

Project Title:	T Zone		Submission no:	TSE-046
Contract No:	HLN-0271			
To:	Andrew Thelwell Bam Design Ben Hopkins Bennetts Matt Waugh Michael Grubb	Company:	Bam Design- For Comment Michael Grubb Studio's- Bennetts- information only	

Approval of the following equipment is required:

Equipment:	Luminaire Type LE
Manufacturer:	Architainment Lighting
Description:	IP67 Exterior linear LED to the entrance canopy structures

Specification References: Bam Design Luminaire Schedule A4 Rev 007

Attached Detail Documents:	
Equipment specifying schedule.	As per Bam Design description, Michael Grubb Studio's
Manufacturer's quotation.	N/A
Manufacturer's details.	As per Attached Sheet from Architainment Lighting - Description of the luminaire, LED driver details, power supply unit, warranty, test reports
Design check calculations.	As per manufacturers design
Certified performance levels.	Enclosed information from Architainment Lighting
Builderswork requirements.	TBC
Assembly and installation details.	TBC
Operation and maintenance details.	TBC
List of recommended spares.	None
Bam Design/ Michael Grubb Studio's Cover sheet	Enclosed

Electrical requirements for equipment:
Planned site delivery: 2020

Issued by: BAM Construction Ltd.	Robert Andrews	Date	30-01-2019
Please return comments by: December 13-02-2019 2019 To achieve construction delivery dates.			

To be completed and returned by MEPH Consultant Design Engineer
Technical submission is ** approved / approved with comments / not approved.
(delete as appropriate)**

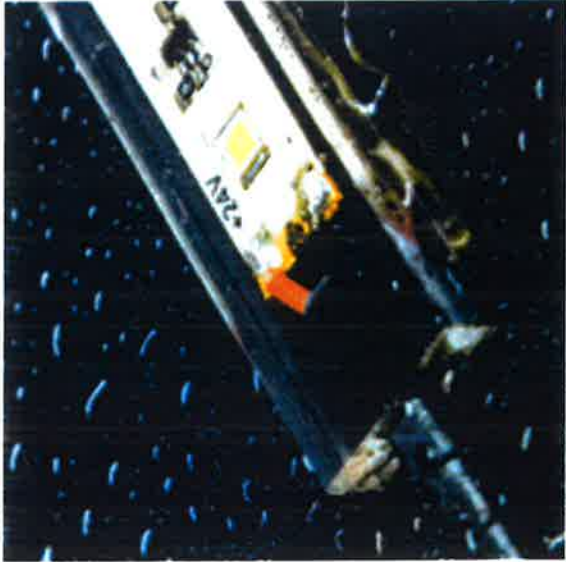
Returned by:		Company:	
Signature:		Date:	

PRODUCT DATA SHEET

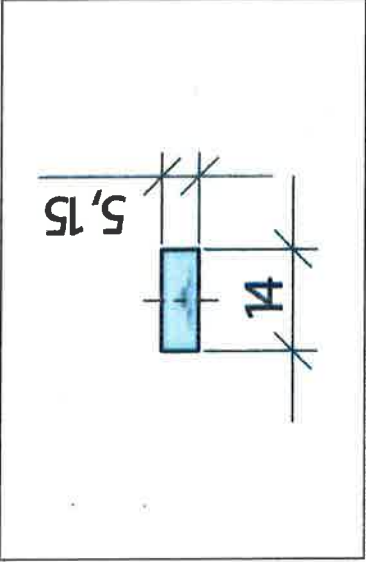
Project: King's Cross, Site T2/T3
Status: Stage 4
Revision: 04

Product Reference

LE



Flex HYDRA LD15 W830 Luminaire.



Luminaire Dimensions.

Exterior Linear LED to Entrance Canopy structures. To provide ambient and functional wash of light to Entrance Canopies.

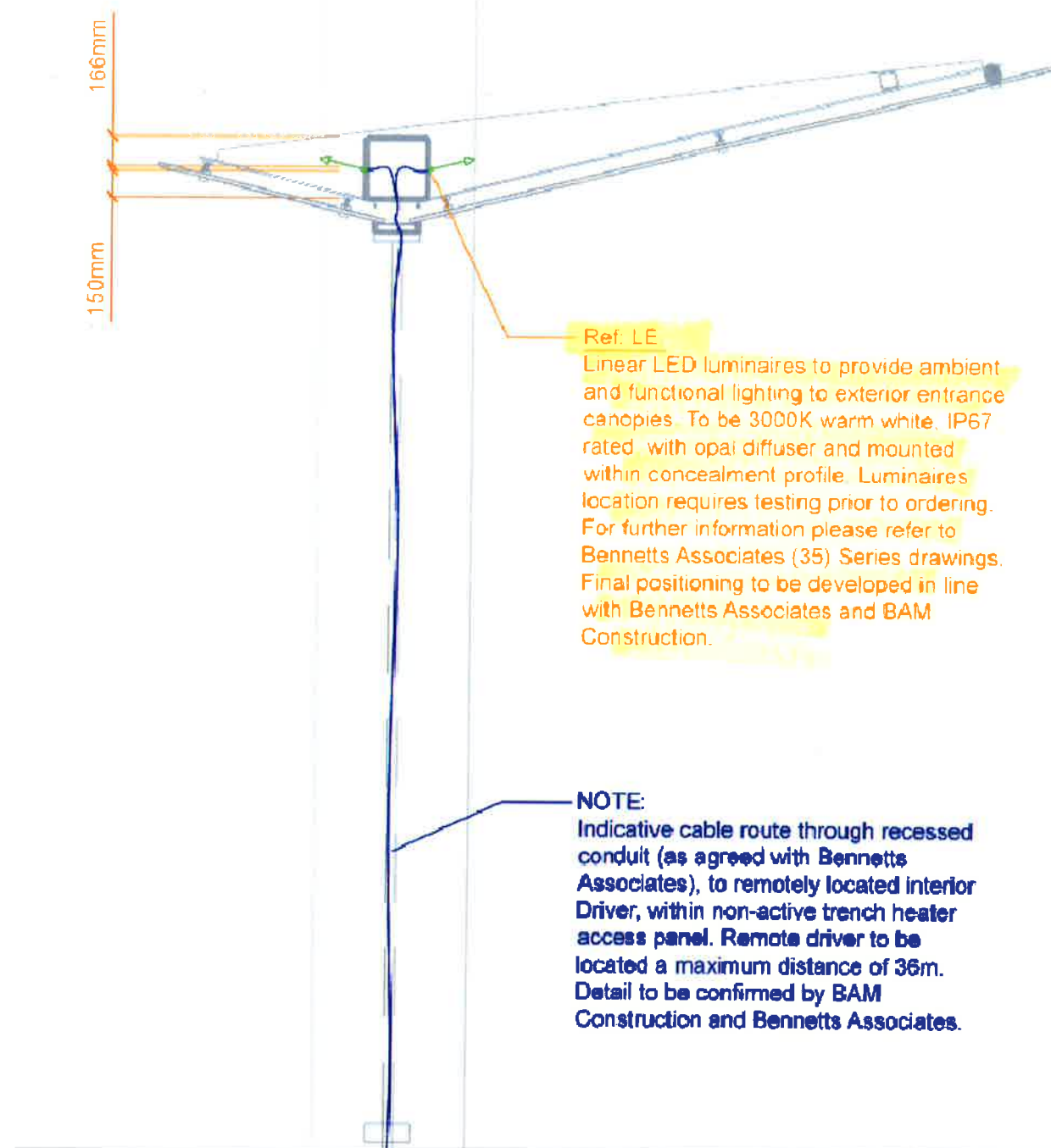
Ordering and Product Details		Manufacturer / Supplier Details
Part Number:	Flex HYDRA LD15 W830 IP67	Architainment Lee Shields 07795 977603 01494 471340 lee.shields@architainment.co.uk www.architainment.co.uk
Description:	IP67 flexible LED strip. To include: 005 opal Contour profile, Mounting brackets, Mains Switched Driver and Power Supply as advised by manufacturer.	
Lamp Specification		
Lamp Type	LED	Control Specification Mains Switched. Required cabling and driver to be confirmed by manufacturer.
Colour Temperature:	3000K	
Wattage:	15.36W/m	
Input Voltage:	24 Volt	
Lumen Output:	1797 lm/m	
IP rating:	IP67	

Notes

- 1: For all the quantities please see **KXC-T2-001-J-250-63-700** Lighting Schedule.
- 2: For lighting layouts please refer to drawing: **KXC-T2-001-J-250-63-101**.
- 3: Manufacturers installation/wiring details must be adhered to.
- 4: Required installation equipment to be ordered together with the fittings.
- 5: Luminaire sample to be requested prior to ordering.
- 6: Luminaire integration requires Mock-up and testing prior to ordering.



Michael Grubb Studio
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Status Code (as defined in BS1192)

Work in Progress (WIP)

00 - Initial Status or WIP

01 - Issued for co-ordination

02 - Issued for information

03 - Issued for internal review

04 - Issued for construction approval

Documentation (Pre-construction)

D1 - Issued for costing

D2 - Issued for tender

D3 - Issued for contractor design

D4 - Issued for manufacture/procurement

Documentation (Contractual)

A - Issued for construction

B - Issued for construction but with comments

C - Comprehensive revision required

Archives

AB - Record Drawing

bam

BAM Design
An operating company of
BAM Contract Ltd Ltd

Architecture
Interior Design
3D Visualisation
Feasibility Studies
Structural Engineering
Environmental Services
Building Information Modelling

Derikem Business Park
Griffiths Way, St Albans
Hertfordshire AL1 1SD
01763 860000
info@bam.co.uk
www.bam.co.uk

project Kings Cross T Zone

East Elevation
External Lighting Layout
Installation Detail-1

scale 1:100 @ A1

date 15.06.18

drawn by ND

checked by 4841

project no. KXC-T2-001-E-BD4507-63-1ZZXX3A

purpose of issue STAGE 4

drawn by A4

rev. 001

TYPE LE



External Linear LED Light Fixtures. To provide ambient and task lighting in all areas of the building.

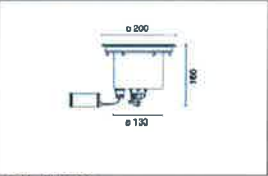
Manufacturer / Supplier Details	Technical Details
Product: Linear LED Light Fixture	Manufacturer: LED Lighting Solutions
Material: Aluminium	Finish: Powder Coated
Length: 2.0m	Width: 100mm
Height: 100mm	Weight: 2.5kg
Power: 100W	Voltage: 230V AC
Beam Angle: 60°	Life Span: 50,000 hours

- Notes:
- For all the external lighting, the fixtures should be mounted on the building facade.
 - The fixtures should be mounted on the building facade at a height of 2.5m.
 - The fixtures should be mounted on the building facade at a height of 2.5m.
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TYPE UL1



Light Up / Earth - Exposed Luminaire

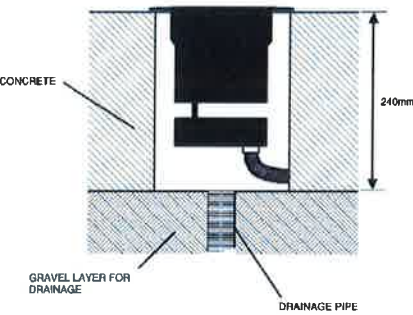


Indicative Dimensions:

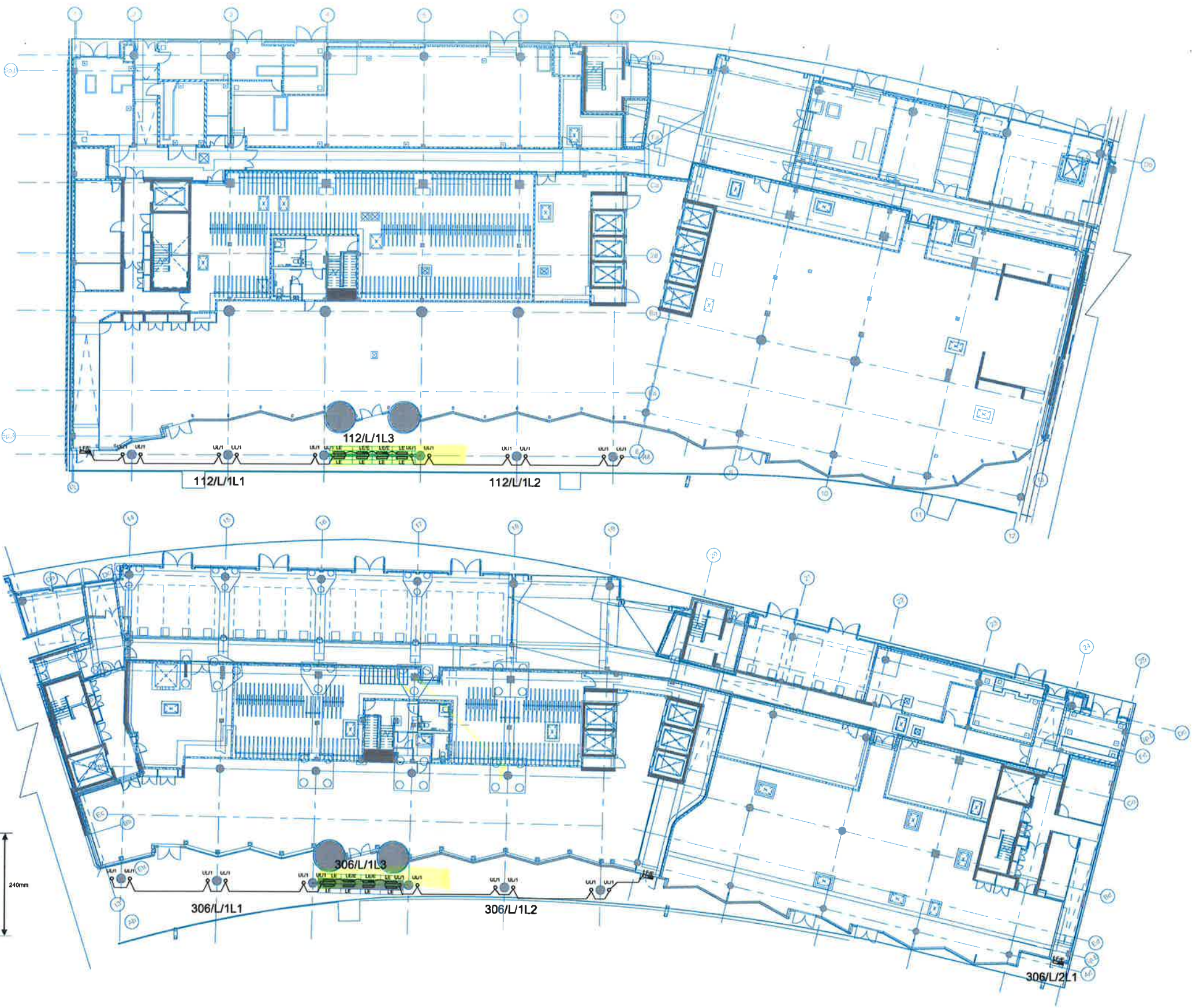
Indicative dimensions are provided for reference only. The actual dimensions of the luminaire may vary.

Manufacturer / Supplier Details	Technical Details
Product: Light Up / Earth - Exposed Luminaire	Manufacturer: LED Lighting Solutions
Material: Aluminium	Finish: Powder Coated
Length: 1.0m	Width: 100mm
Height: 100mm	Weight: 1.5kg
Power: 100W	Voltage: 230V AC
Beam Angle: 60°	Life Span: 50,000 hours

- Notes:
- For all the external lighting, the fixtures should be mounted on the building facade.
 - The fixtures should be mounted on the building facade at a height of 2.5m.
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Status Code (as defined in BS1192)	Description
D3 - Issued for contractor design	
D4 - Issued for manufacture/procurement	
Work in Progress (WIP)	Documentation (Contractual)
W1 - Initial Status or WIP	A - Issued for construction
W2 - Issued for construction	B - Issued for construction but with comments
W3 - Issued for construction with comments	C - Comprehensive revision required
W4 - Issued for construction approval	
Archives	AS - Record Drawing
A1 - Issued for co-ordination	
A2 - Issued for information	
A3 - Issued for internal review	
A4 - Issued for construction approval	
Documentation (Pre-construction)	
D1 - Issued for design	
D2 - Issued for tender	



DO NOT SCALE FROM THIS DRAWING.
ALL DIMENSIONS TO BE CHECKED ON SITE.
FOR REFERENCED VIEWS REFER TO KXC-T2-001-SERIES OF DRAWINGS.

bam
BAM Design
An operating company of
BAM Construction UK Ltd
Architectural
Interior Design
3D Visualisation
Facilities Design
Structural Engineering
Environmental Services
Building Information Modelling

Project: Kings Cross T Zone
East Elevation
External Lighting Layout
Scale: 1:100 @ A1
Date: 15.06.18
Drawn by: ND
Checked by: 4841
Project No: KXC-T2-001-E-BD4507-03-122XX3
Revision: 003
Status: STAGE 4



Light
is our passion

8A Dimmable Constant Voltage LED Driver

LINEARdrive 200 Series are 8A constant voltage LED drivers with two LED outputs that are controlled over one or two channels. Targeted at larger (up to 8A), smoothly dimmable linear LED applications as in accent and cove lighting. Available in 0-10V, DMX/RDM and DALI compatible versions.

Applications

- Accent and cove lighting
- Office lighting
- Architectural lighting
- Hospitality lighting
- Signage / advertising lighting
- Retail lighting
- Public area / park / street lighting
- Display lighting

Features & benefits

Input

- Voltage: 12 - 28V DC
- Current, max: 8A, irrespective of PSU voltage

Output

- Voltage: 12 - 28V
- Max load: 8A, irrespective of whether using one or both LED outputs

Auxiliary output

- Voltage: equal to input voltage
- Current: 180mA current @ 12V and 90mA current @ 24V
- Power: 2W

General

- DALI compatible: LINEARdrive 210D and 220D
- 0-10V compatible: LINEARdrive 211D
- USITT DMX512A / RDM (ANSI E1.20) and LedSync compatible: LINEARdrive 212D and 222D
- HydraDrive: efficient, smooth and flicker-free dimming from 100% to 0.1%
- Interface for external control interface: active 0-10V dimming device or 47kΩ potentiometer for local dimming
- ShowMaster: 9 default shows, up to 20 user-defined shows, uploadable via TOOLbox and ShowMaster DMX software (DMX compatible version only)



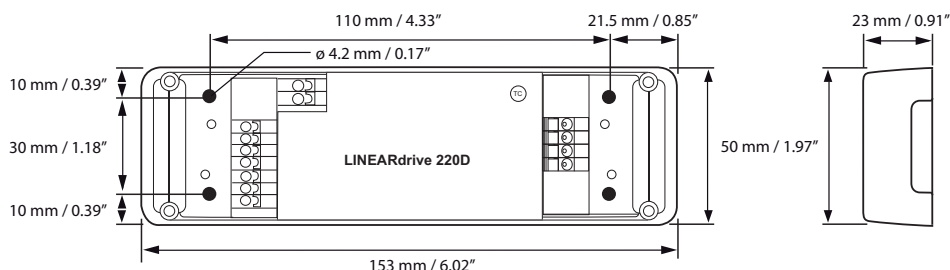
LINEARdrive 212D

Product offering

Description	Product	Order no.
LINEARdrive DC, 8A, 12-24VDC, DALI, 1 ballast, constant voltage	LINEAR 210D	LIN210D1
LINEARdrive DC, 8A, 12-24VDC, DALI, 2 ballasts, constant voltage	LINEAR 220D	LIN220D1
LINEARdrive DC, 8A, 12-24VDC, 0-10V, 1 control channel, constant voltage, log dim curve	LINEAR 211D	LIN211D1-LG
LINEARdrive DC, 8A, 12-24VDC, 0-10V, 1 control channel, constant voltage, lin dim curve	LINEAR 211D	LIN211D1-LN
LINEARdrive DC, 8A, 12-24VDC, DMX, 1 control channel, constant voltage	LINEAR 212D	LIN212D1
LINEARdrive DC, 8A, 12-24VDC, DMX, 2 control channels, constant voltage	LINEAR 222D	LIN222D1

Dimensions, weight, packaging

- Weight: 120 g, 4.2 oz
- Packaging: 12pcs / carton



Connections

Connectors LINEARdrive 210D and 220D

- VDC: + and -
- AUX VDC: +
- Ext in: + and -
- DALI: + and - (x2)
- LED outputs: LED supply + and Group - (x2)

Connectors LINEARdrive 211D

- VDC: + and -
- AUX VDC: +
- Ext in: + and -
- 0-10V: + and - (x2)
- LED outputs: LED supply + and Group - (x2)

Connectors LINEARdrive 212D and 222D

- VDC: + and -
- AUX VDC: +
- Ext in: + and -
- DMX in: +, - and shield
- LedSync thru: +, - and shield
- LED outputs: LED supply + and Group - (x2)

Wiring for VDC and LED group connectors

- Cross section: 0.2 - 1.5 mm², AWG 24 - 16
- Strip length: 9 mm / 0.35 in.

Wiring for 0-10V/DALI/DMX/AUX/EXT IN connectors

- Cross section: 0.2-0.5 mm², AWG 24 - 20 (LINEARdrive 2*2D)
0.2-1.5 mm², AWG 24 - 16 (LINEARdrive 2*0D,211D)
- Strip length: 9 mm / 0.35 in.

Other information

Certifications

- CE
- All: EN 61347, EN 55015, EN 61003, EN 61547
- LINEARdrive 211D: EN 60929 Annex E
- LINEARdrive 210D and 220D: EN 62386-101/102/207

Environmental ratings

- Ta range: -20°C...50°C / -4°F...122°F
- Tc max: 65°C / 149°F
- For use in dry locations

Control compatibility

- DALI control gear
- DMX512A and RDM explore & address (ANSI E1.20) control gear
- Standard 0-10V dimmers, switches and dimming control systems

CE 0-10V DALI DMX RDM SHOWmaster

Europe, Rest of World

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Other documentation and support

Visit www.eldoled.com/support for further documentation such as quick start guide, wiring diagram and 3D IGES files.

Warranty

eldoLED represents and warrants that for a period of 3 (three) years, as of the date of invoice, Products materially meet the specifications and specifically agreed upon quality, both as stated in the applicable datasheet and/or written design-in specifications, or as stated in writing otherwise by eldoLED, provided that these specifications are explicitly designated by eldoLED as "warranted specifications".

For the complete warranty text, visit www.eldoled.com/terms.

Sales support EU & Rest of World: sales@eldoled.com
Sales support US/Canada: na-sales@eldoled.com



HLG-40H-12 **A** Blank : IP67 rated. Cable for I/O connection.
A : IP65 rated. Output voltage and constant current level can be adjusted through internal potentiometer.
B : IP67 rated. Constant current level adjustable through output cable with 1~10Vdc or 10V PWM signal or resistance
D (option) : IP67 rated. Timer dimming function, contact MEAN WELL for details.

SPECIFICATION

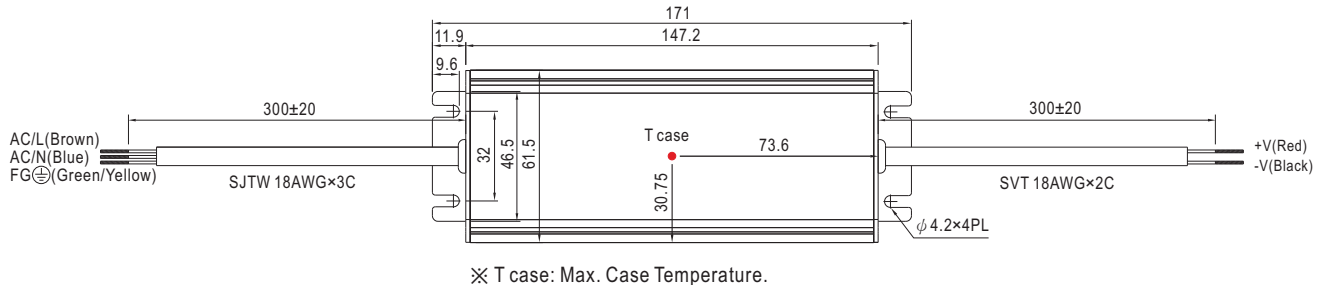
DESCRIPTION											
MODEL		HLG-40H-12	HLG-40H-15	HLG-40H-20	HLG-40H-24	HLG-40H-30	HLG-40H-36	HLG-40H-42	HLG-40H-48	HLG-40H-54	
OUTPUT	DC VOLTAGE	12V	15V	20V	24V	30V	36V	42V	48V	54V	
	CONSTANT CURRENT REGION Note.4	7.2 ~12V	9 ~ 15V	12 ~ 20V	14.4 ~ 24V	18 ~ 30V	21.6 ~ 36V	25.2 ~ 42V	28.8 ~ 48V	32.4 ~ 54V	
	RATED CURRENT	3.33A	2.67A	2A	1.67A	1.34A	1.12A	0.96A	0.84A	0.75A	
	RATED POWER	39.96W	40.05W	40W	40.08W	40.2W	40.32W	40.32W	40.32W	40.5W	
	RIPPLE & NOISE (max.) Note.2	150mVp-p	150mVp-p	150mVp-p	200mVp-p	200mVp-p	200mVp-p	200mVp-p	300mVp-p	300mVp-p	
	VOLTAGE ADJ. RANGE Note.6	10.8 ~ 13.5V	13.5 ~ 17V	17 ~ 22V	22 ~ 27V	27 ~ 33V	33 ~ 40V	40 ~ 46V	44 ~ 53V	49 ~ 58V	
	CURRENT ADJ. RANGE	Can be adjusted by internal potentiometer A type only									
		2 ~ 3.33A	1.6 ~ 2.67A	1.2 ~ 2A	1 ~ 1.67A	0.8 ~ 1.34A	0.67 ~ 1.12A	0.58 ~ 0.96A	0.5 ~ 0.84A	0.45 ~ 0.75A	
	VOLTAGE TOLERANCE Note.3	±2.5%	±2.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	
	LINE REGULATION	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	
	LOAD REGULATION	±2.0%	±1.5%	±1.0%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	
SETUP, RISE TIME Note.8	500ms, 80ms at full load 230VAC / 115VAC										
HOLD UP TIME (Typ.)	16ms/230VAC 16ms/115VAC at full load										
INPUT	VOLTAGE RANGE Note.5	90 ~ 305VAC 127 ~ 431VDC									
	FREQUENCY RANGE	47 ~ 63Hz									
	POWER FACTOR (Typ.)	PF>0.98/115VAC, PF>0.95/230VAC, PF>0.92/277VAC at full load (Please refer to "Power Factor Characteristic" curve)									
	TOTAL HARMONIC DISTORTION	THD< 20% when output loading≥60% at 115VAC/230VAC input and output loading≥75% at 277VAC input									
	EFFICIENCY (Typ.)	86.5%	86.5%	88%	88%	88.5%	88.5%	88.5%	89.5%	89.5%	
	AC CURRENT (Typ.)	0.43A / 115VAC 0.24A / 230VAC 0.23A / 277VAC									
	INRUSH CURRENT(Typ.)	COLD START 50A(twidth=210μs measured at 50% Ipeak) at 230VAC									
	MAX. No. of PSUs on 16A CIRCUIT BREAKER	12 units (circuit breaker of type B) / 20 units (circuit breaker of type C) at 230VAC									
	LEAKAGE CURRENT	<0.75mA / 277VAC									
	PROTECTION	OVER CURRENT Note.4	95 ~ 108% Protection type : Constant current limiting, recovers automatically after fault condition is removed								
SHORT CIRCUIT		Hiccup mode, recovers automatically after fault condition is removed									
OVER VOLTAGE		15 ~ 21V 18 ~ 24V 23 ~ 30V 28 ~ 35V 35 ~ 43V 41 ~ 49V 48 ~ 58V 54 ~ 65V 59 ~ 68V Protection type : Shut down o/p voltage, re-power on to recover									
OVER TEMPERATURE		Shut down o/p voltage, re-power on to recover									
ENVIRONMENT		WORKING TEMP.	-40 ~ +70°C (Refer to "Derating Curve")								
	WORKING HUMIDITY	20 ~ 95% RH non-condensing									
	STORAGE TEMP., HUMIDITY	-40 ~ +80°C, 10 ~ 95% RH									
	TEMP. COEFFICIENT	±0.03%/°C (0 ~ 60°C)									
	VIBRATION	10 ~ 500Hz, 5G 12min./1cycle, period for 72min. each along X, Y, Z axes									
SAFETY & EMC	SAFETY STANDARDS Note.7	UL8750, CSA C22.2 No. 250.0-08 (except for 48V, 54V), EN61347-1, EN61347-2-13 independent, IP65 or IP67, J61347-1, J61347-2-13 approved ; design refer to UL60950-1, TUV EN60950-1, EN60335-1									
	WITHSTAND VOLTAGE	I/P-O/P:3.75KVAC I/P-FG:2KVAC O/P-FG:1.5KVAC									
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C/ 70% RH									
	EMC EMISSION	Compliance to EN55015, EN61000-3-2 Class C (≥60% load) ; EN61000-3-3									
	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; EN61547, EN55024, light industry level (surge 4KV), criteria A									
OTHERS	MTBF	336.5Khrs min. MIL-HDBK-217F (25°C)									
	DIMENSION	171*61.5*36.8mm (L*W*H)									
	PACKING	0.73Kg; 20pcs/15.6Kg/0.8CUFT									
NOTE	1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. Please refer to "DRIVING METHODS OF LED MODULE". 5. Derating may be needed under low input voltages. Please check the static characteristics for more details. 6. A type only. 7. Safety and EMC design refer to EN60598-1, CNS15233, GB7000.1, FCC part18. 8. Length of set up time is measured at cold first start. Turning ON/OFF the power supply may lead to increase of the set up time. 9. The power supply is considered as a component that will be operated in combination with final equipment. Since EMC performance will be affected by the complete installation, the final equipment manufacturers must re-qualify EMC Directive on the complete installation again. 10. Refer to warranty statement. 11. To fulfill requirements of the latest ErP regulation for lighting fixtures, this LED power supply can only be used behind a switch without permanently connected to the mains.										

Mechanical Specification

Case No.957B

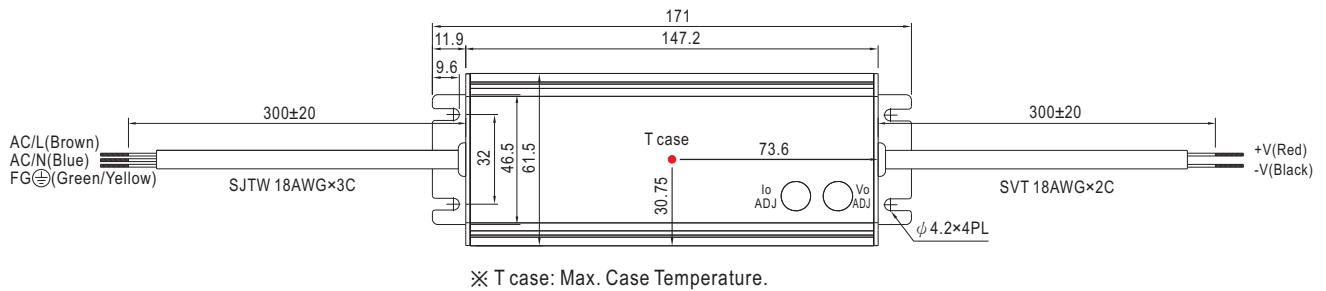
Unit:mm

Blank:(HLG-40H)



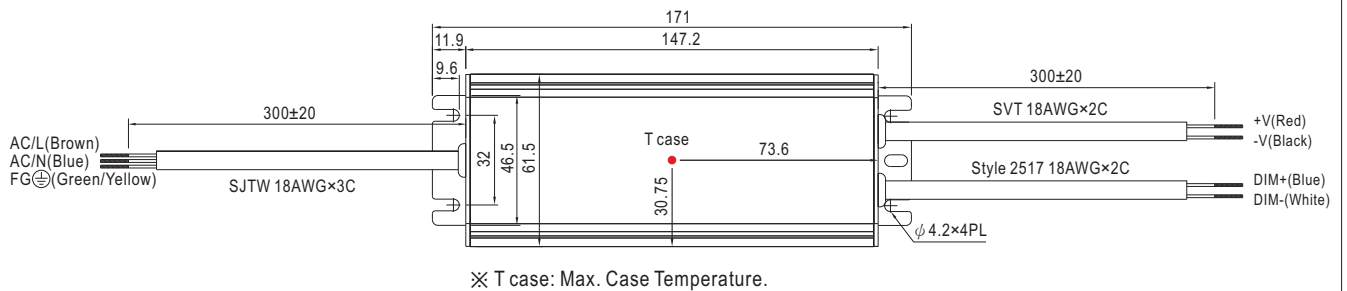
※IP67 rated. Cable for I/O connection.

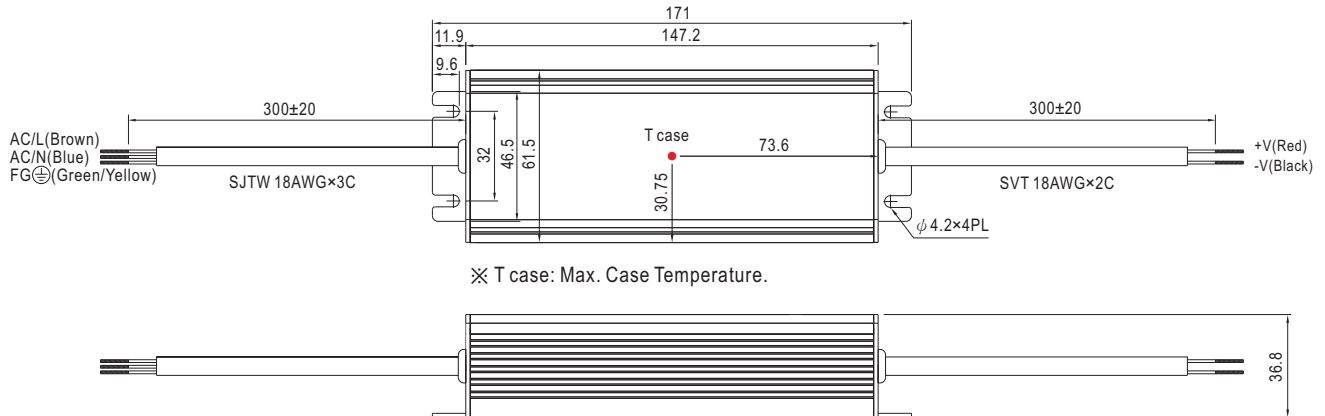
A Type:(HLG-40H-_A)



※ IP65 rated. Output voltage and constant current level can be adjusted through internal potentiometer.
(Can access by removing the rubber stopper on the case.)

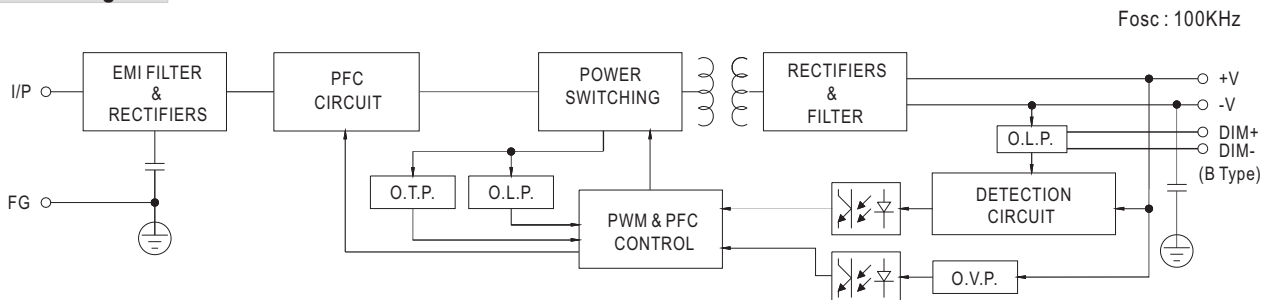
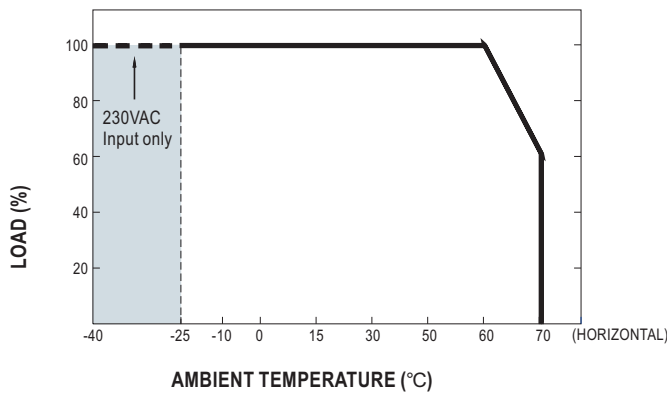
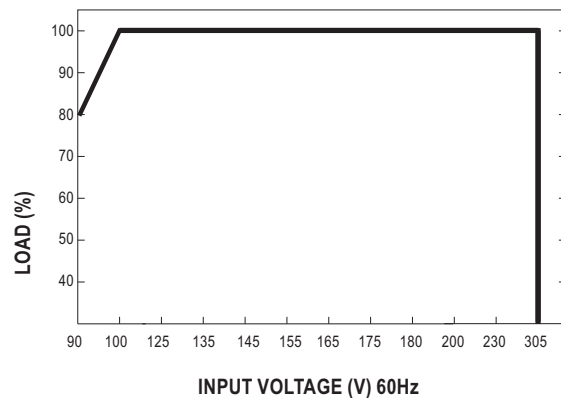
B Type:(HLG-40H-_B)



D Type(option):(HLG-40H-D)


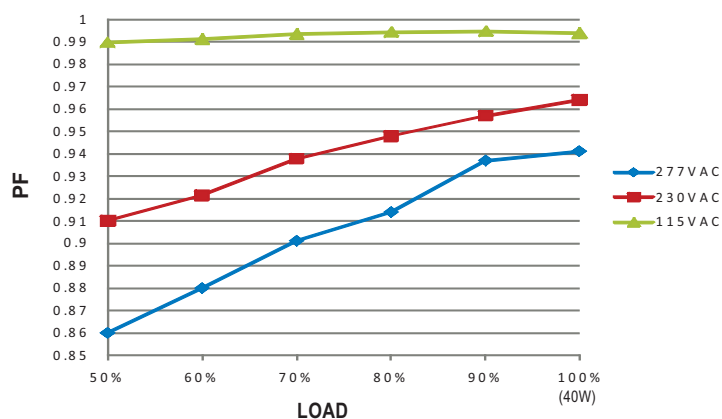
※ T case: Max. Case Temperature.

※ IP67 rated. Timer dimming function, contact MEAN WELL for details.

Block Diagram

Derating Curve

Static Characteristics


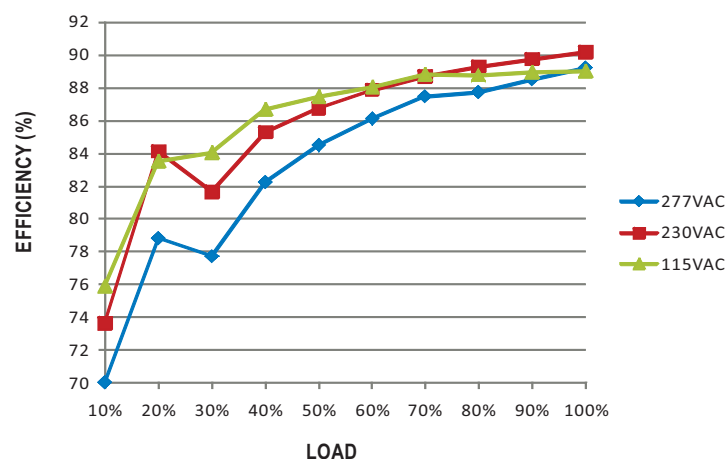
Power Factor Characteristic

Constant Current Mode



EFFICIENCY vs LOAD (48V Model)

HLG-40H series possess superior working efficiency that up to 89.5% can be reached in field applications.

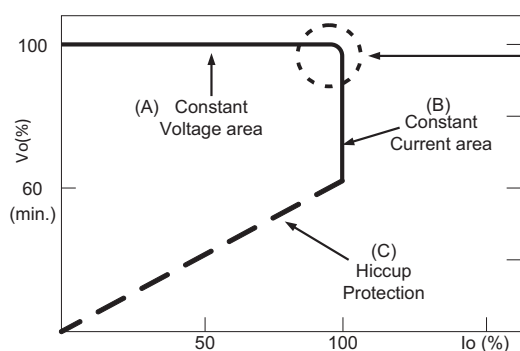


DRIVING METHODS OF LED MODULE

There are two major kinds of LED drive method "direct drive" and "with LED driver".

A typical LED power supply may either work in "constant voltage mode (CV) or constant current mode (CC)" to drive the LEDs.

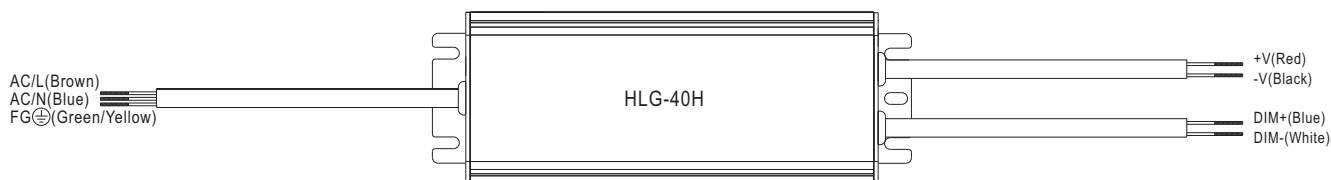
Mean Well's LED power supply with CV+ CC characteristic can be operated at both CV mode (with LED driver, at area (A) and CC mode (direct drive, at area (B)).



Typical LED power supply I-V curve

In the constant current region, the highest voltage at the output of the driver depends on the configuration of the end systems.
Should there be any compatibility issues, please contact MEAN WELL.

DIMMING OPERATION (for B-type only)



※ Built-in 3 in 1 dimming function, IP67 rated. Output constant current level can be adjusted through output cable by connecting a resistance or 1 ~ 10Vdc or 10V PWM signal between DIM+ and DIM-.

※ Please DO NOT connect "DIM-" to "-V".

※ Reference resistance value for output current adjustment (Typical)

Resistance value	Single driver	10KΩ	20KΩ	30KΩ	40KΩ	50KΩ	60KΩ	70KΩ	80KΩ	90KΩ	100KΩ	OPEN
	Multiple drivers (N=driver quantity for synchronized dimming operation)	10KΩ/N	20KΩ/N	30KΩ/N	40KΩ/N	50KΩ/N	60KΩ/N	70KΩ/N	80KΩ/N	90KΩ/N	100KΩ/N	-----
Percentage of rated current		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

※ 1 ~ 10V dimming function for output current adjustment (Typical)

Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
Percentage of rated current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

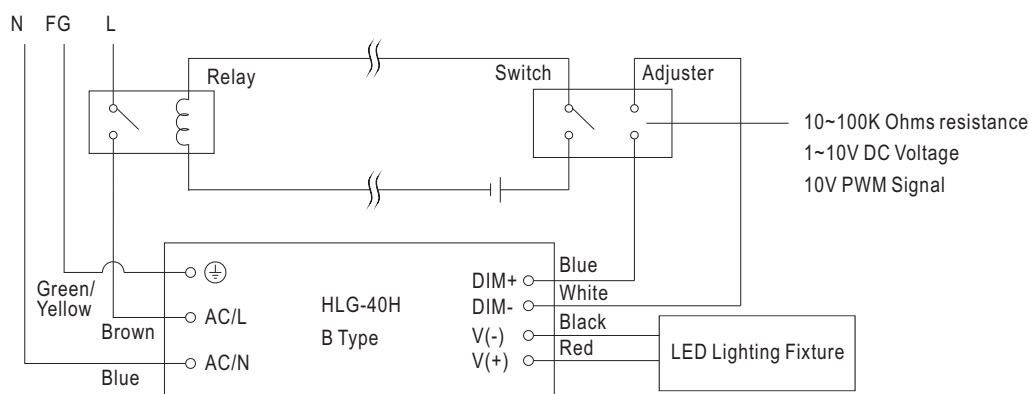
※ 10V PWM signal for output current adjustment (Typical): Frequency range : 100Hz ~ 3KHz

Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
Percentage of rated current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	95%~108%

※ Using the built-in dimming function on B-type model can't turn the lighting fixture totally dark. Please refer to the connection method below to achieve 0% brightness of the lighting fixture connecting to the LED power supply unit.

※ Direct connecting to LEDs is suggested, but is not suitable for using additional drivers.

Dimming connection diagram for turning the lighting fixture ON/OFF :



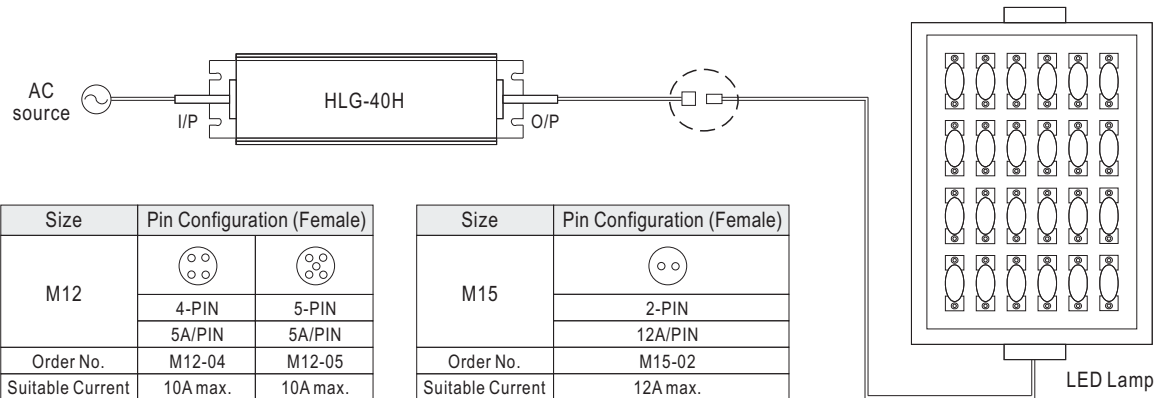
Using a switch and relay can turn ON/OFF the lighting fixture.

1. Output constant current level can be adjusted through output cable by connecting a resistance or 1~10Vdc or 10V PWM signal between DIM+ and DIM-.
2. The LED lighting fixture can be turned ON/OFF by the switch.

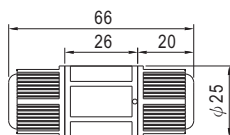
■ WATERPROOF CONNECTION

◎ Waterproof connector

Waterproof connector can be assembled on the output cable of HLG-40H to operate in dry/wet/damp or outdoor environment.



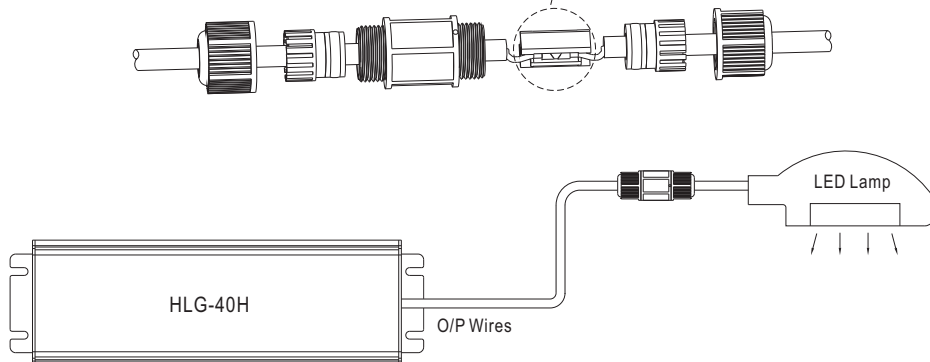
◎ Cable Joiner



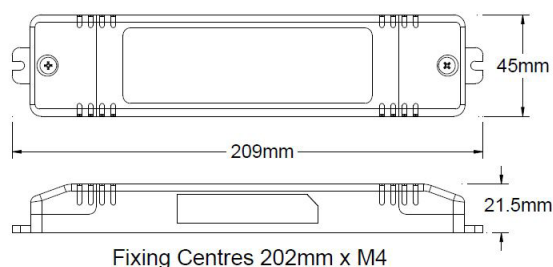
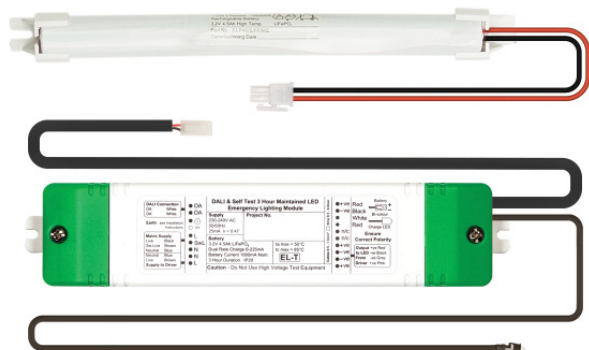
CJ04-1 suitable for 14AWG~16AWG
CJ04-2 suitable for 18AWG~22AWG



Up to four wires can be connected through this cable joiner by soldering or clamping by tools.



※CJ04 cable joiner can be purchased independently for user's own assembly.
MEAN WELL order No. : CJ04-1, CJ04-2.



- DALI Self-Test Conversion Module
- Deep Discharge Protection
- Low Power Consumption
- Long Life LiFePO4 Batteries
- Strain Relief Module
- Suitable for 50mm or Greater Apertures
- Remote Mounting Versions Available
- DALI 1 Device Registered With DiiA
- Average Emergency Power - 2.3W

The DXi/3 range is supplied as a conversion kit for integral use within a luminaire. Remote versions with cable restraint are available, please see separate datasheet for information.

A 3 hour DALI self-test emergency lighting conversion kit which operates with Long Life LiFePO4 batteries. The unit is designed to suit an extremely wide range of LED types and circuits. The DXi/3 automatically adjusts the output LED current to provide the best match between the battery and the load, providing maximum illumination whilst ensuring full battery duration. The batteries used with this unit not only offer double the life of traditional emergency lighting batteries, but consume far less power during their operation.

There are 2 versions available -

Order Codes

DXi/3-K

For LED loads operating in the voltage range of 6-55 Volts.

This DALI self-test kit is designed for integral use within the luminaire.

DXi/3/80-K

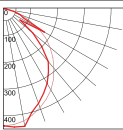
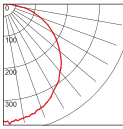
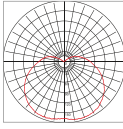
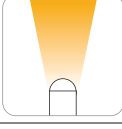
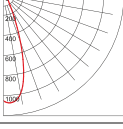
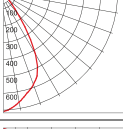
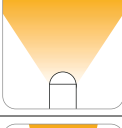
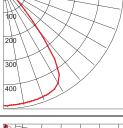
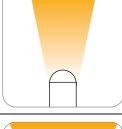
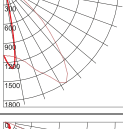
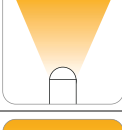
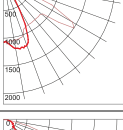
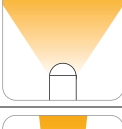
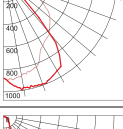
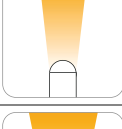
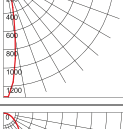
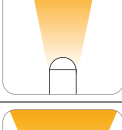
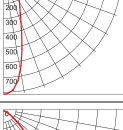
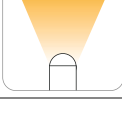
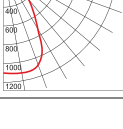
For LED loads operating in the voltage range of 15-80 Volts.

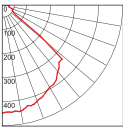
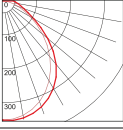
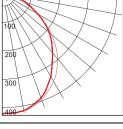
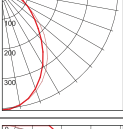
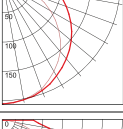
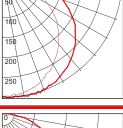
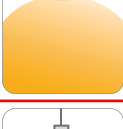
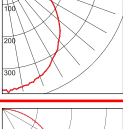
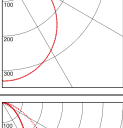
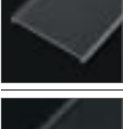
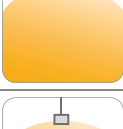
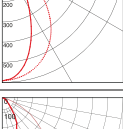
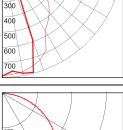
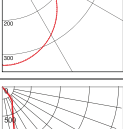
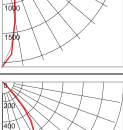
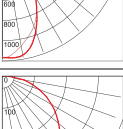
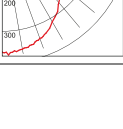
This DALI self-test kit is designed for integral use within the luminaire.

Technical Details:

Mains Supply	230-240V AC 50/60 Hz	Max Ta and Tc	Ta - 50 °C - Tc - 70 °C
Power Rating	25mA $\lambda = 0.55$	Max Battery Temperature	55 °C
Bus Current Consumption	1.52mA	Battery Discharge Current	1000mA nominal
Recharge Period	24-Hours	Discharge Voltage Limit	2.5 Volts
Battery Size & Type	3.2V 4.5Ah LiFePO4 Cells	Ingress Protection	IP20
Charge Current	Dual Rate 0-225mA	Terminal - Push Wire	1.0mm ² - 1.5 mm ²
Module Weight	0.12Kg	Module Dimensions (LxWxH)	209 x 45 x 21.5 (f/c 202mm)
Battery Weight	0.14Kg	Battery Stick Dimensions (LxØ)	230 x 24 (f/c 215mm)

THE PERFECT LIGHT DISTRIBUTION FOR YOUR DESIGN

Article image	Name	Pictogram	Light distribution curves	Remark	Compatible profiles Contour...	Page
	VarioCover 007 Opal L²			80°	Opal cover, flat	007 428
	VarioCover 007 Clear L²			120°	Clear cover, flat	007 428
	VarioCover 007 Opal H²			160°	Opal cover, high square	007 428
	LinearOptic 003/006 Diffuse 15°			15°	Linear lens, diffuse	013, 016 431 432
	LinearOptic 003/006 Diffuse 30°			30°	Linear lens, diffuse	013, 016 431 432
	LinearOptic 003/006 Diffuse 45°			45°	Linear lens, diffuse	013, 016 431 432
	LinearOptic 003/006 Diffuse 0°			0°	Linear lens, diffuse	013, 016 431 432
	LinearOptic 003/006 Clear 30°			30°	Linear lens, clear	013, 016 431 432
	LinearOptic 003/006 Clear 60°			60°	Linear lens, clear	013, 016 431 432
	LinearOptic 003/006 Clear 90°			90°	Linear lens, clear	013, 016 431 432
	LinearOptic 004 Diffuse 10°			10°	Linear lens	004, 020, 024 425 434 436
	LinearOptic 004 Diffuse 30°			30°	Linear lens	004, 020, 024 425 434 436
	LinearOptic 004 Diffuse 60°			60°	Linear lens	004, 020, 024 425 434 436

Article image	Name	Pictogram	Light distribution curves	Remark	Compatible profiles Contour...	Page
	VarioCover 002/004/005 Clear R			120° Clear cover, round	002, 004, 005, 019, 020, 024	424, 425, 427, 433, 434, 436
	VarioCover 002/004/005 Diffuse R			100° Diffuse cover, round	002, 004, 005, 012, 019, 020, 024	424, 425, 427, 430, 433, 434, 436
	VarioCover 002/004/005 Diffuse H²			100° Diffuse cover, high square	002, 004, 005, 020	424 425 427 434
	VarioCover 002/004/005 Diffuse L²			80° Diffuse cover, flat	002, 004, 005, 012, 020, 022, 024	424, 425, 427, 430, 434, 435, 436
	VarioCover 002/004/005 Opal R			154° Opal cover, round	002, 004, 005, 019, 020, 024	424, 425, 427, 433, 434, 436
	VarioCover 002/004/005 Opal H²			140° Opal cover, high square	002, 004, 005, 020	424 425 427 434
	VarioCover 002/004/005 Opal L²			120° Opal cover, flat	002, 004, 005, 012, 020, 022, 024	424, 425, 427, 430, 434, 435, 436
	LinearCover i03/i04 L² Opal			80° Opal cover, flat	i04	440
	LinearCover i03/i04 L² Diffuse			80° Diffuse cover, flat	i04	440
	LinearCover i03/i04 L² Clear			80° Clear cover, flat	ii04	440
	LinearCover 9999 L² Opal			80° Opal cover, flat	9999	441
	Linear reflector 25° UGR < 19			25° Highly efficient Alanod reflector; 25°, UGR < 19	Only with XOOMINESCENT™ tape Contour 007	428
	Linear reflector 65° UGR < 19			65° Highly efficient Alanod reflector; 65°, UGR < 19	Only with XOOMINESCENT™ tape Contour 007	428
	Wall wash			asymmetric Reflector; Wall wash	Only with XOOMINESCENT™ tape Contour 007	428

OPTICS & COVERS

Please find compatible Aluminum profiles (VarioContour) for each optic/cover in the table on page 420 - 421.

Reflector optics



Description VarioContour 007 Reflector 25°
Art.-No. 28100000-1120
Unit meter (m)
Min. OQ 30
25° reflector for VarioContour 007, suited for XOOMINESCENT™ tapes, length 1,120 mm / 3.67'



Description VarioContour 007 Reflector WW
Art.-No. 28100002-1400
Unit meter (m)
Min. OQ 30
Wall wash (WW) reflector for VarioContour 007, suited for XOOMINESCENT™ tapes, length 1,400 mm / 4.59'



Description VarioContour 007 Reflector 65°
Art.-No. 28100001-1120
Unit meter (m)
Min. OQ 30
65° reflector for VarioContour 007, suited for XOOMINESCENT™ tapes, length 1,120 mm / 3.67'

Linear lenses



Description LinearOptic 003/006 Clear 30°
Art.-No. 12000020
Unit meter (m)
Min. OQ 30
Dimensions 8 mm x 20.5 mm / 0.31" x 0.81"
Linear lens 30° for VarioContour 013/016
(L x H x W) 2 m x 8 mm x 20.5 mm / 6.56' x 0.31" x 0.81"



Description LinearOptic 003/006 Clear 60°
Art.-No. 12000021
Unit meter (m)
Min. OQ 30
Dimensions 8 mm x 20.5 mm / 0.31" x 0.81"
Linear lens 60° for VarioContour 013/016
(L x H x W) 2 m x 8 mm x 20.5 mm / 6.56' x 0.31" x 0.81"



Description LinearOptic 003/006 Clear 90°
Art.-No. 12000022
Unit meter (m)
Min. OQ 30
Dimensions 8 mm x 20.5 mm / 0.31" x 0.81"
Linear lens 90° for VarioContour 013/016
(L x H x W) 2 m x 8 mm x 20.5 mm / 6.56' x 0.31" x 0.81"



Description LinearOptic 003/006 Diffuse 15°
Art.-No. 12000049
Unit meter (m)
Min. OQ 30
Dimensions 11 mm x 21 mm / 0.43" x 0.83"
Linear lens 15° diffuse for VarioContour 013/016,
(L x H x W) 2 m x 11 mm x 21 mm / 6.56' x 0.43" x 0.83"



Description LinearOptic 003/006 Diffuse 30°
Art.-No. 12000029
Unit meter (m)
Min. OQ 30
Dimensions 9.7 mm x 20.1 mm / 0.38" x 0.79"
Linear lens 30° diffuse for VarioContour 013/016,
(L x H x W) 2 m x 9.7 mm x 20.1 mm / 6.56' x 0.38" x 0.79"



Description LinearOptic 004 Diffuse 10°
Art.-No. 12000042
Unit meter (m)
Min. OQ 30
Dimensions 7.4 mm x 17.8 mm / 0.3" x 0.7"
Linear lens 10° for VarioContour 004/020/024
(L x H x W) 2 m x 7.4 mm x 17.8 mm / 6.56' x 0.3" x 0.7"



Description LinearOptic 004 Diffuse 30°
Art.-No. 12000043
Unit meter (m)
Min. OQ 30
Dimensions 7.4 mm x 17.8 mm / 0.3" x 0.7"
Linear lens 30° for VarioContour 004/020/024
(L x H x W) 2 m x 7.4 mm x 17.8 mm / 6.56' x 0.3" x 0.7"



Description LinearOptic 004 Diffuse 60°
Art.-No. 12000044
Unit meter (m)
Min. OQ 30
Dimensions 7.4 mm x 17.8 mm / 0.3" x 0.7"
Linear lens 60° for VarioContour 004/020/024
(L x H x W) 2 m x 7.4 mm x 17.8 mm / 6.56' x 0.3" x 0.7"



Description LinearOptic 003/006 Diffuse 60°
Art.-No. 12000031
Unit meter (m)
Min. OQ 30
Dimensions 9.5 mm x 20.1 mm / 0.37" x 0.79"
Linear lens 60° diffuse for VarioContour 013/016,
(L x H x W) 2 m x 9.5 mm x 20.1 mm / 6.56' x 0.37" x 0.79"



Description LinearOptic 003/006 Diffuse 90°
Art.-No. 12000032
Unit meter (m)
Min. OQ 30
Dimensions 9.5 mm x 20.1 mm / 0.37" x 0.79"
Linear lens 90° diffuse for VarioContour 013/016,
(L x H x W) 2 m x 9.5 mm x 20.1 mm / 6.56' x 0.37" x 0.79"

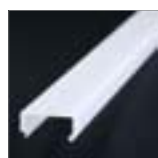
Covers



Description VarioCover 002/004/005 Opal R
Art.-No. 12000011
Unit meter (m)
Min. OQ 30
Dimensions 9 mm x 19.5 mm / 0.35" x 0.77"



Round opal cover for VarioContour 002/004/005/019/020/024
(L x H x W) 2 m x 9 mm x 19.5 mm / 6.56' x 0.35" x 0.77"



Description VarioCover 002/004/005 Opal H²
Art.-No. 12000012
Unit meter (m)
Min. OQ 30
Dimensions 9 mm x 19.5 mm / 0.35" x 0.77"



High square opal cover for VarioContour 002/004/005/020/024
(L x H x W) 2 m x 9 mm x 19.5 mm / 6.56' x 0.35" x 0.77"



Description VarioCover 002/004/005 Opal L²
Art.-No. 12000013
Unit meter (m)
Min. OQ 30
Dimensions 4 mm x 19.5 mm / 0.17" x 0.77"



Low flat opal cover for VarioContour 002/004/005/012/020/024
(L x H x W) 2 m x 4 mm x 19.5 mm / 6.56' x 0.17" x 0.77"



Description VarioCover 002/004/005 Diffuse R
Art.-No. 12000014
Unit meter (m)
Min. OQ 30
Dimensions 9 mm x 19.5 mm / 0.35" x 0.77"



Round diffuse cover for VarioContour 002/004/005/019/020/024
(L x H x W) 2 m x 9 mm x 19.5 mm / 6.56' x 0.35" x 0.77"



Description VarioCover 002/004/005 Diffuse H²
Art.-No. 12000015
Unit meter (m)
Min. OQ 30
Dimensions 9 mm x 19.5 mm / 0.35" x 0.77"



High square diffuse cover for VarioContour 002/004/005/020/024
(L x H x W) 2 m x 9 mm x 19.5 mm / 6.56' x 0.35" x 0.77"



Description VarioCover 002/004/005 Diffuse L²
Art.-No. 12000016
Unit meter (m)
Min. OQ 30
Dimensions 4 mm x 19.5 mm / 0.17" x 0.77"



Low flat diffuse cover for VarioContour 002/004/005/012/020/024
(L x H x W) 2 m x 4 mm x 19.5 mm / 6.56' x 0.17" x 0.77"



Description VarioCover 002/004/005 Clear R
Art.-No. 12000017
Unit meter (m)
Min. OQ 30
Dimensions 9 mm x 19.5 mm / 0.35" x 0.77"



Round clear cover for VarioContour 002/004/005/019/020/024
(L x H x W) 2 m x 9 mm x 19.5 mm / 6.56' x 0.35" x 0.77"



Description VarioCover 003/006 R Clear
Art.-No. 12000002
Unit meter (m)
Min. OQ 30
Dimensions 10 mm x 20 mm / 0.39" x 0.79"

Round clear cover for VarioContour 013/016
(L x H x W) 2 m x 10 mm x 20 mm / 6.56' x 0.39" x 0.79"



Description VarioCover 003/006 R Diffuse
Art.-No. 12000003
Unit meter (m)
Min. OQ 30
Dimensions 10 mm x 20 mm / 0.39" x 0.79"

Round diffuse cover for VarioContour 013/016
(L x H x W) 2 m x 10 mm x 20 mm / 6.56' x 0.39" x 0.79"



Description VarioCover 003/006 R Opal
Art.-No. 12000004
Unit meter (m)
Min. OQ 30
Dimensions 10 mm x 20 mm / 0.39" x 0.79"

Round opal cover for VarioContour 013/016
(L x H x W) 2 m x 10 mm x 20 mm / 6.56' x 0.39" x 0.79"



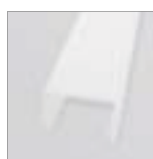
Description VarioCover 007 Clear L²
Art.-No. 12000024
Unit meter (m)
Min. OQ 30
Dimensions 1.5 mm x 21 mm / 0.06" x 0.83"

Flat clear cover VarioContour 007
(L x H x W) 2 m x 1.5 mm x 21 mm / 6.56' x 0.06" x 0.83"



Description VarioCover 007 Opal L²
Art.-No. 12000028
Unit meter (m)
Min. OQ 30
Dimensions 1.5 mm x 21 mm / 0.06" x 0.83"

Flat opal cover VarioContour 007
(L x H x W) 2 m x 1.5 mm x 21 mm / 6.56' x 0.06" x 0.83"



Description VarioCover 007 Opal H²
Art.-No. 12000030
Unit meter (m)
Min. OQ 30
Dimensions 18 mm x 25 mm / 0.71" x 0.98"

High opal cover VarioContour 007
(L x H x W) 2 m x 18 mm x 25 mm / 6.56' x 0.71" x 0.98"



Description LinearCover i03/i04 L² Opal
Art.-No. 12000039
Unit meter (m)
Min. OQ 30
Dimensions 3.6 mm x 37 mm / 0.14" x 1.46"

Opal cover for insert i04 (L x H x W) 2 m x 3.6 mm x 37 mm / 6.56' x 0.14" x 1.46"



Description LinearCover i03/i04 L² Diffuse
Art.-No. 12000036
Unit meter (m)
Min. OQ 30
Dimensions 3.6 mm x 37 mm / 0.14" x 1.46"

Diffuse cover for insert i04 (L x H x W) 2 m x 3.6 mm x 37 mm / 6.56' x 0.14" x 1.46"



Description LinearCover i03/i04 L² Clear
Art.-No. 12000033
Unit meter (m)
Min. OQ 30
Dimensions 3.6 mm x 37 mm / 0.14" x 1.46"

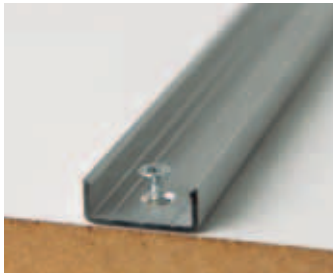
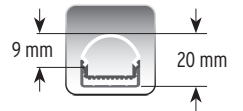
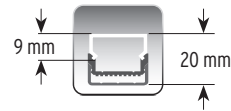
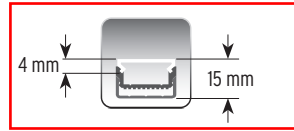
Clear cover for insert i04 (L x H x W) 2 m x 3.6 mm x 37 mm / 6.56' x 0.14" x 1.46"



Description LinearCover 9999 L² Opal
Art.-No. 12000047
Unit meter (m)
Min. OQ 30
Dimensions 17.5 mm x 93.5 mm / 0.69" x 3.68"

Opal low cover for Contour 9999
(L x H x W) 4,450 mm x 17.5 mm x 93.5 mm / 175.20" x 0.69" x 3.68"

VarioContour 005



Schraube einführen
Insert screw



Schraube eindrehen
Screw-in



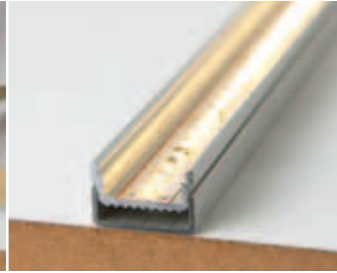
Zuleitung durch den Kabelkanal
Conduct cabling through the channel



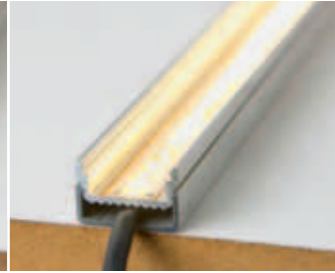
Aufstecken des VarioContour 005
Click in VarioContour 005



Montage mit selbstklebender Rückseite
Mounting with self-adhesive rear side



Akzentbeleuchtung
Mood lighting



Zugentlastung sicherstellen
Ensure strain relief



Endkappe anbringen
Fix end cap



Optionale Montage in der Nut
Optional mounting in a groove



Schöner Abschluss durch Endkappen
Nice finish with end caps



8 mm x 19,5 mm



Bezeichnung	Description	VarioContour 005 Base Profile
Artikelnummer	Art.-No.	10000038
Einheit	Unit	meter (m)
Min. VPE	Min. OQ	30

Al Profil mit Haltenut für Abdeckungen (L x H x B) 2.000 mm x 8 mm x 19,5 mm
Aluminium profile with groove for various covers (L x H x W) 2,000 mm x 8 mm x 19.5 mm



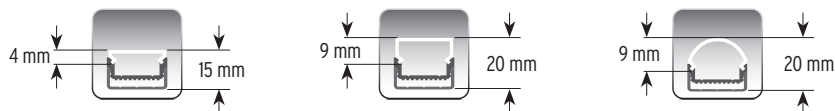
8 mm x 19,5 mm



Bezeichnung	Description	VarioContour 002/004/005 Mounting Profile
Artikelnummer	Art.-No.	10000039
Einheit	Unit	meter (m)
Min. VPE	Min. OQ	30

Al-Montageprofil für VarioContour 002/004/005 (L x H x B) 2.000 mm x 8 mm x 19,5 mm
Aluminium mounting profile for VarioContour 002/004/005 (L x H x W) 2,000 mm x 8 mm x 19.5 mm

VarioContour 005



19,5 mm x 19,4 mm x 6 mm

Bezeichnung Description	VarioCap 005 silver R
Artikelnummer Art.-No.	11000019
Einheit Unit	Stück/piece (pc)
Min. VPE Min. OQ	10

Kunststoffendkappen silber lackiert für VarioContour 005 R (L x H x B) 19,5 mm x 19,4 mm x 6 mm
Silver coated plastic end caps for VarioContour 005 R (L x H x W) 19.5 mm x 19.4 mm x 6 mm



19,75 mm x 19,4 mm x 6 mm

Bezeichnung Description	VarioCap 005 silver H²
Artikelnummer Art.-No.	11000020
Einheit Unit	Stück/piece (pc)
Min. VPE Min. OQ	10

Kunststoffendkappen silber lackiert für VarioContour 005 H² (L x H x B) 19,75 mm x 19,4 mm x 6 mm
Silver coated plastic end caps for VarioContour 005 H² (L x H x W) 19.75 mm x 19.4 mm x 6 mm



14,7 mm x 19,4 mm x 6 mm

Bezeichnung Description	VarioCap 005 silver L²
Artikelnummer Art.-No.	11000021
Einheit Unit	Stück/piece (pc)
Min. VPE Min. OQ	10

Kunststoffendkappen silber lackiert für VarioContour 005 L² (L x H x B) 14,7 mm x 19,4 mm x 6 mm
Silver coated plastic end caps for VarioContour 005 L² (L x H x W) 14.7 mm x 19.4 mm x 6 mm



90 mm x 8 mm x 19,5 mm

Bezeichnung Description	VarioClip 002/004/005 90 mm
Artikelnummer Art.-No.	10000040
Einheit Unit	Stück/piece (pc)
Min. VPE Min. OQ	10

Al Halteklammer für VarioContour 002/004/005 (L x H x B) 90 mm x 8 mm x 19,5 mm
aluminium mounting clip for VarioContour 002/004/005 (L x H x W) 90 mm x 8 mm x 19.5 mm



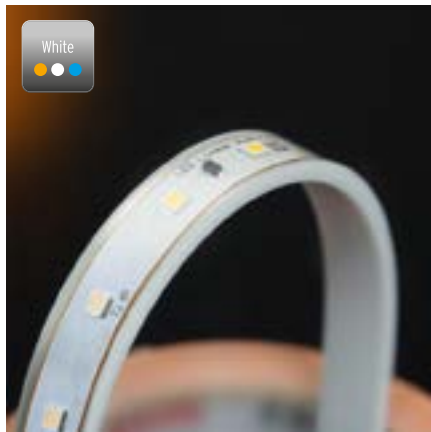
8 mm x 19,4 mm x 29,7 mm

Bezeichnung Description	VarioClip 002/004/005 Plastic*
Artikelnummer Art.-No.	13000032
Einheit Unit	Stück/piece (pc)
Min. VPE Min. OQ	10

Halteklammer aus Kunststoff für VarioContour 002/004/005 (L x H x B) 8 mm x 19,4 mm x 29,7 mm
Plastic mounting clip for VarioContour 002/004/005 (L x H x W) 8 mm x 19.4 mm x 29.7 mm

* Keine Verwendung in Verbindung mit Montageprofil * No use in connection with mounting profile

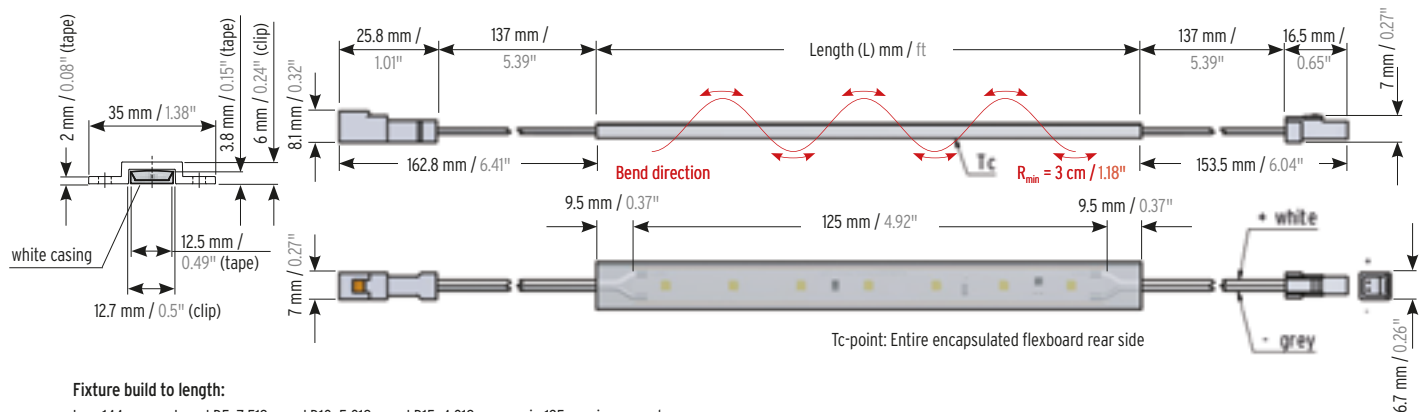
VarioLED™ Flex HYDRA LD White IP67



- ▶ up to 15 W/m / 4.6 W/ft
- ▶ up to 1,880 lm/m / 572 lm/ft
- ▶ One Bin Only: 3 MacAdam
- ▶ up to CRI 95

! CRI up to 95
! up to 147 Lumen/Watt

Dimensions & available lengths



Fixture build to length:

L_{min}: 144 mm; L_{max}: LD5: 7,519 mm; LD10: 5,019 mm; LD15: 4,019 mm; in 125 mm increments
L_{min}: 5.67"; L_{max}: LD5: 24.67"; LD10: 16.47"; LD15: 13.19"; in 4.92" increments

Electrical & output data

Step length	7 LEDs per 125 mm / 4.9"
Voltage	24 Volt (23 V _{min} , 25 V _{max})
Temperature ⁸	T _{Cmin} = -25°C / -13°F, T _{Cmax} = 70°C / 158°F
Storage temperature	T _{Smin} = -30°C / -22°F, T _{Smax} = 85°C / 185°F
Ambient temperature	T _{Amin} = -25°C / -13°F, T _{Amax} = 50°C / 122°F



ONE
BIN
ONLY



Lifetime
L80/B10
> 60,000 h



Photometric code
Wxxx/
339



LM 79 compliant



LM 80 compliant



UV protected



Resistant to solvents



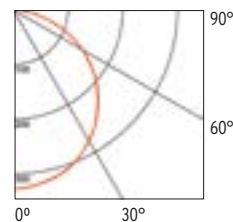
Saltwater resistant



Temporary immersion protection

VarioLED™ Flex HYDRA	LD5	LD10	LD15
Power (W/m / W/ft) ^A	5 / 1.5	10 / 3.1	15 / 4.6
Efficacy (lm/W) ^A @ W850	138	138	147
CRI / R9 @ W930	95 / 65	85 / 25	85 / 25
max. serial run length (m / ft)	7.5 / 24.6	5 / 16.4	4 / 13.1
Current	1.5 A/25 mA per Step	1.5 A/25 mA per Step	1.5 A/25 mA per Step

Color temperature LED tape used		Final color temperature delivered for finished fixture	LD5		LD10		LD15	
			low output		high output		high output	
			lumen/meter (lm/m) ^A		lumen/feet (lm/ft) ^A			
W820	2,000 K	2,500 K	340 / 103	680 / 206	1,090 / 331			
W822	2,200 K	2,900 K	390 / 118	780 / 237	1,250 / 380			
W825	2,500 K	3,300 K	450 / 136	890 / 270	1,430 / 435			
W827	W927	2,700 K	3,800 K	3,600 K	400 / 121	950 / 289	1,510 / 459	
W830	W930	3,000 K	4,300 K	4,300 K	400 / 121	1,000 / 304	1,600 / 487	
W835	W935	3,500 K	5,100 K	4,900 K	420 / 127	1,050 / 319	1,690 / 514	
W840	W940	4,000 K	6,100 K	6,600 K	430 / 130	1,080 / 328	1,720 / 523	
W850		5,000 K	590 / 179	1,180 / 359	1,880 / 572			



^A The given data are typical values. Due to tolerances of the production process and the electrical components, values for light output and electrical power can vary up to 10%.

⁸ The position of the Tc-point is marked on each step of the LED strip. The Tc-point should be measured in thermal equilibrium according to IEC EN 60598-1.



Photo: Florian Bouvet Fournier

IP67 flexible 24 V linear LED strip up to 7.5 m (24.6") in length. Polyurethane encapsulation offering a premium water proof sealing, UV resistance, chemical stability against urban gazes and protection against abrasion. White lower casing for higher efficiency (better light extraction). Delivered with 200 mm (7.87") IP67 mini connectors on both ends. The first choice for homogeneous indirect outdoor or humid cove lighting and other non-directly viewed applications with medium luminaire-surface distance requiring IP67 ingress. Constant voltage LED strip with a step measurement of 125 mm (4.9") and a small LED pitch of 17.86 mm (0.7"). Assembled using state of the art automated Reel to Reel (R2R) production process supporting LED Linear™ Tj Away® thin flexible circuit board technology. In combination with ceramic LED packages a thermal resistivity of 16.3 K/W is achieved for an optimal heat dissipation (junction to instal-

lation surface) which guarantees an outstanding lifetime of > 60,000 hrs L80/B10. Each steps embeds 8 high quality japanese LEDs with 3 step MacAdams (SDCM3) binning centered on target CCT (One Bin Only) with an extended photometric code of Wxxx/339 ensuring an exceptional color consistency over the rated lifetime. Premium color rendition with a CRI of 95 and TM-30-15 up to $R_f = 91 / R_g = 100$ ensuring a remarkable light quality. Consistent light intensity all along the strip length is obtained thanks to active current regulation operated by dedicated integrated circuits (ICs) on each step. Protected against electrostatic discharge $\pm 2,000$ V and polarity miswiring. Fully PWM dimmable for frequency > 0 Hz up to 2 kHz (flicker free for frequency higher than 1.2 kHz according to IEEE P1789 standard). Engineered and produced in Germany.

Order code

Your order code	VarioLED Flex HYDRA	LD__	W_	__	_____	IP67
Order code example	VarioLED Flex HYDRA	LD5	W9	27	7519	IP67

Variant

LD5	LD5
LD10	LD10
LD15	LD15

Color rendering

> 80	8
> 90 (only LD5)	9

Final CCT delivered for finished fixture	Color temperature LED tape used	
2,500 K	2,000 K	20
2,900 K	2,200 K	22
3,300 K	2,500 K	25
3,800 K 3,600 K	2,700 K	27
4,300 K 4,300 K	3,000 K	30
5,100 K 4,900 K	3,500 K	35
6,100 K 6,600 K	4,000 K	40
9,600 K	5,000 K	50

Length*

L_{min} : 144 mm (5.67");
 L_{max} : LD5: 7,519 mm (24.67"); LD10: 5,019 mm (16.47");
 LD15: 4,019 mm (13.19"); in 125 mm (4.92") increments

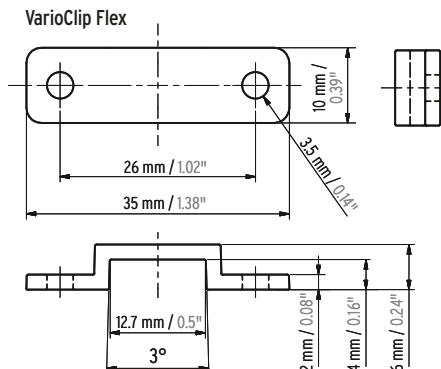
Ingress protection

IP67	IP67
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*max. lengths product ship with male connector only

Please choose your accessories

Mounting	Art.-#
☐ VarioClip Flex 12.7 mm / 0.5" Clear (Set of 50)	13000115
☐ 3M Adhesive tape	18200035
Lead connector from driver	Art.-#
☐ VarioCon Female Mini 2 x 0.34 mm ² , 2 m / 6.56' IP67	15000142
☐ VarioCon Extension Mini 2 x 0.34 mm ² , 2 m / 6.56' IP67	15000144
☐ VarioCon Female Mini Protection Cap Mono IP67	15000218
Recommended power supply	Art.-#
☐ Power Supply Unit IP67	16000153



Recommended control unit	Art.-#
☐ Control System White/IQ-White	16000268-DT6

GLOSSARY

Term	Symbol	Unit	Formula	Explanation
Color rendering index (CRI)	CRI	CRI index		The Color Rendering Index is a quantitative measure of the ability of a light source to reproduce the colors of various objects faithfully in comparison with an ideal or natural light source. The maximum CRI = 100 means the light source radiation is equal to an ideal black body radiator. The lower the value, the worse the body colors are reproduced. The steps are: 1a = 100-90; 1b = 90-80; 2a = 80-70; 2b = 70-60; 3 = 60-40; 4 = 20 - 40
Correlated color temperature (CCT)		Kelvin (K)		The correlated color temperature of a light source is equal to the temperature of an ideal black body radiator.
Efficiency	η	%	$\eta = P_{\text{opt}}/P_{\text{el}}$	The efficiency is the ratio between the total luminous flux emitted by a device and the total amount of input power.
Glare		UGR		Glare influences the visibility of details and the eyesight. Categories are (URG/NB) and (TI/°).
Illuminance	E	Lux (lx)	$E = \Phi/A$	Illuminance is the total incident luminous flux on a surface per unit area.
Lifetime	L80	time (h)		The lifetime describes the time of degradation of the light source, e. g. the time in which the light output decreased to 80%.
Luminance	L	(cd/m ²)	$L = I/A$ ($L = I/A \cos \Phi$)	Luminance is the luminous intensity per unit area of light in a given direction and angle.
Luminance distribution				Luminance distribution is the ratio of different areas and their corresponding luminances.
Luminous color		warm white (< 3,300 K) neutral white (3,300 K - 5,300 K) cold white (> 5,300 K)		Luminance color describes ranges of correlated color temperatures (CCT).
Luminous efficacy	η	lm/W	$\eta = \Phi/P$	Luminous efficacy is the ratio of luminous flux to electrical power consumption of the lamp. The higher the value, the more efficient the lamp.
Luminous flux, luminous power	Φ	Lumen (lm)		Luminous flux is the photometric radiation power or the so-called "light quantity" of a light source, which is evaluated with the spectral sensitivity of the eye.
Luminous intensity	I	Candela (cd)	$I = \Phi/\omega$	Luminous intensity is an expression of the amount of light power emanating from a point source within a solid angle of one steradian.
One Bin Only				Our focus bin is located near the center of the Planckian Curve and within a 3 step MacAdam ellipse.
Tj Away® (LED Linear™ Technology)				The flexible circuit board material (FPC) with optimum copper layer enables advanced thermal management.
Uniformity			$E_{\text{min}}/E_{\text{mid}}$ $L_{\text{min}}/L_{\text{mid}}$	In order to provide a visual task, the uniform distribution of brightness, luminance or illuminance is important in addition to the required lighting level in many cases. The uniformity is calculated by the ratio of minimum to average illuminance.
White point binning				It basically means that the binning of the RGB LEDs is done considering the clean white with a certain colour temperature, which is produced when all RGB single colors are at full power.

STANDARDS AND NORMS

STANDARDS AND NORMS SPECIFICALLY FOR LED'S

The importance of standards and norms specifically for LEDs and LED applications continues to grow steadily in the international market. Since the beginning of LED technology the standards and applications of the conventional lighting industry have been applied for many LED-based products. The safety aspects and the functional properties of LEDs are not entirely comparable with existing norms and standards for the conventional bulbs. The LEDs have to be treated as a separate application with separate standards.

To comply with the EU-Directive, according standards have to be applied. The current norms for LED lighting development include the norm for security of LED modules (DIN EN 62031) on the one hand and the photo biological security norm (DIN EN 62471) on the other hand. In addition to that further norms that will define the performance (DIN EN 62717) of LED and their applications for standard lighting applications are being prepared. These norms will include specific test methods and parameters for further LED developments in the future. Part of these norms will be standard test procedures to estimate the reliability and lifetime of LED modules and LED lamps.

For the certification of products with the CE mark, the products have to fulfill various requirements. For our LED Linear™ products especially the Low Voltage Directive 2014/35/EU and the EMC (Electro Magnetic Compatibility) Directive 2014/30/EU apply. In general the EMC Directive for LED modules can only be examined in a complete system connected to a converter and optionally to a control. In order to meet the Low Voltage Directive requirements, considering the security of LED modules, the norms are DIN EN 62031 and DIN EN 62471, which all LED Linear™ products adhere to.

Additionally, LED Linear™ meets the following european directives:

2009/125/EU (Ecodesign)

2011/65/EU (RoHS)

2012/19/EU (WEEE)

Some manufacturers of fixtures with LED modules deliver their products with an unstandardized technical documentation that is not restricted to any specific guideline. The manufacturer defines the parameters for the product and what will be provided with the customer. Besides the typical photometric and electrical data, these also include the reliability and lifetime of the product. Furthermore, it is yet to be determined how and under what circumstances these parameters are defined. This makes it difficult for the customers to compare products from different manufacturers with each other and to decide the most suitable product for their application.

For this reason another norm (DIN EN 62717) is in progress. This norm will specify the performance and the reliability of LED modules. It will apply for LED modules that emit white light with organic LEDs for general illumination. For LED lamps the norm DIN EN 62722 is being created. It will determine the specific requirements for LED lamps. The data supplied by LED Linear™ already covers most of the relevant characteristics of drafted norms.

LED Linear™ fulfills the following standards:

US-Market/UL Standard	Can-Market/CSA Standard
UL 8750	CSA C22.2#250
UL 2108	
Confirmation by certificates	
EU-Market	
LED modules	TM-30-15
	DIN EN 62031
	DIN EN 62471-1
LED luminaires	DIN EN 60598-1
	DIN EN 62722
	EN 55015
	EN 60100
	EN 61547
	EN 62493
	DIN EN 62717
Lifetime +	LM79
Reliability +	LM80
Measurement requirements	ANSI C78.377-2008
	TM-21-11
	IES LM-84
	IES LM-28

LUMINAIRE CLASSIFICATION ACCORDING TO DIN 5040

LED Linear™ luminaires are classified according to DIN 5040 and thus represent a simple tool for the lighting design. The corresponding indication of the subdivision can be found in the relevant data sheet of the optic or of the luminaire. With the luminaire classification according to DIN 5040 lights are classified according to the distribution of the luminous flux in the upper and lower hemisphere of the luminaire. For this a standard room S was defined which space is based on the roomindex $k = 1.25$ and a standard regular arrangement of luminaires, as seen in Figure 1. The definition of the roomindex k depending on the reflectance combinations for ceiling, walls and floor can be found in the publication LITG 3.5.

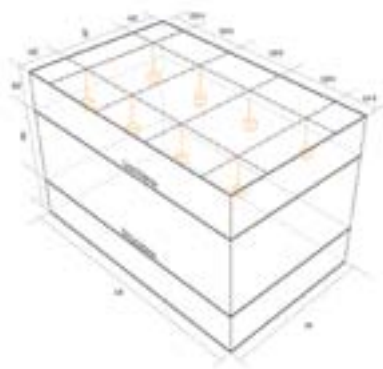


Figure 1 - Standard room S with luminaire standard arrangement in accordance with DIN 5040

The total luminous flux of the luminaire Φ_L is composed of the partial luminous fluxes in the upper hemisphere Φ_o and the lower hemisphere Φ_u . A part of the luminous flux in the lower hemisphere Φ_u falls directly on the used space of the standard room and forms the luminous flux Φ_{su} which generates the direct illuminance E_{dir} there. This illuminance is considered usable illuminance in order to realize, for example, a task lighting (office work). Similarly, the ceiling luminous flux in the standard room is described with Φ_{so} .

Based on the values defined above, the following parameters for the luminous flux distribution of a luminaire can be defined:

$\varphi_u = \Phi_u / \Phi_L$ Luminous flux in the lower hemisphere

$\varphi_o = \Phi_o / \Phi_L$ Luminous flux in the upper hemisphere

Further are defined:

$\varphi_{su} = \Phi_{su} / \Phi_u$ Usable luminous flux in the standard room S

$\varphi_{so} = \Phi_{so} / \Phi_o$ Luminous flux on the ceiling in the standard room S

By integrating the light intensity distribution, the relative partial luminous fluxes are determined and the luminaire can be categorized in a DIN 5040 table, as shown in Figure 2. The code letter informs about the basic nature of the luminaires light distribution:

- A = direct illumination
- B = predominantly direct illumination
- C = direct-indirect illumination
- D = predominantly indirect illumination
- E = indirect illumination

The 1. code number arranges the luminaires according to the proportion of the direct luminous flux on the usable working plane in the standard room S φ_{su} at the spatial luminous flux in the lower hemisphere φ_u (Direct illuminating component).

The 2. code number arranges the luminaires according to the proportion of the luminous flux on the ceiling of the standard room S φ_{so} at the spatial luminous flux in the upper hemisphere φ_o (Indirect illuminating component).

If there is no luminous flux in the upper or lower hemisphere of the luminaire, the corresponding code is specified with 0.

Code letter	φ_u	φ_o	1. Code number	φ_{su}	2. Code number	φ_{so}
A	$0.9 \leq \varphi_u \leq 1.0$	$0 \leq \varphi_o \leq 0.1$	0	$\varphi_{su} = 0$	0	$\varphi_{so} = 0$
B	$0.6 \leq \varphi_u \leq 0.9$	$0.1 \leq \varphi_o \leq 0.4$	1	$0 \leq \varphi_{su} \leq 0.3$	1	$0 \leq \varphi_{so} \leq 0.3$
C	$0.4 \leq \varphi_u \leq 0.6$	$0.4 \leq \varphi_o \leq 0.6$	2	$0.3 \leq \varphi_{su} \leq 0.4$	2	$0.5 \leq \varphi_{so} \leq 0.7$
D	$0.1 \leq \varphi_u \leq 0.4$	$0.6 \leq \varphi_o \leq 0.9$	3	$0.4 \leq \varphi_{su} \leq 0.5$	3	$0.7 \leq \varphi_{so} \leq 0.9$
E	$0 \leq \varphi_u \leq 0.1$	$0.9 \leq \varphi_o \leq 1.0$	4	$0.5 \leq \varphi_{su} \leq 0.6$	4	$0.9 \leq \varphi_{so} \leq 1.0$
			5	$0.6 \leq \varphi_{su} \leq 0.7$		
			6	$0.7 \leq \varphi_{su} \leq 0.8$		
			7	$0.8 \leq \varphi_{su} \leq 0.9$		
			8	$0.9 \leq \varphi_{su} \leq 1.0$		
A			6		0	

Figure 2 - Classification of luminous flux distribution of the luminaire in accordance with DIN 5040

An example, for a luminous flux distribution classified in accordance with DIN 5040 is shown in Figure 3.



Figure 3 - Example for a luminous flux distribution A60 according DIN 5040

PHOTOMETRIC CODE ACCORDING TO DIN EN 62717

All LED lamps of LED Linear™ are marked with a photometric code on the datasheet. The photometric code provides information on photometric quantities of the used LED modules with white light emitting LEDs. The first 3 numbers indicate the general color rendering

(CRI index) and color temperature (CCT) of the modules. The subsequent 3 numbers handle the changes of color coordinates based on MacAdams ellipses and the lumen maintenance depending on the operating time.

Key for the photometric code:

Letter	1. Code number		2. + 3. Code number		4. Code number		5. Code number		6. Code number	
White	Code	Initial CRI-Index	Code	Initial correlated color temperature in Kelvin	Code	Initial MacAdams ellipsis	Code	MacAdams after 25% of the operating time (max. 6,000 h)	Code	Remaining lumen output after 25% of the operating time (max. 6,000 h)
W	7	70 - 79	20	2,000 K	2	2 step MacAdams ellipse	2	2 step MacAdams ellipse	7	$\geq 70\%$
	8	80 - 89	22	2,200 K	3	3 step MacAdams ellipse	3	3 step MacAdams ellipse	8	$\geq 80\%$
	9	90 - 99	24	2,400 K	4	4 step MacAdams ellipse	4	4 step MacAdams ellipse	9	$\geq 90\%$
			25	2,500 K	5	5 step MacAdams ellipse	5	5 step MacAdams ellipse		
			27	2,700 K						
			30	3,000 K						
			35	3,500 K						
			40	4,000 K						
			50	5,000 K						
W	8		27		3		3		9	

Example of the photometric code based on the VarioLED™ Flex HYDRA HD15 with a correlated color temperature of 2,700 K and a color rendering index of CRI > 85. The photometric code always starts with "W" White.

Wxxx/
339

W827 / 339



Figure 4 - VarioLED™ Flex HYDRA HD15 W827

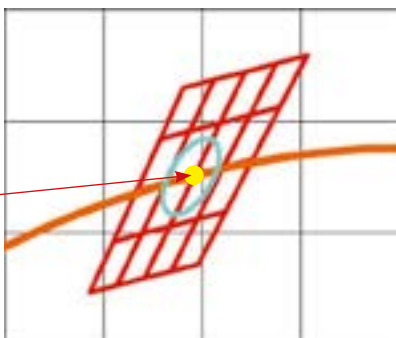
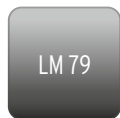


Figure 2 - 3 step MacAdams ellipse and 16 ANSI binnings for 2,700 K

LM 79 AND LM 80



LM 79 compliant



LM 80 compliant

LM 79 and LM 80

Light emitting diodes (LEDs) are a relatively new and unique source for outdoor lighting. They are more reliant upon effective thermal management than any previous source, more of a directional source, and have to be designed and tested as an entire lighting system.

Therefore, LEDs require new guidelines and practices for testing. There also needs to be a correlation between how LED manufacturers test their LEDs and how fixture manufacturers test their LED fixtures. In response, the Illuminating Engineering Society of North America or IESNA developed LM-79-08 and LM-80-08 for LED fixture and LED device testing.

As a high quality LED Linear™ lighting module and system supplier, LED Linear™ remains at the forefront of LED Linear™ lighting technology.

LED Linear™ only uses high quality LED from Japanese manufacturers, who apply LM-80-08 to the LEDs delivered to LED Linear™.

LED Linear™ applies LM-79-08 to their LED lighting modules, systems and fixtures.

The IESNA

The IESNA is a 100+ year old lighting industry group with membership that includes manufacturers (both sources and fixtures), lighting in IESNA designers and architects, utilities, and others affiliated with lighting such as consultants, government, researchers and educators.

LM-80-08 for the LEDs themselves

LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources was published by the IESNA Solid State Lighting (SSL) Subcommittee in the third quarter of 2008. Simply referred to as LM-80, this document covers lumen maintenance measurement for inorganic LED-based packages, arrays, and modules; it does not cover any other aspect of LED performance.

One of the key reasons for the development of LM-80 is due to differences in measuring LED performance criteria. LED manufacturers typically measure LEDs in pulse mode operation with no heat sink. The pulse is very short - typically 10 or 20 milliseconds (that is, thousands of a second) - which will not heat up the LED; therefore, no heat sink is required and T_j can be assumed to be equal to ambient temperature T_A (typically held constant at 25°C). This is useful for doing high yield LED measurements quickly. This also explains why LED manufacturer data sheets typically show LED performance for T_j = 25°C.

In contrast, LED fixture manufacturers measure LED performance in situ, which means while it is in their fixture. Under these conditions, the LED is operated in constant DC mode and there are typically numerous LEDs configured together often in close proximity to one another, elevating T_j above 25°C. This elevated T_j affects the photometric and colorimetric performance of the LEDs. In order to compare "apples to apples", a new testing criteria needed to be developed: LM-80-08.

LM-80-08 prescribes uniform test methods for LED manufacturers under controlled conditions for measuring LED lumen maintenance while controlling the LEDs T_S or case temperature, the DC forward voltage and forward current to the LED. LM-80-08 requires 55°C, 85°C and one other T_S chosen by the LED manufacturer. It also requires lumen maintenance data out to at least 6,000 hours of constant DC mode (not pulse mode) operation 4.

Many of LED Linear™ Japanese LED suppliers chose 120°C for the third T_S for their LED and they have recorded data out to 10,000 hours which is the preferred duration in LM-80. Based upon LM-80-08 data, LED manufacturers then extrapolate lumen maintenance out to ten thousands of hours.

Our LED suppliers go out to 60,000 hours and beyond. While LM-80-08 does not specify the extrapolation method, many LED manufacturers use more conservative exponential extrapolation due to the exponential behavior of LEDs and most electronic components. The SSL Subcommittee is working on TM-21 which will standardize this extrapolation method.

The data resulting from LM-80-08 measurements are matrices of lumen maintenance values. LED fixture manufacturers use this data in combination with their UL in-situ thermal testing to predict the lumen maintenance of the LEDs when used in their fixtures and, subsequently, the lumen maintenance of the LED fixtures themselves. For example, if we measure 85°C T_S at the hottest LED Linear™ LED in one of our fixtures, then we look up that particular data set from our Japanese suppliers to determine the LED fixture's lumen maintenance based upon and correlated with the LEDs lumen maintenance at that same T_S. Fixture manufacturers also use the data to predict LED color stability over time at the various T_S temperatures.

LM-79-08 for the LED fixture

CIE S 025 test method for LED lamps, LED luminaires and LED modules.

LED lumen maintenance and color stability are only part of the puzzle. It is helpful to characterize the performance of LEDs in fixtures so that the entire system is considered. That's where LM-79-08 comes in.

LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products was published by the IESNA Solid State Lighting (SSL) Subcommittee in the first quarter of 2008. LM-79-08 covers photometric and colorimetric performance as well as electrical power measurements for inorganic LED fixtures 5. LM-79-08 prescribes uniform test methods for LED fixture manufacturers under controlled conditions using LED fixtures as they would be manufactured for production.

Unlike traditional sources which are typically tested using relative photometry with test lamps and ballasts, LED fixtures are tested using absolute photometry with production LEDs and fixtures in the orientation in which it will be installed to ensure a more true test of LED performance when in situ. As previously discussed, LEDs operated in situ will perform differently due to the elevated T_j which will be further impacted by fixture orientation and thermal conditions; if the LED array or module were removed from the fixture, its performance would change. This is precisely why absolute photometry is a must for LED fixtures.

LM-79-08 testing is typically performed with either an integrating sphere for all photometric and colorimetric measurements or an integrating sphere in combination with a goniophotometer. The integrating sphere is recommended for colorimetric measurements; alternately, a goniopspectroradiometer or goniocolorimeter may be used. LED Linear™ has an integration sphere for all colorimetric, radiometric and photometric measurements for single LEDs and a custom designed goniophotometer lab and equipment where we test LED fixtures following LM-79-08 procedures. We also test key LED fixtures in independent DOE approved labs - look for the .ies photometric files on our web site that indicate LM-79-08.

In 2015 CIE S 025 was published that focuses on test methods for LED fixtures.

SECURITY AND ENVIRONMENTAL PROTECTION

Protection classes with regard to insulation

Protection class	Symbol	Meaning
I		Luminaires in which protection is based not solely on the basic insulation but also on a protective earth conductor that is connected to exposed conductive parts.
II		Luminaires in which protection is based not solely on the basic isolation but also on an additional or reinforced insulation or which there is no protective earth connection.
III		Luminaires in which protection is based not solely on safety extra low voltage (SELV/PELV). There must be no voltage higher than the safety extra-low voltage in the luminaire. 50 V AC, 120 V DC

The protection class of a luminaire for mains voltage indicates the way in which an electric shock to the user is prevented in the event of a fault. A luminaire in protection class II does not have a protective earth so it places great demands on the design because in this case double isolations have to be available on electrically conductive parts.

More protection classes

Symbol	Meaning
	Luminaires with this identifier are suitable according to DIN VDE 0710 Part 14 for installation in and on furniture, the material of which have normal or reduced flammability as per DIN 4102.
	Luminaires with this identifier are suitable according to DIN VDE 0710 Part 14 for installation in and on furniture with unknown flammability.

The glow wire test

Symbol	Meaning
960°C	For general-purpose luminaires installed in enclosed horizontal escape routes and stairwells.
850°C	For general-purpose luminaires installed in buildings open to the general public if the entire visible area of the ceiling covered by the luminaires is more than 25% of the building area.
750°C	For other general-purpose luminaires installed in buildings open to the general public

External parts of fixed or suspended luminaires must be subjected to a glow wire test at the temperatures indicated above, based on their location and purpose. The above values are binding for France, otherwise a temperature of 650°C is usual.

More information and specifications can be taken from the DIN EN 60598-1.



ETL-Label

Historically, structures and contents of the safety standards in the U.S. have developed different to the standards in the European market. The ETL label is a mark of quality that guarantees the proof of compliance with the relevant UL standards in the United States and the Canadian Standards in accordance with CSA standard. This label has a high acceptance in the U.S. and Canada. It is attributed to the Electrical testing laboratories, which are established by Thomas Alva Edison in 1896. The ETL Label is the second largest and fastest-growing certification label in the North American market.



German "Elektrogesetz"

The icon with crossed-out wastebasket on a EEE states that the product should not be disposed of with household waste at its end of life. Instead, it can be returned free of charge at an appropriate collection point nearby. Please check the available collection points in your city or local government. If the old unit contains personal data, please act responsibly and delete before disposing of it.

The registration number of LED Linear: WEEE-Reg.-Nr. DE 12683737.



CE label

The CE label confirms that the product complies with the relevant EU directives, such as the Low-Voltage Directive 2014/35/EU or the EMC directive 2014/30/EU. Of course, LED Linear™ luminaires meet the requirements of the relevant EC directives and therefore carry the CE label.



Compliance with safety regulations and other standards

Luminaires should not only look good and provide good light, they must also be protected against injury and fire. Safety is guaranteed by compliance with a variety of regulations and standards. Luminaires from LED Linear™ meet all relevant national and international regulations and this can be indicated by approval marks from independent test institutes such as the ones shown above. This is documented by additional approval marks, such as the VDE or ENEC certificate, if the customer wishes..

Safety of the human eye with LED products

In 2006 the International Electrotechnical Commission (IEC) has committed the IEC 62471:2006 to set up the photobiological safety with lamps and lamp systems. This standard can be applied to LEDs, too.

In Germany and Europe the DIN EN 62471 must be applied to lamps and lamp systems. In this standard different risk groups are defined. The risk group classification includes the different spectral ranges and exposure time which takes effect to the human eye, especially for the blue and white light emitting LEDs. According to this definition most of our products are within the exempt group. In this case additional markings and protective actions are not necessary.

Nevertheless, never look into the light source directly. Keep in mind that increasing the current or adding optical components can change the risk group and can damage the human eye.

EU-ENERGY LABEL

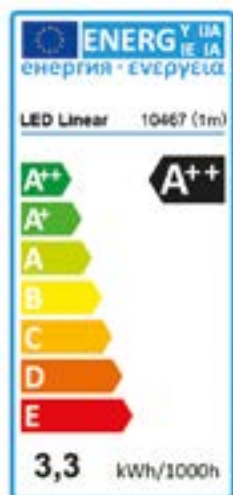
EU Regulation 874/2012 – energy labeling of electrical lamps and luminaires

The EU Regulation 874/2012 supplementing Directive 2010/30/ EU of the European Parliament deals with energy labeling of electrical lamps and luminaires. The stated aim of Regulation 874/2012 is to promote efficient products through clear information regarding their energy efficiency.

In the European Union energy-related products, such as lighting equipment, are marked with a label for electric power consumption – the EU Energy Label. The Energy Label for lamps provides information about the energy efficiency class, the respective lamp is assigned, and what demand for energy it has in 1,000 operating hours. This ensures an easy comparison of products in terms of energy consumption in the competition.

For us it is important to develop environmentally designed products, for thereby contributing to the sustainable conservation of resources. LED Linear develops and manufactures high quality products, which are characterized by high energy efficiency and a long lifetime. Starting with the product idea to the recycling of our products, we ensure that the environmental impact will be reduced continuously throughout the entire product life cycle.

- The EU Energy Labels are ready for download on the relevant product page at www.led-linear.com.
- EU Energy Label based on VarioLED Flex HYDRA SLD3 W850 with a product length of 1 m.



REACH AND ROHS COMPLIANCE

Since 1 June 2007 the regulation (EC) no. 1907/2006, the so-called REACH regulation (REACH-Registration, Evaluation, Authorisation and Restriction of Chemicals) has been in force.

To put it in plain words, the REACH regulation distinguishes between chemical products ("substances on their own and in preparations") and non-chemical products ("substances in articles").

LED Linear™ GmbH as a manufacturer of non-chemical products (linear lighting solutions with LED) is a "producer of articles" according to the REACH regulation. As such a producer LED Linear™ GmbH would be in principle obliged to (pre-)register if, when using our products, chemical substances were released under normal and reasonably foreseeable conditions. But as this is not the case, only the provisions concerning the "candidate list" (substances of very high concern) are important for us.

According to these provisions, producers and importers of articles containing a substance from the "candidate list" in a concentration above 0.1 % by mass per article must provide their professional recipients with sufficient information to allow safe use of the products including, as a minimum, the name of that substance. If the articles contain more than 1 t/a of the substance, the European Chemicals Agency (ECHA) must be informed.

The candidate list according to article 59 (1, 10) REACH (EC regulation no. 1907/2006) has been published in the meantime (see internet address of the European Chemicals Agency (ECHA) <http://echa.europa.eu/>). However, we do not have any information that substances from the candidate list are contained in a concentration above 0.1 % by mass per article in the products delivered to you.

We want to clarify that for the manufacture of our products chemicals are of course used. If they contain substances liable to registration, the duty to register, however, exclusively applies to our suppliers and not to us as a "downstream user". We have contacted the corresponding suppliers to ensure that we are supplied, if possible, with the required chemicals.

We know, of course, the requirements of the RoHS guideline directive concerning lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ethers (PBDE) and their implementation into national law.

Our products are always conform to the current RoHS-policy.



PROTECTION GRADES FOR CONTACT, FOREIGN MATTER AND WATER PROTECTION ACCORDING TO DIN EN 60529 (IP CODE)

First index IP	Protection against the ingress of solid foreign objects (Importance for the protection of the operating medium)	Protection against contact and access to hazardous parts (Importance for the protection of persons)
0	 Unprotected against solid objects	Unprotected against contact
1	 Protection against large solid objects > 1.97" / 50 mm	Protection against access with back of the hand
2	 Protection against mid-sized solid objects > 0.49" / 12.5 mm	Protection against access with finger
3	 Protection against small solid objects > 0.1" / 2.5 mm	Protection against access with tool
4	 Protection against granular objects > 0.04" / 1 mm	Protection against access with wire
5	 Dust protection (ingress of dust not impossible)	Protection against access with wire
6	 Dust tight (no ingress of dust)	Protection against access with wire
Second index IP	Protection against contact and access to hazardous parts (Importance for the protection of persons)	Rough environments protection
0	 Unprotected against water	 UV protected
1	 Protection against vertically falling drops of water	 Resistant to solvents
2	 Protection against diagonally fallings drops of water (up to 15° tilt)	 Saltwater resistant
3	 Protection against spray water	
4	 Protection against splashing water from all directions	
5	 Protection against water jets	
6	 Protection against powerful water jets and flooding	
7	 Protection against temporary immersion	
8	 Protection against permanent submersion under defined conditions	

IK-CLASSIFICATION ACCORDING TO DIN EN 62262

The IK code is used for the classification of protection in terms of mechanical force or shock resistance is the IK code used. The protection class is alpha-numeric and is specified by the letters "IK" directly followed by a two-digit code.

Example: IK10 - A luminaire with this IK-classification was successfully tested in a shock resistance to the force of 20 joules.

Some LED Linear luminaires are shockproofed and resistant to external forces through their PU-encapsulation. All luminaires tested according to the DIN EN 62262 standard are marked on the relevant data sheet with an IK10 Icon.

DIN EN 62262 CODE

Shock resistant up to an impact energy of:
(specification in Joule)

 0.00 Joule	 1.00 Joule
 0.15 Joule	 2.00 Joule
 0.20 Joule	 5.00 Joule
 0.35 Joule	 10.00 Joule
 0.50 Joule	 20.00 Joule
 0.70 Joule	

TECHNICAL SIGNS

IP RATING

IP00	IP rating 00
IP10	IP rating 10
IP20	IP rating 20
IP40	IP rating 40
IP54	IP rating 54
IP67	IP rating 67
IP68	IP rating 68

MOUNTING

	Pendant direct
	Recessed
	Surface-mounted
	In-ground
	Ground surface-mounted
	Pendant direct/indirect

POWER SUPPLIES

12 V DC	Constant voltage 12 V
24 V DC	Constant voltage 24 V
48 V DC	Constant voltage 48 V
CC	Constant Current

OPTICS

Lenses

	Linear lens 10°
	Linear lens 30°
	Linear lens 60°
	Linear lens 90°
	Spot lens 6°
	Spot lens 14°
	Spot lens 15°
	Spot lens 30°
	Spot lens 60°
	Spot lens 12° x 48°

BENDING RADIUS

	Top View $R_{min} = 15 \text{ cm} / 5.9''$
	Side View $R_{min} = 15 \text{ cm} / 5.9''$

STANDARDS

LM 79	LM 79 compliant
LM 80	LM 80 compliant

PROFILES

	Contour 001
	Contour 002
	Contour 004
	Contour 005
	Contour 007
	Contour 012
	Contour 013
	Contour 016
	Contour 019
	Contour 020
	Contour 022
	Contour 024
	Contour 034
	Contour 036
	4242 incl. i04
	4262 incl. i04
	Contour 9999

COLOR RENDERING INDEX

CRI 80+	CRI 80+
CRI 85+	CRI 85+
CRI 90+	CRI 90+
CRI 95+	CRI 95+

MOUNTING ACCESSORIES

	Contour VENUS SV
	Contour VENUS TV
	Adjustable bracket
	Pendant
	Surface-mounted

LIFETIME

	Lifetime (L80) (20 % less luminous intensity after 60,000 hours)
---	--

CONTROLS

	Power control system
---	----------------------

Covers

	Round (R) opal
	Round (R) clear
	Round (R) diffuse
	High Square H² opal
	High Square H² clear
	High Square H² diffuse
	Low Square L² opal
	Low Square L² clear
	Low Square L² diffuse

Reflectors

	Reflector 65°
	Reflector 25°
	Wall washer

TECHNICAL SIGNS

PENDANT DIRECT

	Wall washer
	asymmetric diffuse
	asymmetric
	wide / diffuse
	wide 65°
	deep wide 60°
	deep 25°
	narrow beam / grazing light
	double asymmetric

RECESSED

	Wall washer
	asymmetric diffuse
	asymmetric
	wide / diffuse
	wide 65°
	deep wide 60°
	deep 25°
	narrow beam / grazing light
	double asymmetric

SURFACE-MOUNTED

	Wall washer
	asymmetric diffuse
	asymmetric
	wide / diffuse
	wide 65°
	deep wide 60°
	deep 25°
	narrow beam / grazing light
	double asymmetric

LIGHT COLOR

	True Color
	Weiß
	IQ White
	RGB
	RGBW
	Color (R/G/B)

PENDANT DIRECT/INDIRECT

	indirect 20% 40% 60% 80%
	direct 80% 60% 40% 20%
	indirect direct asymmetric
	indirect direct wall wash
	indirect symm. direct double asym.
	indirect

IN-GROUND

	Orientation
	Wallgrazing
	Wall washer

GROUND SURFACE-MOUNTED

	Wallgrazing
	Wall washer

LED LINEAR LABORATORY: CLIMATE AND TEMPERATURE TEST CHAMBERS

To ensure and test our high level of product reliability and lifetime we have expanded our laboratory with modern climate and temperature shock test chambers. To have an impression of the performance of the chambers a few technical details are shown below.

Climatic Test Chamber 2 x VCL4010

Temperature mode

- Temperature range: -40°C - +180°C / -40°F - +356°F
- Temperature deviation: $\pm 1^\circ\text{C}$ / $\pm 33.8^\circ\text{F}$
- Temperature homogeneity: $\pm 2^\circ\text{C}$ / $\pm 35.6^\circ\text{F}$

Climate mode

- Temperature range: 10°C - 95°C / 50°F - 203°F
- Humidity range: 10% - 98%
- Humidity range: $\pm 3\%$
- Temperature deviation: $\pm 0.5^\circ\text{C}$ / $\pm 32.9^\circ\text{F}$
- Temperature homogeneity: $\pm 1.5^\circ\text{C}$ / $\pm 34.7^\circ\text{F}$

General info

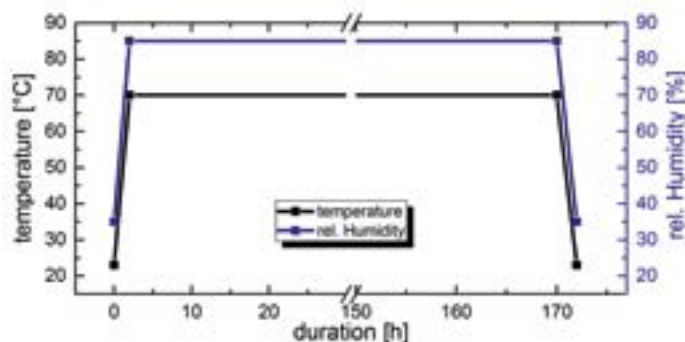
- Testing volume: 100 l
- Dimension of test chamber: 50 cm x 49 cm x 40 cm
1.64' x 1.61' x 1.31' (H x W x L)
- 1 opening for electrical contacts
- Annual maintenance and calibration

Changing rate:

- Heating: 3.5°C/min / 3.5°F/min
- Cooling: 5°C/min / 5°F/min

Typical tests at LED Linear™

- Temperature HumidityBias Test (THBT)
- 70°C / 158°F & 85 % r. H.
- Severity level depends on duration
- I: 168 h • II: 504 h
- III: 1000 h • IV: 2000 h



Climatic Test Chamber 1 x VC³4100

Temperature mode

- Temperature range: -42°C - 180°C
-43.6°F - +356°F
- Temperature deviation: $\pm 1^\circ\text{C}$ / $\pm 33.8^\circ\text{F}$
- Temperature homogeneity: $\pm 2^\circ\text{C}$ / $\pm 35.6^\circ\text{F}$

Climate mode

- Temperature range: 10°C - 95°C / 50°F - 203°F
- Humidity range: 10% - 98%
- Humidity range: $\pm 3\%$
- Temperature deviation: $\pm 0.5^\circ\text{C}$ / $\pm 32.9^\circ\text{F}$
- Temperature homogeneity: $\pm 1.5^\circ\text{C}$ / $\pm 34.7^\circ\text{F}$

General info

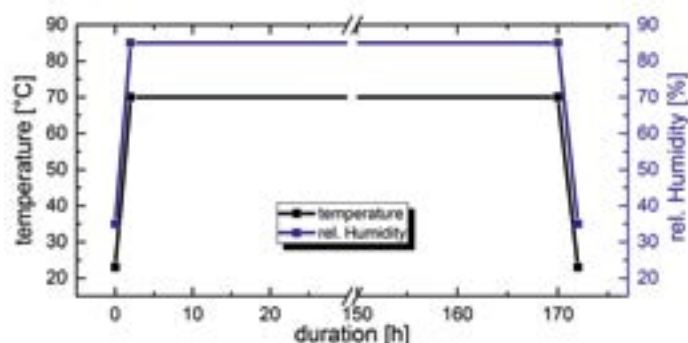
- Testing volume: 990 l
- Dimension of test chamber: 95 cm x 110 cm x 95 cm
3.12' x 3.61' x 3.12' (H x W x L)
- 2 openings for electrical contacts
- Annual maintenance and calibration

Changing rate:

- Heating: 3.5°C/min / 3.5°F/min
- Cooling: 5°C/min / 5°F/min

Typical tests at LED Linear™

- Temperature HumidityBias Test (THBT)
- 70°C / 158°F & 85 % r. H.
- Severity level depends on duration
- I: 168 h • II: 504 h
- III: 1000 h • IV: 2000 h



Temperature Shock Chamber VT³701252

Hot chamber



- Temperature range: +50°C - +220°C
+122°F - +428°F
- Temperature deviation: $\pm 1^\circ\text{C}$ / $\pm 33.8^\circ\text{F}$
- Temperature homogeneity: $\pm 2^\circ\text{C}$ / $\pm 35.6^\circ\text{F}$

Changing rate:

- Heating: 14 K/min

Cold chamber



- Temperature range: -80°C - +70°C
-112°F - +158°F
- Temperature deviation: $\pm 1^\circ\text{C}$ / $\pm 33.8^\circ\text{F}$
- Temperature homogeneity: $\pm 2^\circ\text{C}$ / $\pm 35.6^\circ\text{F}$

Changing rate:

- Heating: 2 K/min
- Cooling: 6.3 K/min

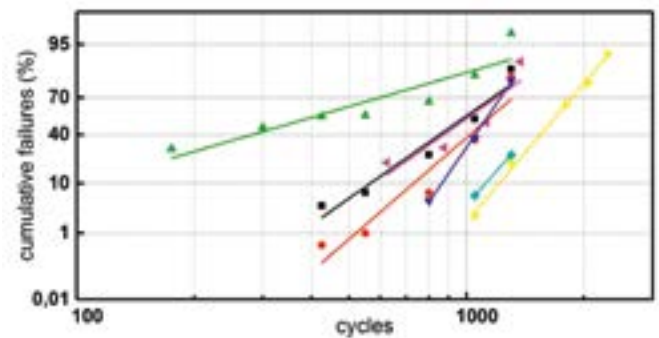


Schematic

Typical tests at LED Linear™



- Testing of interconnections of components
- -25°C; 85°C / -13°F; 185°F; 30 min; 24 cycles
- reliability of the solder joints
- -55°C; 125°C / -67°F; 257°F; 30 min; $\leq 3,000$ cycles
- (weibull distribution)



NEW

PHOTOMETRIC MEASUREMENTS

LED LINEAR SERVICE OFFER: IN HOUSE LABORATORY PHOTOMETRIC MEASUREMENTS

Since 2018 we are able to offer you photometric measurements and several tests as a new service of our in house laboratory. The main measurement and test equipment is shown below.

For applying these or additional measurements and tests do not hesitate to ask your contact partner of LED Linear™.

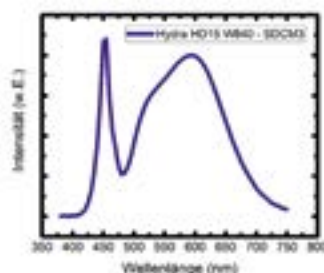
Lighting Measurements^A

Goniometer

- Measurement of the light distribution curve up to $\gamma = 120^\circ$ ^A
- Luminous flux
- Measurement of angle dependent colorimetric values
- Photometric results available as IES- or EULUMDAT Files

Integration sphere

- Luminous flux
- Measurement of colorimetric values like: CCT, CRI etc.
- Measurement of spectral radiant flux



Climatic Tests and Thermal Shock^B

Temperature mode



- Temperature range: $-40^\circ\text{C} - +180^\circ\text{C}$ / $-40^\circ\text{F} - +356^\circ\text{F}$
- Temperature deviation: $\pm 1^\circ\text{C}$ / $\pm 33.8^\circ\text{F}$
- Temperature homogeneity: $\pm 2^\circ\text{C}$ / $\pm 35.6^\circ\text{F}$

Changing rate

- Heating: $3.5^\circ\text{C}/\text{min}$ / $38.3^\circ\text{F}/\text{min}$
- Cooling: $5^\circ\text{C}/\text{min}$ / $41^\circ\text{F}/\text{min}$

Climate mode



- Temperature range: $10^\circ\text{C} - 95^\circ\text{C}$ / $50^\circ\text{F} - 203^\circ\text{F}$
- Humidity range: 10% - 98%
- Humidity range: $\pm 3\%$
- Temperature deviation: $\pm 0.5^\circ\text{C}$ / $\pm 32.9^\circ\text{F}$
- Temperature homogeneity: $\pm 1.5^\circ\text{C}$ / $\pm 34.7^\circ\text{F}$

Thermal shock on demand

Thermography^C

- Thermographic measurement of devices and components



Template Test Report

^{A)} Measurements according to DIN EN 13032-4:2015-08, CIE S 025:2015; DIN EN ISO/IEC 17025 (works in progress)

^{B)} Diverse Standards possible, please ask

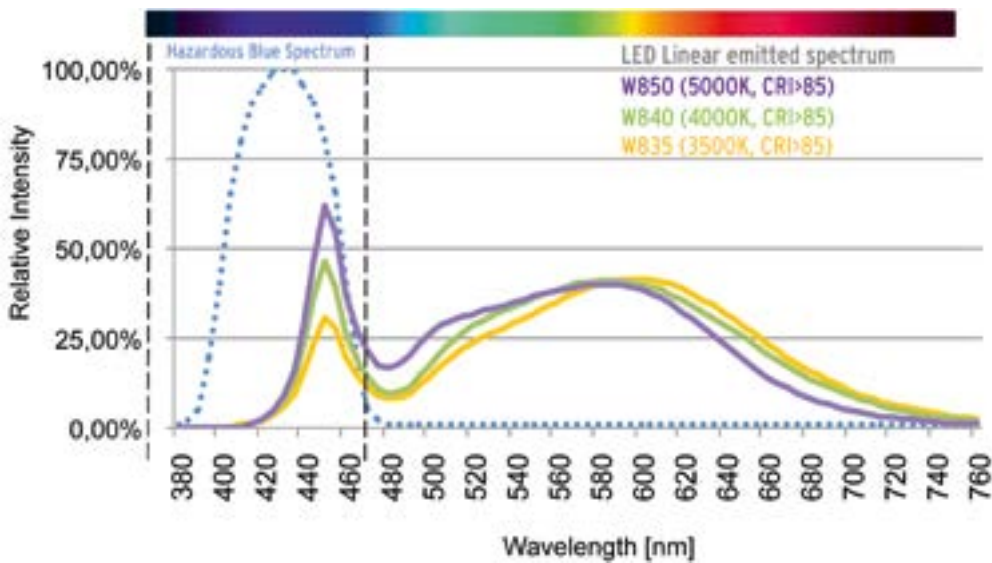
^{C)} With ITC level 2 certified personnel

PHOTOBIOLOGICAL SAFETY OF LED LINEAR LIGHT SOURCES

(HAZARDOUS BLUE INDEX ACCORDING TO IEC 62471)

Photobiological safety is a constant and highly frequented topic in the lighting industry. Most discussions are about hazardous radiation in certain wavelength ranges, on radical radiation angles and high luminances. Especially for the LED technology these topics are always on top due to the fact, that LEDs often have high luminous intensities on a small surface and a high blue component of the

emitted light in the wavelength range of 380 nm - 480nm which can harm the eyes, especially the retina of humans. High luminances can be easily reduced by optical systems. It looks different with the high blue light part of the LED. Most LEDs for general lighting have a blue emitting chip-die on which a phosphor conversion layer enriched with color particles is applied. This combination creates white light through additive color mixing.



The IEC 62471 standard deals with the photobiological safety of light sources as well as the blue light hazard between 380 nm and 480 nm. To distinguish, four groups are defined in IEC 62471 to give the people an indication of the danger. LED Light engines by LED Linear

do not pose any harm to humans due to the low blue component of the emitted light within 380 nm - 480 nm. LED Linear™ light engines are principle for any type of lighting application.

LED Linear VarioLED™ Flex			
Exempt Group	Risk Group I*	Risk group II	Risk Group III
Lamp or luminaire does not constitute a danger in the sense of Photobiological safety. Labeling is not required.	Lamp or luminaire does not constitute a danger in the sense of Photobiological safety. Labeling is not required.	Lamp or luminaire does not constitute a danger in the sense of Photobiological safety. Labeling is not required.	Not permitted in general lighting

The IEC 62471 standard deals wi* LED Linear™ LED light engines with „risk group I“ according to IEC 62471 are correspondingly labled or marked.

PHOTOBIOLOGICAL SAFETY OF LED LINEAR LIGHT SOURCES

(VARIOLED FLEX HYDRA SERIES – HAZARDOUS BLUE INDEX ACCORDING TO IEC 62471)

This document certifies on behalf of LED Linear that, to the best of LED Linear's knowledge that the products based on VarioLED Flex™ HYDRA series was tested and evaluated by LED Linear™ in compliance with IEC 62471(2006) assigned to the risk group specified as follows:

Details of Evaluation:

Based on VarioLED Flex HYDRA Series up to $I_f = 65 \text{ mA}$

Hazard Name	Symbol	Measurement Value	Emission Limits			Units	Risk Group
			Exempt	Low-Risk	Mod-Risk		
Actinic UV	E_s	* ²	10^{-3}	3×10^{-3}	3×10^{-2}	$\frac{W}{m^2}$	Exempt group * ³
Near UV	E_{UVA}	* ²	10	33	10^2	$\frac{W}{m^2}$	Exempt group * ³
Retinal blue-light	L_B	N/A	10^2	10^4	4×10^6	$\frac{W}{m^2/sr}$	
Retinal blue-light, small source	E_B	2.50×10^{-1} * ⁴ 3.17×10^{-1} * ⁵	1	1	4×10^2	$\frac{W}{m^2}$	Exempt group * ⁴ Exempt group * ⁵
Retinal thermal	L_R	3.80×10^4 * ⁴ 4.62×10^4 * ⁵	8.2×10^6 * ⁴ 6.9×10^6 * ⁵	8.2×10^6 * ⁴ 6.9×10^6 * ⁵	2.1×10^7 * ⁴ 1.7×10^7 * ⁵	$\frac{W}{m^2/sr}$	Exempt group * ⁴ Exempt group * ⁵
Retinal thermal, weak visual stimulus	L_{IR}	* ²	5.5×10^5 * ⁴ 5.5×10^5 * ⁵	5.5×10^5 * ⁴ 5.5×10^5 * ⁵	5.5×10^5 * ⁴ 5.5×10^5 * ⁵	$\frac{W}{m^2/sr}$	Exempt group * ³
IR radiation, eye	E_{IR}	* ²	10^2	5.7×10^2	3.2×10^3	$\frac{W}{m^2}$	Exempt group * ³

*¹ Only if the hazard is considered when determining the Risk Group(s) assigned to the product, the measurement values for this hazard is provided.

*² This product has not been evaluated for the hazard due to no emission in the applicable wavelength range.

*³ This product has been classified as Exempt Group due to no emission in the applicable wavelength range.

*⁴ For general lighting service lamps Measurement distance: 240 mm (9.5"), Aperture size: 7 mm (0.28"), Angular subtense: 3.39 mrad, Ambient: 25°C/40%RH

*⁵ For all other light sources Measurement distance: 200 mm (7.87"), Aperture size: 7 mm (0.28"), Angular subtense: 4.07 mrad, Ambient: 25°C/40%RH

*⁶ This product is not applicable to this hazard.

Notes

In accordance with the classification for lamps intended for general lighting service (GLS), this product was classified as Exempt Group. The measurement value for each hazard was below the emission limit for Exempt Group.

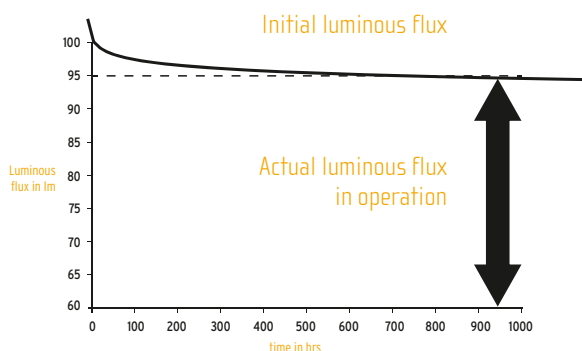
In accordance with the classification for all other light sources, this product was classified as Exempt Group. The measurement value for each hazard was below the emission limit for Exempt Group.

* LED Linear LED light engines with „risk group I“ according to IEC 62471 are correspondingly labeled or marked.

HEAT MANAGEMENT

TEMPERATURE-SENSITIVE BEHAVIOR OF LUMINOUS FLUX

The luminous flux and the so generated light from the LED modules depend on the temperature generated in the LED module. Due to the lower temperature the LED emits more light when it is cold than it does in the warmer operating state. The time it takes until this operating state is reached, depends on the particular structure of the module and on the thermal management. The aim of the thermal management is to transfer the heat to the environment as fast as possible. Thus a constant luminous flux behavior is guaranteed. The described behavior is shown in the following diagram:



Due to the heat right after the power is turned on the luminous flux is reduced. After a while the flux stabilizes at a fix value and in constant environmental conditions does not change anymore. During this so called operating state the photometric data of the LED module is determined. Since not all manufacturers determine the photometric data during the operating state but right after turning on the power, their measured value does not reflect the value during the actual application.

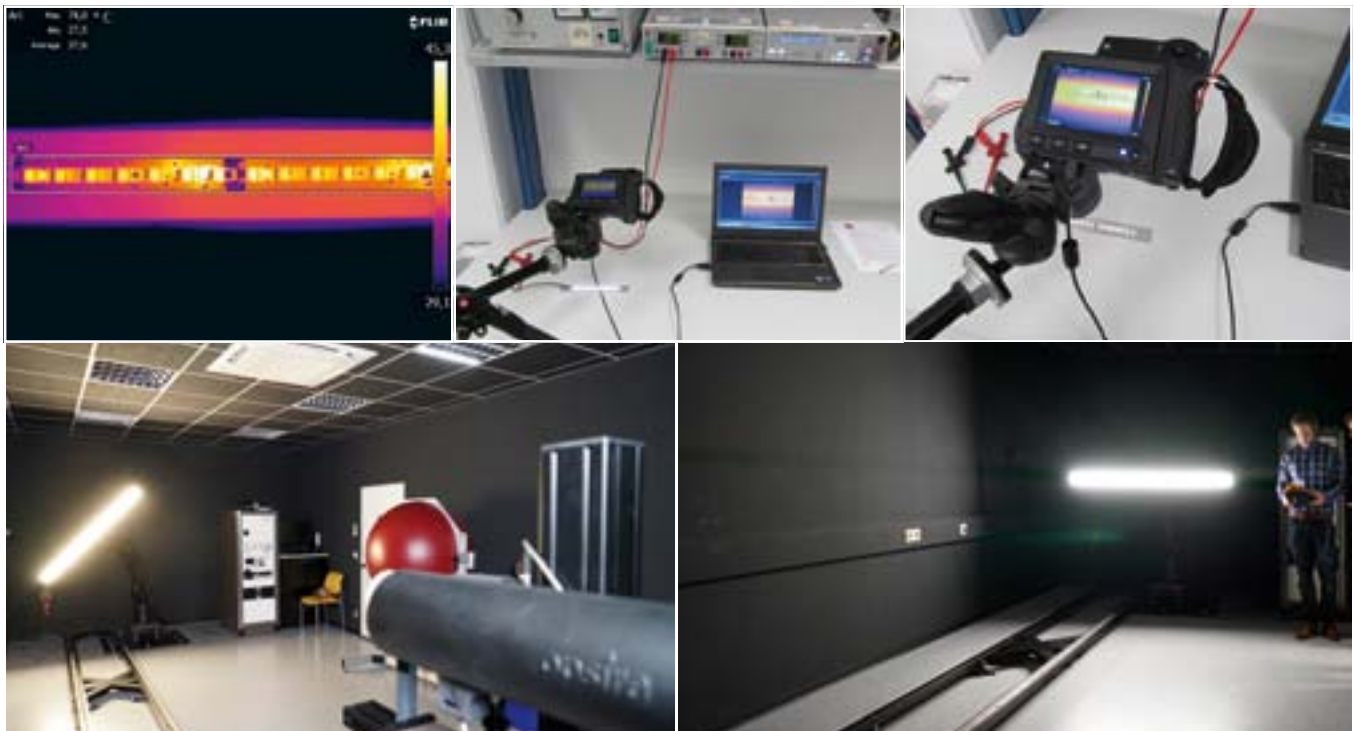
These manufacturers' instructions do then not represent the actual operating state in each application. According to the Norm EN 62717 (LED Modules for General Lighting-Performance Requirements) the data to define the performance parameters has to be determined after an operating time of 15 minutes (900 s).

The displayed graph is shown to get an impression about luminous flux degradation. Most of the VarioLED™ Flex tapes have more than 90% of it's initial luminous flux after 60,000 hrs of operation!

Designed for 60,000 hours lifetime

The light output and lifetime of LEDs are exponentially related to the heat at LED chip level, i. e. the location where the light is physically created. This location is known as T-Junction (Tj). During the design of LED Linear™ products we take care that the junction temperature will not rise over $T_j = 95^\circ\text{C}$ at ambient temperature levels of $T_a = 45^\circ\text{C}$. There-

fore we can guarantee a lifetime of more than 60,000 hours. Additionally we drive our LED products well below the maximum rated LED current of the manufacturer. The reduction of the current density significantly improves the LED lifetime.

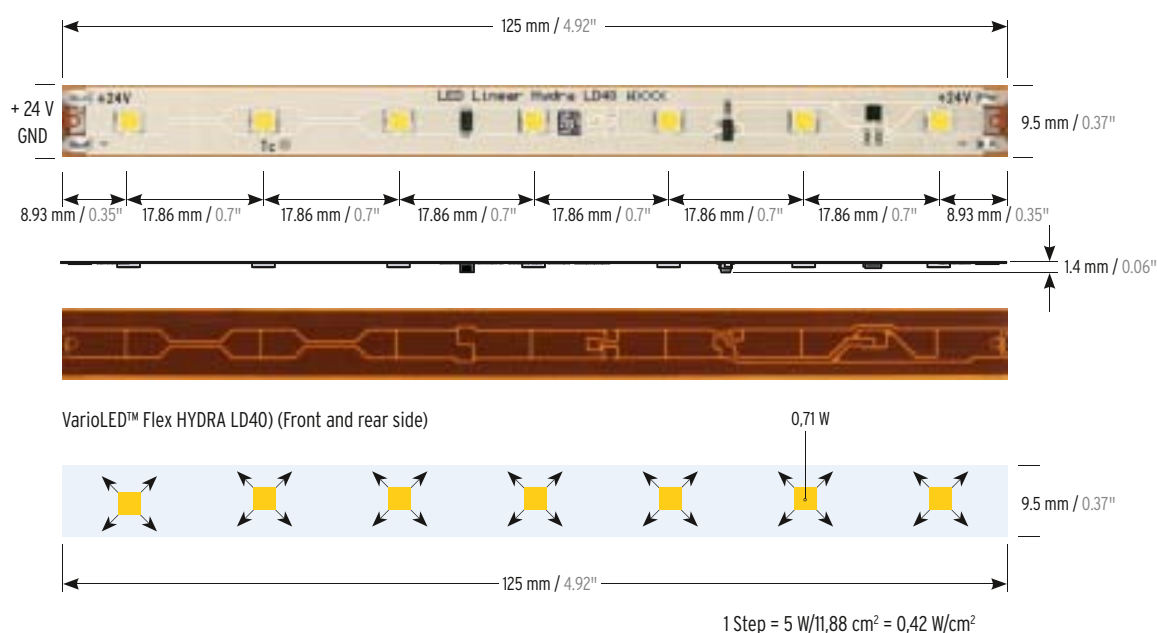


OUTSTANDING QUALITY MEASURES

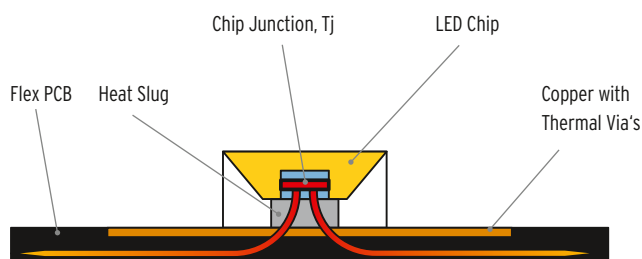
Tj Away® flexible circuit board technology

The design philosophy of our linear flexible circuit boards is to use their area for an optimized heat management to the maximum extend. Therefore our design is based on large heat conductive copper areas below our LEDs. These areas guarantee that the heat is spread out fast and wide at the location where heat is generated at the same

time. This is key for our unique flexible PCB technology. For example, our signature and high power product VarioLED™ Flex HYDRA LD40 provides a power of 40 W/m (12.8 Watt/ft) at a power density of only 0.42 Watt/cm². All of this based on our unique thermal circuit board design on very thin and heat conductive flex board material - Tj Away®.



LED Linear™ Tj Away® flexible PCB technology guarantees quick heat spreading maintaining high luminous flux based on low thermal power densities.



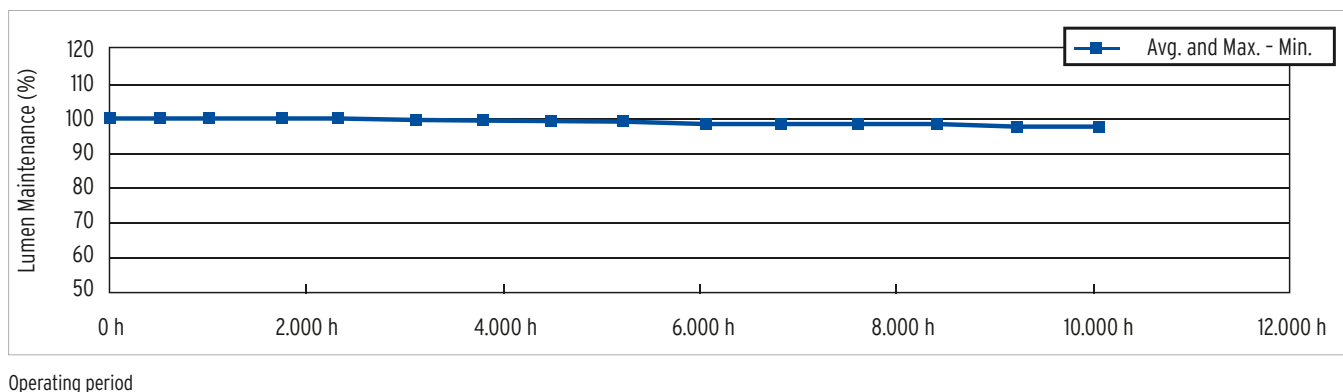
Unique LED Linear™ Flex board technology to draw heat away from the junction of the chip.



LUMEN MAINTENANCE ACCORDING TO LM-80-08

The standard LM-80-08 „Measuring Lumen Maintenance of LED Light Sources“ provides methods of the measurement of lumen maintenance of LED packages and LED modules. The products shall be tested for at least 6,000 hours with data collection at a minimum of every 1,000 hours. Test must include three case temperatures, recommending nomi-

nal case temperatures: 55°C, 85°C and a third temperature which can be freely chosen by the manufacturer and is in our case mostly at 105°C. Depending on the application with corresponding current an additional case temperature is selected. Chromaticity or voltage shift is also reported over the measurement time.



LIFE TIME PREDICTION ACCORDING TO TM-21-11

The TM-21-11 standard „Projecting Long Term Lumen Maintenance of LED Light Sources“ provides a calculation tool to interpret the data collected from LM-80-08 testing. LED Linear™ provides users with lumen maintenance life projection or to predict estimated lumen output values at a given time duration by interpolating lumen maintenance behaviors for the in-situ temperature which are different from testing temperature. For example

the lumen maintenance life projection L80 in hours is estimated when 80% from primarily lumen output is given. Or the predicted lumen maintenance can be calculated within a given life time.

LED Linear™ calculates all lifetime data according to the standard TM-21-11 and are documented on all data sheets. Do not hesitate to ask for detailed test reports.

NEW STANDARDS

Lumen maintenance according to IES LM-84

This standard provides the method for reproducible measurements of lumen and color maintenance of LED lamps, light engines and LED luminaires. It does not provide performance requirements or predictive estimations or extrapolation for lumen maintenance beyond the limits of the lumen maintenance determined from actual measurements

Life time prediction according to IES LM-28

The typical minimum test duration is 6,000 h. If at least 6,000 h of LM-84 data are available, a TM-21 like projection based on these data can be used. LM-84 data may be used in conjunction with LM-80 data for the same type of LEDs to reduce the test duration to 3,000 h. Some specification allows 3,000 hour test results to be used for prequalification.

LINEARE BELEUCHTUNG FÜR DEN AUSSENEINSATZ MIT HOHER SCHUTZART FÜR RAUE UMGEBUNGEN

Das gesamte VarioLED™ Flex Tape Portfolio ist in vielfältigen Ausführungen für den anspruchsvollen Einsatz auch bei rauen Umgebungsbedingungen konzipiert. Auf Basis unserer patentierten Prozesstechnik zum Schutz unserer LED Flex Produkte in Polyurethan bieten wir Ihnen lineare LED Beleuchtungsprodukte mit einer Schutzart von bis zu IP68.

Mit unserer Aufbautechnik schützen wir die Produkte gegen Eindringen von Wasser.

Das dabei von uns verwendete Material ist sehr beständig gegen UV-Strahlung, Salzwasser, Lösungsmittel, Säuren und Benzin. Hohe Temperatur- und Temperaturwechselbeständigkeit sowie Abriebfestigkeit und Flammenschutz garantieren eine hohe Produktqualität und Dauerbeständigkeit.

TOLERANZEN DER FARBTemperatur BEI IP67/IP68 PRODUKTEN

Die in den Datenblättern und den lichttechnischen Dateien genannten Werte stellen statistische Größen dar. Die Werte entsprechen nicht notwendigerweise den exakten Parametern jedes einzelnen Produktes, daher können die tatsächlichen Farbtemperaturen unter Umständen von in den Datenblättern angegebenen Mittelwerten abweichen.

Die Toleranzen der Farbtemperatur bei IP67 Produkten werden bedingt durch

- die LEDs
- den Produktionsprozess
- das Vergussmaterial
- die Messung

LEDs:

Die LEDs werden entsprechend ihrer Farbtemperatur einem Binning zugeordnet, d.h. in verschiedene fein abgestufte Klassen der Farborte eingeteilt. Das menschliche Auge nimmt Farbtemperaturen innerhalb eines MacAdam-Binnings als absolut homogen wahr. Bei kaltweißen LEDs ist die Toleranz der Farbtemperatur innerhalb eines Binnings größer als bei warmweißen LEDs.

Produktionsprozess:

Die Herstellung unserer LED-Bänder beruht auf mehreren Prozessschritten, die alle einer Toleranz unterliegen. Insbesondere beim Verguss können Toleranzen mit Auswirkung auf die Farbtemperatur auftreten. Bei einigen Produkten werden zudem Schichtsysteme aus unterschiedlichen Vergussmaterialien erzeugt, die zur Erhöhung des CCT-Wertes führen. Prozesstechnisch sind Abweichungen der Schichtkompositionen aufgrund der Maschinentoleranzen unvermeidbar.

Vergussmaterial:

Durch das Vergussmaterial Polyurethan werden die jeweiligen Spektralbereiche unterschiedlich beeinflusst. Der optische Weg durch das Vergussmaterial beeinflusst die Farbtemperatur aufgrund von wellenlängenabhängiger Absorption. Dabei gelangt der blaue Anteil des Spektrums bevorzugt aus dem Vergussmaterial. Das Licht wirkt daher insgesamt kälter aufgrund der Verschiebung zu höheren Farbtemperaturen. Dieser Effekt ist bei warmweißen LED-Bändern stärker ausgeprägt.

Messung:

Die Farbtemperatur wird mit Messgeräten im Lichtlabor bestimmt. Wie bei jeder Messung, ist die absolute Genauigkeit von Labormessungen aufgrund von Statistik und der gegebenen Messungenauigkeit der Instrumente und Geräte limitiert.

OUTDOOR LINEAR LIGHTING WITH HIGH INGRESS PROTECTION FOR ROUGH ENVIRONMENTS

The entire VarioLED™ Flex Tape Portfolio is as well designed for the application in rough environmental conditions. We offer up to IP68 protect LED Lighting products. Based on our patented process technology we seal our products in a continuous cover of highly resistant polyurethane.

With our design we protect the products against the immersion of water.

The used material itself is resistant against UV-A, UV-B, fuel, acid, solvents and saltwater. Thermal shock, heat, high temperature, abrasion and flammability resistance guarantee a high product quality and durability, too.

TOLERANCE OF THE COLOR TEMPERATURE AT IP67/IP68 PRODUCTS

The values mentioned in the data sheets and in the photometric files represent statistical variables. The values do not necessarily represent the exact parameters of an individual product, so the actual color temperature can be different from averages indicated in the data sheets.

The tolerance of the color temperature of IP67 products are caused by

- the LED
- the production process
- the encapsulation material
- the measurement

The LED:

The LED are classified in binnings according to their color temperature, i.e. divided into different finely graduated classes. The human eye perceives color temperatures within within one MacAdam binning as absolutely homogeneous. In case of cool white LEDs, the tolerance of the color temperature within one binning is larger than in case of warm white LEDs.

Production process:

The production of our LED strips is based on several process steps that are all subject to a tolerance. Especially during the encapsulation tolerances affecting the color temperature can occur. For some products, multilayer systems from different encapsulation materials are generated leading to the increase in the CCT value. In the technical process, deviations of the layer compositions due to machine tolerances are unavoidable.

Encapsulation material:

Due to the encapsulation material polyurethane the respective spectral regions are affected differently. The optical path through the encapsulation material affects the color temperature on the basis of wavelength-dependent absorption. Here, the blue part of the spectrum passes out preferably from the encapsulation material. The light is therefore overall colder due to the shift to higher color temperatures. This effect is more pronounced in warm white LED strips.

Measurement:

The color temperature is determined by measuring instruments in the lighting laboratory. As in any measurement, the absolute accuracy of laboratory measurements is limited due to statistics and the given measurement inaccuracy of instruments and devices.

POLYURETHANE ENCAPSULATION SYSTEM FOR LEDs

Outdoor Resistance

Tests	Ref. Method	Test Conditions	Results
Florida Test	SAE J 1976	Direct Inland, 45° South	Good (after 2 years)
Arizona Test	SAE J 1976	Direct Weathering, 45° South	Good (after 2 years)
Xenon WOM	SAE J1960 - 89 2000h	65 °C - cycle 102 min. UV + 18 min. UV/waterspray	no color change, minimal gloss change
Weatherometer QUV-B	SAE J 2020	(8 h UV 60° - 4 h cond. 50 °C)	no color change, minimal gloss change
Weatherometer QUV-A	SAE J 2020	2,000 h (8 h UV 70° - 4 h cond. 50 °C)	no color change, minimal gloss change

Water and Chemical Resistance

Tests	Ref. Method	Test Conditions	Results
Fuel Resistance	G.M.6073	Immersion	No gloss change/No degradation
Acid Resistance	MS-CG12	Spot Test 0.5 - 10 % conc.	No gloss change/No degradation
Solvent Resistance	GM 6121 M	Various types of used chemicals	No gloss change/No degradation
Water Immersion	WSK-M3G178	240 h @ 45°C	No gloss change/No degradation
Salt Spray Resistance	ASTM B117-95	2,000 h @ 38 °C 5 % NaCl	No gloss change/No degradation
Humidity Resistance	MS-CG12	250 h @ 40 °C 100 % R. H.	No gloss change/No degradation
Environmental Cycle	G.M.6073	Three Cycles	No gloss change/No degradation

Heat Resistance

Tests	Ref. Method	Test Conditions	Results
Heat Resistance	MS-CG12	250 h @ 80°C	No gloss change/No degradation
High Temperature Resistance	G.M.6073	60 min. @ 93°C	No gloss change/No degradation
Thermal Shock	ESK-M99P16-A:3.5.5	16 h @ - 40 °C+ water @ 70 °C/10 cycles	No gloss change/No degradation

Abrasion Resistance

Tests	Ref. Method	Test Conditions	Results
Stone Chip Resistance	SAE J400:85	0.47 L of 250 - 300 graded gravel fired @ sample @ 480 KPa in 5 - 10 s	Chipping rating 10- No chipping to substrate

Flammability Resistance

Tests	Ref. Method	Test Conditions	Results
Flammability Resistance	FMVSS 302	ISO 3795	Flame self extinguishing

Electrical Properties

Tests	Ref. Method	Test Conditions	Results
Surface Resistivity	ASTM D257	500 V - spec. thickness 2 mm	2 x 10E15 Ohm
Volume Resistivity	ASTM D257	500 V - spec. thickness 2 mm	1 x 10E15 Ohm cm



LED LINEAR™ GARANTIE – HERSTELLERGARANTIE IM GEWERBLICHEN BEREICH

Licht ist unsere Leidenschaft. Die Lieferung qualitativ hochwertiger und zuverlässiger Produkte ist unser Anspruch. Davon profitieren Sie als Kunde.

LED Linear™ setzt stets qualitativ hochwertige Bauteile in seinen Produkten ein. Der hohe Qualitätsstandard wird durch systematische Qualitätssicherungsmaßnahmen sichergestellt.

Deshalb bietet LED Linear™ GmbH („LED Linear™“) für in Deutschland verkaufte und für den Verkauf in Deutschland bestimmte LED Linear™ Standardprodukte für die Allgemeinbeleuchtung der Marken-namen VarioLED™, X00LUM™, X00LUX™ und X00LIGHT™ („Produkte“) Endkunden bei Einsatz im gewerblichen Bereich eine über die gesetzlichen Pflichten hinausgehende Herstellergarantie zu den folgenden Bedingungen:

Umfang

Mängel der Produkte, die während der Garantiefrist auftreten und von dieser Herstellergarantie umfasst sind, werden innerhalb einer wirtschaftlich angemessenen Frist durch LED Linear™ oder eine von LED Linear™ autorisierte Kundendienststelle kostenfrei durch Reparatur, oder sollte es LED Linear™ nach eigenem Ermessen für nötig erachten, durch Austausch des Produkts, beseitigt. Alternativ zu Reparatur oder Austausch des Produkts kann LED Linear™ auch eine Gutschrift über den Zeitwert der Ware für den Kauf von Produkten bei LED Linear™ erteilen.

Für den Umfang der Garantie gelten im Übrigen die Bedingungen dieser Herstellergarantie.

Bitte beachten Sie, dass es aufgrund des technischen Fortschritts sowie der nutzungsbedingten Veränderung des Lichtstroms und der Lichtfarbe von Produkten bei Nachlieferung von LED Modulen und Leuchten zu Abweichungen in den Lichteigenschaften gegenüber dem Ursprungsprodukt kommen kann.

Garantiefrist

Die Garantiefrist beginnt mit dem Datum, an dem das Produkt erstmals an einen Endkunden abgeliefert wurde. Die Garantiefrist beträgt

- sieben Jahre für Produkte mit einer Schutzart bis IP54 bei deren Anwendung im Innenbereich.
- drei Jahre für Produkte von IP54 bei deren Anwendung im geschützten Außenbereich.
- sieben Jahre für Produkte mit einer Schutzart von IP67 bei deren Anwendung im Innenbereich bzw. drei Jahre bei deren Anwendung im Außenbereich.

Die Garantiefrist beträgt unabhängig vom Ablieferdatum maximal 7,5 Jahre ab Herstellung des Produkts.

Die Garantiefrist wird weder verlängert noch beginnt sie neu, wenn das Produkt durch LED Linear™ repariert oder ausgetauscht wird oder später weiter veräußert wird.

Weitere Voraussetzungen der Herstellergarantie

Die Herstellergarantie besteht unter den folgenden, weiteren Voraussetzungen:

- Registrierung des Produkts und des Endkunden bei LED Linear™ (www.led-linear.de/registrierung) nach Inbetriebnahme der Beleuchtungsanlage.
- Die Registrierung hat innerhalb von 14 Tagen nach Inbetriebnahme der Beleuchtungsanlage zu erfolgen, spätestens jedoch sechs Monate nach Ablieferung.
- LED Module und Leuchten sind ausschließlich mit Vorschaltgeräten und Steuerungen, die von LED Linear™ hergestellt und abgegeben wurden, betrieben worden.
- Die Herstellergarantie gilt nicht für einzelne Produkte sondern lediglich für Anlagen (mehrere Produkte werden an einem Ort in Verbindung miteinander betrieben) ab zwanzig Produkten oder einer Anschlussleistung von mindestens 1.000 Watt und bezieht sich ausschließlich auf die Erstbestückung der jeweiligen Anlage.
- Die jährliche Brenndauer der Produkte darf 5.000 Betriebsstunden nicht überschreiten haben.
- Die Herstellergarantie umfasst nur solche Ausfallraten, die die Nennausfallrate übersteigen. Ausfälle können durch Materialfehler oder durch Fehler im Produktionsprozess verursacht werden. Bei Produkten mit einer Lebensdauer von 50.000 Stunden legen wir eine Nennausfallrate von 0,2 % pro 1.000 Betriebsstunden zu Grunde, bei Produkten mit 30.000 Stunden Lebensdauer eine Nennausfallrate von 0,3 % pro 1.000 Betriebsstunden. Für die Berechnung der Nennausfallrate wird eine jährliche Brenndauer von 5.000 Betriebsstunden vorausgesetzt.
- Der Betrieb der Produkte hat entsprechend der Vorgaben von LED Linear™ und der einschlägigen Vorschriften und Normen zu erfolgen.

Ersatz von Kosten

Für den Fall, dass ein Garantieanspruch nach den Bedingungen dieser Herstellergarantie besteht, übernimmt LED Linear™ die folgend aufgeführten, unmittelbar für Reparatur oder Austausch des Produktes erforderlichen Kosten in angemessener Höhe:

- Arbeitszeit Monteur/Installateur,
- Anfahrt bis max. 100 km einfach und
- Steighilfen wie Hebegeräte/Gerüste bis zu einem Wert von maximal 500 EUR

Nicht umfasst sind sämtliche sonstige Kosten wie beispielsweise

- administrative oder vertrieblich bedingte Kosten für die Reklamationsabwicklung,
- Kosten der Fehlerermittlung,
- Zuschläge auf weiter verrechnete Kosten,
- Overhead-Kosten,
- Mangelfolgeschäden,
- Mehrkosten auf Grund schwieriger Erreichbarkeit oder unüblichem Einbau des Produktes oder
- Kosten, die wegen Abweichung von durch LED Linear™ vorgegebenen Einbau- und Installationsvorgaben entstehen.

Sämtliche geltend gemachten Kosten sind durch entsprechende Belege vom Anspruchsteller nachzuweisen. Es können lediglich solche Kosten ersetzt werden, die unter Berücksichtigung der Schadensminderungspflicht als erforderlich anzusehen sind.

Der Ersatz von Kosten ist auf einen Höchstbetrag von 30.000 EUR pro mangelhafter Anlage begrenzt.

Abwicklung der Garantie

Die Abwicklung von Garantiefällen erfolgt über die LED Linear™ Zentrale in Deutschland. LED Linear™ behält sich vor, die Berechtigung des Garantieanspruchs zu überprüfen.

Das betroffene Produkt ist im Rahmen des LED Linear™ RMA-Prozesses frei (auf Kosten des Anspruchstellers) und unter Angabe der RMA-Nummer an folgende Adresse zu senden:

LED Linear™ GmbH
Abt. Qualitätssicherung
Dr. Alfred Herrhausen Allee 22 a - d
47228 Duisburg
Germany

Der Sendung ist eine Kopie der erfolgreichen Registrierung, des Lieferscheins pro Produkt (falls vorhanden) und der Kaufrechnung beizufügen.

Der RMA Prozess regelt die Anlieferung der reklamierten Ware an LED Linear™ sowie die Analyse der Fehlerursache und weitere Bearbeitung der Reklamationsabwicklung. Vor dem Versenden der Ware ist eine Rücksendenummer (Return Merchandise Authorization - Nummer) anzufordern.

Die Abwicklung des Garantiefalles erfolgt gegen Zusendung des vollständig ausgefüllten LED Linear™ Reklamationsberichts, der im Rahmen des RMA-Prozesses von LED Linear™ erstellt und an den Kunden gesandt wird.

Weitere Mängelrechte bleiben unberührt

Mängelrechte des Kunden gegen seinen Verkäufer der Produkte (ob LED Linear™ oder ein Dritter) bleiben von dieser Herstellergarantie unberührt und gelten unabhängig davon.

Sonstiges

Die Bedingungen dieser Herstellergarantie gelten für Produkte, die bis zum 31.12.2017 erstmals an Endkunden abgeliefert wurden.

Auf diese Herstellergarantie findet deutsches Recht unter Ausschluss des UN-Kaufrechts (CISG) Anwendung. Erfüllungsort für Verpflichtungen aus dieser Herstellergarantie ist Neukirchen-Vluyn. Ausschließlicher Gerichtsstand für alle Streitigkeiten aus oder in Verbindung mit dieser Herstellergarantie ist das Landgericht Kleve.



LED LINEAR™ GUARANTEE – COMMERCIAL MANUFACTURER'S GUARANTEE

Light is our passion. We aspire to supply high quality and reliable products. As a customer you profit from this.

LED Linear™ always uses high quality components in its products. The high standard of quality is ensured by systematic quality assurance measures.

That's why LED Linear™ GmbH ("LED Linear™") offers end customers in the commercial sector a manufacturer's guarantee for specific standard LED Linear™ products for the general lighting of brand names VarioLED™, X00LUM™, X00LUX™ and X00LIGHT™ ("Products") in excess of the legal requirements on the following terms:

Scope

Defects in products that arise during the guarantee period and are included in this manufacturer's guarantee are repaired free of charge within a reasonable period of time by LED Linear™ or a customer service centre authorised by LED Linear™ or the product shall be exchanged, if LED Linear™ considers this to be necessary. Instead of repairing or exchanging the product, LED Linear™ may also issue a credit note for the current market value of the goods to be used for purchasing products from LED Linear™.

Otherwise the terms of this manufacturer's guarantee shall apply for the scope of the guarantee.

Please note that lighting properties of replacement LED modules and lights may differ from the original product due to technical advancements and usage-related changes in the light flux and light color of products.

Guarantee period

The guarantee period begins on the date on which the product was initially delivered to the end customer. The guarantee period lasts for

- seven years for products with a safety class up to IP54 when they are used indoors.
- three years for products of IP54 in their application in protected outdoor areas.
- seven years for products with a safety class of IP67 when applying them indoors or three years if used outdoors.

The guarantee period lasts for a maximum of 7.5 years from manufacture of the product irrespective of the date of delivery.

The guarantee period is neither extended nor renewed if the product is repaired or exchanged by LED Linear™ or is subsequently sold.

Further conditions of the manufacturer's guarantee

The manufacturer's guarantee applies under the following additional conditions:

- Registration of the product and the end customer with LED Linear™ (www.led-linear.com/registration) after the lighting system has been put into operation.
- **Registration must take place within 14 days after the lighting system has been put into operation, however six months after delivery at the latest.**
- LED modules and lights are operated exclusively with electronic ballasts and controls that are manufactured or supplied by LED Linear™.
- **The manufacturer's guarantee does not apply for individual products, but solely for systems (several products are operated in connection with one another on-site) of twenty products or more or a connected load of at least 1,000 watts and applies exclusively to the initial fittings in the respective system.**

- The annual usage time of the products may not exceed 5,000 operating hours.
- The manufacturer's guarantee only includes those failure rates that exceed the rated failure rate. Failures can be caused by material defects or defects in the production process. For products with a lifespan of 50,000 hours, we take a rated failure rate of 0.2 % per 1,000 operating hours as a basis; for products with a lifespan of 30,000 hours, a rated failure rate of 0.3 % per 1,000 operating hours. An annual usage time of 5,000 operating hours is assumed when calculating the rated failure rate.
- The usage of the products must comply with the specifications of LED Linear™ and the applicable regulations and standards.

Processing the guarantee

Guarantees are processed by the LED Linear™ headquarters in Germany. LED Linear™ retains the right to review the justification of the claim.

Within the framework of the RMA (Return Merchandise Authorisation) process, the concerned product should be sent to the following address, carriage paid (at the cost of the claimant) stating the RMA number:

LED Linear™ GmbH
Quality assurance dept.
Dr. Alfred Herrhausen Allee 22 a - d
47228 Duisburg
Germany

A copy showing successful registration, the delivery note for each product (if available) and the purchase invoice must be attached to the consignment.

The RMA process regulates the delivery of products under complaint to LED Linear™, as well as the analysis of the causes of the defect and further handling of complaints. A return number (Return Merchandise Authorization Number) must be requested before sending the goods.

The guaranteed event is processed upon receipt of the fully completed LED Linear™ complaint report that is produced and sent to the customer by LED Linear™ within the scope of the RMA process.

Other rights arising from product defects remain unaffected

The customer's rights arising from product defects against the seller of the products (whether LED Linear™ or a third party) remain unaffected by this manufacturer's guarantee and apply independent of it.

Other

The terms of this manufacturer's guarantee apply for products that were initially delivered to end customers by 31 December 2017.

This manufacturer's guarantee is subject to German law excluding the UN Convention on Contracts for the International Sale of Goods (CISG). The place of fulfilment for obligations arising from this manufacturer's guarantee is Neukirchen-Vluyn. The exclusive place of jurisdiction for all disputes arising from or in connection with this manufacturer's guarantee is Kleve District Court.

ALLGEMEINE VERKAUFS- UND LIEFERBEDINGUNGEN

1. Allgemeine Bestimmungen
- 1.1 Sämtliche Lieferungen durch LED Linear™ GmbH („LED Linear™“) erfolgen ausschließlich zu den nachstehenden Allgemeinen Verkaufs- und Lieferbedingungen („Allgemeine Bedingungen“). Andere Bestimmungen, insbesondere Allgemeine Geschäftsbedingungen des Käufers, gelten nicht, unabhängig davon, ob sie von LED Linear™ ausdrücklich zurückgewiesen wurden oder nicht. Dies gilt auch dann, wenn LED Linear™ in Kenntnis von anderen Geschäftsbedingungen eine Leistung vorbehaltlos ausführt.
- 1.2 Im Einzelfall getroffene individuelle Vereinbarungen zwischen LED Linear™ und dem Käufer haben Vorrang. Sie bedürfen ebenso wie Änderungen, Ergänzungen oder eine Aufhebung von Vereinbarungen zwischen LED Linear™ und dem Käufer sowie dieser Allgemeinen Bedingungen zu ihrer Wirksamkeit der Schriftform. Dies gilt auch für die Aufhebung dieses Schriftformerfordernisses. Zur Wahrung des Schriftformerfordernisses sind Telekommunikationsmittel, die nicht wenigstens eine Kopie oder ein Faksimile der Unterschrift des Ausstellers enthalten, insbesondere einfache E-Mails, nicht ausreichend.
2. Angebote, Bestellungen
- 2.1 Angebote von LED Linear™ sind grundsätzlich unverbindlich. Sollte ein Angebot von LED Linear™ ausdrücklich schriftlich als verbindlich gekennzeichnet sein, ist dieses für zehn Werktage ab Angebotsdatum bindend.
- 2.2 Lichtplanungen, die auf Verlangen des Interessenten besonders erstellt werden müssen, können auch dann berechnet werden, wenn kein entsprechender Lieferauftrag erteilt wurde. Der Rechnungsbetrag bemisst sich anhand des Zeitaufwands nach marktüblichen Stundensätzen.
- 2.3 Bestellungen des Käufers werden für LED Linear™ erst mit Annahme der Bestellung durch schriftliche Bestätigung oder durch Übersendung der Ware und der Rechnung verbindlich. LED Linear™ kann Bestellungen innerhalb von zwei Wochen nach Zugang annehmen.
- 2.4 Auf Abruf bestellte Ware muss innerhalb der festgelegten Abruffrist abgenommen werden. Wird diese Frist um drei Monate überschritten, behält sich LED Linear™ das Recht zur Fakturierung sowie zur Berechnung von Kapitalzinsen und Lagermiete vor.
- 2.5 An Angeboten, Kostenvoranschlägen, Zeichnungen und anderen Unterlagen, in schriftlicher, mündlicher, elektronischer oder sonstiger Form („Unterlagen“) behält sich LED Linear™ die Eigentums- und urheberrechtlichen Verwertungsrechte vor. Die Unterlagen und deren Inhalt dürfen nur nach vorheriger schriftlicher Zustimmung von LED Linear™ Dritten zugänglich oder anderweitig bekannt gemacht werden und sind, wenn der Vertrag zwischen LED Linear™ und dem Käufer nicht erteilt wird, auf Verlangen von LED Linear™ unverzüglich zurückzugeben. Etwa angefertigte Kopien sind zu vernichten.
3. Lieferung, Annahme der Lieferung
- 3.1 Lieferungen erfolgen EXW (Versandwerk LED Linear™, Dr.-Alfred-Herrhausen-Allee 22b-d, 47228 Duisburg, Deutschland) ICC Incoterms 2010. Auch wenn im Einzelfall vereinbart sein sollte, dass LED Linear™ die Versendung der Ware übernimmt, ist der Erfüllungsort der Ort der Übergabe der Ware durch LED Linear™ an die Transportperson.
- 3.2 Die genannten Lieferfristen oder Liefertermine sind unverbindlich, soweit sie nicht im Einzelfall verbindlich vereinbart wurden. Im Falle unverbindlicher Lieferfristen oder Liefertermine kommt LED Linear™ nicht vor fruchtlosem Ablauf einer vom Käufer schriftlich gesetzten angemessenen Frist zur Lieferung in Verzug. Der Käufer darf den Ablauf einer solchen Frist nicht auf einen früheren Termin als vier Wochen nach dem Ablauf der unverbindlichen Lieferfrist oder des unverbindlichen Liefertermins festsetzen.
- 3.3 LED Linear™ kommt nicht in Lieferverzug, wenn ein Zulieferer LED Linear™ aus Gründen, die nicht im Verantwortungsbereich von LED Linear™ liegen und obwohl LED Linear™ ein kongruentes Deckungsgeschäft mit dem Zulieferer geschlossen hat, nicht richtig oder nicht rechtzeitig beliefert.
- 3.4 LED Linear™ kommt ebenfalls nicht in Lieferverzug, soweit die Verzögerung darauf beruht, dass der Käufer für die Lieferung erforderliche, von ihm zu beschaffende Unterlagen, Lizenzen, Genehmigungen, Freigaben oder sonstige Formalitäten oder Verpflichtungen nicht oder nicht rechtzeitig beigebracht bzw. nicht rechtzeitig erfüllt hat. Dies gilt nicht, wenn LED Linear™ die Verzögerung zu vertreten hat.
- 3.5 Kommt LED Linear™ in Verzug, kann der Käufer einen pauschalierten Schadensersatz für jede vollendete Woche des Verzuges von je 0,5 %, insgesamt jedoch höchstens 5 %, des Nettopreises für den Teil der Lieferungen verlangen, der wegen des Verzuges nicht in zweckdienlichen Betrieb genommen werden konnte. LED Linear™ bleibt der Nachweis vorbehalten, dass dem Käufer nur ein wesentlich geringerer oder gar kein Schaden entstanden ist.
- 3.6 Der Käufer hat auf Verlangen von LED Linear™ innerhalb einer angemessenen Frist zu erklären, ob er wegen der Verzögerung der Lieferung vom Vertrag zurücktritt oder auf der Lieferung besteht.
- 3.7 LED Linear™ ist zu Teillieferungen berechtigt, sofern deren Annahme für den Käufer nicht unzumutbar ist, insbesondere wenn die Lieferung der restlichen bestellten Ware sichergestellt ist und dem Käufer hierdurch weder erheblicher Mehraufwand noch erhebliche zusätzliche Kosten entstehen (es sei denn, LED Linear™ erklärt sich zur Übernahme dieser Kosten bereit). Jede Teillieferung kann gesondert in Rechnung gestellt werden.
- 3.8 Der Käufer gerät in Annahmeverzug, wenn er die Ware nicht an dem verbindlich vereinbarten Liefertermin abholt. Im Falle unverbindlicher Lieferfristen oder Liefertermine kann LED Linear™ dem Käufer mit einer Frist von zwei Wochen mitteilen, dass die Ware zur Abholung bereit steht; holt der Käufer die Ware mit Ablauf der Frist nicht ab, gerät er in Annahmeverzug. Der Käufer darf die Annahme nicht wegen unerheblicher Mängel verweigern.
- 3.9 Wird die Lieferung auf Wunsch des Käufers um mehr als einen Monat nach Anzeige der Versandbereitschaft verzögert, kann dem Käufer für jeden weiteren angefangenen Monat Lagergeld in Höhe von 0,5 % des Nettopreises der Gegenstände der Lieferung, höchstens jedoch insgesamt 5 %, berechnet werden. Der Nachweis höherer oder niedrigerer Lagerkosten bleibt den Vertragsparteien unbenommen.
4. Mustersendung

Leuchten werden als Muster für höchstens einen Monat zur Verfügung gestellt. Innerhalb dieser Zeit nicht retourniertes Material wird in Rechnung gestellt. In jedem Fall werden die Leuchten berechnet, die vom Kunden nicht original verpackt oder abgeändert oder beschädigt wurden.

5. Preise, Preisanpassung
- 5.1 Soweit nicht anders vereinbart, gilt die jeweils gültige Preisliste. Die Preise verstehen sich EXW (Versandwerk LED Linear™, Dr.-Alfred-Herrhausen-Allee 22b-d, 47228 Duisburg, Deutschland) ICC Incoterms 2010 in Euro, ausschließlich Verpackung und Versand. Etwaige anfallende Umsatzsteuer wird zum jeweils gültigen gesetzlichen Satz separat berechnet und ist vom Käufer zu zahlen.
- 5.2 LED Linear™ behält sich das Recht vor, die Preise entsprechend anzupassen, wenn nach Abschluss des Vertrags bis zur Lieferung Kostenänderungen, insbesondere aufgrund von Tarifabschlüssen, Änderungen der Rohstoffpreise, sonstiger Preisänderungen der Zulieferer oder Wechselkursschwankungen, eintreten, die nicht von LED Linear™ zu vertreten sind und nicht mit hinreichender Bestimmtheit vorhersehbar waren. Auf Verlangen wird LED Linear™ dem Käufer die Gründe für die Preisanpassung nachweisen.
6. Zahlung, Zahlungsverzug
- 6.1 Rechnungen sind ohne Abzug innerhalb von 30 Tagen nach Lieferung und Erhalt der Rechnung durch Überweisung auf ein dem Käufer von LED Linear™ angegebenes Konto zu bezahlen. Soweit nicht anders vereinbart, haben Zahlungen in Euro zu erfolgen.
- 6.2 Bei Überschreiten der Zahlungsfrist kommt der Auftraggeber ohne weitere Mahnung in Verzug. Maßgeblich für die Rechtzeitigkeit der Zahlung ist der Eingang des Rechnungsbetrages auf dem angegebenen Konto.
- 6.3 Bei Zahlungsverzug ist LED Linear™ berechtigt, Verzugszinsen in Höhe von acht Prozentpunkten über dem Basiszinssatz zu verlangen. Die Geltendmachung eines weiteren Schadens bleibt vorbehalten.
- 6.4 Kommt der Käufer mit mindestens zwei Zahlungen aus der Geschäftsbeziehung mit LED Linear™ in Zahlungsverzug, werden sämtliche Zahlungsverpflichtungen des Käufers aus allen Geschäftsbeziehungen mit LED Linear™ sofort fällig.
7. Vermögensverschlechterung
- 7.1 Stellt sich nach Vertragsschluss mit dem Käufer heraus, dass aufgrund seiner Vermögenslage die Erfüllung seiner Vertragspflichten gefährdet ist (insbesondere bei Zahlungseinstellung, Antrag auf Insolvenzverfahren, Pfändungs- oder Zwangsvollstreckungsmaßnahmen, Erhebung von Wechsel- oder Scheckprotesten und Lastschriftrückgaben, und zwar auch gegenüber bzw. an Dritte), so ist LED Linear™ berechtigt, nach eigener Wahl die Lieferung bis zur Vorauszahlung des Kaufpreises oder Leistung einer angemessenen Sicherheit zurückzubehalten. Dies gilt auch dann, wenn infolge Zahlungsverzugs des Käufers begründete Zweifel an dessen Zahlungsfähigkeit oder Kreditwürdigkeit bestehen.
- 7.2 In den Fällen der Ziffer 7.1 ist LED Linear™ zudem berechtigt, Lieferungen bis zum Eingang aller Zahlungen aus offenen Forderungen gegen den Käufer oder Leistung einer angemessenen Sicherheit zurückzubehalten. Für noch nicht fällige Forderungen, einschließlich Forderungen, bei denen LED Linear™ aus bereits abgeschlossenen Verträgen vorleistungspflichtig ist, und Forderungen ohne inneren natürlichen oder wirtschaftlichen Zusammenhang mit der Lieferung gilt dies jedoch nur, sofern hierfür ein berechtigtes Interesse von LED Linear™ besteht.
- 7.3 Besteht im Rahmen der Geschäftsverbindung ein Kontokorrentverhältnis, ist LED Linear™ in den Fällen der Ziffer 7.1 zudem berechtigt, Lieferungen bis zum Eingang aller Zahlungen aus anerkannten Salden oder Leistung einer angemessenen Sicherheit zurückzubehalten.
- 7.4 Sollte die Vorauszahlung oder Sicherheitsleistung nach Ziffer 7.1 nicht binnen zwei Wochen von dem Käufer erbracht werden, ist LED Linear™ berechtigt, vom entsprechenden Vertrag zurückzutreten.
8. Eigentumsvorbehalt
- 8.1 LED Linear™ behält sich das Eigentum an der gelieferten Ware bis zum Eingang aller Zahlungen aus der Geschäftsverbindung vor. Besteht im Rahmen der Geschäftsverbindung ein Kontokorrentverhältnis, so behält sich LED Linear™ das Eigentum an der gelieferten Ware bis zum Eingang aller Zahlungen aus anerkannten Salden vor.
- 8.2 Bei vertragswidrigem Verhalten des Käufers, insbesondere bei Zahlungsverzug ist LED Linear™ berechtigt, die unter Eigentumsvorbehalt gelieferte Ware („Vorbehaltsware“) zurückzunehmen. Im Falle des Zahlungsverzugs ist eine vorherige Fristsetzung nicht erforderlich. Zum Zwecke der Rücknahme der Vorbehaltsware darf LED Linear™ die Geschäftsräume des Käufers zu den üblichen Geschäftszeiten betreten. Weitere Ansprüche von LED Linear™ bleiben unberührt.
- 8.3 Nach Rücknahme der Vorbehaltsware ist LED Linear™ nach im Voraus erklärter Androhung zu deren angemessener Verwertung befugt; der Verwertungserlös ist auf die Verbindlichkeiten des Käufers anzurechnen, abzüglich angemessener Verwertungskosten.
- 8.4 Für die Dauer des Eigentumsvorbehalts ist der Käufer nicht berechtigt, die Vorbehaltsware zu verpfänden oder als Sicherheit zu verwenden. Der Käufer ist berechtigt, die Vorbehaltsware

im ordentlichen Geschäftsgang zu verarbeiten und/oder weiterzuveräußern, er tritt jedoch bereits jetzt sämtliche Forderungen in Höhe des Rechnungsbetrages (einschließlich Umsatzsteuer) an LED Linear™ ab, die ihm aus der Weiterveräußerung gegen seine Abnehmer oder Dritte erwachsen, und zwar unabhängig davon, ob die Vorbehaltsware ohne oder nach Verarbeitung weiterveräußert worden ist. Der Käufer ist nicht berechtigt, die abgetretenen Forderungen zu verpfänden oder als Sicherheit zu verwenden.

- 8.5 Der Käufer hat seinem Abnehmer beim Weiterverkauf die erfolgte Abtretung der Ansprüche auf das Lieferentgelt anzuzeigen. Der Käufer ist nicht berechtigt, die Vorbehaltsware an Abnehmer zu verkaufen, die die Abtretung gegen sie gerichteter Zahlungsforderungen ausgeschlossen oder beschränkt haben. Ist die Vorbehaltsware mit anderen, dem Käufer nicht gehörenden Gegenständen weiterverarbeitet worden, so erfolgt die Abtretung nur in dem Verhältnis der Miteigentumsanteile an dem weiterverarbeiteten Gegenstand gemäß Ziffer 8.10.
- 8.6 Der Käufer bleibt nach der Abtretung zur Einziehung der Forderungen ermächtigt. Die Berechtigung von LED Linear™, die Forderungen selbst einzuziehen, bleibt hiervon unberührt. LED Linear™ wird jedoch die Forderungen nicht einziehen, solange der Käufer seinen Zahlungsverpflichtungen aus den vereinnahmten Erlösen nachkommt, nicht in Zahlungsverzug gerät und insbesondere keinen Antrag auf Eröffnung eines Insolvenzverfahrens gestellt und seine Zahlungen nicht eingestellt hat. Liegt einer dieser Fälle vor, so kann LED Linear™ verlangen, dass der Käufer die abgetretenen Forderungen und deren Schuldner bekannt gibt, alle zum Einzug erforderlichen Angaben macht, die dazugehörigen Unterlagen aushändigt und den Schuldnern die Abtretung mitteilt. Mit dem Eintritt eines solchen Falls erlischt das Recht des Käufers zur Einziehung der Forderungen.
- 8.7 Soweit zwischen dem Käufer und dessen Abnehmer ein Kontokorrentverhältnis nach § 355 HGB besteht, bezieht sich die an LED Linear™ vom Käufer im Voraus abgetretene Forderung auch auf den anerkannten Saldo. Im Falle der Insolvenz des Abnehmers bezieht sie sich ebenfalls auf den dann vorhandenen Saldoüberschuss des Schlussaldos.
- 8.8 Der Käufer ist verpflichtet, LED Linear™ unverzüglich schriftlich von sämtlichen Beschlagnahmen, Pfändungen und sonstigen Eingriffen Dritter in Bezug auf die Vorbehaltsware oder die abgetretenen Forderungen zu unterrichten. Darüber hinaus hat der Käufer gegenüber diesen Dritten auf den Eigentumsvorbehalt hinzuweisen. Soweit der Dritte nicht in der Lage ist, LED Linear™ die gerichtlichen und außergerichtlichen Kosten einer Klage nach § 771 ZPO zu erstatten, haftet der Käufer für den LED Linear™ entstandenen Ausfall.
- 8.9 Der Käufer ist verpflichtet, die Vorbehaltsware pfleglich zu behandeln. Insbesondere hat er die Vorbehaltsware ausreichend zum Ersatzwert gegen Feuer, Wasser und Diebstahl zu versichern. Der Käufer ist verpflichtet, die Vorbehaltsware getrennt aufzubewahren und sie als Eigentum von LED Linear™ zu kennzeichnen sowie die abgetretenen Forderungen in seinen Handelsbüchern als LED Linear™ zustehend zu bezeichnen.
- 8.10 Die Verarbeitung oder Umbildung der Vorbehaltsware durch den Käufer wird stets für LED Linear™ vorgenommen. Wird die Vorbehaltsware mit anderen, nicht LED Linear™ gehörenden Gegenständen verarbeitet oder umgebildet, so erwirbt LED Linear™ das Miteigentum an der neuen Sache im Verhältnis des Wertes der Vorbehaltsware zu den anderen, verarbeiteten oder umgebildeten Gegenständen zum Zeitpunkt der Verarbeitung oder Umbildung; für die hierdurch entstandene neue Sache gilt im Übrigen das Gleiche wie für die unter Vorbehalt gelieferten Waren.
- 8.11 Wird die Vorbehaltsware mit anderen, nicht LED Linear™ gehörenden Gegenständen untrennbar vermischt oder verbunden, so erwirbt LED Linear™ das Miteigentum an der neuen Sache im Verhältnis des Wertes der Vorbehaltsware zu den anderen vermischten Gegenständen zum Zeitpunkt der Vermischung oder Verbindung. Erfolgt die Vermischung oder Verbindung in der Weise, dass die Sache des Käufers als Hauptsache anzusehen ist, überträgt der Käufer anteilmäßig Miteigentum. Der Käufer verwahrt das so entstandene Alleineigentum oder Miteigentum für LED Linear™.
- 8.12 Der Käufer hat angemessene Maßnahmen zu ergreifen und LED Linear™ umfassend dabei zu unterstützen, die Rechte von LED Linear™ nach dieser Ziffer 8 in dem Land entsprechend (ggf. durch andere Sicherungsmittel) zu schützen, in dem sich die Vorbehaltsware befindet.
9. Beschaffenheit der Ware, Angaben und Anwendung, Garantien
- 9.1 Als Beschaffenheit der Ware gilt ausschließlich die vereinbarte Spezifikation. Es liegt in der Verantwortung des Käufers zu prüfen, ob die Ware für die von ihm gewünschten Zwecke geeignet ist.
- 9.2 Eigenschaft der Waren, welche in Veröffentlichungen von LED Linear™ oder von Verkaufvertretern von LED Linear™, insbesondere in der Werbung, in Zeichnungen, Prospekten oder anderen Dokumenten oder auf der Verpackung und Kennzeichnung der Waren angegeben sind, sind nur dann als von der vertraglichen Beschaffenheit der Waren umfasst anzusehen, wenn sie ausdrücklich in einem Angebot oder einer Auftragsbestätigung enthalten sind.
- 9.3 Angaben von LED Linear™ in Wort, Schrift und sonstiger Form zur Eignung, einschließlich Anwendung, Verarbeitung und sonstiger Verwendung, sowie eine technische Beratung von LED Linear™ erfolgen nach bestem Wissen, gelten jedoch nur als unverbindlicher Hinweis und befreien den Käufer nicht von der eigenen Prüfung der von LED Linear™ gelieferten Ware auf ihre Eignung für die beabsichtigten Zwecke. Anwendung, Verarbeitung und sonstige Verwendung der Ware erfolgen außerhalb der Kontrollmöglichkeiten von LED Linear™ und liegen daher ausschließlich im Verantwortungsbereich des Käufers.
- 9.4 Garantien, insbesondere Beschaffenheitsgarantien, sind für LED Linear™ nur in demjenigen Umfang verbindlich, in welchem sie (i) in einem Angebot oder einer Auftragsbestätigung enthalten sind, (ii) ausdrücklich als „Garantie“ oder „Beschaffenheitsgarantie“ bezeichnet werden, und (iii) die aus einer solchen Garantie für LED Linear™ resultierenden Verpflichtungen ausdrücklich festlegen.
10. Mängelrechte
- 10.1 Die Mängelrechte des Käufers setzen voraus, dass dieser die Ware bei Lieferung untersucht und Mängel ordnungsgemäß gemäß § 377 HGB rügt.
- 10.2 Rügen haben unter spezifischer Angabe des Mangels schriftlich zu erfolgen. Rügen wegen unvollständiger Lieferung und sonstiger erkennbarer Mängel sind LED Linear™ unverzüglich,

spätestens aber innerhalb von einer Woche nach Lieferung schriftlich mitzuteilen, versteckte Mängel unverzüglich, spätestens innerhalb von einer Woche nach ihrer Entdeckung. Wegen unwesentlicher Mängel darf die Annahme der Ware nicht verweigert werden. Ansprüche wegen verspätet mitgeteilter Mängel sind ausgeschlossen.

- 10.3 Die Prüfung der Produkte erfolgt gemäß unserem RMA-Prozess. Die Kosten der Untersuchung der Ware trägt der Käufer. Mangelhafte Ware ist LED Linear™ auf Verlangen zur Prüfung zur Verfügung zu stellen. Die Kosten für die Rücksendung trägt der Kunde.
- 10.4 LED Linear™ wird für ordnungsgemäß gerügte mangelhafte Ware nach eigener Wahl Nacherfüllung durch Beseitigung des Mangels (Nachbesserung) oder Lieferung einer mangelfreien Sache (Nachlieferung) leisten. Die Nacherfüllung erfolgt ohne Anerkennung einer Rechtspflicht. Im Falle der Nachbesserung beginnt der verbleibende Teil der ursprünglichen Verjährungsfrist mit der Rückgabe der nachgebestellten Ware zu laufen. Dasselbe gilt im Falle der Nachlieferung.
- 10.5 Ansprüche des Käufers wegen der zum Zweck der Nacherfüllung erforderlichen Aufwendungen, insbesondere Transport-, Wege-, Arbeits- und Materialkosten sind ausgeschlossen, soweit sich die Aufwendungen durch nachträgliche Verbringung der Waren an einen anderen als den vereinbarten Lieferort erhöhen; LED Linear™ ist berechtigt, derartige Mehrkosten dem Käufer in Rechnung zu stellen. Der Ausbau der mangelhaften sowie der Einbau der nachgelieferten Ware bzw. die Kosten dafür sind ebenfalls nicht von der Nacherfüllung erfasst; sie können als Schadensersatz im Rahmen der Ziffer 12 zu erstatten sein.
- 10.6 Schlägt die Nacherfüllung fehl, kann der Käufer nach seiner Wahl den Kaufpreis angemessen mindern oder vom Vertrag zurücktreten.
- 10.7 Weitere Mängelansprüche, gleich welcher Art, sind vorbehaltlich etwaiger nach Maßgabe von Ziffer 12 beschränkter Schadensersatzansprüche ausgeschlossen.
- 10.8 Es bestehen keine Mängelansprüche für unwesentliche Abweichungen von der vereinbarten Beschaffenheit, die den Gebrauch nicht erheblich beeinträchtigen, natürliche Abnutzung, fehlerhafte oder nachlässige Behandlung, ungeeignete oder unsachgemäße Verwendung, fehlerhafte Montage oder Inbetriebsetzung durch den Käufer oder von ihm beauftragte Dritte, übermäßige Beanspruchung, Nutzung ungeeigneter Betriebsmittel oder Austauschstoffe, mangelhafte Bauarbeiten, ungeeigneten Baugrund oder sonstige besondere äußere Einflüsse, sofern die Schäden nicht auf ein Verschulden von LED Linear™ zurückzuführen sind. Ebenfalls ausgeschlossen sind Mängelansprüche, die auf unsachgemäße Änderungen oder Reparaturen durch den Käufer oder von ihm beauftragte Dritte zurückzuführen sind.
- 10.9 Der Käufer trägt die angemessenen Kosten einer unberechtigten Geltendmachung von Mängelrechten (z. B. wenn das Produkt nicht mangelhaft war); das Gleiche gilt, wenn LED Linear™ fälschlich Mängelrechte gewährt, ohne dazu verpflichtet zu sein.
- 10.10 Die Verjährungsfrist für Mängelrechte beträgt zwölf Monate ab Lieferung. Diese Beschränkung gilt jedoch nicht, soweit (i) ein Mangel arglistig verschwiegen wurde oder (ii) eine Garantie für die Beschaffenheit einer Ware übernommen wurde (diesbezüglich gilt gegebenenfalls die sich aus der Garantie ergebende Garantieregelung bzw. Verjährungsfrist). Im Falle von Schadensersatzansprüchen gilt diese Beschränkung weiterhin nicht in folgenden Fällen: (i) Haftung nach dem Produkthaftungsgesetz, (ii) Verletzung von Leben, Körper oder Gesundheit, (iii) Vorsatz und (iv) grobe Fahrlässigkeit von Organen oder leitenden Angestellten von LED Linear™.
- 10.11 Die gesetzlichen Rückgriffsansprüche des Käufers, falls die Waren an einen Verbraucher verkauft werden, bleiben unberührt. Solche Rückgriffsansprüche bestehen nur insoweit, als der Käufer mit seinem Abnehmer keine über die gesetzlichen Mängelansprüche hinausgehenden Vereinbarungen getroffen hat.
11. Schutzrechte
- 11.1 LED Linear™ hat die Waren lediglich in Bezug auf das Land des Lieferorts frei von Urheber- und sonstigen gewerblichen Schutzrechten (nachfolgend „Schutzrechte“) zu liefern. Bei einem Verstoß gegen diese Pflicht haftet LED Linear™ dem Käufer nach Maßgabe der nachfolgenden Bestimmungen, unter der Voraussetzung, dass die Waren vom Käufer vertragsgemäß genutzt wurden und die Verjährungsfrist für Mängelansprüche gemäß Ziffer 10.10 noch nicht abgelaufen ist.
 - a) LED Linear™ kann nach ihrer Wahl entweder auf eigene Kosten ein ausreichendes Nutzungsrecht in Bezug auf das verletzte Schutzrecht erlangen, die Waren so ändern, dass das Schutzrecht nicht länger verletzt wird oder die Waren austauschen, soweit hierdurch die vereinbarte oder vorausgesetzte Nutzung durch den Käufer nicht beeinträchtigt wird. Ist dies nicht möglich oder für LED Linear™ unzumutbar, so kann der Käufer von dem Vertrag hinsichtlich der betroffenen Waren zurücktreten oder den Kaufpreis angemessen mindern.
 - b) Die Haftung von LED Linear™ für Schadensersatz unterliegt den Bestimmungen der Ziffer 12.
 - c) Die vorgenannten Pflichten von LED Linear™ gelten nur, soweit der Käufer (i) LED Linear™ von der Geltendmachung von Ansprüchen durch Dritte unverzüglich schriftlich unterrichtet, (ii) das Bestehen einer Rechtsverletzung Dritten gegenüber nicht einräumt, und (iii) jegliche Verteidigungsmaßnahmen und Verhandlungen zur Beilegung von Streitigkeiten LED Linear™ in deren Ermessen überlässt. Falls der Käufer die Benutzung der Waren zur Verminderung von Schäden oder aus einem anderen berechtigten Grund einstellt, hat er den Dritten darauf hinzuweisen, dass aus der Einstellung der Benutzung keinerlei Anerkennung der behaupteten Rechtsverletzung folgt.
- 11.2 Sämtliche Ansprüche des Käufers sind ausgeschlossen, wenn die Verletzung eines Schutzrechts von dem Käufer zu vertreten ist, insbesondere wenn sie verursacht wurde durch eine Art der Benutzung, die von LED Linear™ nicht vorgesehen ist, oder eine Veränderung der Waren durch den Käufer oder von ihm beauftragte Dritte oder deren Benutzung zusammen mit Produkten, die nicht von LED Linear™ bereitgestellt oder für eine gemeinsame Nutzung empfohlen wurden.
- 11.3 Weitergehende Ansprüche des Käufers gegen LED Linear™ oder ihre Erfüllungsgehilfen, die über die in dieser Ziffer 11 festgesetzten Rechte hinausgehen und auf einer Schutzrechtsverletzung beruhen, sind ausgeschlossen.

12. Haftung

- 12.1 Die Haftung von LED Linear™ für Schäden bei einfacher Fahrlässigkeit ist beschränkt auf Schäden aus der Verletzung von wesentlichen Vertragspflichten, deren Erfüllung die ordnungsgemäße Durchführung des Vertrags überhaupt erst ermöglicht und auf deren Einhaltung der Vertragspartner regelmäßig vertraut und vertrauen darf; in diesem Fall ist die Haftung jedoch auf den typischen vorhersehbaren Schaden beschränkt. Diese Haftungsbeschränkung gilt in gleicher Weise für Schäden, die von Mitarbeitern oder Beauftragten von LED Linear™, welche nicht Organe oder leitende Angestellte von LED Linear™ sind, grob fahrlässig verursacht werden.
- 12.2 In Fällen der Ziffer 12.1 ist die Haftung auf das 3-fache des Kaufpreises der betroffenen Lieferung beschränkt.
- 12.3 In Fällen der Ziffer 12.1 ist die Haftung für Folgeschäden, einschließlich entgangenem Gewinn und Betriebsunterbrechung, auf das 3-fache des Kaufpreises beschränkt.
- 12.4 In Fällen der Ziffer 12.1 beträgt die Verjährungsfrist zwei Jahre ab dem Zeitpunkt, in dem der Anspruch entstanden ist und der Käufer von den Anspruch begründenden Umständen Kenntnis erlangt hat. Unabhängig von der Kenntnis des Käufers verjährt der Anspruch drei Jahre nach dem den Schaden auslösenden Ereignis. Die Verjährungsfrist bei Schadensersatzansprüchen wegen Mängeln richtet sich nach Ziffer 10.10.
- 12.5 Die vorstehenden Haftungsbeschränkungen gelten für alle Schadensersatzansprüche unabhängig vom Rechtsgrund mit Ausnahme von Schadensersatzansprüchen des Käufers (i) wegen arglistig verschwiegener Mängel, (ii) wegen Mängeln bezüglich derer eine Garantie für die Beschaffenheit einer Ware übernommen wurde (diesbezüglich gilt gegebenenfalls die sich aus der Garantie ergebende Garantieregelung bzw. Verjährungsfrist), (iii) nach dem Produkthaftungsgesetz, (iv) aus der Verletzung von Leben, Körper oder Gesundheit, (v) wegen Vorsatz oder (vi) wegen grober Fahrlässigkeit von Organen oder leitenden Angestellten von LED Linear™.
- 12.6 Die vorstehenden Haftungsbeschränkungen gelten auch für Schadensersatzansprüche des Käufers gegen Organe, leitende Angestellte, Mitarbeiter oder Beauftragte von LED Linear™.
- 12.7 Die vorstehenden Beschränkungen von Schadensersatzansprüchen gelten entsprechend für den Anspruch auf Ersatz vergeblicher Aufwendungen.

13. Höhere Gewalt

- 13.1 Ist LED Linear™ aufgrund höherer Gewalt wie Mobilmachung, Krieg, Terrorismus, Aufruhr, Naturkatastrophen, Feuer oder anderer unvorhersehbarer und nicht durch LED Linear™ zu vertretende Umstände wie z. B. Streiks oder rechtmäßige Aussperrungen, Betriebs- oder Transportstörungen, Rohstoffbeschaffungsschwierigkeiten, Virus- und sonstiger Angriffe Dritter auf das IT-System von LED Linear™, soweit diese trotz Einhaltung der bei Schutzmaßnahmen üblichen Sorgfalt erfolgten sowie mangelnder Belieferung durch Zulieferer an der Erfüllung der vertraglichen Verpflichtungen von LED Linear™ gehindert, verlängern sich die vereinbarten Lieferfristen jeweils um die Dauer der Behinderung zuzüglich einer angemessenen Anlaufzeit, höchstens jedoch um drei Monate. Die genannten Umstände sind von LED Linear™ auch dann nicht zu vertreten, wenn sie während eines bereits bestehenden Verzugs eintreten. LED Linear™ wird dem Käufer den Beginn und das voraussichtliche Ende derartiger Umstände baldmöglichst mitteilen.
- 13.2 Dauert die Behinderung sechs Wochen oder länger, können beide Parteien vom Vertrag zurücktreten.
14. Einhaltung von Vorschriften und Export
- 14.1 Der Käufer hat alle anwendbaren gesetzlichen und regulatorischen Vorschriften sowie behördliche Anforderungen einzuhalten, einschließlich anwendbarer Ein- und Ausfuhrbestimmungen und sonstiger Gesetze des Landes, in dem der Käufer geschäftlich tätig wird. Der Käufer hat rechtzeitig alle erforderlichen Genehmigungen und Lizenzen sowie alle anderen erforderlichen Erlaubnisse, die zur Nutzung oder dem Export der Ware nach all diesen anwendbaren Gesetzen erforderlich sind, einzuholen.
- 14.2 LED Linear™ ist berechtigt, die Lieferung gegenüber dem Käufer zurückzuhalten, wenn der Käufer solche anwendbaren Gesetze verletzen würde oder wenn nicht alle erforderlichen Genehmigungen vorhanden sind und dies nicht auf das Verschulden oder die Verantwortlichkeit von LED Linear™ zurückzuführen ist.
15. Aufrechnung und Zurückbehaltungsrecht
- Die Aufrechnung oder Ausübung eines Zurückbehaltungsrechts durch den Käufer wegen betrübter oder nicht rechtskräftig festgestellter Gegenansprüche ist ausgeschlossen. Die Ausübung eines Zurückbehaltungsrechts durch den Käufer ist auch insoweit ausgeschlossen, als die Gegenansprüche nicht auf demselben Vertragsverhältnis beruhen.
16. Abtretung
- Der Käufer darf die ihm in Verbindung mit Lieferungen obliegenden Rechte und Pflichten nicht ohne vorherige schriftliche Zustimmung von LED Linear™ ganz oder teilweise abtreten. LED Linear™ ist die Abtretung der LED Linear™ in Verbindung mit Lieferungen obliegenden Rechte und Pflichten, insbesondere an verbundene Unternehmen im Sinne des § 15 AktG, erlaubt.
17. Anwendbares Recht, Gerichtsstand, Sonstiges
- 17.1 Für alle Rechtsbeziehungen zwischen LED Linear™ und dem Käufer gilt deutsches Recht unter Ausschluss des UN-Kaufrechts (CISG).
- 17.2 Ausschließlicher Gerichtsstand für alle Streitigkeiten aus oder in Verbindung mit einer Lieferung ist das Landgericht Kleve; LED Linear™ ist jedoch berechtigt, den Käufer auch an seinem Sitz zu verklagen.
- 17.3 Sollten einzelne Bestimmungen dieser Allgemeinen Bedingungen unwirksam sein oder werden, so berührt dies nicht die Wirksamkeit der verbleibenden Bestimmungen.

GENERAL TERMS AND CONDITIONS OF SALE AND DELIVERY

1. General Provisions

- 1.1 All deliveries by LED Linear™ GmbH („LED Linear™“) shall be subject exclusively to the following General Terms and Conditions of Sale and Delivery („General Terms and Conditions“). Any other provisions, in particular any general terms and conditions of the Buyer, shall not be effective, irrespective of whether they have been explicitly rejected by LED Linear™ or not. This shall also apply in the event that LED Linear™ performs under the agreement without reservation despite being aware of conflicting or differing terms and conditions.
 - 1.2 Individual agreements concluded from case to case between LED Linear™ and the Buyer shall have priority. They require written form in order to be effective, as shall any modifications of, amendments to, or cancellation of any agreements between LED Linear™ and the Buyer and of these General Terms and Conditions. This shall also apply to any revocation of this requirement of written form itself. Means of telecommunication that do not comprise at least a copy or facsimile of the signature of the issuing party, in particular simple e-mails, shall not be deemed sufficient to constitute compliance with the requirement of written form.
- ## 2. Offers, Orders
- 2.1 Offers issued by LED Linear™ shall generally not be binding. In the event that an offer issued by LED Linear™ is explicitly designated in writing as binding, it will be regarded as binding for a period of ten workdays from the date of issuance of the offer.
 - 2.2 Light planning especially made for the prospective buyer can be invoiced although no respective delivery order was placed. The amount to be invoiced will be calculated on the basis of hourly rates usual in the market.
 - 2.3 Orders placed by the Buyer shall not become binding for LED Linear™ until the order has been accepted by written confirmation or by dispatch of the product and the invoice. LED Linear™ shall have the right to accept orders within two weeks after receipt.
 - 2.4 Orders on call-off have to be called off within the agreed time frame. Is the time limit exceeded for more than three months LED Linear™ is entitled to invoice the total order amount as well as interest on capital and storage fee.
 - 2.5 LED Linear™ shall retain the title and all patent rights in respect of any offers, cost estimates, drawings, and other documentation provided in written, oral, electronic or any other form („Documents“). The Documents and their contents may only be made accessible or otherwise disclosed to third parties after the prior written consent of LED Linear™ and shall be returned at the request of LED Linear™ immediately if the agreement between LED Linear™ and the Buyer is not finalised. Any copies shall be destroyed.
- ## 3. Delivery, Acceptance of Delivery
- 3.1 Deliveries shall be made EXW (Versandwerk LED Linear™, Dr.-Alfred-Herrhausen-Allee 22b-d, 47228 Duisburg, Germany) ICC Incoterms 2010. Even where it is agreed from case to case that LED Linear™ is responsible for shipping the product, the place of fulfilment shall be the place of transfer of the product by LED Linear™ to the individual contracted for shipping.
 - 3.2 Delivery periods or dates stated shall be non-binding unless agreed as binding from case to case. If non-binding delivery periods or dates are stated, LED Linear™ shall not enter into default of delivery until a reasonable delivery period set in writing by the Buyer has expired to no avail. The Buyer shall not set the expiry of such period at a date sooner than four weeks after expiry of the non-binding delivery period or the non-binding delivery date.
 - 3.3 LED Linear™ shall not be in default of delivery if a subcontractor fails to deliver to LED Linear™ correctly or on time for reasons beyond the responsibility of LED Linear™ and despite a congruent hedging transaction having been concluded with the sub-contractor.
 - 3.4 Nor shall LED Linear™ be in default of delivery if the delay is attributable to the fact that the Buyer has failed to present duly or on time the documentation, licenses, approvals, releases or other formalities required for shipment or has failed to meet other obligations. This shall not apply if LED Linear™ is responsible for the delay.
 - 3.5 If LED Linear™ is in default, the Buyer shall be entitled to claim liquidated damages (pauschalierter Schadensersatz) in the amount of 0.5% for each full week of delay, in total however no more than 5% of the net price of that portion of the shipment that could not be put to its intended use on account of the delay. LED Linear™ reserves the right to prove that the damage incurred by the Buyer was significantly less or that no damage was incurred at all.
 - 3.6 The Buyer shall, at the request of LED Linear™, state within a reasonable period whether it elects to withdraw from the agreement because of the delay in delivery or whether it insists on delivery being executed.
 - 3.7 LED Linear™ shall be entitled to effect part deliveries provided the Buyer can reasonably be expected to accept such part deliveries, in particular if the delivery of the remaining products ordered is ensured and this does not constitute a significantly increased effort for the Buyer nor significant extra costs (unless LED Linear™ agrees to bear any such extra costs). Each part delivery may be invoiced separately.
 - 3.8 The Buyer shall be in default of acceptance if it fails to collect the product on the binding delivery date as agreed. In the case of non-binding delivery periods or delivery dates, LED Linear™ shall be entitled to inform the Buyer subject to a notice period of two weeks that the product is ready for collection; if the Buyer fails to collect the product by the expiry date, it shall be in default of acceptance. The Buyer shall not decline acceptance on the grounds of negligible defects.
 - 3.9 If the delivery is delayed at the request of the Buyer by more than one month after notice of readiness for dispatch, it may be charged with a storage fee for each additional month or part thereof in the amount of 0.5 % of the net price of the objects of delivery, however no more

than 5 % in total. The parties to the agreement shall reserve the right to provide proof of storage costs being higher or lower.

4. Samples for temporary review

Luminaires can be supplied for a maximum of one month as samples. After this period an invoice will be issued if the samples were not returned in time. The products have to be returned in the original packaging. Samples not returned in original packing and samples that have been altered or damaged will always be invoiced.

5. Prices, Price Adjustments

- 5.1 Unless otherwise agreed, the current price list as valid from time to time shall be applicable. Prices shall be understood to be EXW (Versandwerk LED Linear™, Dr.-Alfred-Herrhausen-Allee 22b-d, 47228 Duisburg, Germany) ICC Incoterms 2010 in Euros, and are exclusive of packaging and shipping costs. Any applicable value added tax shall be calculated separately at the statutory rates as valid from time to time and shall be payable by the Buyer.
- 5.2 LED Linear™ reserves the right to adjust the prices in the event of cost changes occurring after conclusion of the agreement and until delivery is effected, in particular as a result of wage agreements, changes in raw material costs, other price adjustments on the part of subcontractors, or exchange rate fluctuations, that are beyond the responsibility of LED Linear™ and were not with sufficient certainty foreseeable. If requested, LED Linear™ shall substantiate the reasons for the price adjustments to the Buyer.

6. Payment, Default of Payment

- 6.1 Invoices shall be payable without any deductions within 30 days after delivery and receipt of the invoice by bank transfer to a bank account specified by LED Linear™ to the Buyer. Unless otherwise agreed, payments shall be effected in Euros.
- 6.2 If the Buyer fails to effect payment by expiry of the due date for payment, it shall be in default without further notice. Timeliness of payment shall be determined by the date of receipt of the invoiced amount in the bank account specified.
- 6.3 In the event of default of payment, LED Linear™ shall be entitled to charge default interest in the amount of eight percentage points above the base interest rate. The right to assert further damages is reserved.
- 6.4 If the Buyer is in default with at least two payments that are due from the contractual relationship with LED Linear™, all payment obligations on the part of the Buyer arising from all business relationships with LED Linear™ shall become due and payable immediately.

7. Deterioration of Financial Situation

- 7.1 If it turns out after signing of the agreement with the Buyer that the fulfilment of its contractual obligations is in jeopardy on account of its financial situation (in particular in the event of suspension of payment, application for institution of insolvency proceedings, attachment or compulsory execution proceedings, protested bills or cheques, and direct debit recalls, also including transactions involving third parties), LED Linear™ shall be entitled, at its own discretion, to retain delivery until the purchase price has been paid in advance or a satisfactory security has been provided. This shall also apply if the default of payment on the part of the Buyer gives rise to reasonable doubt in regard to its ability to meet its financial obligations or in regard to its credit standing.
- 7.2 In the cases specified in Clause 7.1 LED Linear™ shall moreover be entitled to retain deliveries until receipt of all payments due from outstanding receivables against the Buyer or until provision of an appropriate security. For receivables not yet due, including receivables for which LED Linear™ has entered into an advance performance obligation on the basis of agreements already executed, and for receivables without any natural or economic connection to the delivery, this shall only apply if LED Linear™ has a legitimate interest therein.
- 7.3 In the event of a current account relationship existing within the context of the business relationship, LED Linear™ shall moreover be entitled, in the cases listed in Clause 7.1, to retain deliveries until receipt of all payments from acknowledged account balances or furnishing of an acceptable security.
- 7.4 Should the Buyer fail to make the prepayment or to provide the pursuant to Clause 7.1 within two weeks, LED Linear™ shall be entitled to withdraw from the relevant agreement.

8. Retention of Title

- 8.1 LED Linear™ shall retain title in the supplied product until receipt of all payments due from the contractual relationship. In the event of a current account relationship existing within the context of the business relationship, LED Linear™ shall retain title in the supplied product until receipt of all payments from acknowledged account balances.
- 8.2 In the event of a violation of the agreement on the part of the Buyer, in particular in the event of default of payment, LED Linear™ shall be entitled to collect the product supplied subject to retention of title („Retained Product“). In the case of default of payment, prior indication of a notice period is not required. For the purpose of collecting the Retained Product LED Linear™ shall be entitled to enter the Buyer's premises during the usual business hours. Any other claims on the part of LED Linear™ shall remain unaffected.
- 8.3 After taking back the Retained Product, LED Linear™ shall be authorised, after prior announcement, to utilise the product as appropriate; the revenues shall be set off against the Buyer's liabilities, after deduction of the appropriate utilisation costs.
- 8.4 For the duration of retention of title the Buyer shall not be entitled to pledge the Retained Product or to use it as security. The Buyer is entitled to process and/or to sell the Retained Product in the ordinary course of business, however it now already assigns all claims in the

- amount of the final invoice amount (including value added tax) to LED Linear™ that it may have as a result of the sale against its customers or third parties, irrespective of whether the Retained Product was sold before or after processing. The Buyer shall not be entitled to pledge the assigned claims or use them as security.
- 8.5 The Buyer shall notify its customer, when selling the product, of the assignment of the claims for payment of the delivered goods. The Buyer shall not be entitled to sell the Retained Product to customers who have excluded or restricted the assignment of claims for payment against them. If the Retained Product has been processed together with other objects that are not the property of the Buyer, the assignment shall be effected only in proportion of co-ownership in the processed object pursuant to Clause 8.10.
- 8.6 The Buyer shall retain its right to collect the receivables even after assignment. The right of LED Linear™ itself to collect the receivables shall remain unaffected. LED Linear™ shall not collect the receivables, however, as long as the Buyer meets its payment obligations from the revenues acquired, does not enter into default of payment, and in particular does not file a petition for institution of insolvency proceedings and has not suspended its payments. In any of the aforementioned cases LED Linear™ shall be entitled to request that the Buyer disclose the assigned receivables and their debtors, that it provide all information necessary for collection, that it surrender the related documents, and that it notify the debtors of the assignment. The occurrence of any of these events shall terminate the right of the Buyer to collect the receivables.
- 8.7 Insofar as the Buyer and its customer have entered into a current account relationship pursuant to § 355 German Commercial Code, the claim assigned in advance to LED Linear™ by the Buyer shall also apply to the acknowledged account balance. If insolvency proceedings are instituted against the customer, such claim shall also apply to the account surplus of the final balance existing at that point in time.
- 8.8 The Buyer shall be obliged to notify LED Linear™ immediately in writing of any and all seizures, pledges, and other attachments and other interventions by third parties in respect of the Retained Product or the assigned receivables. In addition, the Buyer shall inform such third party of the retention of title. If the third party is not able to reimburse LED Linear™ for the court and out-of-court costs of legal action pursuant to § 771 German Code of Civil Procedure, the Buyer shall be held liable for the loss incurred by LED Linear™.
- 8.9 The Buyer shall be obliged to handle the Retained Product with due care. In particular it shall take out adequate insurance to insure the Retained Product at replacement value against damage caused by fire, water, and theft. The Buyer shall be obliged to store the Retained Product separately and to identify it as the property of LED Linear™ and to mark the assigned receivables in its accounts as being owed to LED Linear™.
- 8.10 Processing or conversion of the Retained Product by the Buyer shall invariably be performed on behalf of LED Linear™. If the Retained Product is processed or converted together with other objects not belonging to LED Linear™, LED Linear™ shall acquire co-ownership in the new object in proportion of the value of the Retained Product to the other objects processed or converted at the time of processing or conversion; apart from the aforesaid, the new object thus created shall be subject to the same provisions as those governing the product supplied under retention of title.
- 8.11 If the Retained Product is merged or combined inseparably with other objects not belonging to LED Linear™, LED Linear™ shall acquire co-ownership in the new object in proportion of the value of the Retained Product to the other merged objects at the time of merging or combining. If the merging or combining is performed in such a manner that the Buyer's object is to be regarded as the main constituent, the Buyer shall transfer co-ownership proportionately. The Buyer shall store the sole property or co-property thus created for LED Linear™.
- 8.12 The Buyer shall adopt appropriate measures for and offer LED Linear™ comprehensive support in safeguarding the rights of LED Linear™ pursuant with this Clause 8 (and, as necessary, by other means of protection) in the country in which the Retained Product is located.
9. Properties and Condition of the Product, Information and Application, Guarantees
- 9.1 The properties of the product shall be defined by the agreed specifications only. The Buyer shall be responsible for verifying whether the product is suitable for the intended purpose.
- 9.2 Properties of the product which are indicated in publications of LED Linear™ or by sales representatives of LED Linear™, in particular in advertising, in drawings, brochures or other documents or on the packaging materials and identification labels of the product shall only be regarded as included in the contractual properties of the product if they are explicitly specified in a quotation or in an order confirmation.
- 9.3 Information provided by LED Linear™ in writing or other form with a view to the suitability, including application, processing and other use, as well as technical consultation by LED Linear™ shall be effected to the best of LED Linear™'s knowledge, but shall be regarded as non-binding and shall not release the Buyer from inspecting the product supplied by LED Linear™ with a view to its suitability for the intended purposes. Application, processing, and any other use of the product are beyond the control of LED Linear™ and are therefore the sole responsibility of the Buyer.
- 9.4 Guarantees, in particular guarantees in regard to specific properties, shall only be binding for LED Linear™ to the extent that they (i) are incorporated in a quotation or an order confirmation, (ii) are explicitly identified as „Guarantee“ or „Guarantees“, and (iii) explicitly specify the obligations resulting from such a guarantee for LED Linear™.
10. Rights and Warranties
- 10.1 The Buyer's warranty rights are subject to the Buyer's inspecting the product upon delivery and submitting a proper notice of defects pursuant to the provisions of § 377 HGB.
- 10.2 A notice of defect shall be submitted in writing and shall specifically state the defect in question. Complaints for incomplete delivery and other visible defects shall be notified to LED Linear™ without delay, but no later than one week after delivery, in writing; hidden defects shall be notified without delay, but no later than one week after they were detected. Acceptance of the product shall not be denied on the grounds of insignificant defects. Claims for defects notified belatedly are excluded.
- 10.3 Inspection of the products shall be effected in accordance with our RMA procedure. The costs for inspection of the product shall be for the Buyer's account. The defective products shall be made available to LED Linear™ for inspection upon request. The buyer shall bear the costs to return the products.
- 10.4 LED Linear™ will ensure, at its own discretion, remedy for defective products properly notified as defective either by correcting the defect (rectification) or by supplying non-defective products (replacement). Remedy shall be effected without any acknowledgment of a legal obligation. In the case of rectification, the remaining period of the original statutory period of limitations shall begin with the return of the rectified product. The same shall apply for replacement delivery.
- 10.5 Any claims on the part of the Buyer for expenditures necessary for the purpose of remedy, in particular shipping, transit, labour and material costs, are excluded insofar as these expenditures are increased as a result of the product ultimately being forwarded to a different place of delivery than that originally agreed; LED Linear™ shall be entitled to invoice the Buyer for such extra costs. Similarly, the removal of the defective product and installation of the replacement product and the related costs are not part of the remedy; they may be reimbursable as damages pursuant to Clause 11.
- 10.6 Should the remedy prove unsuccessful, the Buyer may, at its discretion, reduce the purchase price by a reasonable amount or withdraw from the agreement.
- 10.7 Any other warranty claims, regardless of their nature, shall be excluded without prejudice to any claims for damages limited pursuant to Clause 11.
- 10.8 There shall be no warranty claims for insignificant deviations from the agreed properties unless they have a substantial adverse effect on the intended use, for normal wear, improper or negligent handling, unsuitable or incorrect use, incorrect installation or commissioning by the Buyer or third parties subcontracted by the Buyer, excessive operational demands, use of unsuitable materials and supplies or substitute materials, inadequate construction work, unsuitable subsoil material or other special external influences, provided the damage is not due to the fault of LED Linear™. Warranty claims attributable to improper modifications or repair work performed by the Buyer or by third parties subcontracted by the Buyer shall also be excluded.
- 10.9 The Buyer shall bear the reasonable costs of an unjustified assertion of warranty claims (e.g. if the product was not defective); the same shall apply if LED Linear™ wrongfully grants warranty rights without being obliged to do so.
- 10.10 The limitation period for warranty claims is twelve months from the date of delivery. This limitation shall not apply, however, insofar as (i) a defect was intentionally not disclosed or (ii) a guarantee for the properties of a product was given (in this context, the guarantee and/or limitation period laid down in the guarantee shall apply as applicable). In the event of damage claims this restriction shall, moreover, not apply in the following instances: (i) liability pursuant to the German Product Liability Act, (ii) death, damage to body or health, (iii) intent and (iv) gross negligence on the part of corporate bodies or executives of LED Linear™.
- 10.11 The statutory rights of recourse on the part of the Buyer in the event that the product is sold to a consumer, shall remain unaffected. Such rights of recourse shall only exist insofar as the Buyer has not entered into any agreement with its customer that extend beyond the statutory warranty rights.
11. Intellectual Property Rights
- 11.1 LED Linear™ shall deliver the product unencumbered by copyrights and other intellectual property rights only with regard to the country in which the place of delivery is located (hereinafter referred to as „Property Rights“). In the event of a violation of this obligation, LED Linear™ shall be held liable to the Buyer pursuant to the following provisions, provided that the product was used by the Buyer in accordance with the agreement and the statutory period of limitations for warranty claims as specified in Clause 9.10 has not yet expired.
- a) LED Linear™ shall at its discretion either acquire, at its own cost, an adequate right of exploitation with regard to the violated Property Right, modify the product so that the Property Right is no longer violated, or replace the product, provided this does not impair the agreed or presumed use thereof by the Buyer. If this is not possible, or if this cannot reasonably be expected of LED Linear™, the Buyer may withdraw from the agreement as far as the affected product is concerned, or reduce the purchase price by an appropriate amount.
- b) LED Linear™'s liability for damages shall be subject to the provisions laid down in Clause 11.
- c) The aforementioned obligations of LED Linear™ shall only apply insofar as the Buyer (i) informs LED Linear™ without delay in writing of the assertion of claims by third parties, (ii) does not acknowledge the existence of a violation vis-à-vis third parties, and (iii) leaves all measures of defence and negotiations aimed at settling the conflict to the discretion of LED Linear™. If the Buyer discontinues the use of the product for the purpose of minimising damage or for any other justified reason, it shall inform the third party that such discontinuation does not constitute any acknowledgement of the alleged violation.
- 11.2 All claims on the part of the Buyer shall be excluded if the violation of a Property Right was caused by the Buyer, in particular if it was caused by a manner of use not intended by LED Linear™, or by a modification of the product by the Buyer or by third parties subcontracted by the Buyer or their use in combination with products not provided or recommended for combined use by LED Linear™.
- 11.3 Any other claims on the part of the Buyer against LED Linear™ or its agents that extend beyond the rights laid down in this Clause 11 and are based on a violation of Property Rights are excluded.
12. Liability
- 12.1 LED Linear's liability for damages caused by simple negligence is limited to damages arising from the violation of material contractual obligations the fulfilment of which is prerequisite to the proper execution of the agreement and in the observance of which the contractual

partner regularly trusts and is entitled to trust; in this case, however, liability shall be limited to the typical foreseeable damage. This limitation of liability shall apply analogously for any damage caused by gross negligence on the part of employees or agents of LED Linear™ who are not corporate bodies or executives of LED Linear™.

- 12.2 In cases governed by Clause 12.1, the liability shall be limited to three times the purchase price of the delivery in question.
- 12.3 In cases governed by Clause 12.1, the liability for consequential damages, including lost profits and production downtimes, shall be limited to two and a half times the purchase price.
- 12.4 In cases governed by Clause 12.1, the limitation period shall be two years from the time when the claim arose and the Buyer became aware of the circumstances giving rise to the claim. Irrespective of the Buyer's awareness, the claim shall expire three years after occurrence of the event causing the damage. The limitation period for claims for damages due to defects shall be determined pursuant to Clause 10.10.
- 12.5 The aforementioned limitations of liability shall apply for all claims for damages irrespective of the legal basis, with the exception of damage claims filed by the Buyer (i) for defects intentionally not disclosed, (ii) for defects for which a guarantee for the properties of a product was given (in this context, the guarantee provisions and/or limitation periods laid down in the guarantee shall apply as applicable), (iii) pursuant to the German Product Liability Act, (iv) for death, damage to body or health, (v) for intent or (vi) for gross negligence on the part of corporate bodies or executives of LED Linear™.
- 12.6 The aforementioned limitations of liability shall also apply for damage claims filed by the Buyer against corporate bodies, executives, employees or agents of LED Linear™.
- 12.7 The aforementioned limitations of claims for damages shall apply accordingly for claims for reimbursement of futile expenses.
- 13. Force Majeure
- 13.1 If LED Linear™ is prevented from fulfilling its contractual obligations due to circumstances of force majeure including mobilisation, warfare, acts of terrorism, riots, natural disasters, fire or other unpredictable circumstances beyond the control of LED Linear™, for example strikes or lawful lockouts, operational or transportation disruptions, raw material shortages, virus and other attacks by third parties to the IT system of LED Linear™, insofar as such attacks occurred despite compliance with the usual care adopted for protective measures, and shortages in materials supplied by subcontractors, the agreed terms of delivery shall be extended by the duration of the delay plus an appropriate start-up period, however by no more than three months. The aforementioned circumstances shall also be deemed beyond the control of LED Linear™ if they occur in the course of a delay already occurring. LED Linear™ shall inform the Buyer of the beginning and the anticipated end of such events as swiftly as possible.
- 13.2 If the delay extends for a period of six weeks or longer, both parties shall have the right to withdraw from the agreement.

14. Compliance with Regulations and Export

- 14.1 The Buyer shall comply with all applicable legal and regulatory provisions as well as government requirements, including applicable import and export regulations and any other legal provisions valid in the country in which the Buyer is engaged in business. The Buyer shall procure in good time all necessary approvals and licences as well as all other necessary permissions that are required for the use or export of the product pursuant to all such applicable laws and provisions.
- 14.2 LED Linear™ shall be entitled to withhold delivery to the Buyer if the Buyer violates such applicable laws or if the required permissions have not been procured through no fault or responsibility on the part of LED Linear™.

15. Set-Off and Retention of Title

Set-off of claims and the exercising of a right of retention by the Buyer for contested counter-claims or counter-claims not established as final and absolute are excluded. The Buyer's right of retention shall also be excluded insofar as the counterclaims are not based on the same contractual relationship.

16. Assignment

The Buyer shall not assign the rights and obligations that devolve upon him in connection with deliveries, neither in part nor in their entirety, without the prior written consent of LED Linear™. LED Linear™ is entitled to assign the rights and obligations that devolve upon LED Linear™ in connection with deliveries, in particular to associated companies as defined in § 15 German Stock Companies Act.

17. Applicable Law, Place of Jurisdiction, Miscellaneous

- 17.1 All legal relationships between LED Linear™ and the Buyer shall be governed by German law with the exclusion of the United Nations Convention on Contracts for the International Sale of Goods (CISG).
- 17.2 The exclusive place of jurisdiction for all disputes arising from or in connection with a delivery is Landgericht Kleve; however, LED Linear™ shall also be entitled to file suit against the Buyer at its registered place of business.
- 17.3 Should individual clauses contained in these present General Terms and Conditions prove to be or become invalid, this shall have no bearing on the validity of the remaining clauses.

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

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Party Authorized To Apply Mark: Same as Manufacturer
Report Issuing Office: Intertek, Kaufbeuren; Germany

Control Number: 4004471

Authorized by: Ulla-Pia Johansson-Nilsson

Ulla-Pia Johansson-Nilsson
for Dean Davidson, Certification Manager



Intertek

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UL 2108 - Issued: 2015/12/07 Ed. 2 Low Voltage Lighting Systems	
Standard(s):	CSA C22.2#250.0 Issued: 2008/09/17 Ed:3 Luminaires; General Instruction No.1 2010/01/11, General Instruction No. 2 2012/10/17
Product:	LED luminaires
Brand Name:	

Models:

VarioLED XXX IP67
VarioLEDflex XXX IP67
Hydralux XXX IP67
VENUS IP67
PHOBOS IP67
AMOR IP67
ADONIS XXX IP67
KALYPSO XXX IP67
POSEIDON XXX IP67
POSEIDON2 XXX IP67
OCEANOS XXX IP67
OCEANOS XXX IP68
Xooline XXX IP67
XOOLUM R XXX IP67
XOOLUM XXX IP67
XOOTOO XXX IP20
XOOTOO XXX IP40
XOOLIGHT™ XXX IP67
XOOTUBE XXX IP40
VESTA XXX IP67
LUNA XXX IP67
LYRA XXX IP67
MARS XXX IP67
SKYLLA XXX IP67
SKYLLA XXX IP68
NIKE XXX IP67
NIKE XXX IP68

XXX stands for: different numbers or letters or Blanks for designation, flexible color, intensity, Length and power by meter

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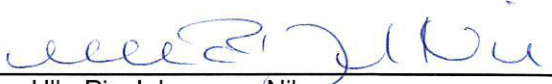
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Control Number: 4004471

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 for Dean Davidson, Certification Manager



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Standard(s):	Low Voltage Lighting Systems [UL 2108:2015 Ed.2] Light Emitting Diode (Led) Equipment For Lighting Applications [CSA C22.2#250.13:2014 Ed.2]
Product:	LED luminaires
Brand Name:	 

Models:

VarioLED XXX IP20
VarioLEDXXXIP40
XOOLINE XXX IP40
VESTA XXX IP40
LUNA XXX IP40
LYRA XXX IP40
XOOLUM R XXX IP20
XOOLUMXXXIP40
Mars CV XXX IP20
XOOLIGHT™ XXX IP10
XOOLIGHT™ XXX IP40

XXX stands for: different numbers or letters or Blanks for designation flexible, color, intensity, Length and power by meter.