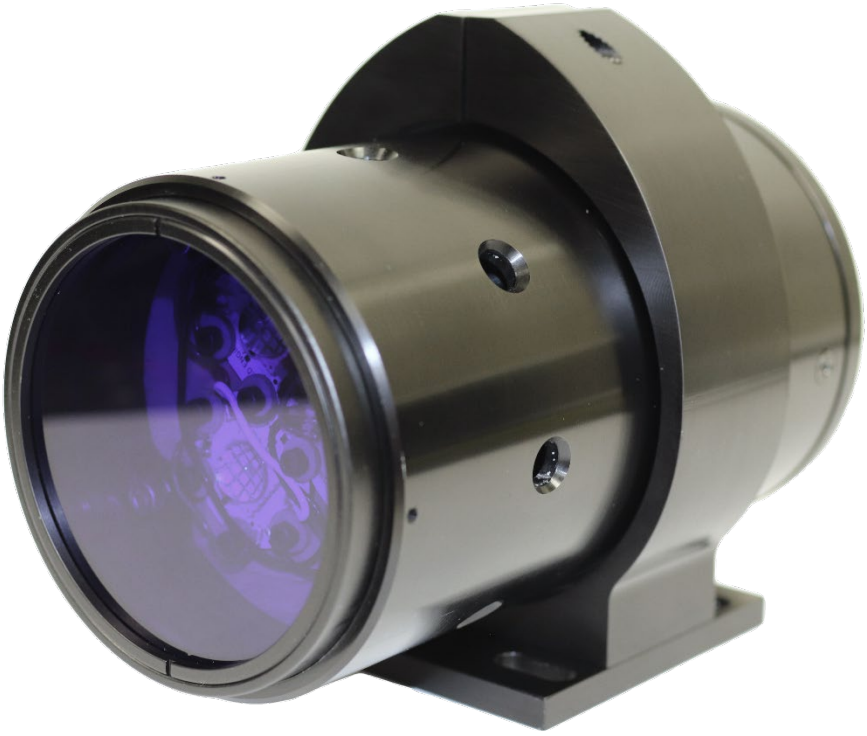

VORTEX-COOLED LED SYSTEM

User Manual

Version 1.2

Getting started using your new vortex-cooled LED system for pressure sensitive paint

Innovative Scientific Solutions, Inc.
2020

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CE FC RoHS MADE IN USA

Revision Date: 5/6/2020

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this device near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
9. Use only the supplied power cord. Consult manufacturer for replacement if lost or damaged.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Refer all servicing to manufacturer. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
13. This apparatus shall not be exposed to dripping or splashing, and no object filled with liquids, such as vases or beer glasses, shall be placed on the apparatus.
14. Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
15. Wear appropriate safety glasses at all times. ISSI recommends UVEX SCT Orange lenses. Safety glasses utilizing these lenses block near 100% of the damaging retinal blue light. The LM3X series of LED Illuminators have a high optical output power. The light they produce is in the blue to UV wavelength which in substantial amounts can be very damaging to the eye. It is though that severe exposure may lead to age related macular degeration (AMD), and possible blindness. Wear appropriate safety glasses at all times during use. ISSI recommends UVEX SCT Orange lenses. Safety glasses utilizing these lenses block near 100% of the damaging retinal blue light.

16. This apparatus has been designed with Class-I construction and must be connected to a mains socket outlet with a protective earthing connection (the third grounding prong).

17. This apparatus has been equipped with an all-pole, rocker-style AC mains power switch. This switch is located on the front panel and should remain readily accessible to the user.
18. NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
    - Reorient or relocate the receiving antenna.
    - Increase the separation between the equipment and the receiver.
    - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
    - Consult the dealer or an experienced radio/TV technician for help.

    CAUTION: Changes or modifications to this device not expressly approved by Innovative Scientific Solutions,
Inc. could void the user's authority to operate the equipment under FCC rules.
19. This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION — *Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant las limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le réglement sur le brouillage radioélectrique édicté par les ministere des communications du Canada.*

20. Exposure to extremely high noise levels may cause permanent hearing loss. Individuals vary considerably in susceptibility to noise-induced hearing loss, but nearly everyone will lose some hearing if exposed to sufficiently intense noise for a period of time. The U.S. Government's Occupational Safety and Health Administration (OSHA) has specified the permissible noise level exposures shown in the following chart.

According to OSHA, any exposure in excess of these permissible limits could result in some hearing loss. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels use hearing protectors while the equipment is in operation. Ear plugs or protectors in the ear canals or over the ears must be worn when operating the equipment in order to prevent permanent hearing loss if exposure is in excess of the limits.

Duration, per day in hours	Sound Level dBA, Slow Response	Typical Example
8	90	Duo in small club
6	92	
4	95	Subway Train
3	97	
2	100	Motorcycle (Riding)
1.5	102	
1	105	Sporting Event
0.5	110	
0.25 or less	115	Loudest parts at a rock concert

Chapter 1: Welcome

Welcome! Thank you for purchasing the vortex-cooled LED system. We hope it exceeds your expectations.

Instead of one lengthy document containing all of the hardware specifications and details, we have divided the manual into separate sections. The first section contains all the information that most users will require to get up and a running quickly. The remaining pages describe the hardware side of things in more detail, and is intended to be used a reference. If you have any questions or comments about this User's Manual, please contact us at: support@innssi.com

About This Guide

This guide is designed to be accessible, with subsections as complete as practical to minimize the need to scan back and forth to find what's needed.

This guide provides the following resources:

- A general overview of the DC3X facilities and features.
- A general overview of the LM3X facilities and features.
- Hookup diagrams depicting some of the more common setups.
- Listing and Description of Key Components
- Hookup diagrams depicting some of the more common setups.

Chapter 2 : DC3X Front Panel

The DC3X LED Drive and Control Assembly front panel is outfitted with ten connectors. The six BNC connectors at the center are comprised of inputs and outputs that control the functions of the emitters via standard 5V (TTL) logic. The multi-pin circular connectors at the top right provides power, and cooling for the LM3X LED emitters are provided by the NPTM fittings at bottom right via the included umbilical cable.

BNC Inputs

The bottom left BNC connector is the trigger input for both LEDs. A PWM 5V signal fed into this connector controls the timing and overall optical output of the both LED heads in unison. A 5V high signal may be inputted here for constant on (DC) operation.

Caution: The DC (constant on) operation of the LEDs should be limited to short durations (<90s).

The top row of BNC connectors controls the LM3X emitters output states. When a 5V high signal is provided to the respective connectors the outputs are disabled. Similarly, the middle row of connectors controls the cold air supply to the LM3X emitters. The intent is to provide a means of disabling air when the LM3X output is not being used.

***Caution**: Do not disable the cold air outputs when the LM3X outputs are illuminated.*

BNC Output

The BNC connector at the bottom right is a 5V (TTL) output. The intent of the output is to provide the operator with remote feedback in a multi-unit setup. If while in operation, either LM3X LED emitter exceeds a safe operating temperature, the output of the LED will disable and a 5V high signal will be present at this output.

Multi-Pin Circular Connectors

The multi-pin circular connectors at the top right of the DC3x front panel provide power for the LM3X LED emitters. The connections to the LED are made using the provided umbilical cables.

Caution: Do not use any other means to connect to the LM3X emitters other than the cables provided. If you believe you require a different length or cable configuration for your application, please consult the manufacturer.

The connectors are keyed to prevent improper insertion, and are locked in place by a clockwise twist lock mechanism. Note that the genders of the connectors on the DC3x Drive and Control Assembly differ from the LM3X head and therefore are not interchangeable from end to end.

NPTM Air Fittings

Cooling to the LM3X LED emitters is provided by the NPTM fittings at the bottom right of the DC3x front panel. Connections to these fittings are made using the provided umbilical cables. In most cases is only necessary to hand tighten these fittings. If you encounter condensation on these connectors during operation due to the environmental conditions in your application, you may elect to add some split foam tubing insulation around the NPTM connectors and NPTF connectors on the umbilical cables. In most applications the condensation will be minimal, and no additional insulation is necessary.

LED Indicators

The LEDs on the left of the DC3x front panel indicate there is a temperature fault, or that the LM3X(s) outputs have been disabled respectively.

Chapter 3 : DC3X Rear Panel

The DC3X LED Drive and Control Assembly rear panel contains the compressed air input, AC power input, cooling flow inlet and warm air discharge. It is important to keep the rear panel away from wall and clear of debris to make sure the system is well-vented.

AC Power

AC input power to the DC3X is provided via the IEC C14 power inlet connector to the right on the rear panel.

A power cord has been provided. Do not substitute the provided cable. If you require a replacement cable please consult the manufacturer.

The DC3X has been designed to operate on international power. The allowable input voltage range is 115 to 250 V at 50 to 60 Hz. The power supply is auto-sensing and does not require any change of settings to operate anywhere in the above range.

Fuse

AC power for the DC3X is current limited by a fuse. The fuse is integrated into the power input module. If you believe the fuse needs to be replaced due to suspected fault with the hardware, please consult the manufacturer.

Air Vents

The large vent at bottom right of the rear panel provides cooling for the internal power supply, and the smaller vent at bottom left allows warm air to discharge from the active cooling system.

Cooling Flow Inlet for Power Supply

Warm Air Discharge

Caution: *Do not block the air vents on rear panel. Exit air from the cooling system can be hot.*

Air Input Connector

Supply air for the DC3x is supplied via the ½" NPTM coupler at the top left of the rear panel. A barbed female mating fitting is included with the DC3x system for ease of integration. Considerations should be made to assure that the volume of air available at this connector is sufficient for proper cooling. A **minimum** of 40 SCFM (1,130 L/min) at a pressure of 95 psi is required.

Caution: *Supply air for the DC3x should be filtered and free of oil, water, and particulates.*

Chapter 4 : LM3X LED Emitter

The LM3X LED emitter is a special purpose LED light source that is specifically designed to provide the optimal illumination source for all pressure sensitive paint applications using ISSI proprietary paint formulations. The unit has two connectors on the rear cover of the housing, one 38999 circular connector for electrical connections and on ½ NPTM air inlet for cooling.

Caution: *Possibly hazardous radiation emitted from this product. Do not stare at operating lamp. May be harmful to the eyes.*

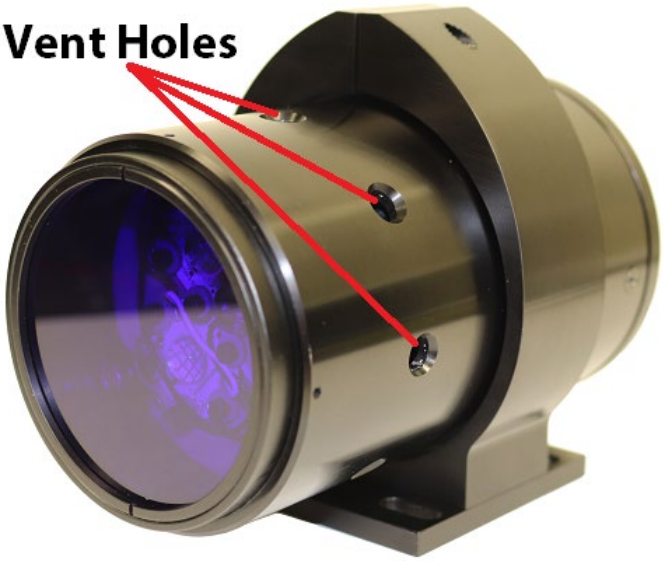
Multi-Pin Circular Connector

The multi pin circular connector at the top of LM3X rear cover supplies DC power to the integrated LED array. Also provided is the temperature feedback to the DC3x for the purpose of over-temperature protection.

Cold Air Inlet

Cooling for the LM3X is provided via the ½" NPTM connector on the bottom of the rear cover. The cooling connection should be made directly to the provided air supply hose. Do not substitute the cable or use adapter fittings on the cold air connection.

Air Vents



Caution: *Do not cover vent holes. Covering the vent holes will cause the unit to overheat and over-temp protection circuit will engage.*

Filter and Filter Holder Assembly

The filter holder is held in place with (4) 4-40 set screws. NPTF connectors on the umbilical cables. In most applications the condensation will be minimal, and no additional insulation is necessary.

Optional Items

LM3X Clamp (LM3X-CL)

The LM3X-CL is an optional accessory for the LM3X that securely clamps to the LED housing for extra grip during mounting. It is compatible with the SL20 ball mount base from Thorlabs. This is a strongly recommended accessory as it makes mounting much faster and adjusting the LED position much easier than a single threaded hole and post method.

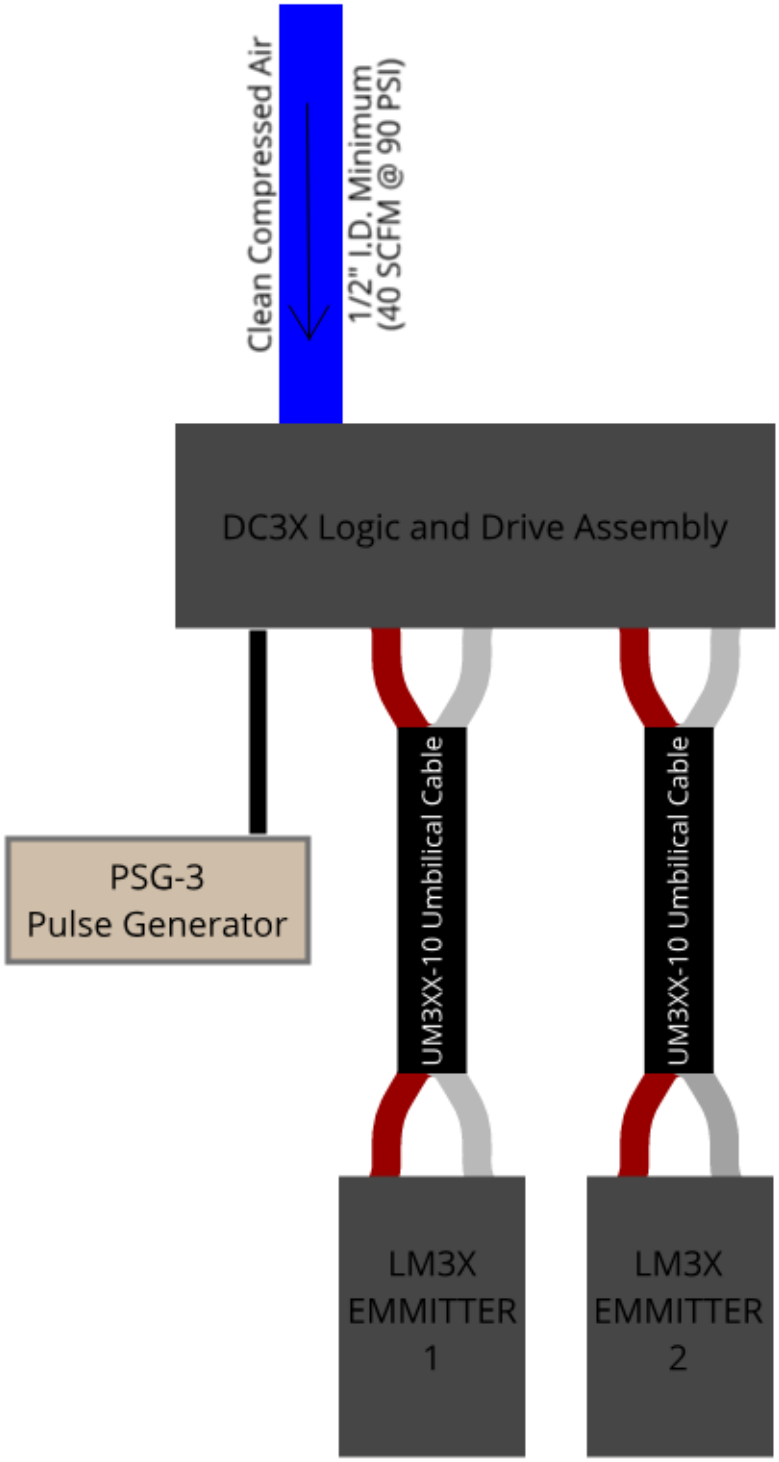
Ball Mount

The LM3X-CL clamp is designed to fit directly onto a Thorlabs SL20 articulating base ball stage (pictured above). This can be purchased separately for easy of adjustment during mounting with superior holding torque.

Chapter 5: Electronics and Cooling Umbilical

Each LM3X connects to the DC3X via an umbilical cable which provides power and trigger to the LM3X as well as cold air from the DC3X. Connections can only be made one way so the cable cannot be incorrectly installed. Always start by hand-tightening the cables before securing with a wrench (provided) to avoid stripping the threads.

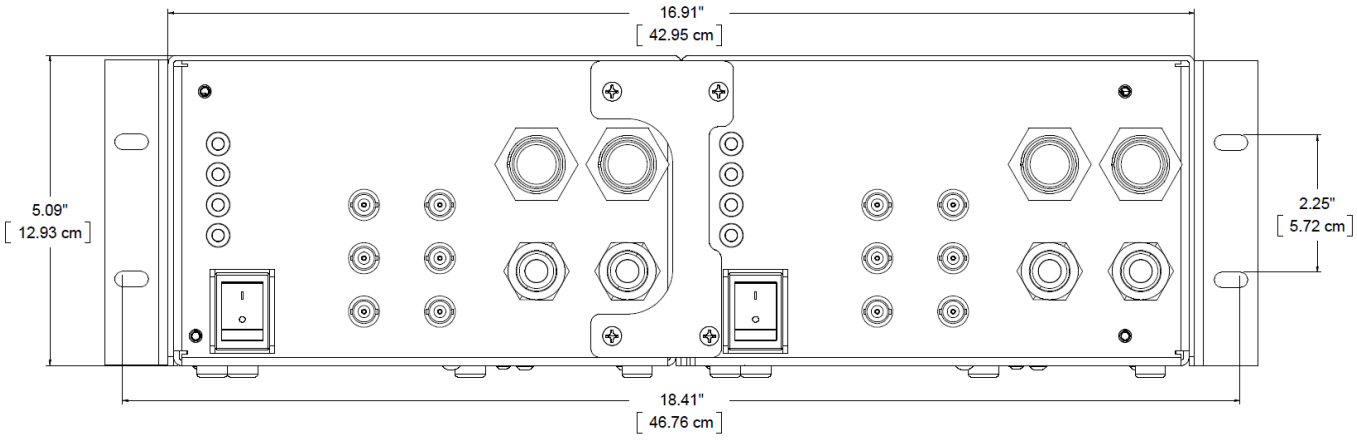
Appendix A : System Diagram



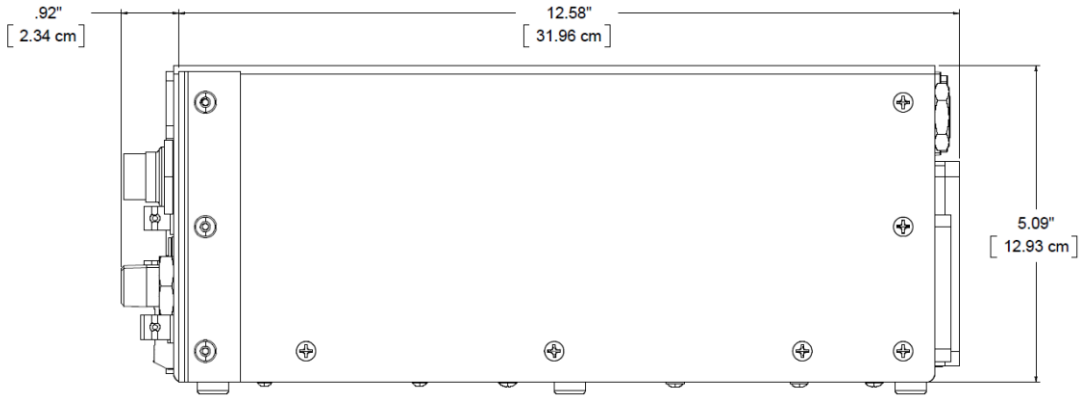
Appendix B : Technical Information

DC3X

Input Power	**100-240 V, 50-60Hz, 8.2A**
Operating Temperature	2-50 ˚C
Required Supply Air	40 scfm (1,130 lpm) @ 90 psi min (Dry)
Air Inlet	1/2" NPT
Noise Level	<85 dB
Length (Drive Assembly)	8.4"
Width (Drive Assembly)	12.5"
Height (Drive Assembly)	5.5"
Weight (Drive Assembly)	12.5 lbs.
Rack Height	3U



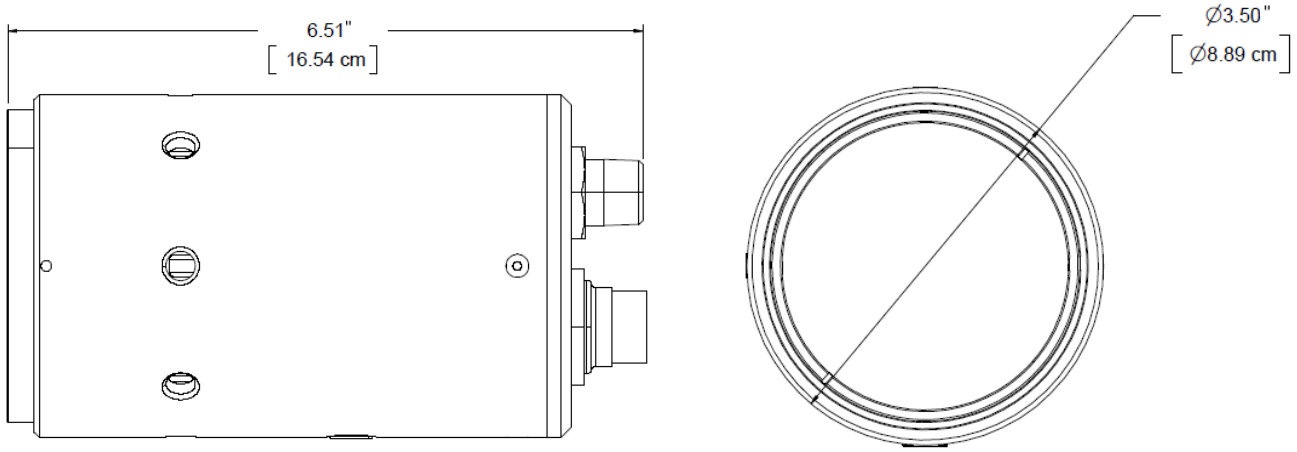
Dual DC3X Control Box with Rack Mounting



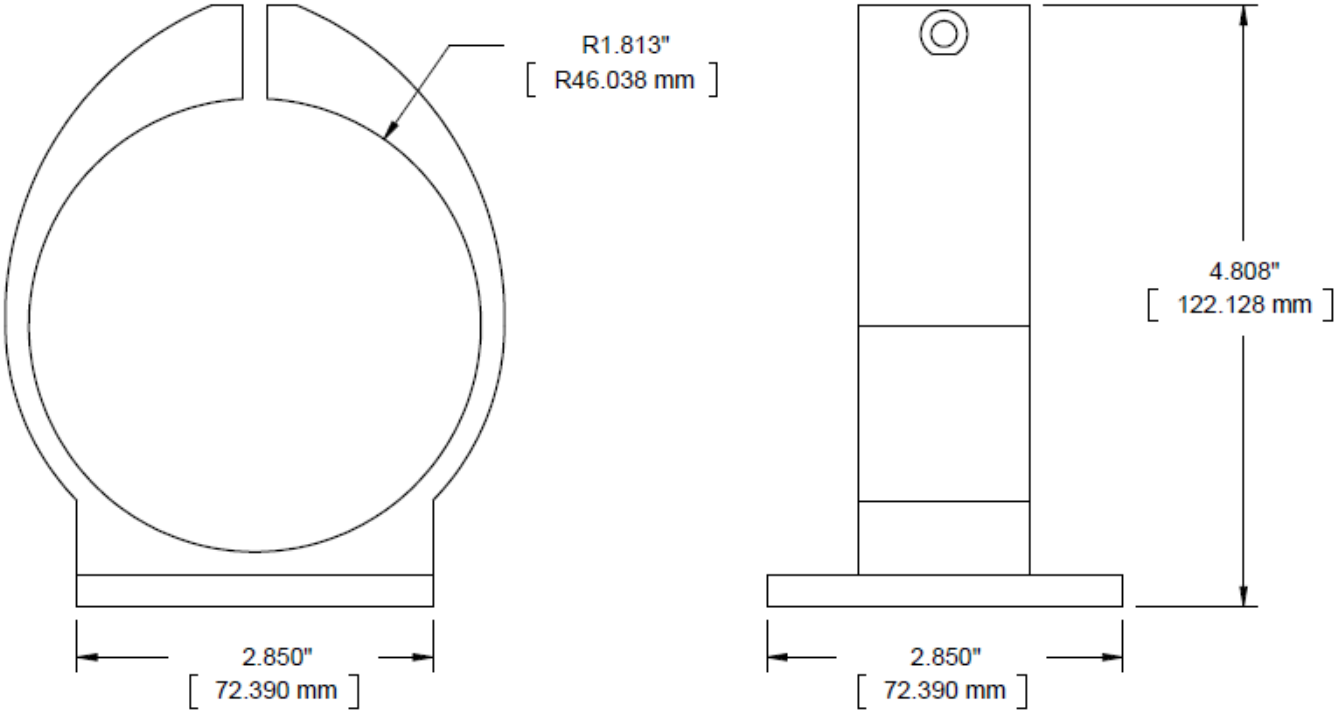
DC3X Control Box Profile

LM3X

Optical Output Power	18 W per Emitter (36W Total)
Operating Temperature	2-50 ˚C
Length (LED Emitter)	6.5”
Diameter (LED Emitter)	3.5”
Weight (LED Emitter)	2.5 lbs.
Umbilical Length	10 ft.



LM3X Head



LM3X-CL Clamp