LED Driver

EUCO ARENA SPORT 2.1KW Series

EUCO ARENA SPORT

Highlights & Features

- 3 independent output channels: 2100W – max 700W per channel
- Nominal input voltage: 220-400VAC
- Ultra high Efficiency (97.8%)
- Control method: DALI2/D4i and DMX-RDM
- Programmable output current range 700-2000 mA
- Output voltage range from 250-550Vdc per channel
- Very low peak-to-peak current ripple (typ.1%) for HDTV broadcasting
- DALI-2 and DMX-RDM configurable single channel or multi-channel (up to 3 x DT6 or 3 x DMX)
- High-accuracy integrated power metering
- Constant Light Output (CLO)
- Smart Timer Dimming (STD)
- Wide dimming range 0.1-100% or 0.4-100%
- Input surge protection: DM 10kV; CM 10kV
- IP66 & IK08 enclosure
- Max remote distance 200 meters

Standards & Marks

IP 66 IK 08

Model Number: EUCO-2K1200G□A□□

Unit Weight: ~5.8kg

Dimensions (L × W × H): 500x152x77 mm

General Description

Delta EUCO ARENA SPORT 2K1 series with DALI 2 & D4i or RDM / DMX control functions are constant current non-isolated LED drivers. Compatible with wide input voltage range 220~400Vac from any system manufacturer for indoor and outdoor applications. With IP66 ingress protection and wide ambient operating temperature range from -40°C to +50°, the driver can fulfill any harsh condition. The extremely low output current ripple makes the driver a typical application for outdoor stadium lighting.

Model Information

Model Number	Input Voltage Range	Rated Output Power	Output Current Channel	Control Interface
EUCO-2K1200GIA	220/400Vac(typical) 198~440Vac(range)	2100W	3	DALI 2 & D4i
EUCO-2K1200GDA		2100W	3	RDM/DMX

*Default setting is a single address. Optionally, user could be able to assign a dedicated address per each channel via GUI and programming tool for both DALI and DMX models.

Model Numbering

EU	C	O	2K1	□□□	G	□	A	□□
Market Code	Constant Current	Outdoor	Output power 2K1:2100W	Output Current 200:2000mA	i-Programming	Function I：DALI 2 & D4i D：RDM/DMX	Variable A - Standard	Mode series, can be 0~9, A~Z or blank.

All parameters are specified at 25°C ambient for all products unless otherwise indicated.

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Specifications

Input Ratings / Characteristics

Specification	Min.	Typ.	Max.	Conditions
Nominal Input Voltage	220Vac	-	400Vac	
Input Voltage Range	198Vac	-	440Vac	
Nominal Input Frequency	-	50/60Hz	-	
Input Frequency Range	47Hz	-	63Hz	
Nominal Input Current	-	10A	11.5A	At 220Vac, 25°C, 2100W output
	-	5.4A	6A	At 400Vac, 25°C, 2100W output
Efficiency[1]	-	96.6%	-	At 220Vac, 25°C, 350V/2A *3 channels output
	-	97.0%	-	At 220Vac, 25°C, 550V/1.27A *3 channels output
	-	97.3%	-	At 400Vac, 25°C, 350V/2A *3 channels output
	-	97.8%	-	At 400Vac, 25°C, 550V/1.27A *3 channels output
Standby Power Consumption	-	0.3W	-	At 230Vac, Dim OFF, in compliance with Erp (EU) 2019/2020
	-	0.8W	-	At 400Vac, Dim OFF
Power Factor	-	0.99	-	At 220Vac, 25°C, 2100W output
		0.97	-	At 400Vac, 25°C, 2100W output
Total Harmonic Distortion	-	6%	-	At 220Vac, 25°C, 350V/2A *3 channels output
	-	10%	-	At 400Vac, 25°C, 350V/2A *3 channels output
Inrush Current (Apk / 50%-us)	-	15A	-	At 220Vac，50%Apk to 50%Apk time: 2ms
	-	25A	-	At 400Vac，50%Apk to 50%Apk time: 2ms
Power metering accuracy	-	±1%	±2%	At 220Vac~400Vac，100% load

1. 100% Load and tested after 30 minutes warming up.

Output Ratings / Characteristics

Specification		Min.	Typ.	Max.	Conditions
Output Channels		-	3	-	3 independent output channels
Default Output Current		-	1250mA	-	
Programmable Output Current Range		700mA	-	2000mA	Operation range refer to Appendix 1
Output Voltage Range		250V	-	550V	
Max. No Load Output Voltage		-	-	600Vrms	
Total Output Power		-	-	2100W	
Output Power Range		-	-	700W	
Output Current Tolerance		-	-	±3%	700~2000mA
Output Current Ripple[2]		-	1%	2%	(ripple = (pk-pk)/avg)，at low frequency(<8kHz)
		-	5%	15%	(ripple = (pk-pk)/avg)，at high frequency(>15kHz)
Output Remote Distance		-	-	200m	The total voltage drop on the cable of each channel should be within 5V
Turn on Delay Time	DALI version	-	0.7s	1s	Compliant with clause 9.13 of IEC 62386-102:2014
	RDM/DMX version	-	0.7s	1s	Connecting to the controller correctly.
		1.25s	-	2s	No controller or incorrect connection to the controller, compliant with clause 3.5 of ANSI E1.37-1:2012.

2. Output Current Ripple could be affected by the parasitic capacitance of LED fixture, more details are given in Appendix 8.

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Auxiliary Power Supply Ratings / Characteristics[3]

Specification	Min.	Typ.	Max.	Conditions
Integrated 24V Auxiliary Power Supply				
Operating Voltage	21.6V	24.0V	26.4V	0.1W~6.0W, reference to “DA-”.
High frequency ripple of operating voltage	-	-	1.0 V_{pp}	21.6V~26.4V, f_{ripple} > 10kHz
Voltage in no-load condition	-	-	30.0V	Output power < 0.1W
Average output power capability	-	3.0W	-	CC mode load：4.0mA~125mA (0.1W~3W).
Pulsed output power capability	-	6.0W	-	Dynamic CC mode load： peak load = 250mA/2.2ms and avg load = 4.0mA~125mA/3.8ms.
Start-up time	-	-	0.6s	From AC power on to Vaux increases and reaches 21.6 V, Mains is applied at any phase angle.
Integrated DALI-2 Bus Power Supply				
DALI-2 Bus voltage	12V	-	22.5V	CC load: 0~50mA, integrated bus power supply is pre-configured to a disabled state, and it can be activated via GUI or DALI controller.
Over Current Protection	50mA	-	62.5mA	Auto recovery and no component damaged. Limits output current to 50~62.5mA when output is short-circuited.

3. This part applies to DALI version only: EUCO-2K1200GIA.

Dimming Control

Specification	EUCO-2K1200GIA	EUCO-2K1200GDA
Control interface	DALI 2 & D4i	RDM/DMX
Dimming range	0.1%-100%	0.4%-100%

Control Interface Standards

Specification	EUCO-2K1200GIA	EUCO-2K1200GDA
Control interface standards	DALI2 & D4i IEC 62386-101 Ed 2.0 IEC 62386-102 Ed 2.0 IEC 62386-207 Ed 2.0 IEC 62386 part 150: Integrated 24Vdc auxiliary power supply IEC 62386 part 250: Integrated bus power supply[4] IEC 62386 part 251: Memory bank 1 extension (luminaire data) IEC 62386 part 252: Energy report IEC 62386 part 253: Diagnostics and maintenance	DMX & RDM ANSI E1.11 DMX512A ANSI E1.20 RDM – Remote Device Management ANSI E1.37-1 Additional message sets for dimmer

4. Part 250 - DALI2 integrated bus power supply is pre-configured to a disabled state, and it can be activated via GUI or DALI controller.

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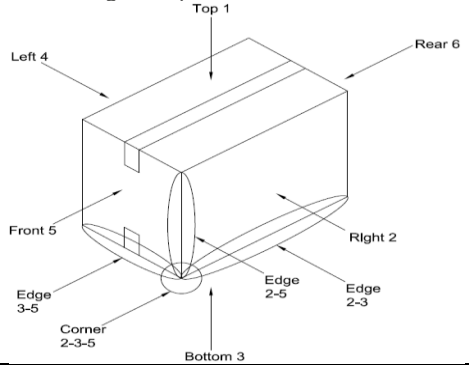
Additional Dimming Features

Specification	EUCO-2K1200GIA	EUCO-2K1200GDA
Smart Timer Dimming (STD)	3 different configurable autonomous dimming profiles (fixed timer, midnight centric timer, and ratio rescale timer) over the night are available for users to select and set in GUI. This function is not activated by default. For more details, please refer to "**LNA/EUCO Series Programming Tool User Manual**".	
Constant Lumen Output (CLO)	CLO is a function to make the brightness consistent by compensating the ageing of the light source over the lifetime. It's available in GUI to set starting dimming level (for example 90%) and end of life of the product (for example 50khrs), so that the driver by counting its functioning hours can do a linear interpolation in between starting dimming level at t=0hrs, and go to 100% at t=end of life. This function is not activated by default. For more details, please refer to "**LNA/EUCO Series Programming Tool User Manual**".	

Mechanical Characteristics

Specification	EUCO-2K1200GIA	EUCO-2K1200GDA
Casing	Aluminum case, Dark Gray, compliance with C5 environment (ISO 9223)	
Dimensions (L x W x H)	500x152x77 mm	
Unit Weight	5.8 kg	
Cooling System	Natural Convection	
INPUT	With the sign of L1, L2, PE	
OUTPUT	With the sign of PE, NTC, V3+ V3-, V2+, V2-, V1+, V1-	
DIMMING	DA+, DA-, +24V	D1+, D1-, COM

Environment & Package

Specification		EUCO-2K1200GIA	EUCO-2K1200GDA
Ambient Temperature	Operating	-40 ~+50°C	
	Storage	-40°C to +85°C	
Maximum Case Temperature		+85°C	
Lifetime Case Temperature		+80°C	
Relative Humidity	Operating	10% to 95% RH (Non-Condensing)	
	Storage	5% to 95% RH (Non-Condensing)	
Audible Noise (30cm distance)		Sound Pressure Level (SPL) < 24dBA	
Ingress Protection classification		IP66	
Impact Protection classification		IK08	
Drop Test (Non-Operating)		According to ASTM D-775, 40cm height drop to concrete floor as below drawing, total 10 times. 	
Vibration (Non-Operating)		IEC 60068-2-6, Random: 5 Hz to 10 Hz (1G); 30 min per axis for all X, Y, Z direction	
Packing		1pcs per carton	

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Protections

Specification		Min.	Typ.	Max.	Notes
Input Under Voltage Protection(IUVP)	Protection	160Vac	-	180Vac	The driver shuts down and then restarts to normal status when the fault condition is cleared.
	Recovery	170Vac	-	190Vac	
Input Over Voltage Protection(IOVP)	Protection	460Vac	-	480Vac	
	Recovery	440Vac	-	460Vac	
Open Load & Output Over Voltage Protection	Protection	-	-	600Vrms	Hiccup mode. The output voltage shall not exceed 600Vrms under no load, open load or other over voltage conditions.
Constant Output Power Protection		-	720W	-	Output power limited. The driver shall come back to its original programmed current after the fault condition is cleared.
Output Short Circuit Protection		-	-	-	Hiccup mode
Internal Over Temperature Protection		85℃	-	95℃	Output power derating. Refer to Appendix 6 "Internal Over Temperature Protection" for more details.
Programmable External Over Temperature Protection		80℃	-	110℃	Output power derating. Refer to Appendix 7 "Programmable External Over Temperature Protection" for more details.

Electro-Magnetic Compatibility (EMC)

Specification	Standards
EMC-Emission Characteristics	
Radiated Emission	EN55015
Conducted Emission	EN55015
Harmonic Current Emission	EN61000-3-2
Voltage Fluctuation & Flicker	EN61000-3-3
EMC-Immunity Characteristics	
Electrostatic Discharge(ESD)	EN 61000-4-2
Radio Frequency Electro -magnetic Fields	EN 61000-4-3
Electrical Fast Transient (EFT)	EN 61000-4-4
Surge(AC Mains)	EN 61000-4-5 - Common Mode: 10kV[5] (Line to Earth, Neutral to Earth) - Differential Mode: 10kV (Line to Neutral)
Conducted Disturbance	EN61000-4-6
Voltage Dip & Interruptions	EN 61000-4-11

5. Level B, the peak of residual common mode voltage pulse from output +/- to Earth is typically around 2.5kV.

Reliability Data

Specification	Test Conditions / Notes
Lifetime	50,000 hours applicable for 220Vac to 400Vac(50/60Hz) @100% of load, @ Ta 45°C. Appendix 2 "Life Time versus Case Temperature Curve" for more details.
MTBF	475khrs. at Ta=+45°C Telcordia SR-332
Warranty	5 years, refer to Appendix 10 "Warranty Policy" for more details.

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Safety Agencies Approvals

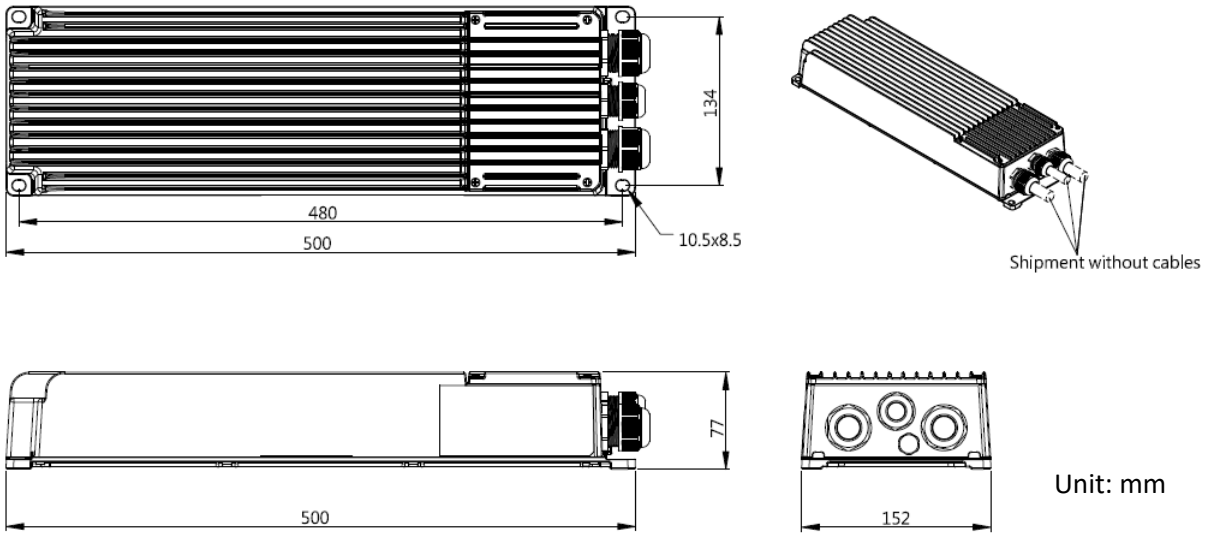
Specification		Test Conditions / Notes
ENEC	**MARK**	EN 61347-2-13:2014, EN 61347-2-13/A1:2017 EN 61347-1:2015, EN 61347-1:2015/A1:2021 EN IEC 62384:2020
UKCA	**MARK**	BS EN 61347-2-13: 2014+A1:2017
CE	**MARK**	CE Declaration of Conformity.
UL	**MARK**	UL Compliant ANSI / UL8750 2nd Ed. , CSA C22.2 No.250.13, 4th Ed.
RCM	**MARK**	AS 61347-2-13: 2018 AS/NZS 61347-1: 2016+A1
CB	**REPORT**	CB report.
Isolation		Class I，input to output: non-isolation, RDM/DMX or DALI to input/output: reinforced isolation.
RoHS		RoHS 2.0 Directive (EU) 2015/863
REACH		In compliance

Miniature Circuit Breaker Configuration

The maximum number of LED drivers connectable to a single MCB is recommended in the following table for maximum 2100W and each nominal input voltage. Due to the differences in application conditions and different kinds of miniature circuit breakers available on the market, this table is just for reference.

Input Voltage	MCB Type	10A	16A	20A	25A	32A	40A	63A
220 Vac	B/C/D	1	1	2	2	3	4	6
400 Vac	B/C/D	2	3	3	4	5	6	10

Physical Dimensions



Unit: mm

All parameters are specified at 25°C ambient for all products unless otherwise indicated.

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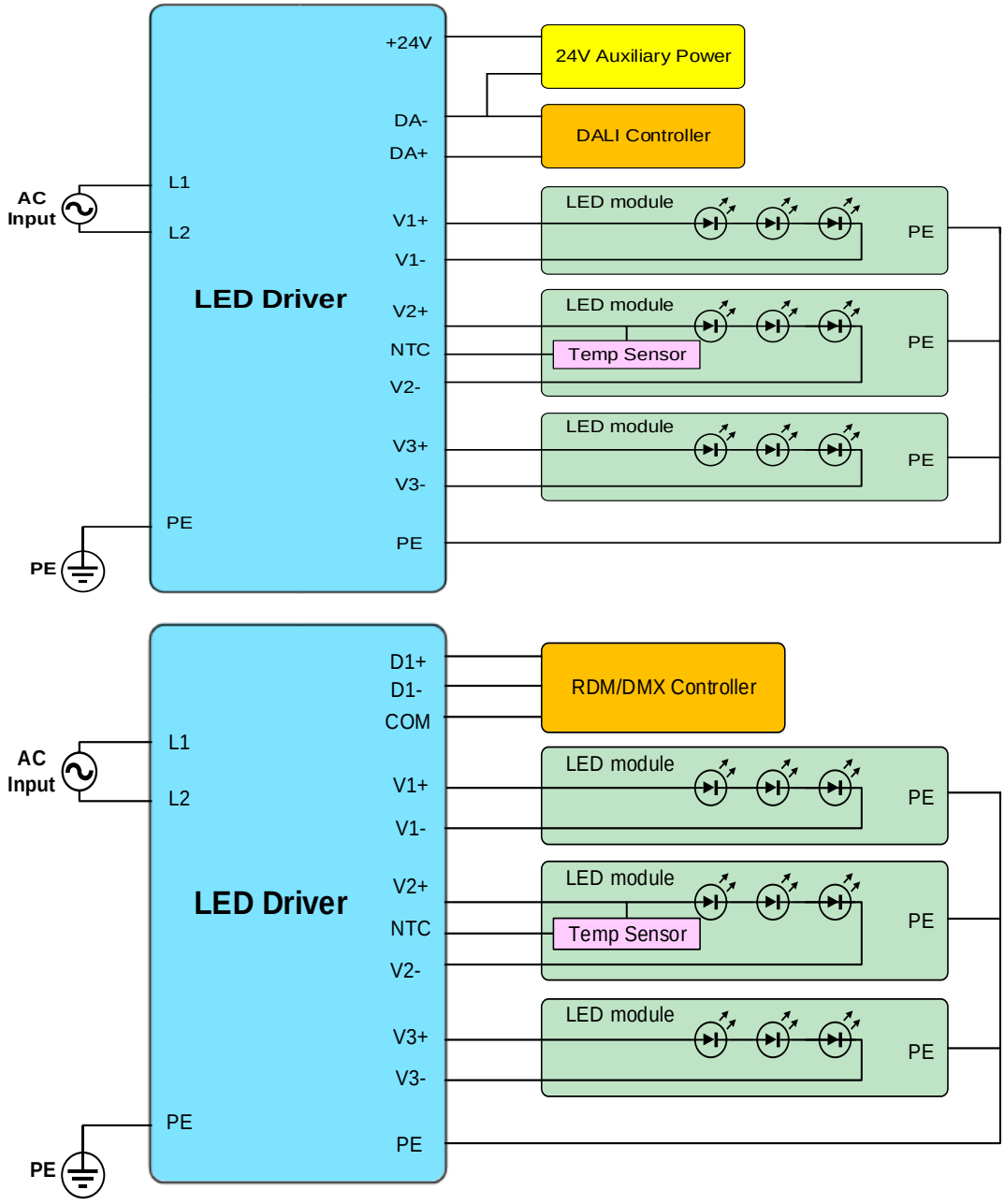
Electrical Connection



Note: All the output channels are independent, any series or parallel connections are not allowed, the user should strictly follow the connection schematic.

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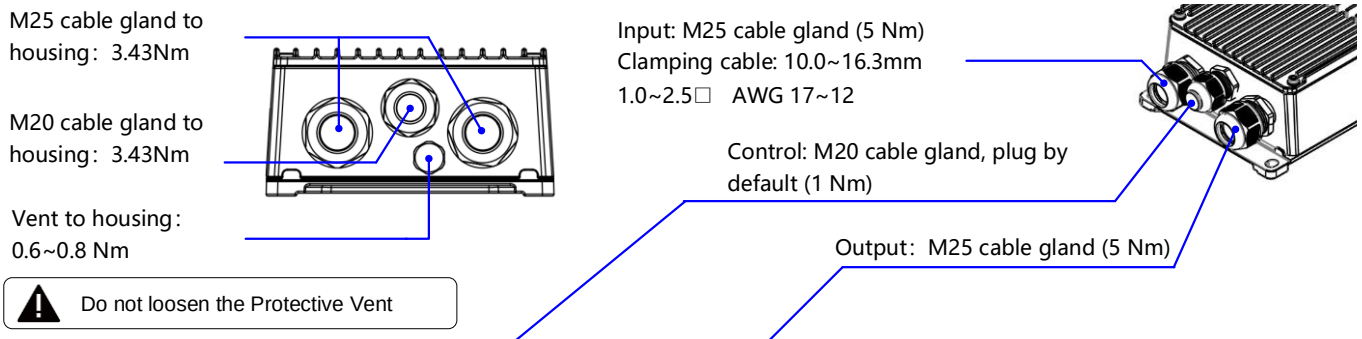
Programming Configuration

Common setting functions and implementation methods/conditions are shown in the following table, more functions and details please refer to the **LNA/EUCO-series Programming Tool User Manual.**

Item		DALI	DMX
Setup	Tool Connection	DA+, DA-	D1+, D1-
	AC power supply	■	■
	Load Connection	○	○
Tool	Delta Programming Tool	SDDV1505UAC（SDDV1505UAB, SDPTDV05UAB)	
Configurable Parameters and Functions	Current programming	√	√
	Luminaire OTP setting	√	√
	Constant lumen output setting	√	√
	Smart timer dimming	√	√
	Address mode	√	√
	Software update	√	√

Note: ■ Required, ○ Optional, √ Available.

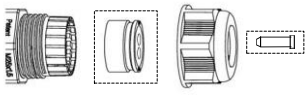
Cable Gland



Option A:
Clamping cable (3.5 Nm)
6.3~11.3mm(1 hole seal)
1.0~2.5□ AWG 17~12

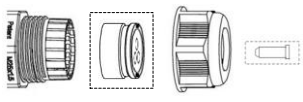
Default:
Clamping cable (5 Nm)
10~16.3mm(1 hole seal)
1.0~2.5□ AWG 17~12

Option B:
Clamping cable (3.5 Nm)
5.0~6.5mm(2 holes seal)
0.3~2.5□ AWG 22~12



The 2 holes seal and plug are in the plastic bag.

Optional:
Clamping cable (5 Nm)
5.0~6.5mm(3 holes seal)
0.3~2.5□ AWG 22~12



The 3 holes seal and plug are in the plastic bag.

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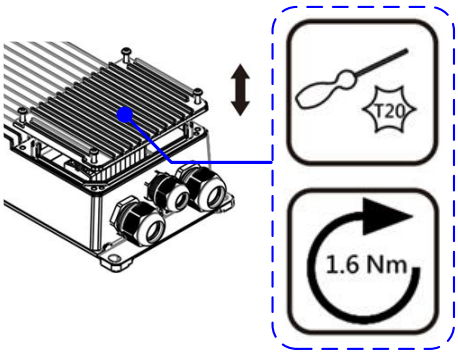
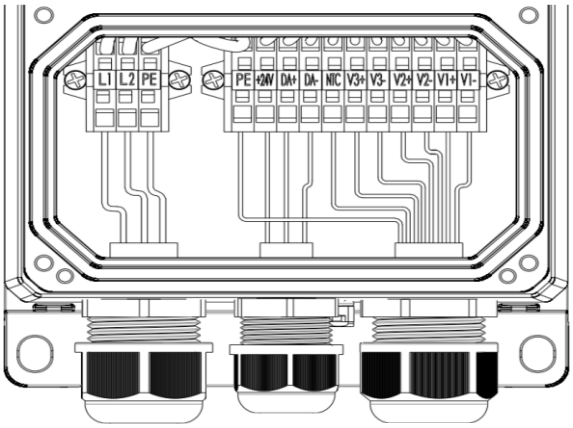
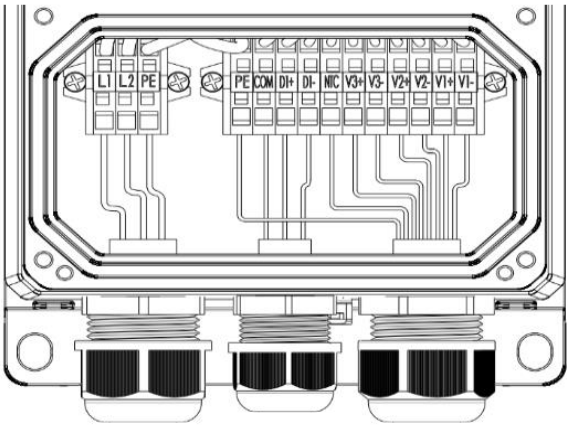
Junction Box



Note: The cap and fastening 4 screws all have the function of anti-falling off.



Input **DALI-2** **Output**



Input **DMX/RDM** **Output**

Number	Label	Description
1	L1	AC input
2	L2	AC input
3	PE	Protective Earth
4	PE	Protective Earth for luminaire
5	+24V	24V auxiliary power supply ,and the ground of "+24V" is "DA-".
	COM	DMX Common port/Shielding
6	DA-	DALI signal -, and the ground of “+24V”
	D1-	DMX signal -
7	DA+	DALI signal +
	D1+	DMX signal +
8	NTC	Luminaire Temperature Detection
9	V3+	Channel 3 output +
10	V3-	Channel 3 output -
11	V2+	Channel 2 output +
12	V2-	Channel 2 output -
13	V1+	Channel 1 output +
14	V1-	Channel 1 output -

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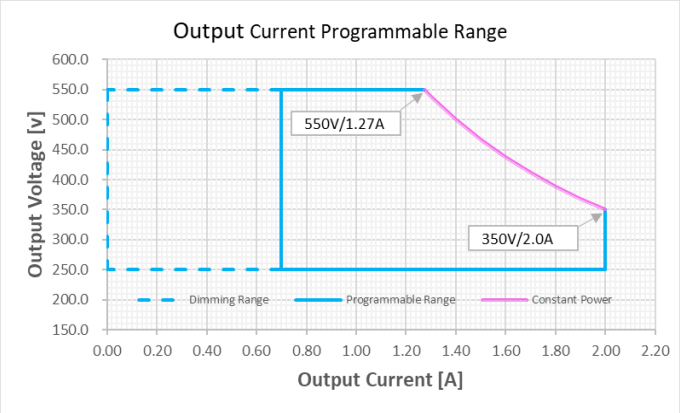
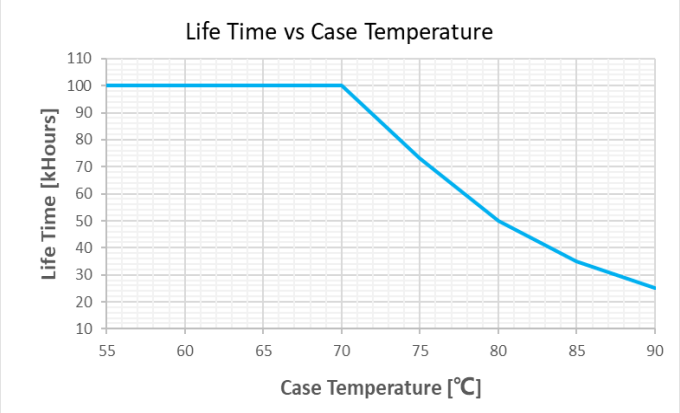
Appendix

1. Operating Range Curve



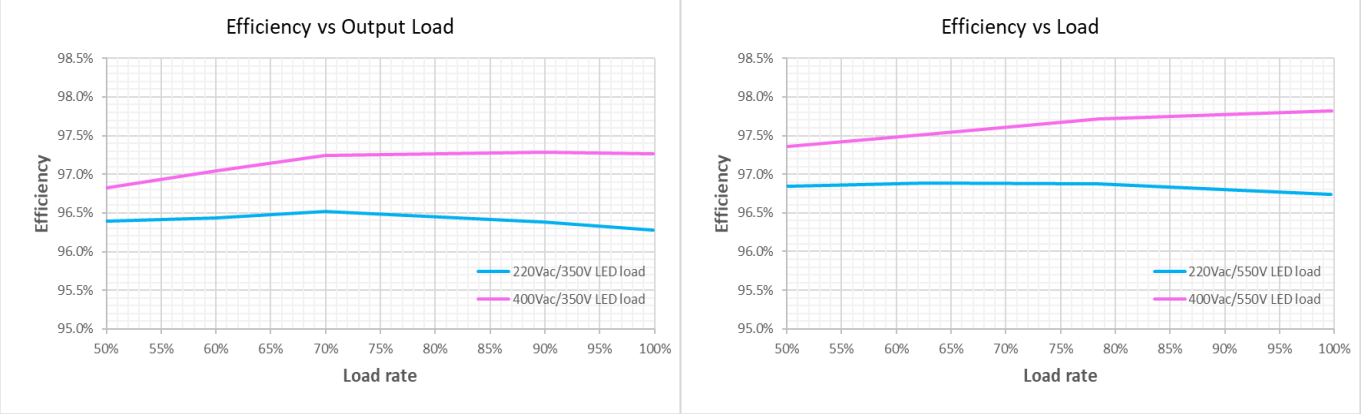
Note: EUCO ARENA SPORT 2K1 series can be programmed with wide output current through computer and programming tool. For more details, please refer to DALI programming User Manual or RDM/DMX programming User Manual.

2. Life Time versus Case Temperature Curve



Note: Test at input voltage 220Vac & 400Vac, at full Load with each channel 2.0A/350V.

3. Efficiency versus Load



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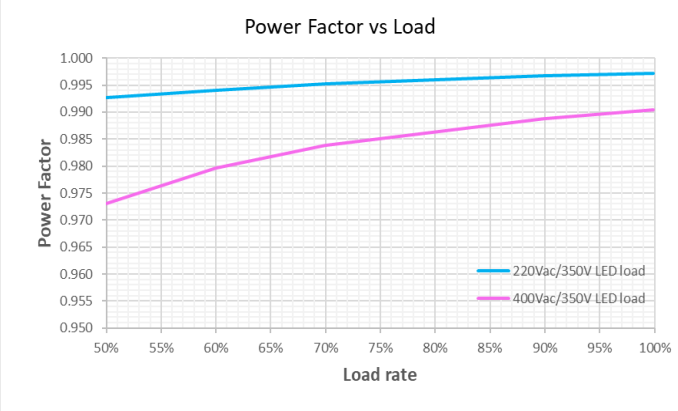
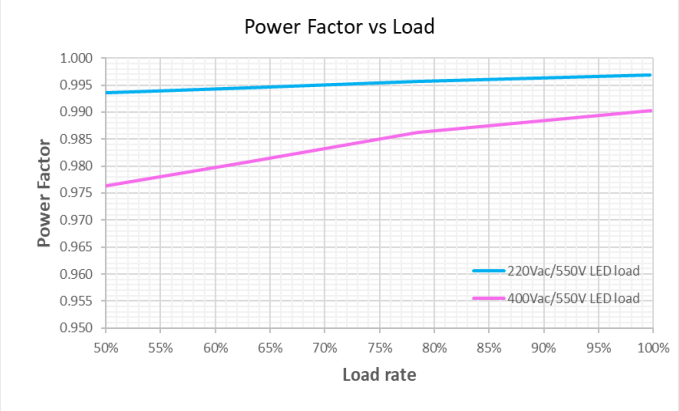
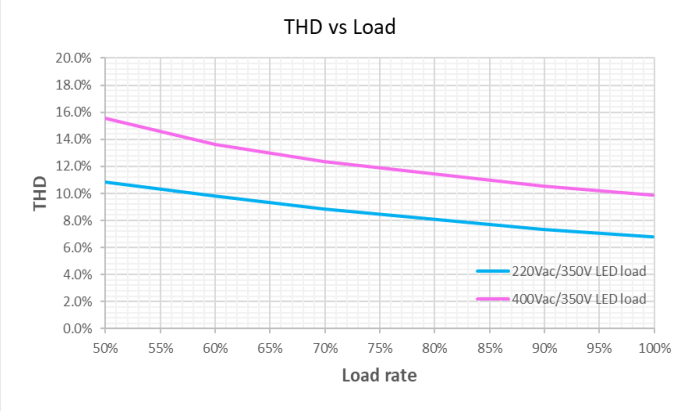
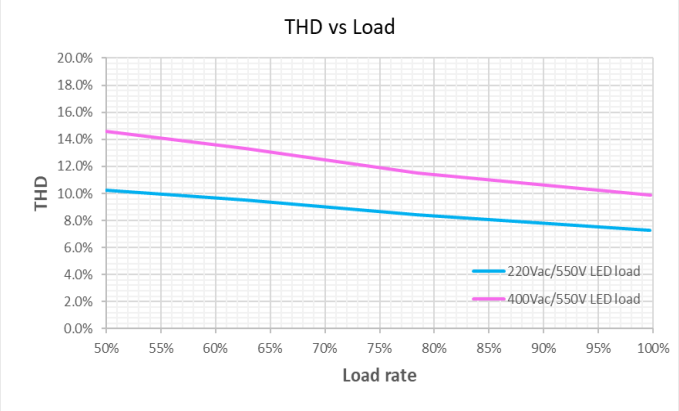
4. Power Factor versus Load





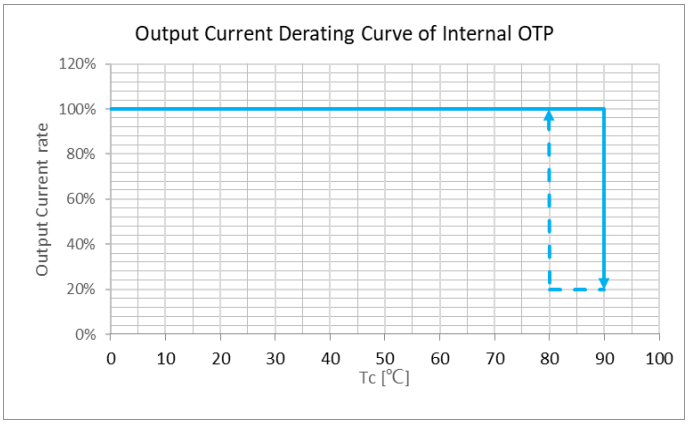
5. THD versus Load





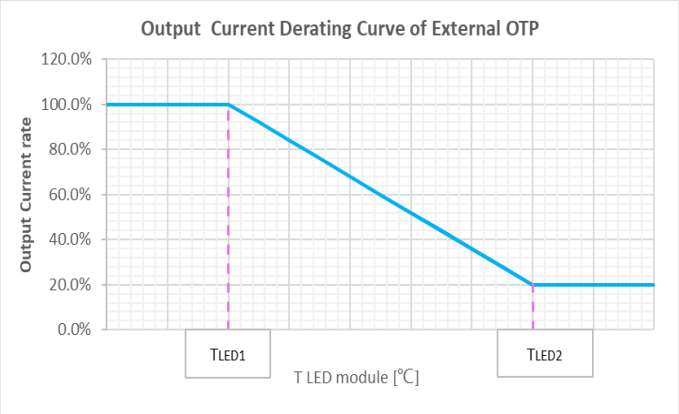
6. Internal Over Temperature Protection

This function ensures that the driver works under safe operating temperature condition. When the ambient temperature exceeds a fixed threshold (T_{c1} = 90℃ typical), the output current of each channel will decrease to 20% automatically to reduce the internal temperature of the driver. The minimum output current ratio is 20% of the value before the internal OTP enabled. The output current will recover to 100% when the internal temperature is below recovery threshold (T_{c2} = 80℃ typical).

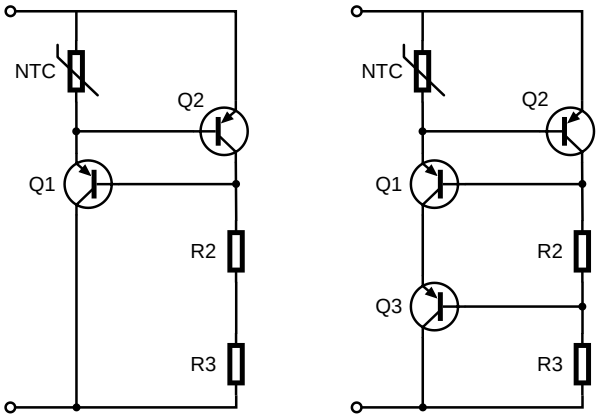


7. Programmable External Over Temperature Protection

This protection is an optional feature and user can ignore it without connecting to NTC connector in the junction box. The driver monitors the temperature of the LED module through NTC terminal. The output current will be reduced smoothly and linearly at OTP status and return to normal when the fault condition is removed.



The trigger point of this protection can be set easily according to the actual conditions of the LED fixtures, the user can set the trigger point between 80 ℃ and 110 ℃ by the Delta programming tool, and the default value is 100 ℃. When the temperature exceeds the triggering point, the output current will decrease automatically to bring the temperature of the LED module back to safe value. More details about parameter setting please refer to DALI programming User Manual or RDM/DMX programming User Manual. An external temperature sensing circuit is required to achieve the NTC terminal function to prevent the LED fixture from overheating. The default setting is for a 33Kohm NTC, the circuits shown as both (a) and (b) below are acceptable.



The circuits of above (a) and (b) have same OTP performance by using the same parts listed in the table, and to achieve good accuracy of OTP, Q2 should be placed close to NTC to make them have same temperature.

Parameter	Part	Manufacturer	Description
NTC	TSM1A333F3952RZA	THINKING	RES NTC 33Kohm F 3950K +/-1% SMD 0603 TP
R2/R3	RC1206FR-07 5M1L	YAGEO	RES SMD 1/4W 5.1Mohm F 1206
Q1/Q2/Q3	PBHV9050T	NEXPERIA	500V 150 mA PNP high-voltage low VCEsat transistor

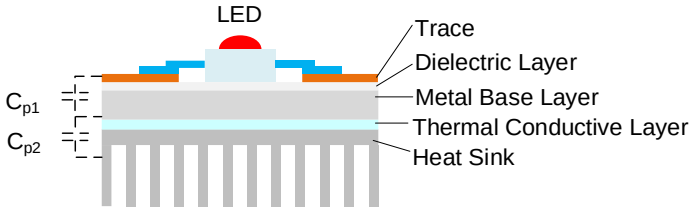
This product is also compatible with the circuitry (b) for a 10Kohm NTC, this version could be selected and activated by “OTP on Fixture” section of GUI (Select “10K” in this section). The circuit and BOM table are shown as below.

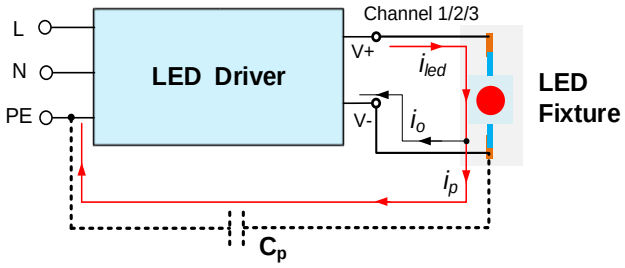
Parameter	Part	Manufacturer	Description
NTC	B57371V2103H060	TDK	RES NTC 10Kohm F 4480K +/-3% SMD 0603 TP
R2/R3	RC1206FR-07 1ML	YAGEO	RES SMD 1/4W 1Mohm F 1206
Q1/Q2/Q3	PBHV9050T	NEXPERIA	500V 150 mA PNP high-voltage low VCEsat transistor

Note: The output voltage need to be over 300V to be effective by using this 10Kohm NTC version. And to achieve good accuracy of OTP, Q2 should be placed close to NTC to make them have same temperature.

8. Effect of Parasitic Capacitance in LED Fixture

The simplified structure of LED fixtures and leakage current effect are illustrated as following figures. As the driver is non-isolated between input and output, there could be an inevitable leakage current path through LED and equivalent parasitic capacitor C_p (C_{p1} and C_{p2}) to the PE (protective earth) in case that Heat Sink of the LED fixture grounds to the PE. This leakage current ip could impact on the output current ripple and the performance at low dimming level or dimming OFF. The equivalent C_p should be kept as low as possible for low leakage current and accordingly optimized performance of the driver.





9. External SPD requirement for extra LED fixture common mode surge protection

The EUCO series driver has been designed with a built-in surge absorber which protects against lightning up to CM/DM 10kV level. The built-in surge absorber activates once a common mode surge intrusion occurring, which offers a protection against any unexpected voltage surge to the LED module of ≤3kV.

Even though, EUCO Arena driver series do not require the installation of an additional SPD protect the driver and LED module against any unexpected surge voltage, it would allow to further strength the robustness protection capability against surge residual voltage of LED modules which allows the fixtures to be marketed globally by attributing different surge protector device (SPD) to meet differing surge levels.

However, Delta Electronics proposes not to install an external SPD at LED module side because it would be unsafe attributable to when this device would be triggered, a high common mode current will generate through driver and SPD that will cause some unexpected and irreversible damage to the driver.

10. Warranty Policy

Please reach out our Warranty Policy should you require any further clarification.

11. Attention

Delta provides all information in the datasheets on an “AS IS” basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalog and datasheets, the datasheets shall prevail (please refer to http://www.DeltaPSU.com for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

Delta reserves the right to make changes to the information described in the datasheets without notice.