



LILLY80 AC IoT

LILLY80 AC IoT

10W | 22W



Compact round LED-light engine for pendants with wireless Casambi and wire DALI technology.

No driver is required!

CE

optoGa



Key features

Story

Lilly is designed for downlight and other places where the need is to create a good atmosphere for people to dwell in whether they take care of business or socialize.

These AC LED –light engines or LED modules are designed with internal drivers and are therefore very easy to connect into applications with different dimming scenarios. The light output efficiency is the highest available on the market for these types of applications.

Key features

- High efficiency
- Center-hole for wires
- Optimized Uniformity
- Lens with poke-in connector
- Architectural Lighting
- Decorative Lighting





LILLY80 AC IoT 120V/230V

Document no: n/a	Revision: 1.5	Page: Page 3 of 28
Object: Datasheet LILLY80 AC 120 and 230VAC	Author: SL	Date: 2022-11-15

Content

Introduction.....	4
Short form Characteristics.....	5
Article number structure	6
Dimensions LED Module.....	10
Mounting instructions wires.....	11
Optical data	16
CCT structure graphical representation	19
Electro Optical data	20
Measurement Control	22
Lifetime (Calculated).....	23
Verification of Conformity	24
Light fitting routine tests	24
DIMMERS tested.....	25
Precautions for use.....	26
ROHS III Compliant	27



Introduction

If you want to dim with ordinary dimmers, they work exactly as they are, but if you want it more intelligent, a sugar-bite-sized unit called DimIn is fitted with the option of DALI, Casambi or another communication protocol.

The boundary between what is a luminaire and what is a system (of luminaires) is opened up. The control systems behind the luminaires are becoming increasingly complex and enable personal and intuitive lighting solutions. There are really no restrictions beyond how and in what way the light from these LED Modules can be controlled.

Lilly package

The light-engine is a round LED-light engine for pendants with a centered hole for wires. Wires are easily inserted into poke-in connectors. DALI and Casambi and other Eco-Systems of communications can easily be integrated. All IoT LED Modules have an electrical insulated heat PAD mounted to be able to manage Class II light fitting installations.

Light output

Colour stability is important to ensure that the installation has a uniform light output. Parameters such as binning, lifetime and thermal control are vital for good results.

Dimming

Use the latest dimmers from standard manufacturers for LED and make sure that the dimmer has the capacity to manage the low load of the LEDs power consumption.

Smart lighting

The LED modules have Casambi, DALI, DALI DT8 or an internal protocol (for internal dimming). We have designed this so that the small and medium-sized customers can integrate this into a very simple process. They will be able to use our standard solutions and decide for themselves what they want to do extra if it is DALI, Casambi or other additions they want to make. It is very simple and goes hand in hand with the new EU directives on circular economy.



Short form Characteristics

MODULE CHARACTERISTICS	10W	10W	22W	22W
Power	10W +/-10%	10W +/-10%	22W +/-10% ea.	22W +/-10% ea.
Voltage	120 VAC	230 VAC	120 VAC	230 VAC
Number of LEDs	44	44	44	44
CRI	>Ra90			
Colour temperature	2700K, 3000K, 4000K			
Optics	130° Cover			

MECHANICAL

Module dimension	Round Ø 80mm			
Inner diameter hole	Ø 12mm			
Height	7.5mm			
Weight	TBD			
Assembly holes	3 x 3.5 mm			
Wire connector	Poke in			

ELECTRICAL

Input voltage range	100-130 V	220-240V		
Power factor	0.90			
Total harmonic distortion	<15%			
Peak inrush current	600mA			
Inrush current duration	< 35µs			
Type of current	AC			
Surge protection	1.5kV on board			
Burst protection	2kV on board			
Over temp. protection	150°C			
Energy class	E			

PHOTOMETRICAL

Flux nominal (3000K)	1200 lm	1200lm	2500 lm	2500 lm
Efficiency	120 lm/W	120 lm/W	110lm/W	110lm/W
SDCM (Mac Adam)	3			
SVM	0,5			
PstLM	0,6			

ENVIRONMENTAL

Relative Humidity	10-75%			
Temperature range	-40°C to 85°C (Absolute maximum temp Tc 85°C)			
Ambient air pressure	500-1060 HPa			
Life length L70B10*	>50 000h			

Article number structure

LILLY AC.P.230.44.XYY-NN.ZZ

AC	AC= 230VAC, ED=External Driver required, ID=Internal Driver
P	Power (Watt)
V	Voltage: 120VAC or 230VAC
N	Amount of LEDs
X	9=Ra>90
YY	CCT: 27 =2700K, 30 =3000K, 40 =4000K
NN	Viewing angle code NN – without and 130 - with cover
ZZ	Variance code IOT

Article name and versions

LED Module

ARTICLE NAME	POWER	CURRENT	LEDS	CRI	CCT	LENS	Energy Class
Lilly AC.10.120.44.927-130.IOT.FF	10	120	44	90	2700	130°	E
Lilly AC.10.120.44.930-130.IOT.FF	10	120	44	90	3000	130°	E
Lilly AC.10.120.44.940-130.IOT.FF	10	120	44	90	4000	130°	E
Lilly AC.22.230.44.927-130.IOT.FF	22	230	44	90	2700	130°	E
Lilly AC.22.230.44.930-130.IOT.FF	22	230	44	90	3000	130°	E
Lilly AC.22.230.44.940-130.IOT.FF	22	230	44	90	4000	130°	E

DimIn (retrofit mountable functionality device)

Article code	ARTICLE NAME	DimIn design	DimIn Potentiometer design
105117	DimIn DALI DT8		
105111	DimIn Casambi		
	DimIn Switch		
105040	DimIn PoT		
105148	DimIn Potentiometer		



IoT area for Smart Lighting

Smart LED Engines is a game changer for light and luminaire designers. Now, DALI and Casambi can be combined in lighting controls and lighting designers can build flexibility into how spaces are lit from the beginning to provide an immersive and interactive experience. Optoga makes it possible to use smart lighting and combine DALI with Casambi directly in the lighting to take your design to the next level. Wouldn't you like to have smart lighting built into your LED module right from the start?

We will work with the small sugar-cube sized device as a functionality module that fits into our IoT interface. They are all interchangeable between each other. All devices have mains (Neutral and Live 230VAC) connected. Plus, two wires more, that can be connected and those two can either be DALI or two wires going out to a potentiometer, switch or similar.

Platform	Table- or freestanding light	Downlight	Spotlight	Pendent	Medium size Opaque glass	Medium size Opaque glass HCL/TW	Big size Opaque glass
Lilly80 AC IoT	X	X		X	X		
ADA60 AC IoT	X	X	X	X	X		
ADA76 AC IoT	X	X	X	(X)			
Sanna158 IoT	X			X	X		
Sanna158 AC IoT HCL				X		X	
Sanna290 IoT				X			X



DALI

This is a bus-powered device and it works with the Eco-System DALI-2.

Casambi

Most Casambi users know that smart lighting is not just about dimming or turning wireless on and off. Smart lighting is connected and intelligent so that it can change in brightness or color in response to all kinds of information. It can also be used to save energy, to enable dynamic light and to provide "human-centered lighting" that promotes well-being. An increasing amount of scientific evidence shows that this can make workplaces and schools more productive by improving vigilance.

Switch

For freestanding devices where you use it on the same output for the wiring of DALI together with a regular momentary Switch to dim up and down.

POT

For freestanding devices where we use a potentiometer on the same output for the wiring of DALI. We have designed a potentiometer that can be mounted and easily used for dimming, on/off, up and down.

Potentiometer

The potentiometer, which rotates counterclockwise to the end position. It has a click functionality so you can easily feel where ON / OFF is. As soon as you turn it clockwise so that it clicks, the luminaire will light up and by continuing to rotate the potentiometer clockwise, the light intensity will increase according to a logarithmic scale. This of course only happens when it is mounted together with an IoT LED Module that has a DimIn POT mounted.



Packaging information

Lilly80 – Packaging information

Description	Qty (pcs)	Dimension (cm)			GW (kg)
		Length	Width	Height	
Inner Box	30	35,6	22,7	9,6	
Outer Box	180	46,5	37,5	39,6	13,3

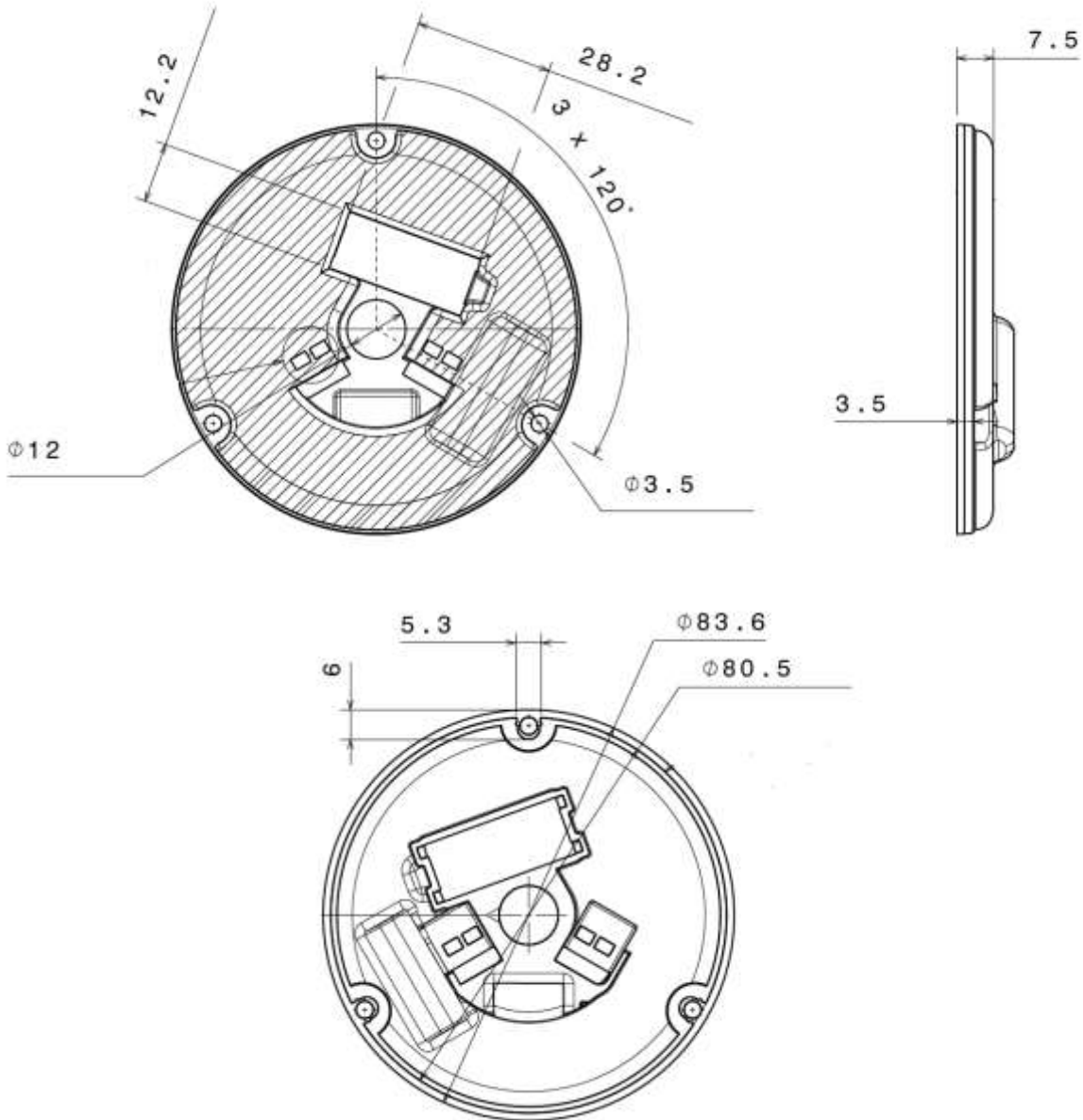
DimIn – Packaging information

Description	Qty (pcs)	Dimension (cm)			GW (kg)
		Length	Width	Height	
Inner Box	288	35,6	22,7	9,6	
Outer Box	2304	46,5	37,5	39,6	TBD

Potentiometer – Packaging information

Description	Qty (pcs)	Dimension (cm)			GW (kg)
		Length	Width	Height	
Inner Box	TBD	35,6	22,7	9,6	
Outer Box	TBD	46,5	37,5	39,6	TBD

Dimensions LED Module

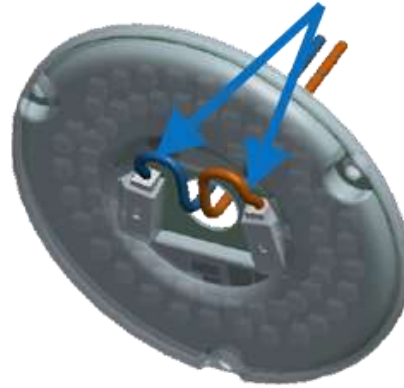


Mounting instructions wires

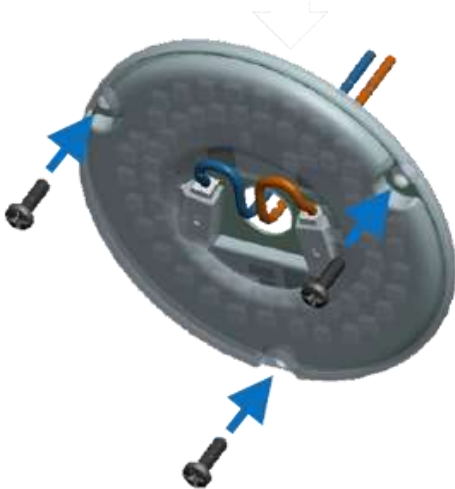
Mounting



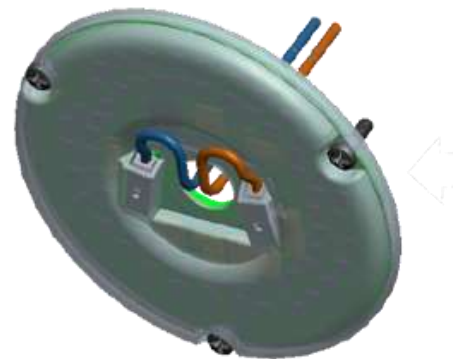
1 Insert the wires into the cover hole.



2 Slot in AC cable into AC connector.



3 Mount the screws to fixate module.



4 Mounted.

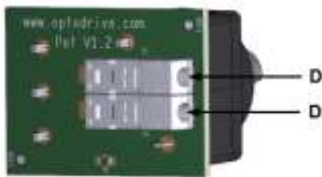
Mount the device on heatsink with screws safely

The LED module with the nomenclature IoT can be expanded with additional functionality, has terminal blocks with the texts N for zero, L for phase, D- and D + for dimming function with either Dali or a potentiometer.

DimIn

To obtain additional functionality, the LED Module needs to have an additional module mounted in the IoT interface.

Potentiometer card

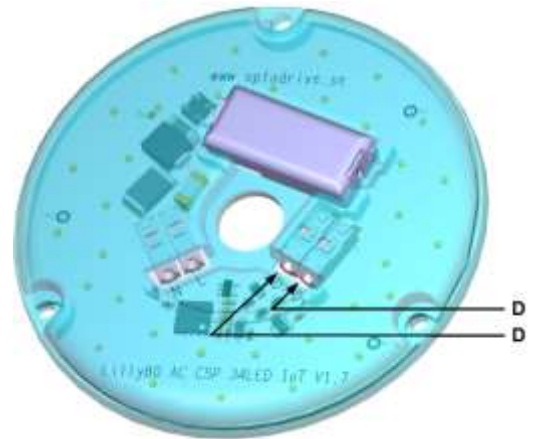


The Pot potentiometer board works with the DimIn Pot functionality module. D + or D- play a certain role as they change the dimming direction depending on the connection.

Wire Connections (DALI or other)

Connect BUS control cables from the DALI control unit or Master unit (standard product that Optoga does not supply) or cables from DimIn Pot to D + and D- on the LED module. This depends on whether there is a DALI or DimIn Pot module mounted on the LED module.

DALI is polarity independent so it does not matter which of D+ and D- is connected.



Connector

Type	Push In type
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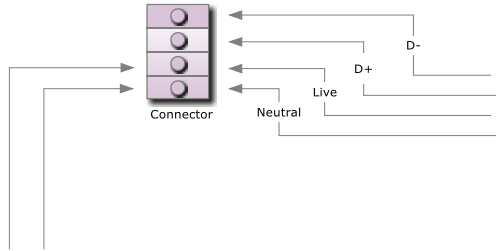
Wire (Recommended)

Type of wire	AWG	mm ²
Stranded	22-20	0.32-0.5mm ²
Solid	24-18	0.51-1.02Ø (0.2-0.8mm ²)
Insulation diameter	Max 2.1 mm	



Wiring for different DimIn versions

Casambi



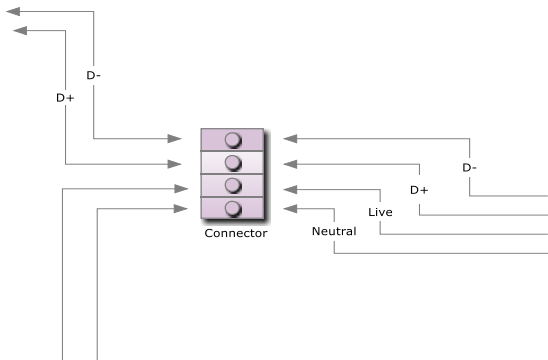
Incoming Wires 110/230VAC

LED Module with IoT (DimIn Casambi)



DALI

DALI BUS Incoming



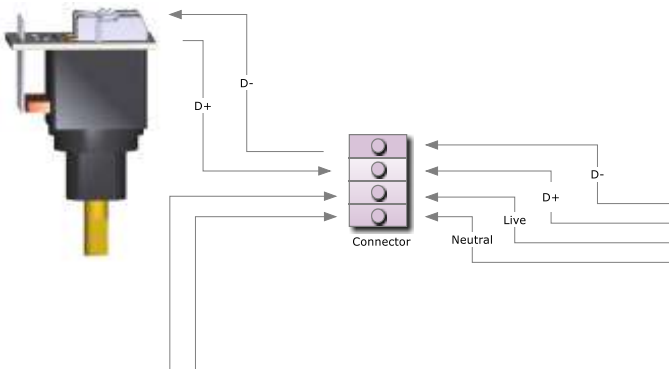
Incoming Wires 110/230VAC

LED Module with IoT (DimIn DALI)



POT / Potentiometer

Potentiometer



Incoming Wires 110/230VAC

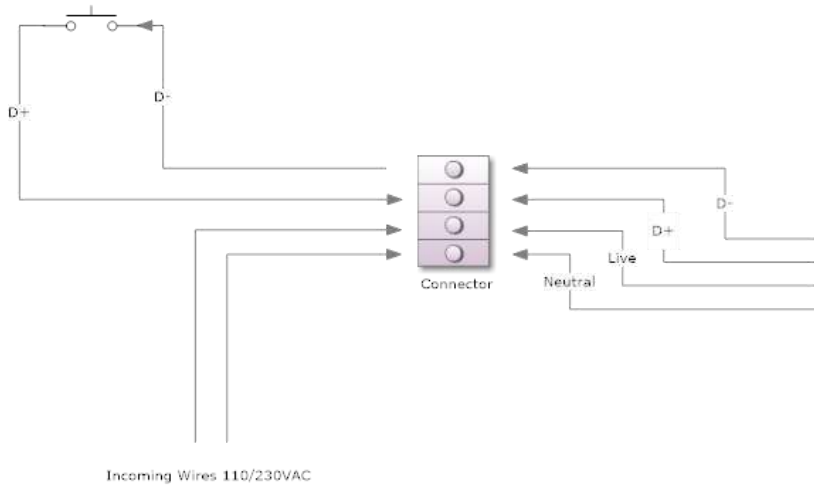
LED Module with IoT (DimIn POT)





DimIn Switch (Switch-Dim)

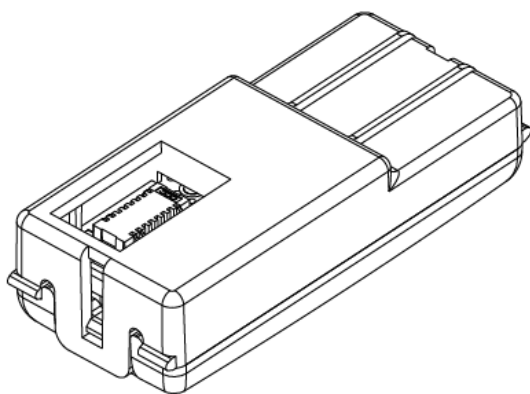
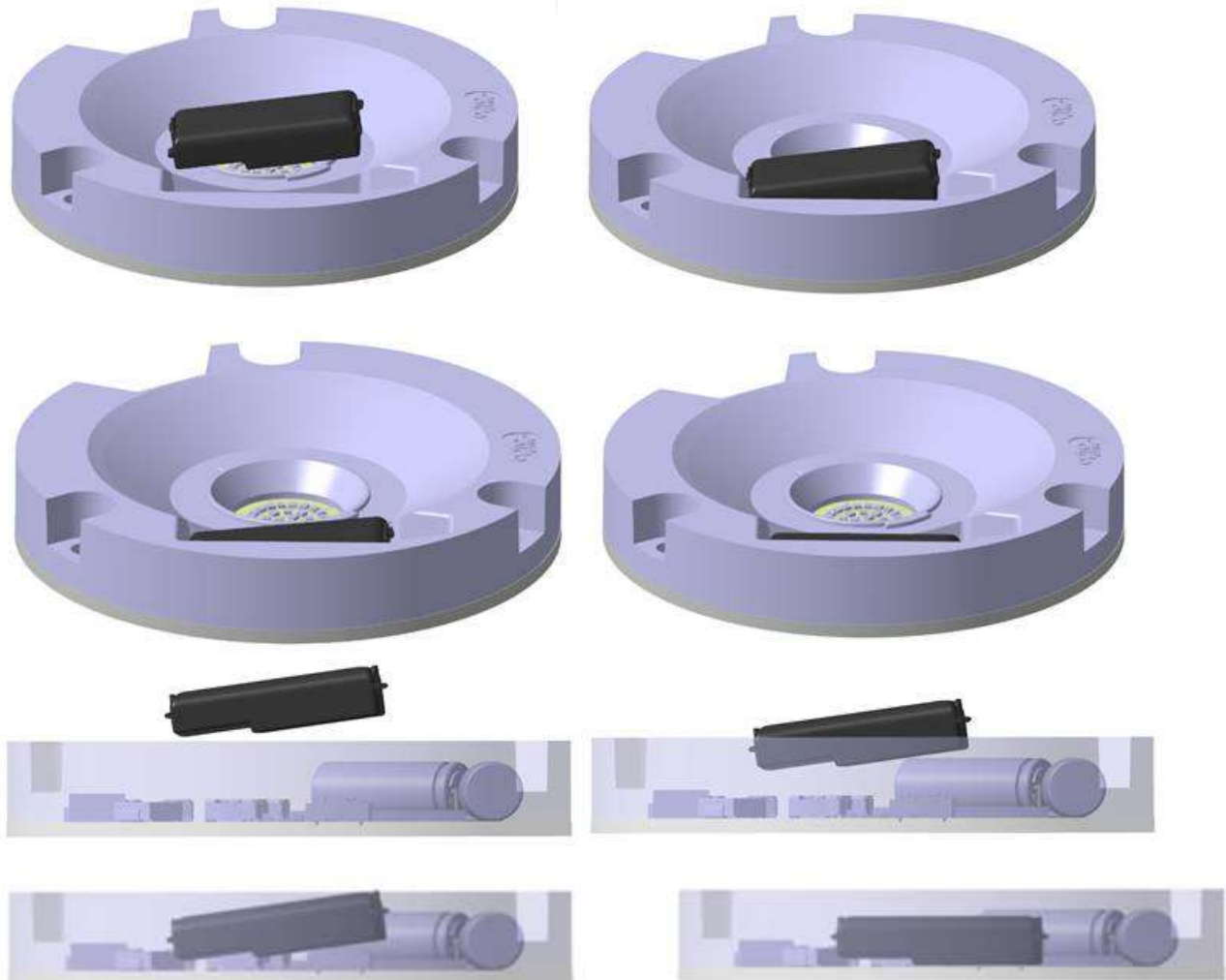
Momentary Switch (Switch DIM)



LED Module with IoT (DimIn Switch)



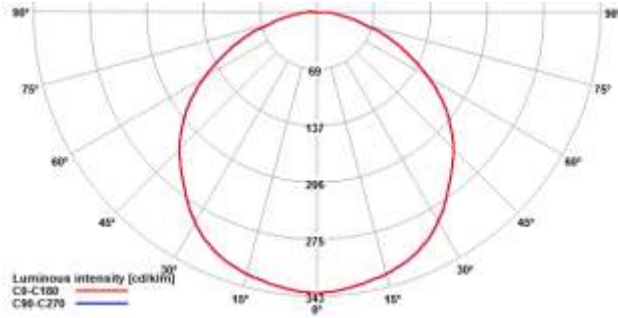
Mounting of DimIn



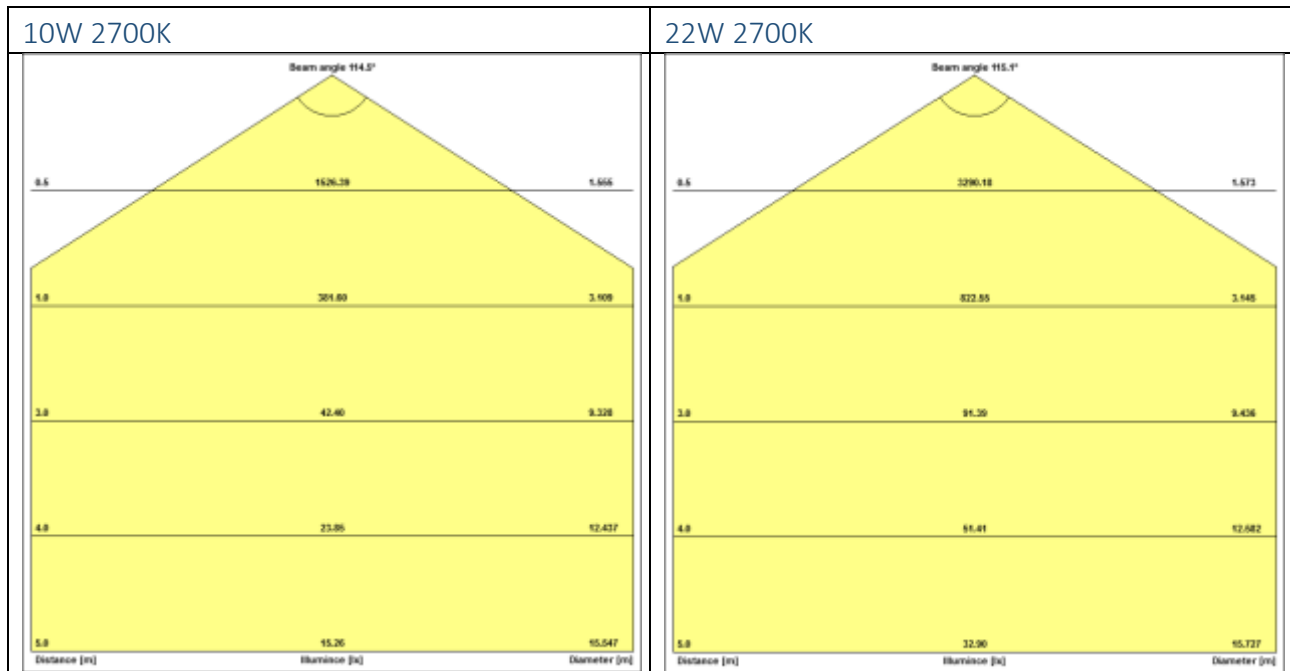
Here on the left you can see the DimIn unit from below and you can see the connector that is connected to the LED module as well. It is important to insert the front first during assembly, as you can see in the pictures above, then press the rear end and the contact into place. Friction locking between the LED module's safety cover and the DimIn unit's protection locks it in place.

Optical data

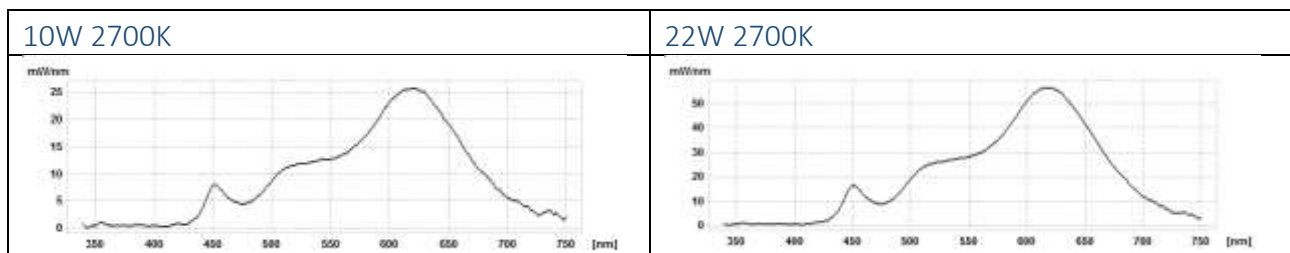
Light intensity distribution 44LED, 22W version



Beam Angle

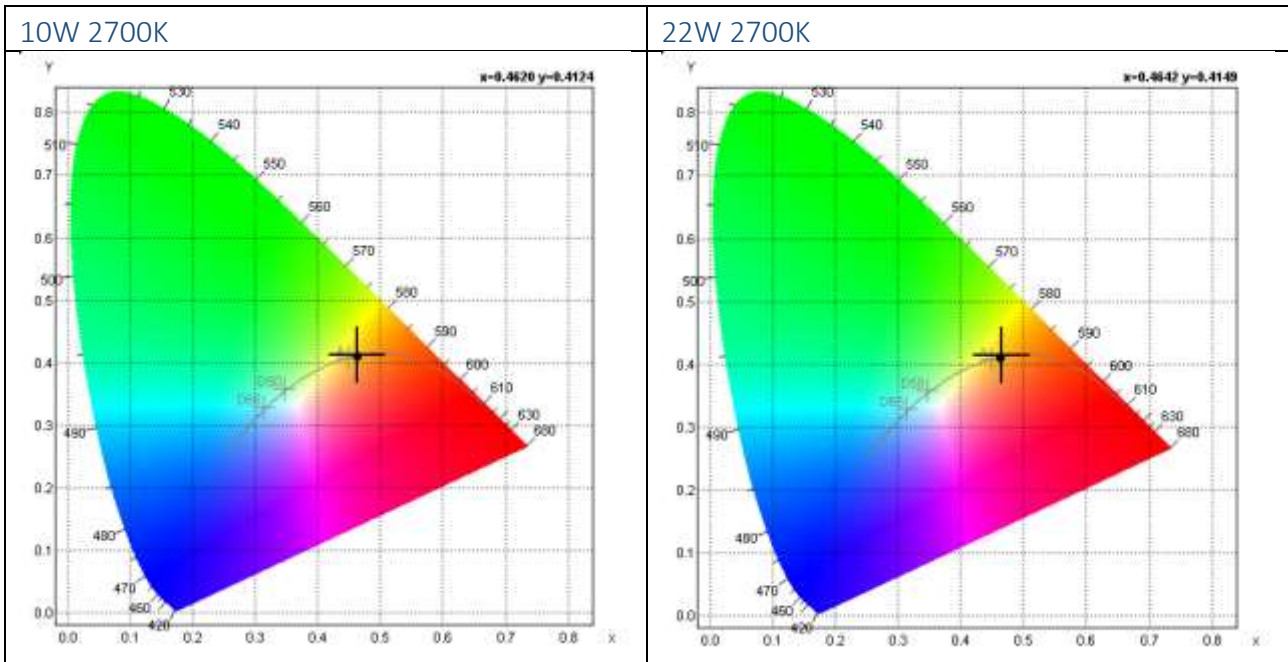


Spectrum





CIE1931

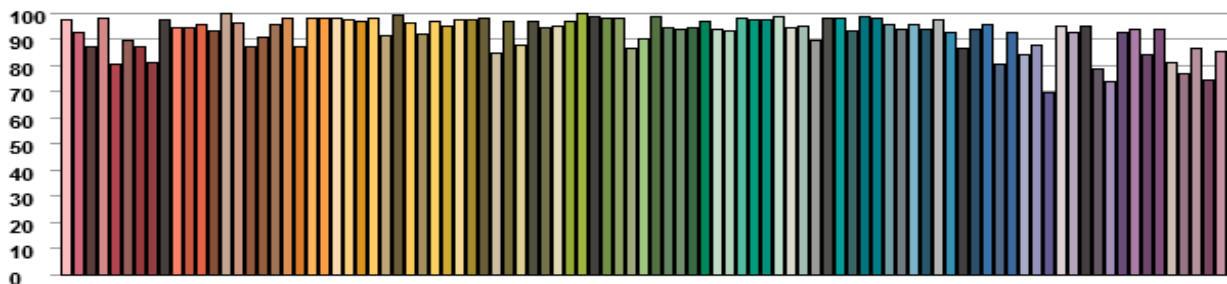


TM-30-15 Calculations

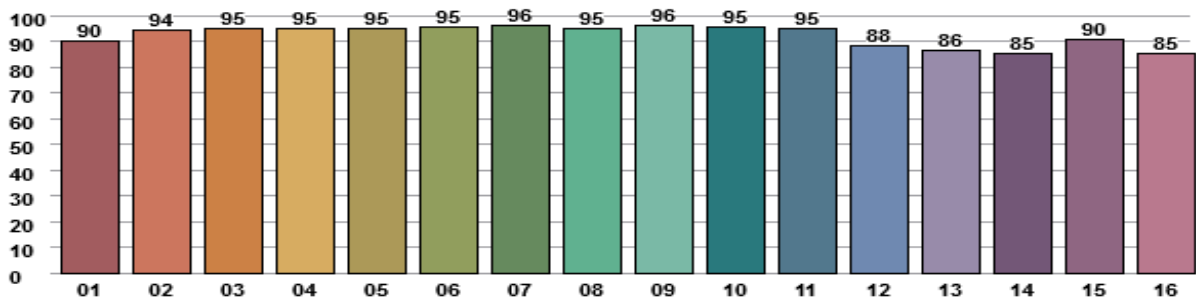
Main parameters

Fi	93
Rg	99
Rfskin	96

Fidelity Index (Rf,j)



Hue Bin Fidelity Index (Rfh,j)





Measurement results including CRI

2700K 10W

CIE 1931 2° observer	
x	0.4620
y	0.4124
u'	0.2631
v'	0.5284
L	100.00
a	28.16
b	69.24
X	1235.23
Y	1102.62
Z	335.53

Other	
CCT	2684
Chromaticity Error	0.001
Color Peak	621.93
Color Peak Value	25.66
Color Dominant	584.1
Radiometric	3.7384
Luminous Efficacy	113.7
Power [W]	9.70
Current [A]	0.047
Voltage [VAC]	230.1
Duv	0.0005

Rendering Indices	
Ra	94.8
R1	97.8
R2	99.6
R3	97.2
R4	99.6
R5	99.0
R6	93.9
R7	90.4
R8	80.5
R9	57.9
R10	99.2
R11	94.1
R12	91.4
R13	99.2
R14	99.0

2700K 22W

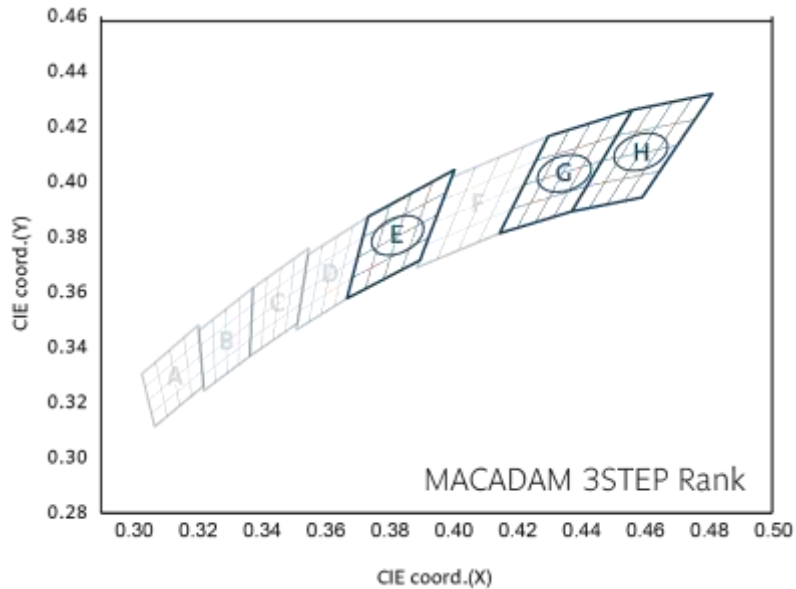
CIE 1931 2° observer	
x	0.4642
y	0.4149
u'	0.2633
v'	0.5296
L	100.00
a	27.92
b	71.13
X	2707.09
Y	2419.77
Z	704.85

Other	
CCT	2673
Chromaticity Error	0.002
Color Peak	620.26
Color Peak Value	56.19
Color Dominant	584.0
Radiometric	8.0715
Luminous Efficacy	112.9
Power [W]	21.4
Current [A]	0.103
Voltage [VAC]	230.1
Duv	0.0012

Rendering Indices	
Ra	94.6
R1	97.0
R2	99.4
R3	97.9
R4	99.3
R5	98.1
R6	95.2
R7	90.5
R8	79.6
R9	55.2
R10	98.6
R11	94.7
R12	92.6
R13	98.3
R14	99.2

CCT structure graphical representation

Binning structure graphical representation IEC 1976



* Note that the Blue boxes represent Energy Star Rank

Short form in diagram	Colour Code	CCT
H	27	2700K
G	30	3000K
E	40	4000K

Colour Rendering Index (CRI)

CRI Code	CRI (min) Ra
8	>80
9	>90

Short form letters for CCT (K)

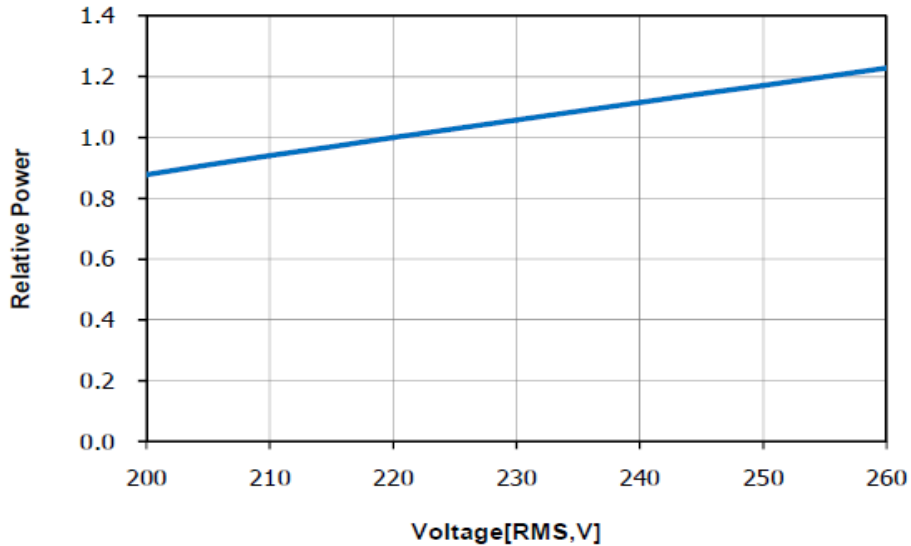
Colour Code	CCT
27	2700K
30	3000K
40	4000K



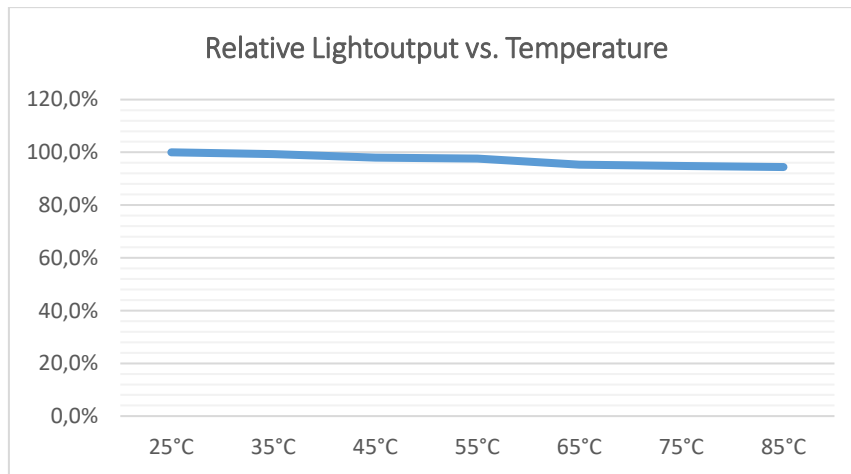
Electro Optical data

Current vs. Voltage

With increasing voltage the light output and the heat increases.



Temperature Characteristics



Consider the thermal properties where the LED module is to be mounted. Temperature is an important factor for lifetime longevity as well as for degradation of luminous flux.

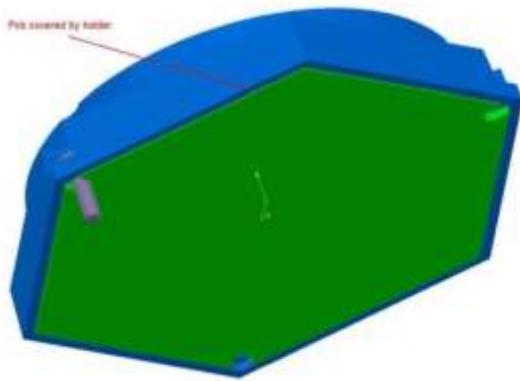


Thermal information

The thermal area (green) should be properly connected to an even and fine surface of a heat sink. Without this arrangement the unit will be overheated and will not be able to survive.

Maximum Temperature

Secure the temperature in your application not to exceed 85°C. Read more in the section “Measurement control”.



Measurement Control

The recommended maximum value is 85°C on Tc or measuring point. If this value is exceeded, we cannot guarantee the function and the lifetime of the product. The purpose of the measurement is to control the Junction (Tj) temperature of the LED and also in order to control the performance on the complete setup. By measuring the junction temperature (Tj) the average lifetime of the product is known.

The thermal connection is measured in temperature vs. Power.

Measurement points

When the measurement takes place, you verify that the temperature on the marked measurement points is satisfying. Pending on the result you know what lifetime to expect from the module.



■ Tc

This step will be implemented after the heat sink has been connected properly!



Lifetime (Calculated)

The lifetime is calculated at the maximum temperature recommended at the T_c (measuring point). It is important not to exceed this recommendation; you find more information under the chapter “measurement control”.

Version Lilly80, 44 LED, 10W

Predicted light output based on LED lifetime (LM80) performance <u>ONLY</u>				
	55°C (T_c)	65°C (T_c)	75°C (T_c)	85°C (T_c)
L70	>50 000h	>50 000h	>50 000h	>50 000h
L80	>50 000h	>50 000h	>50 000h	>50 000h
L90	>50 000h	>50 000h	45 000h	37 000h

Version Lilly80, 44 LED, 22W

Predicted light output based on LED lifetime (LM80) performance <u>ONLY</u>				
	55°C (T_c)	65°C (T_c)	75°C (T_c)	85°C (T_c)
L70	>50 000h	>50 000h	>50 000h	>50 000h



Verification of Conformity

The module are tested at Intertek Semco according to IEC 62031.

Radio Disturbance	IEC 55015:2006 + A1:2007 + A2:2009	
SURGE	IEC 61000-4-5	1.5 kv
Fast transient BURST	IEC 61547	2 kv
SAFETY	IEC 62031:2008	
Photo Biological Safety	IEC 62471:2008	
Radio Disturbance	IEC 55015:2006 + A1:2007 + A2:2009	
ESD*	IEC 61000-4-2	8 kv Air discharge 4 kv Contact discharge

** Please consult the document ESD standards on Optodrive ED, ID and AC*

Production Setup

Production in accordance with IPC-6012-B and IPC-A-600G class 2

The LED Module is in accordance to EU Directive 2002/95/EC (ROHS)

The bare PCB is isolation tested with 3000VDC/10mA for 10 seconds

PCB Material Setup

In all questions regarding the bare PCB please use “Material Data sheet Optodrive” as a guideline.

Light fitting routine tests

According to EN/IEC 60598-1 should the routine test be performed as a dielectric strength test or insulation test. Only the insulation test of 500Vdc should be performed according to standard, 1s with min 2MΩ.

No dielectric tests are allowed to be performed on OptoDrive LED Modules.



DIMMERS tested

<i>Dimmer name</i>	Dimmer part no.	Max W	Min W	Min %	Flicker (perceived)	Noice
<i>Elko</i>	400GLI					
<i>Niko</i>	310-0190X					
<i>Vadsbo</i>	VD200					
<i>Qlight</i>	Monodim 350					
<i>Dig trail edge</i>						
<i>Schneider</i>	SBD315RC					
<i>SG</i>	820320 LEDIM400					
<i>Elko</i>	315 GLE					
<i>Gira</i>	2262 00 / i01					
<i>Busch</i>	2247U					
<i>Q-light</i>	Duo touchdim					
<i>Q-light</i>	Zerodim 350					
<i>Ehmann</i>	T14.03.1					
<i>V-com</i>	1-OR 2 WAY Dimmer switch					
<i>Vadsbo</i>	VD300					
<i>Eltako</i>	EUD12D-UC					
<i>Gelia</i>	EF700DC					

It is important to understand that this is figures tested with standard dimmers and can only be considered as reference information. Please, always perform a test on the application in advance in its actual application. We don't take any blame for the changes, differences and updates towards dimmers and the performance etc. due to this.



Precautions for use

- This device should not be used in any type of fluids such as water, oil, organic solvent etc.
- When cleaning is required, use only water together with mild soap on the outside of the lens. Cleaning inside of the LED module is strictly prohibited.
- The appearance and specifications of the product may be modified for improvement without notice.
- Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.
- Opening of the LED module is prohibited due to risk of EMC, dust, grease and other exposures that will damage it.
- The LED Module should always be mounted to a proper heat sink before it's connected with its proper leads.

Handling in regards to static electricity

- The Optodrive products have integrated circuits (IC) on board that may be damaged if exposed to static electricity. Please handle the products only while using equipment that prevents static electricity. Do not handle them without having ESD protection.
- The Optodrive products are not be installed into the end product without proper ESD protection.
- Optodrive LED Modules meet IEC61547:2009 and IEC61000-4-2. We recommend the light fixture manufacturer to take the mentioned standards under consideration.

Storage before use

- Use only properly rated test equipment and tools for the rated voltage and current of the product being tested.
- It is strongly suggested to wear rubber insulated gloves and rubber bottom shoes while handling the product.
- Do not wear any conductive items (such as jewelry) which could accidentally contact electric circuits.
- Faults, lightning, or switching transients can cause voltage surges in excess of the normal ratings.
- Internal component failure can cause excessive voltages.
- Stored or residual electricity in long wire could be hazardous.



ROHS III and TSCA Compliant

All our LED modules meet the Restrictions of Hazardous Substances (RoHS III) and Toxic Substances Control Act (TSCA).

There has been a growing consensus that Lead Free Systems should increase for the safety of our environment. It is a very serious problem that lead and other harmful materials are being used in commercial and industrial products, causing more and more environmental problems. This has led to regulations such as RoHS (Restriction of the use of certain Hazardous Substances) from the EU, the Japan Ministry of Trade and Industry (MITI) and US Environmental Protection Agency under TSCA Section 6(h). All LED module makers providing products to these countries should comply with these restrictions. In order to meet the RoHS III regulation, Optoga is strictly implementing a ban on lead and other hazardous materials in its products according to these mentioned directives. We also manage those required by the Toxic Substances Control Act (TSCA), to reduce exposure to certain Persistent, Bioaccumulative and Toxic (PBT) chemicals.

Design for Environment:

According to the EU-directive (RoHS III) the following substances must not be used in this product

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Chromium VI (Cr⁶⁺)
- Polybrominated biphenyls PBB
- Polybrominated diphenyl ethers PBDE
- Bis(2-ethylhexyl) phthalate DEPH
- Butyl benzyl phthalate BBP
- Dibutyl phthalate DBP
- Diisobutyl phthalate DIBP



Do you want to know more about benefits of OptoDrive LED?

Read more about OptoDrive at www.optoga.com.

You can contact us via info@optoga.com.

You can also call us on +46 (0)589 490 950.

Optoga AB

Optoga was founded in November 2004 in Arboga, Sweden and has many years of experience in electronics design. The company develops and supplies LEDs and LED-module solutions for the lighting industry, vehicle manufacturers and electronics companies.

With the OptoDrive LED-module, Optoga has taken the initiative to replace strip lights, incandescent and halogen bulbs with LED-based sources.



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