



VMU048012LP8xxA



5.5"LP-LINEARHO DC MODULE, 480mA MAX CURRENT

- Low Profile design, no magnets
- Direct mount to luminaire housing
- Superior thermal performance than standard LinearHO
- Higher aluminum material density
- Extruded Aluminum material for thermal management
- High lumen, high efficacy
- Accessories: Diffused lens compatible
- For use in UL Class 2 lighting systems
- Suitable for DLC applications: L70>54,000hrs / L90=39,000hrs
- Meets UL8750 recognized
- RoHS compliant
- The module is supplied by short circuit proof SELV controlgear

General Specifications

	Min.	Typical	Max.
Input Voltage ^①	20.5VDC	23.1VDC	23.9VDC
Input Current ^①	50mA	350mA	480mA
Input Power ^①	1.0W	8.1W	11.5W
Initial Lumens @4000K / 80CRI	233 lumens	1,509 lumens	2,042 lumens
Initial Lm/W @4000K / 80CRI	228 lm/W	187 lm/W	178 lm/W
Beam Angle	120°		
CRI	80CRI (standard), 90CRI available		
Storage Temperature Range	-40°C to 100°C / -40°F to 212°F		
Operating Temperature Range (ta)	-40°C to 55°C / -40°F to 131°F		
Maximum Case Temperature (Tc)	L70: Tc max 105°C / L90: Tc max 105°C		
Estimated Lumen Maintenance ^②	L70: >54,000Hrs / L90: 39,000Hrs		
Color Consistency	Binning per ANSI C78.377-2015 @ 25°C; 3 SDCM		
Overall Size	5.51" L x 1.26" W x 0.29" H (140mm x 32mm x 7.4mm)		
PCB Material / Thermal Conductivity	MCPCB (Aluminum Clad)/ 1.5W / mK		
Extruded Material / Finish	Aluminum/surface treatment with Anodic Oxidation		
LED Quantity	24pcs.		
Module Weight	36.29g / 0.08lb		
PCB Part Number	PTL022C01M1		
Maximum Screw Installation Torque	25 inch - ounces		
Connector Type	WAGO #2060-452 / 998-404 (2 pin connector)		
Packaging: Master Carton	40pcs.		
Thermal Feedback	Not Available		
Safety/Compliance	cURus (File # E351548) Suitable for UL Class 2 Lighting Systems RoHS Compliant Dry and Damp Location CE (IEC 62031: 2008. AMD1: 2012, AMD2: 2014) SELV		
Energy Efficiency Label (EEI-Label)	C		
Warranty	5 years @ Max. Tc from the date of manufacture		

^① Nominal ratings. Performance based on Tc mod = 25°C. See thermal de-rating chart (pg. 3) for higher temperature operation

^② TM-21 Reported Numbers



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Electrical and Optical Specifications

LED Module Part Number	Number of LED	Input Current	Nom. Forward Voltage	Nom. Rated Power	Max. Fwd. Voltage	Max. Rated Power	Nom. Lum. Flux @4000K/80 CRI	Nom. Efficacy @4000K/80 CRI
VMU048012LP8xxA (5.5")	24	50 mA	20.5 VDC	1.0 W	23 VDC	1 W	233 lm	228 lm/W
		100 mA	21.0 VDC	2.1 W	23 VDC	2 W	450 lm	215 lm/W
		150 mA	21.5 VDC	3.2 W	24 VDC	4 W	666 lm	207 lm/W
		200 mA	21.9 VDC	4.4 W	24 VDC	5 W	879 lm	201 lm/W
		250 mA	22.3 VDC	5.6 W	25 VDC	6 W	1091 lm	196 lm/W
		300 mA	22.7 VDC	6.8 W	25 VDC	8 W	1301 lm	191 lm/W
		350 mA	23.1 VDC	8.1 W	25 VDC	9 W	1509 lm	187 lm/W
		400 mA	23.4 VDC	9.4 W	26 VDC	10 W	1715 lm	183 lm/W
		450 mA	23.8 VDC	10.7 W	26 VDC	12 W	1920 lm	180 lm/W
		480 mA*	23.9 VDC	11.5 W	26 VDC	12 W	2042 lm	178 lm/W

Luminous Flux De-Rating: CCT and CRI Multipliers

	2700K	3000K	3500K	4000K	5000K	5700K	6500K
CRI 80(R9> 0)	0.929	0.955	0.968	1.000	1.013	1.006	1.000
CRI 90(R9>50)	0.776	0.801	0.821	0.863	0.869	0.865	0.863

NOTES:

- 1) Performance based on Tc mod = 25°C. See thermal de-rating chart (pg. 3) for higher temperature operation
- 2) Standard lumen output and efficacy is calculated for standard options. Reference CCT & CRI vs Luminous Flux chart for lumen ratio calculation.
- 3) Specifications are subject to change without notice.
- 4) The LED DC Module can be configure with different LED chip quantities, series and parallel design configurations to meet a specific design requirement. Contact Fulham for further assistance.
- 5) * Indicates maximum rated current. Modules may be operated at a current less than or equal to this value, below the Tc rating.
- 6) 70CRI is NOT available.



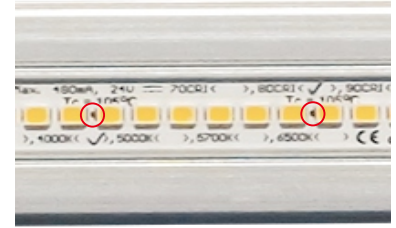
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Thermal Specifications

LP-LinearHO DC Module

Storage Temperature Range	-40 to +100°C / -40 to +212°F
Operating Ambient Temperature Range (ta)	-40 to 55°C / -40 to 131°F
Maximum Case Temperature (Tc)	L70 = 105°C (221°F) / L90 = 105°C (221°F)

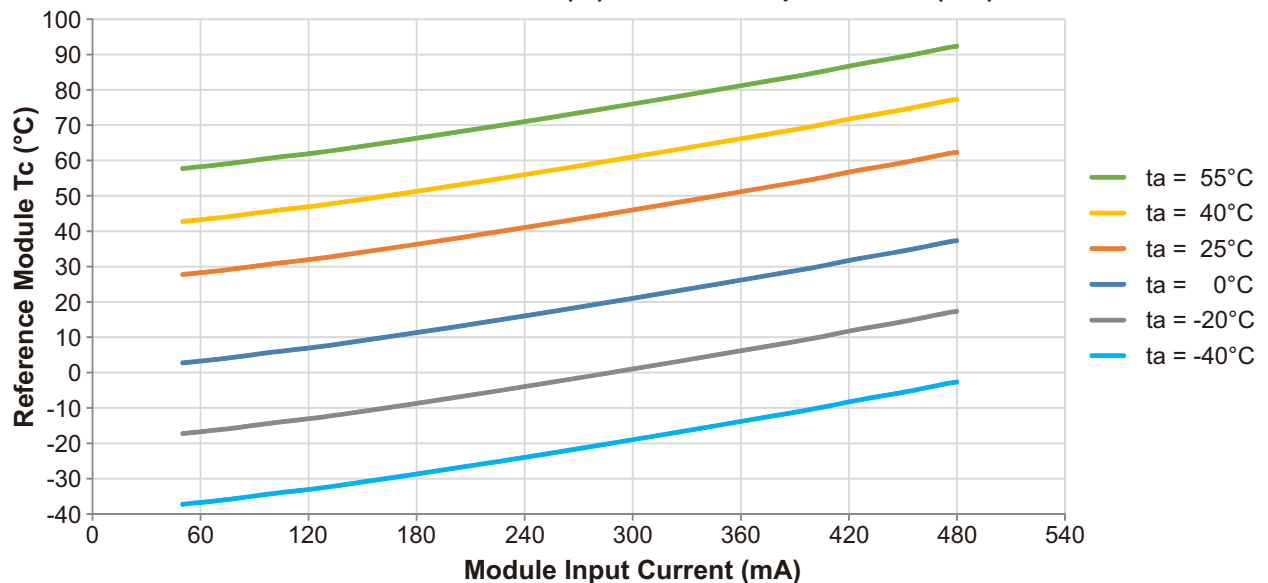


Thermal De-Rating

Tc vs. Luminous Flux vs. Forward Voltage

Module Case Temperature (Tc)	Total Vf Multiplier	Luminous Flux Multiplier
25°C	1.000	1.000
30°C	0.998	0.995
35°C	0.996	0.990
40°C	0.994	0.985
45°C	0.992	0.979
50°C	0.990	0.974
55°C	0.988	0.968
60°C	0.986	0.962
65°C	0.985	0.956
70°C	0.983	0.950
75°C	0.981	0.944
80°C	0.979	0.938
85°C	0.977	0.931
90°C	0.975	0.925
95°C	0.974	0.918
100°C	0.972	0.911
105°C	0.970	0.904

Module Tc vs. Ambient (ta) vs. Module Input Current (mA)



NOTES:

1) Chart "Module Tc vs. Ambient (ta) vs. Module Input Current (mA)" for reference only in an open ambient. The performance with in a luminaire will vary depending on the size and material of luminaire.



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Certification Chart

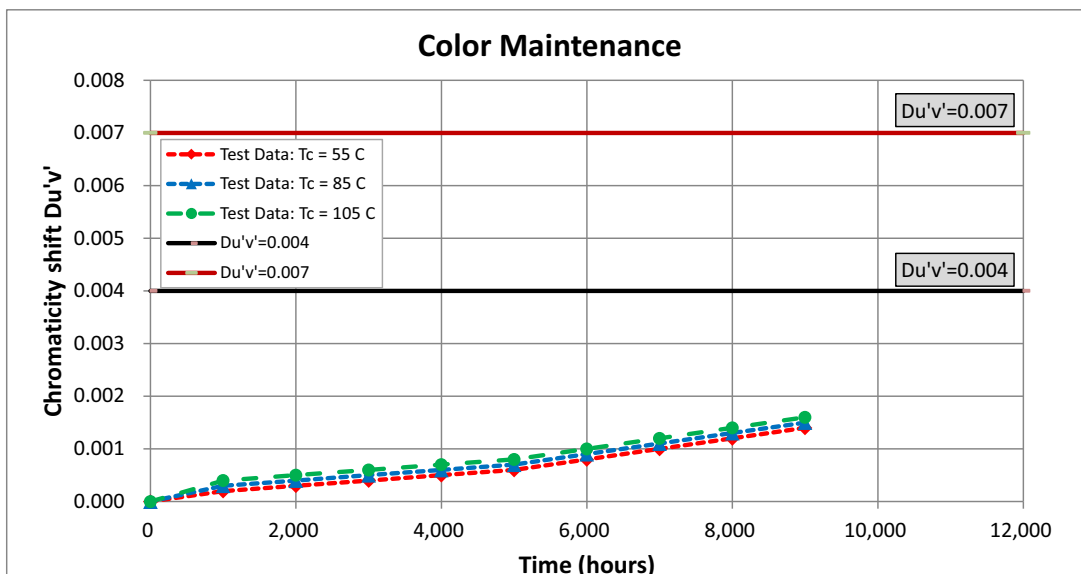
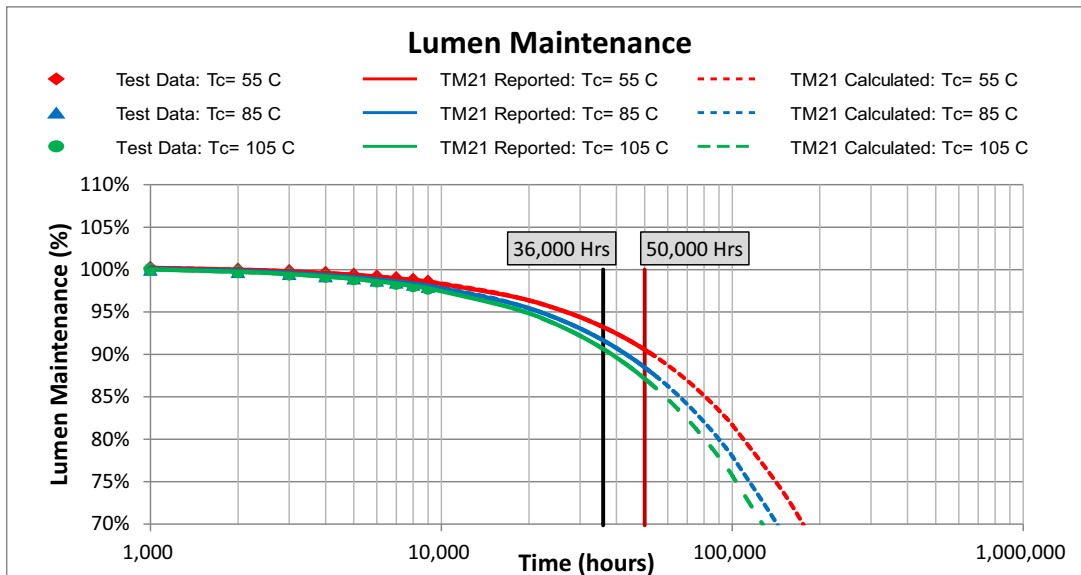
Classification	Model
RoHS COMPLIANT	YES
cUL US	YES
CE UK CA	YES
Energy Efficiency Label (EEI-Label)	C
Suitable for UL Class 2 Lighting System	YES

Energy Star™ TM-21 Calculator Data

Tc Module	Reported L70	Reported L90
55°C	>54,000 Hrs	53,000 Hrs
85°C	>54,000 Hrs	43,000 Hrs
105°C	>54,000 Hrs	39,000 Hrs

Tc Module	Calculated L70	Calculated L90
55°C	174,000 Hrs	53,000 Hrs
85°C	142,000 Hrs	43,000 Hrs
105°C	127,000 Hrs	39,000 Hrs

LED Lumen & Color Maintenance Data per LM-80 report and TM-21 Calculator





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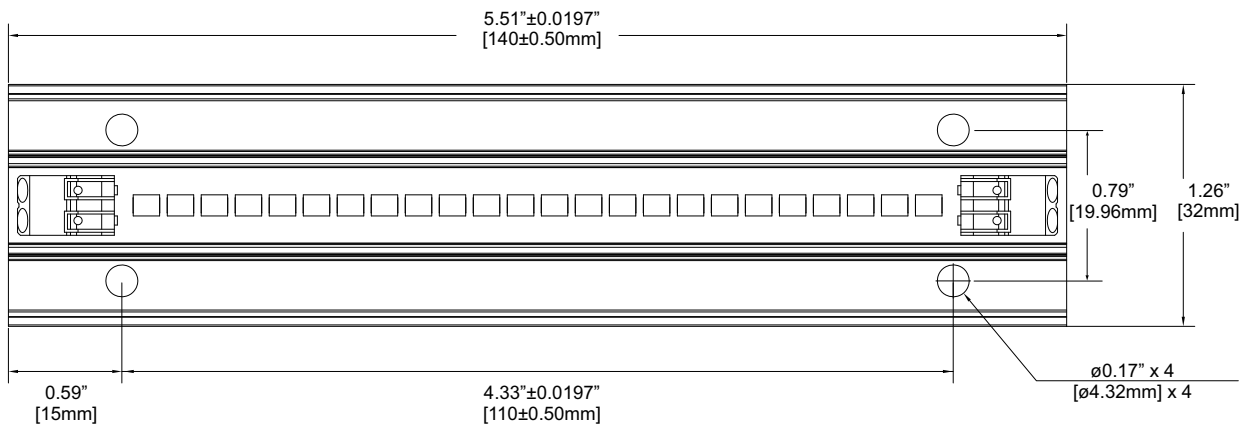


Mechanical Drawings

(Scale 1:1)

5.5"
[140mm]

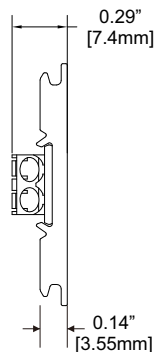
Overall Dimensions	
Length	5.51" [140mm]
Width	1.26" [32mm]
Height	0.29" [7.4mm]



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Unmarked General Tolerance

<4" [100mm]: ±0.0138" [±0.35mm]
 4"~11.8" [100~300mm]: ±0.0197" [±0.5mm]
 >11.8" [300mm]: ±0.0236" [±0.6mm]
 HOLES: ±0.002" [±0.05mm]



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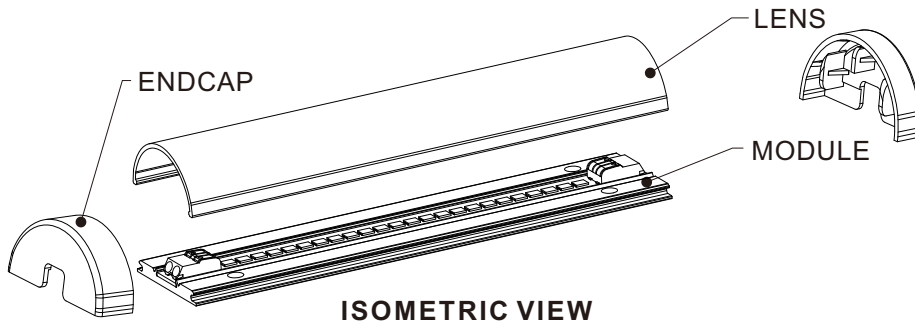


Accessories

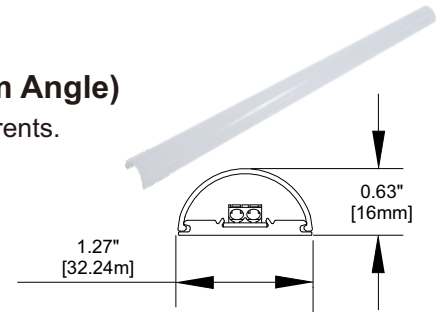
Diffuser Lens

Fulham Part Number: **TLE-OPT-120-002 (5.5" Diffuser Lens - 120° Beam Angle)**

- White polycarbonate diffuser lens - 82% transmissivity at nominally rated currents.



ISOMETRIC VIEW



SIDE VIEW

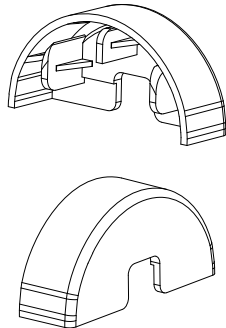
Installation Steps when using clamps:

1. Place the LED Module on the luminaire surface.
2. Place the Diffuser lens on top of LED module (line it up with LED module mounting edges).
3. Push down to snap into place.

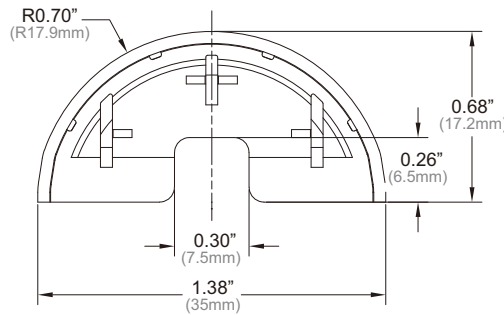
Endcap

Fulham Part Number: **VLE-OPT-120-012**

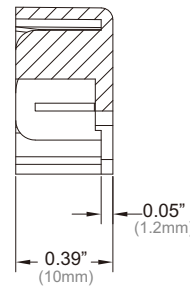
- White Polybutylene Terephthalate (PBT) end caps



ISOMETRIC VIEW



SIDE VIEW

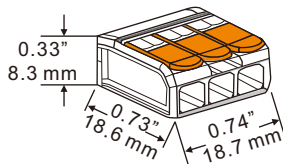
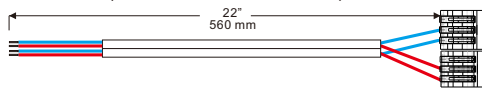


FRONT VIEW



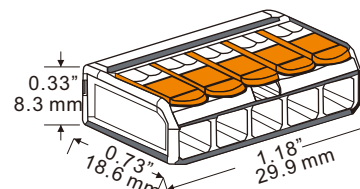
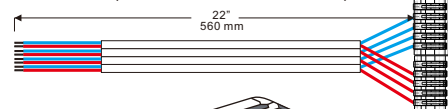
Harness

TLC-HN02 (1 and 2 module connection)

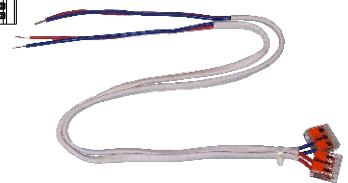


ISOMETRIC VIEW

TLC-HN04 (3 and 4 module connection)



ISOMETRIC VIEW

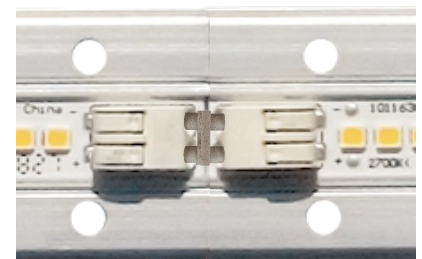


Interconnects

- Interconnect Type: WAGO Double pins to interconnect Modules (#2060-952/028-000)
- Approvals: cURus, UL 1977, and RoHS Compliant

NOTES:

- 1) Interconnects are NOT sold by Fulham.
- 2) Do not connect LinearHO Modules in parallel (end to end) if the current exceeds the maximum module rated current. This type of wiring would cause the pass-through current on the first module to exceed the rated current. This setup is in reference to wiring diagram #2 per Fulham's wiring diagram (see link on page #8). If the current is higher than the rated max, it is recommended to use wiring diagram #3.



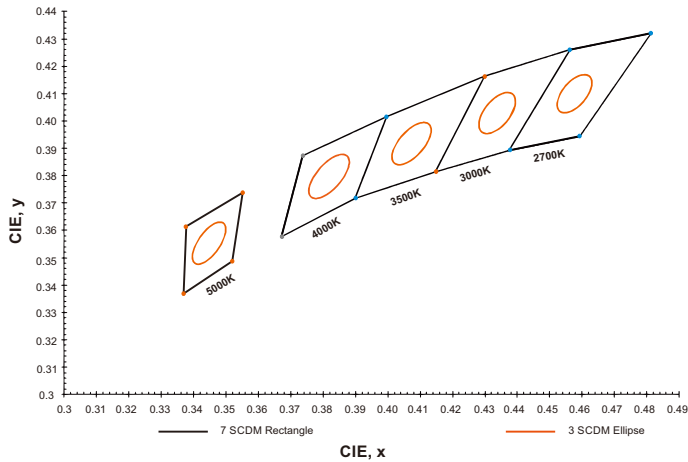
Top View



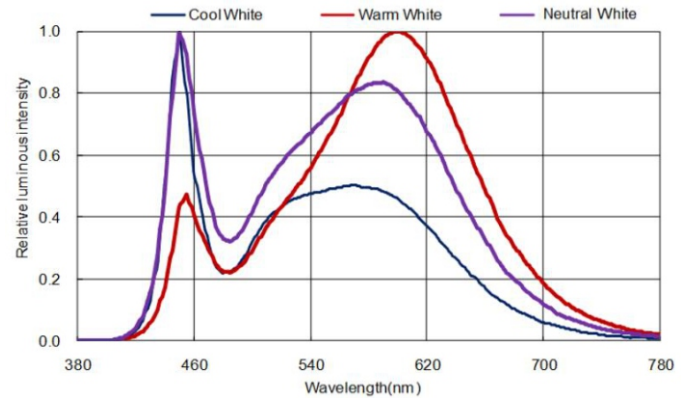
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Color and Binning



Optical Spectrum



Compatible Fulham Drivers

(Please use the links below for a complete list of compatible Fulham drivers and wiring diagrams)

- LP-LinearHO System Combination:
- Fulham's Wiring Diagrams: <https://cdn.fulham.com/PDFs/SpecSheets/DC-Modules-Wiring-Diagrams.pdf>
- Compatible with Fulham Hotspot EM Systems.

NOTES:

- 1) The Color and Binning and Optical Spectrum charts are for reference only. For more detailed info, contact factory.
- 2) Reference Seoul Chromaticity Diagram for Color and Binning. Binning per ANSI C78.377-2015 @ 25°C; 3 SDCM.
- 3) The Optical Spectrum values vary depending on product type and color rank.
- 4) Driver not included.
- 5) Do not connect LinearHO Modules in parallel (end to end) if the current exceeds the maximum module rated current. This type of wiring would cause the pass-through current on the first module to exceed the rated current. This setup is in reference to wiring diagram #2 per Fulham's wiring diagram (see the link above). If the current is higher than the rated max, it is recommended to use wiring diagram #3.



Guidelines

Termination Notes

- Connector Type: WAGO #2060-452 / 998-404 (2 pin push wire connector)
 - AWG: 24...18 solid wire
 - Strip length: 7...9mm / 0.28...0.35in
 - Connector Max amp. rating: 9 Amps.

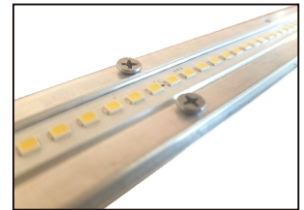


Connector

For more detail information, please visit Wago's website: <http://www.wago.com/infomaterial/pdf/51300133.pdf>

Fastening Notes

- If fastening by screw hole a recommended screw size: 6-20 x 5/8" flat head drilling screws. Use all available screw holes to ensure good contact between back side of module and mounting surface. Refer to max specified torque for installation.
- If fastening using double-sided tape, start with clean, oil-free and dust-free surface. Peel backing and place LED module on mounting surface. Firmly press down on the module to ensure good adherence. Follow the double-side tape manufacturer's installation instructions.
- BJB P2F (Push-to-Fix) fixing elements for PCBs can be used to fasten LED modules to mounting surface. Reference BJB's website for ordering information and specific model to use: <http://www.bjb.com/index.php?pid=376706&lid=10>.
- HEYCO HEYClip Snap Rivets 9035 is recommended for fast and easy installation with clean and finish look. For more detail information, please visit Heyco website: https://www.heyco.com/Nylon_PVC_Hardware/product.cfm?product=Snap-Rivets



Heyco Rivet 9035

Environmental Rating / Conformal Coating

- The DC LP-LinearHO Modules have been evaluated for use in dry or damp locations only. If used in wet locations, acceptability and the need for additional evaluation shall be determined in the end product.
- Fulham's LP-LinearHO modules are available with conformal coating; made to order with MOQ and lead time will apply. The conformal coating is a silicone based material which is double sprayed on the module only (LEDs and PCB). Conformal coating is recommended for the following applications: near ocean where salt is present, constant moisture, refrigeration, continuously high humidity, or outdoor applications. An IP rating of IP64 or IP65 is achieved when the conformal coating is used, but other factors should be considered. Fulham still recommends the luminaire also meet an IP64/65 rating.

Electrostatic Sensitive Product (ESD)

- Fulham LED products should be handled with proper measures to protect against any potential ESD damage.
- When servicing, personnel should be ground and direct contact with LED should be avoided.

Thermal Management

- Proper thermal management should be employed to ensure life and reliability of product. Max Tc of module should not be exceeded.
- Use of thermal grease, paste, pad, or other material interface is highly recommended.

Polarity Notes

- DC LP-Modules are polarity sensitive.
- Ensure that "positive" from LED Driver is connected to "positive" of LED modules and that "negative" from LED Driver is connected to "negative" of LED modules.
- Polarities of modules are marked with "+" for positive and "-" for negative.



VMU048012LP8xxA



Part Number Matrix

V M U 048 012 LP 8 XX A

Product Line	Type	Control Type	Input Current	Max. Power	Design	CRI	Color Temperature	Option
V = Vizion	M = Module (UL Class 2)	U = None	048 = 480mA	012 = 12W	LP = Low Profile	⑧ 8 = 80 9 = 90	27 = 2700K ③ 30 = 3000K ③ 35 = 3500K ③ 40 = 4000K ③ 50 = 5000K 57 = 5700K 65 = 6500K	A = Standard ② D = Conformal Coating (MTO)

- ③ Standard Product offering (All other options are made to order with MOQ and lead time)
② See page #8 for Conformal Coating information. Made to order (MTO).

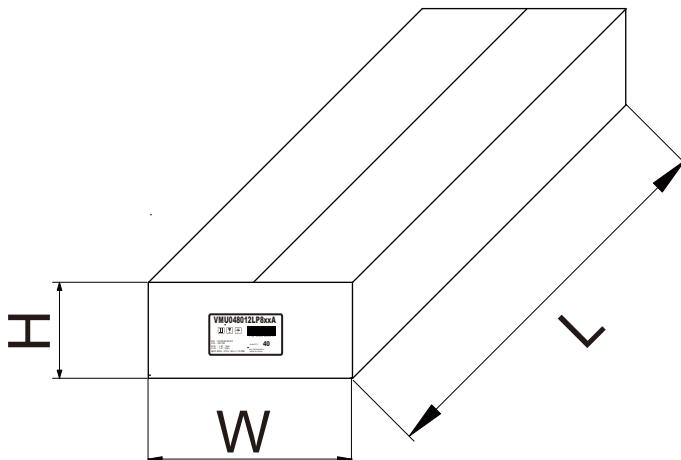
Product Image: LP-LinearHO Module



TOP VIEW

Packaging

Master Carton



OUTER DIMENSION		
L	W	H
10.63"(270mm)	6.50"(165mm)	4.33"(110mm)
Net Weight	Gross Weight	QUANTITY
3.2 lbs. (1.45kg)	3.98 lbs. (1.81kg)	40pc.