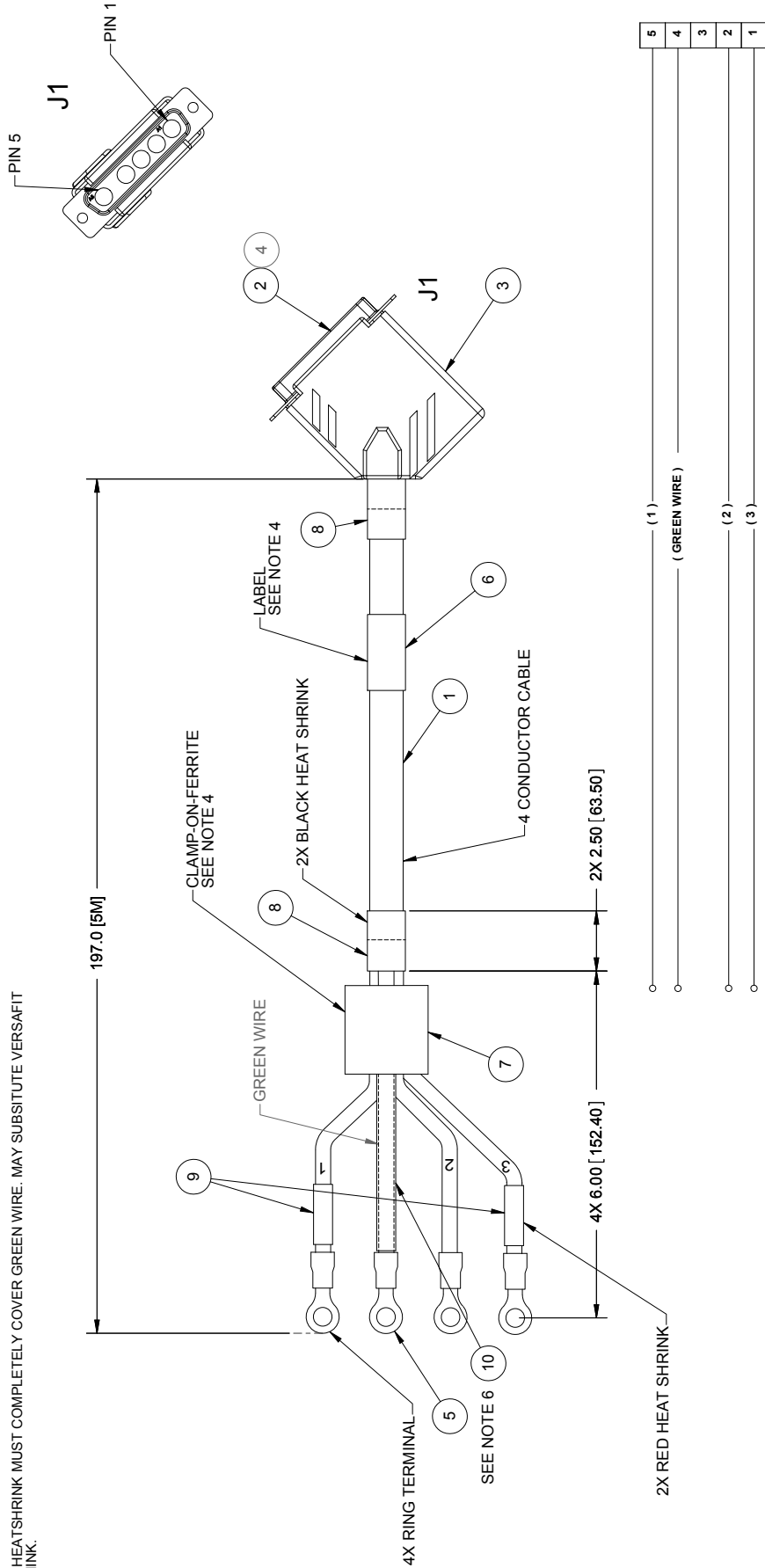
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WITHOUT THE WRITTEN PERMISSION OF PHOSEON TECHNOLOGY IS PROHIBITED.

NAME		DATE	PHOSEON TECHNOLOGY		
R. JASMIN		07/29/09	TITLE: CABLE DC POWER, 2M FE400 HUB		
DRAWN			4		
CHECKED					
ENG APPR.					
MFG APPR.					
G.A.			SIZE	DWG. NO.	REV
			C	25838	4
DO NOT SCALE DRAWING			SCALE:	SHEET 1 OF 1	

REVISIONS						
REV.	DESCRIPTION	ENGR.	REV DATE	ECO	APPROVED	DATE
1	INITIAL RELEASE	GLM	08/29/16	2033	EK	09/01/16

NOTES: UNLESS OTHERWISE SPECIFIED.

- 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.
- TOLERANCE:
DIMENSIONS LESS THAN 3.00 [76.2mm] SHALL BE: $XX = \pm .10$ [2.5mm]
DIMENSIONS BETWEEN 3.00 [76.2mm] AND 12.00 [304.8mm] SHALL BE: $XX = \pm .25$ [6.4mm]
DIMENSIONS BETWEEN 12.01 [304.8mm] AND 36.00 [914.4mm] SHALL BE: $XX = \pm .50$ [12.8mm]
ALL DIMENSIONS GREATER THAN 36.00 [914.4mm] SHALL BE $\pm 1\%$ OF SPECIFIED LENGTH.
- TEST CABLE ASSEMBLY CONTINUITY FROM PIN TO PIN.
- 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.
- PART MARKING: LABEL WITH PHOSEON PART NUMBER AND REVISION WHERE SHOWN.
- ITEM 10 HEATSHRINK MUST COMPLETELY COVER GREEN WIRE. MAY SUBSTITUTE VERSAFIT HEATSHINK.



Item	Phoseon P/N	Qty	UseAs	Title	Manufacturer	Mfr P/N
1	20340	197	inch	Cable, 5-conductor, 10AWG	IGUS	CF130US-60-05
2	25903	1	each	Connector, Plug, DB 5W5	FCI	DB5W5SAOOLF
3	26026	1	set	Connector Shells with Jack screws installed	Northern Technology	C88E221000
4	25902	4	each	Contact, Female 5W5	FCI	8638PSC4005LF
5	10674	4	each	Terminal, Crimp, ring, 10-12 awg, 5/16", RoHS	Molex/Waldom	19070-0136
6	10568	1	each	Label, self laminating, 1 x 3/4	Hellemann Tyton	TAG9L-105
7	19709	1	each	Ferrite Tube Box Clamp-on .500" BLK	Steward	28A2024-0A2
8	15821	5	inch	Tubing, heatshrink, 3/4", black, adhesive	3M	EPS-300 3/4"
9	26363	4	inch	Tubing, heatshrink, 3/16", red	3M	FP-301 3/16" RD 250'
10	20056	AR	inch	Tubing, heatshrink, 3/16", black	3M	FP-301 3/16" BLK 250'

PROPRIETARY AND CONFIDENTIAL

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NAME	DATE	REV
G. MCKENZIE	08/19/16	1
DRAWN		
CHECKED		
ENG APPR.		
MFG APPR.		
G.A.		
DO NOT SCALE DRAWING		
SCALE:		
SIZE	DWG. NO.	REV
C	33614	1
SHEET 1 OF 1		

PHOSEON TECHNOLOGY
TITLE:
CABLE, DC POWER, 5M
FE400 HUB

Reducing Light Reflection



Technical Note

Overview

One of the many benefits of UV LED technology is divergent light, meaning there is no focal point of the light output. This creates a longer exposure time for media traveling under the light source, and therefore typically higher dose for curing the adhesive, coating, ink or other UV curable material. When the light source is mounted adjacent to a print head, there may be a concern when using very sensitive inks that light could reflect off the media into the print head and begin curing prematurely. This document describes techniques to reduce reflected light.

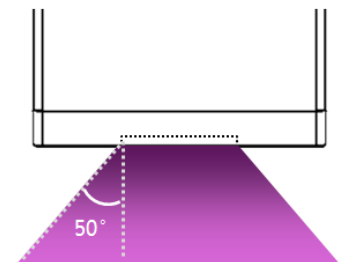
Note:

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

Light Output Angle

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

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



Half Angle for 20mm products ~50°

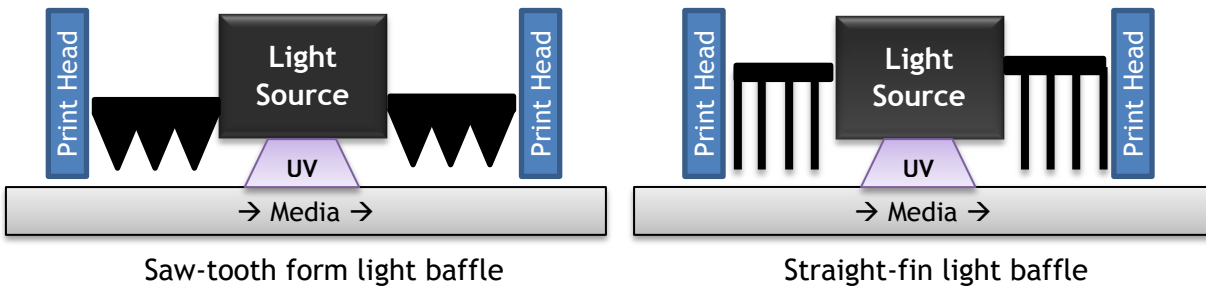
Reducing Light Reflection

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

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

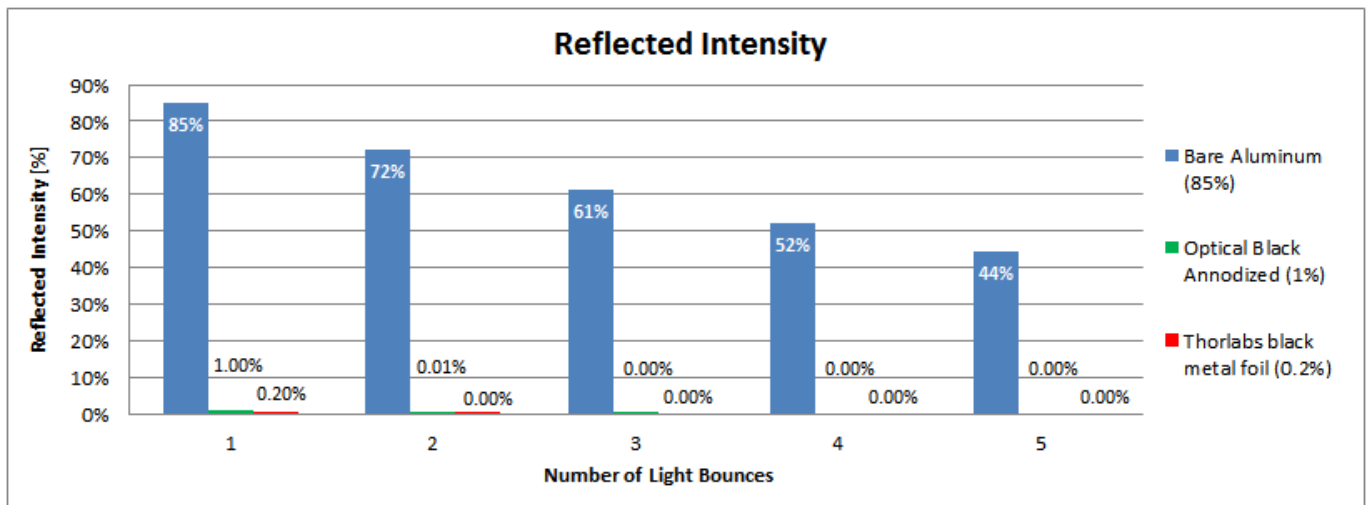
Light Baffle Examples (not to scale)

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

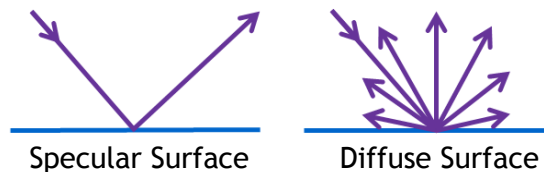


Materials

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



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

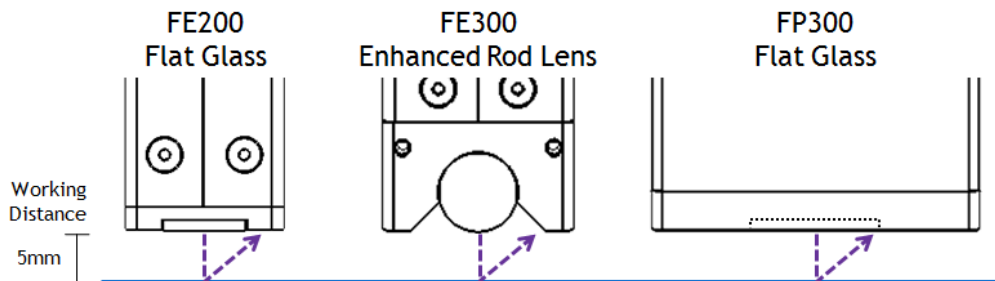


Light Reflection Examples

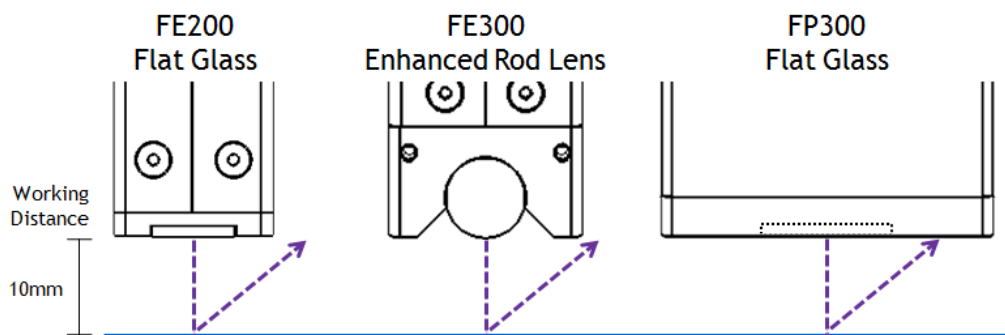
When curing with a reflective surface, like bare or polished aluminum, the size of the window frame and the working distance from the emitting window to the media, will affect how much light is allowed to reflect past the light source. Adding a light catch or shield that extends past the light source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

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

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



Phoseon Product Examples at 5mm Working Distance

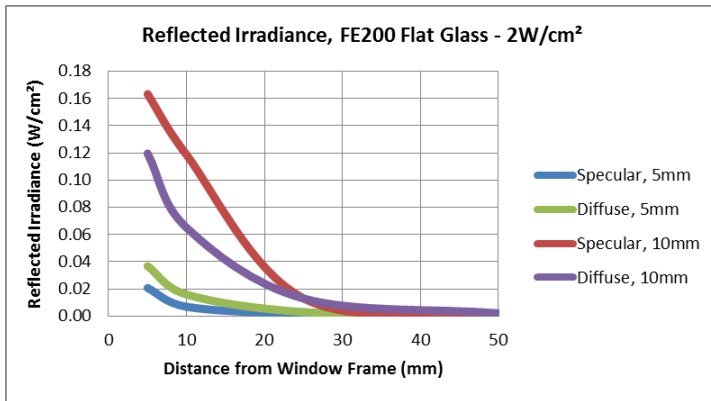


Phoseon Product Examples at 10mm Working Distance

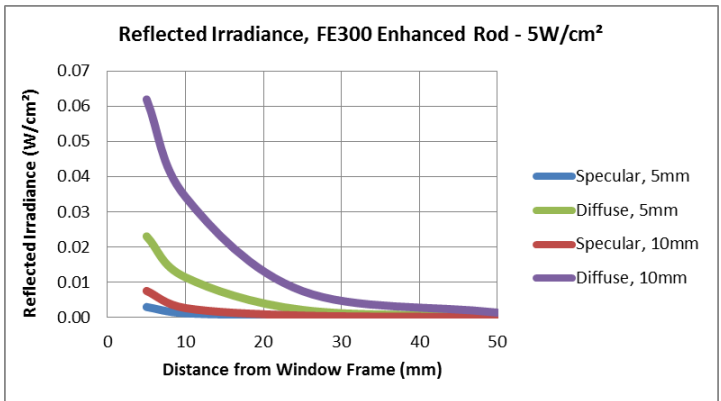
The charts below illustrate the irradiance values of reflected light with 3 different light sources; the FE200-2W/cm² with Flat Glass, the FE300-5W/cm² with Enhanced Rod Lens, and an FP300-20W/cm².

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

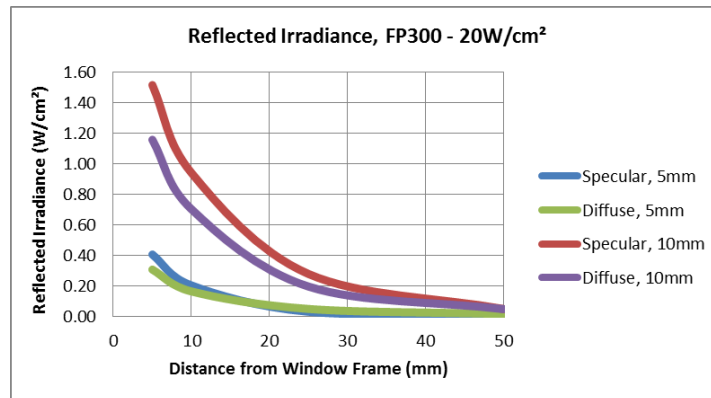
- Each media type is shown at two different working distances: 5mm and 10mm from the emitting window to the media
- The point of measurement for the reflected light is on the same plane as the emitting window at varying distances away from the edge of the light source (window frame, not the glass)



FireEdge FE200 Flat Glass, 2W/cm²



FireEdge FE300 Enhanced Rod, 5W/cm²



FirePower FP300, 20W/cm²

Observations from the charts above:

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

Air Flow

The FE400 has internal cooling fans 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. The advanced body style also has a replaceable air filter.

Note: Minimum clearance of 21mm should be maintained for air inlets and 50mm for exhaust ports.

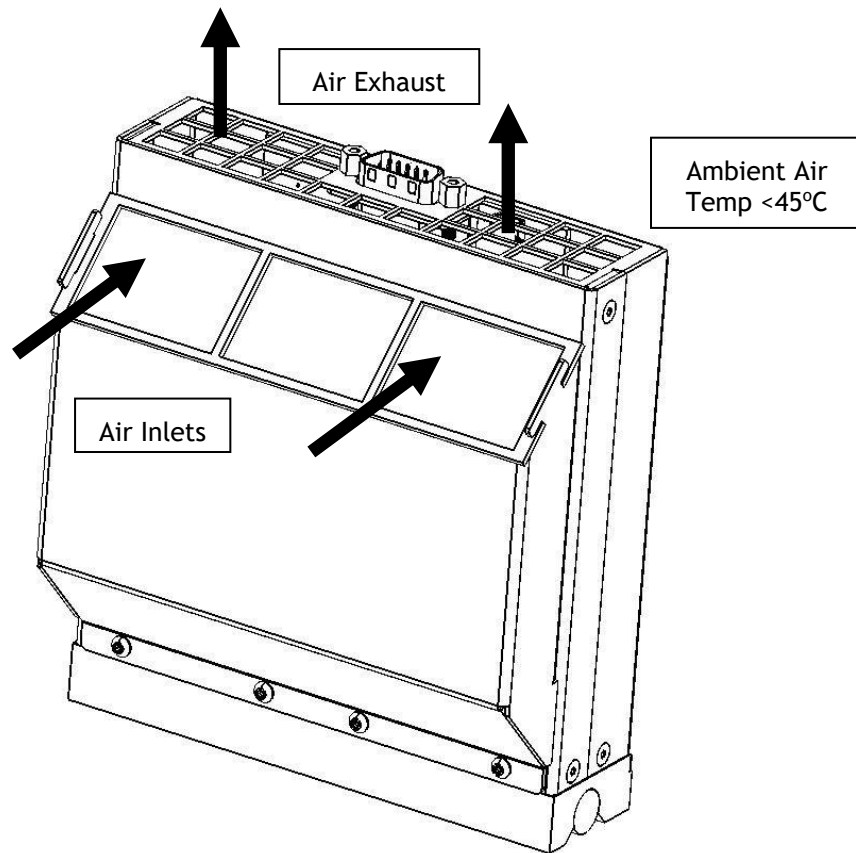


Figure 2.2: Air Flow Direction for FireEdge FE400 (Advanced Body Style Shown)

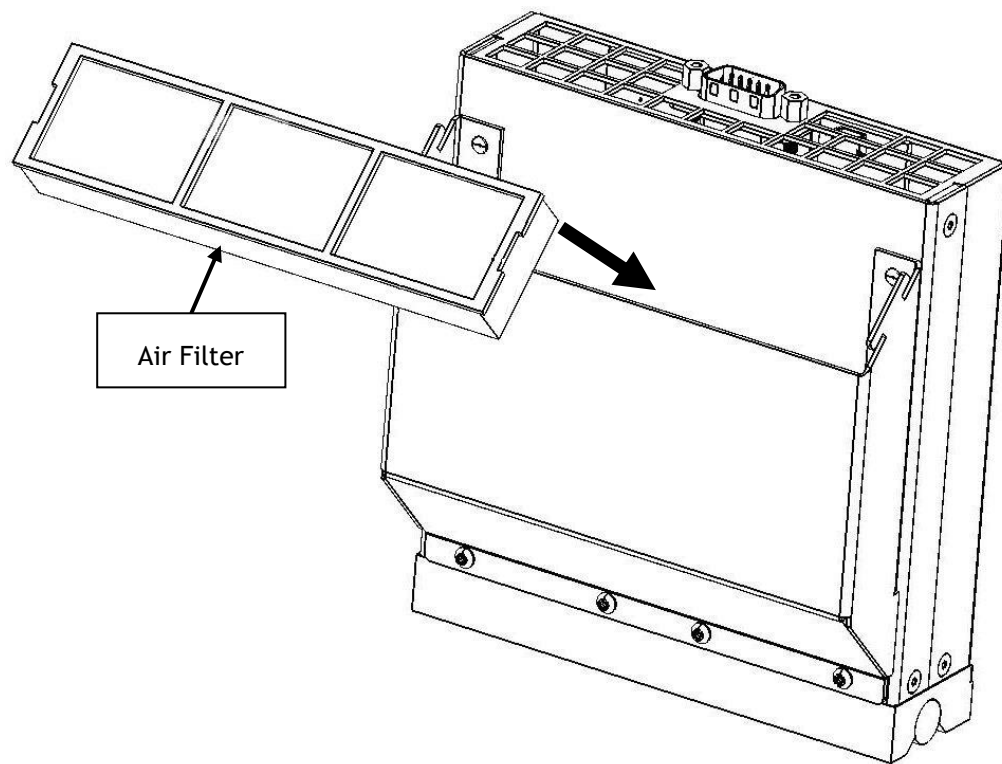


Figure 2.3: Advanced Body Style Air Filter Replacement

The air filter is removed by pinching the two ends of the assembly and then lifting up. Replaceable air filters, five filters per pack, can be purchased separately from Phoseon: PN 33837 (80x10mm); PN 33838 (120x10mm); PN 33839 (160x10mm); PN 33840 (180x10mm); PN 33841 (240x10mm).

Operation

On/Off Control

The UV output of the light source is enabled and disabled through a simple PLC level voltage (Pin 3 on the rear connector). The light source does not require external shutters as the UV output turns on and off in less than 50ms.

CAUTION: Any material exposed to UV, when not in motion, can reach very high temperatures. Turn off the light source when not actively UV curing.

Intensity Control

The intensity of the UV output is controlled through an analog voltage (Pin 2 on the rear connector). The valid range of this voltage is 0.5 to 10Vdc. 10Vdc corresponds to 100% output irradiance and UV power and 0.5Vdc corresponds to 5% output irradiance and UV power.

The output of the FE400 varies linearly from 5% to 100% for intensity control voltages between 0.5Vdc and 10Vdc. Below 0.5Vdc the output irradiance is held at a constant minimum value below 5%. If zero UV output is desired, the enable line (Pin 3) should be pulled low. Performance of the FE400 below 0.5Vdc and above 10Vdc is not specified.

Lamp Ready Output

The status of the FE400 is given by the state of the Lamp Ready line (Pin 5 on the rear connector). The line is high when the FE400 is in the Ready state, meaning the UV output may be enabled through the Enable line. If this line is low, the FE400 is in the Not Ready state, indicating the UV output will not enable.

Note: For FE400s with serial numbers below D20677, an external 10kΩ, ¼W pull-up resistor to 24V is needed on this line. For FE400s with serial numbers at or above D20677, no external resistor is needed. See the 33855 Product Specifications section for more detail.

The Not Ready state is caused by one or more of the following conditions:

- The FE400 DC power supply is turned off.
- The FE400 DC power supply is providing a voltage too low for proper operation.
- The FE400 is in thermal shutoff due to excessive internal temperatures.

Refer to the troubleshooting guide later in this manual for help identifying the cause of the Not Ready state.

High/Low Intensity Mode

The FE400 can be switched between High/Low Intensity Mode through a PLC level voltage (Pin 4 on the rear connector). The default mode is High Intensity Mode (Pin 4 open or low). Low Intensity Mode reduces irradiance by a factor of 10 (Pin 4 high).

SLM™ Control

Either the left or right segment can be turned on/off through PLC level voltages. Summarized below:

Pin 3, Enable High	Pin 7, Disable Left	Pin 13, Disable Right	Left SLM	Right SLM
High	Open or Low	Open or Low	Enabled	Enabled
Open or Low	-	-	Disabled	Disabled
High	High	Open or Low	Disabled	Enabled
High	Open or Low	High	Enabled	Disabled

Irradiance as a Function of Distance

The UV emission from the FE400 UV light source diverges with distance away from the window glass. However it is important to note that as the distance between the media and the emitting window increases, the total energy (dose) delivered by the light source remains constant. Peak irradiance decreases as the working distance increases, but it is offset by an increase in the exposure area (light footprint), keeping the dose constant.

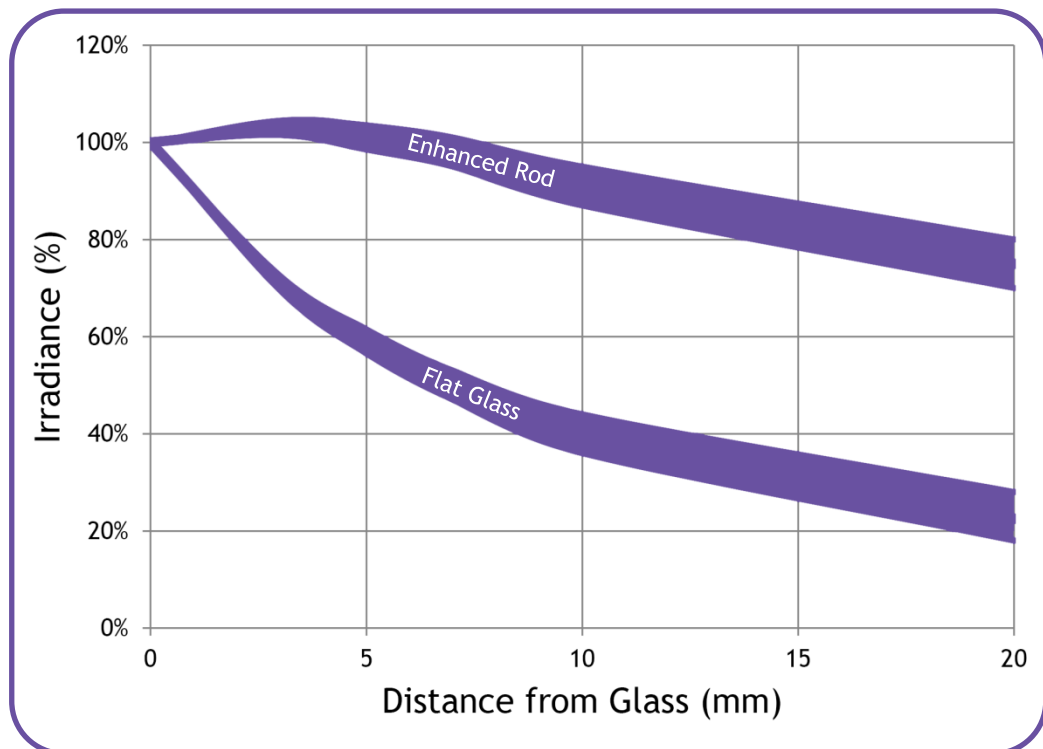


Figure 3.1: Irradiance as a Function of Distance

Service

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

Troubleshooting Guide

Table 4.1: Troubleshooting Guide

Symptom	Component	Action or Cause
No Light is emitted from light source Lamp Ready line (Pin 5) is low	Power Supply	Check that AC and DC cables are wired correctly to power supply. 1. If using Mean Well Power Supply check that the green LED indicator is on and the fans are running 2. Check power supply is plugged in to AC outlet 3. Verify voltage at the light source is +48Vdc at Pins 1, 6, 11 and 12 (return at Pins 8, 9, 10, 14 and 15)
	Temperature	If light source has thermally tripped, no light will be emitted until the light source returns to a safe operating temperature. Check the ambient conditions. Insure the ambient temperature is less than or equal to 50°C. Check for adequate clearance around the air inlet and outlet of the FE400.
	Light Source with PLC Control	Check the control voltages on the rear connector. Ensure 24Vdc is applied to Pin 3 (Enable), and a voltage in the range of 0.5 to 10Vdc is applied to Pin 2.

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.

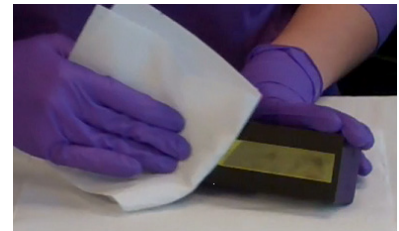
CAUTION: Wearing vinyl gloves is recommended to avoid getting any uncured UV material on the skin.

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.

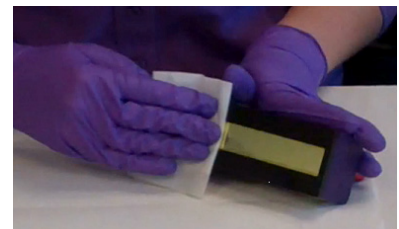
4. Use the pre-moistened IPA wipe to remove any remaining dust or debris left on the window during the cleaning process.
5. Repeat steps 2 through 5 until the window is clear of all contaminants.
6. If needed, use a dry paper towel to wipe down the light source.



Wipe Glass



Scrape with Razor



Wipe with IPA

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	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