



120V LED DirectAC Engine and Retrofit Kits

- Suitable for open or fully enclosed luminaires
- Suitable for luminaires with plastic and glass lenses
- Integrated AC Direct Drive (No DC Driver)
- 120VAC dedicated Input
- <20% Flicker
- TRIAC / ELV Dimmable with Smooth Dimming
- Full CCT Option Available (Standard CCT's: 2700K,3000K,4000K)
- 80 CRI standard and 90 CRI available
- UL Classified (B/C option)
- UL Recognized (A option)
- High Voltage Barrier and 5VA rated Lens
- Energy Star Listed Luminaire 2.0

General Specifications

Input Voltage ^①	120VAC (108~132VAC);50/60 Hz
Input Current ^①	~0.194A
Input Power ^①	23W
Input PF	>0.98
THD	<20%
Operating Frequency	120Hz
Max Lumen Output @ Full Power ^①	2470 lumens @ 4000K / 80 CRI
Dimming Type/Range	Leading Edge (TRIAC) or Trailing Edge (ELV) /100% ~ 10%
Beam Angle	120°
CRI	80 (standard), 90 available
Operating Ambient Temperature Range (Ta)	-35 to 50°C / -31 to +122°F
Maximum Engine Case Temperature	L70: Tc max=90°C (Ts=95°C) / L90: Tc max=85°C (Ts=90°C)
Maximum Lens Temperature	Lens: 90°C / 194°F
Estimated Lumen Maintenance (at Max Tc)	L70= >54,000 hours / L90= >18,000 hours
Color Consistency	Binning per ANSI C78.377-2011 @25°C; 4 SDCM
Overall Size	6.97" diameter x 0.81" H ("B"option with lens)
Wire Type/ Length	18AWG / 12" Black and White wires
LED Quantity	64 Pcs.
Weight	A:(Engine Only) 54g B:(Eng + Lens) 125g C:(Kit) 348g
Maximum Screw Installation Torque	35 inch - ounces
Safety/Compliance	DirectAC Engines: cURus (File # E486778) TAT120023ACxxxA Retrofit Kits: cULus (File # E486779) TJT120023ACxxxB, cULus (File # E486779) TJT120023ACxxxC
	RoHS Compliant
	Dry and Damp Location
	IC Over Temperature Control
RFI/EMI	FCC Part 15B Consumer, EN55015
Input Surge Protection	2.5kV Common and Differential mode (Per ES Ring Wave Test)
Sound Rating / Noise	A / <24 dBA
Percent Flicker	<20%
Flicker Index	<0.0409
Protective Lens/Enclosure	High Voltage Barrier / 3mm Clear Polycarbonate 5VA Flame rated
Lens Transmittance	<7.5%
PCB Material	MCPCB
Warranty	5 years @ Max. Tc from the date of manufacture
Electrolytic Capacitor Rating	>60,000 hours

① Measured electrical data per UL file



TAT120023ACxxxA
TJT120023ACxxxB
TJT120023ACxxxC



Part Number Matrix

T J T 120 023 A C 8 40 B

Engine Type
 A= DirectAC Engine (Recognized)
 ⓐ J= DirectAC Engine Retrofit Kit (Classified)

Dimming
 T = TRIAC/ELV

Input Voltage
 120 = 120VAC

Input Power
 023 = 23W

Material
 A=MCPCB+wire

Shape
 C=Circular

CRI
 ⓐ 8 = 80
 9 = 90

Color Temperature
 ⓐ 27 = 2700K
 ⓐ 30 = 3000K
 35 = 3500K
 ⓐ 40 = 4000K
 50 = 5000K

Option
 A = DirectAC Engine
 B = DirectAC Engine +Lens (Retrofit Kit)
 C = DirectAC Engine +Lens +Plate (Retrofit Kit)

Electrical and Optical Specifications

Color Temperature	DirectAC Engine Part Number	Input Power	Nominal Luminous Flux @ 90 CRI	Engine Efficacy @ 90 CRI	Nominal Luminous Flux @ 80 CRI	Engine Efficacy @ 80 CRI
2700K	TJT120023ACx27B	23W	1915 lumens	83 lm/W	2215 lumens	96 lm/W
3000K	TJT120023ACx30B	23W	2010 lumens	87 lm/W	2330 lumens	101 lm/W
3500K	TJT120023ACx35B	23W	2010 lumens	87 lm/W	2330 lumens	101 lm/W
4000K	TJT120023ACx40B	23W	2125 lumens	92 lm/W	2470 lumens	107 lm/W
5000K	TJT120023ACx50B	23W	2125 lumens	92 lm/W	2470 lumens	107 lm/W

Luminous Flux De-Rating: CCT and CRI Multipliers

	2700K	3000K	3500K	4000K	5000K
CRI 80(R9> 0)	0.90	0.94	0.94	1.00	1.00
CRI 90(R9>50)	0.78	0.81	0.81	0.86	0.86

NOTES:

1) DirectAC Engines standard model "B" comes with engine and lens.

ⓐ Standard Product offering (All other options are made to order with MOQ and lead time)

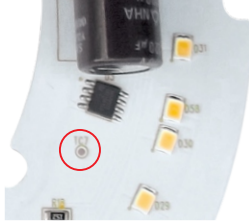
ⓐ LED Engine Retrofit Kit includes mounting hardware, retrofit labels, and installation instructions.

TAT120023ACxxxA
TJT120023ACxxxB
TJT120023ACxxxC



Thermal Specifications

	DirectAC Engine (A)	④ DirectAC Engine Retrofit Kit (B)	④ DirectAC Engine Retrofit Kit (C)
Storage Temperature Range	-35°C(-31°F) to 100°C(212°F)	-35°C(-31°F) to 100°C(212°F)	-35°C(-31°F) to 100°C(212°F)
Operating Ambient Temperature Range	-35°C(-31°F) to 50°C(122°F)	-35°C(-31°F) to 40°C(104°F)	-35°C(-31°F) to 45°C(113°F)
Maximum Engine Case Temperature (Tc)	L70: Tc max=90°C (Ts=95°C) / L90: Tc max=85°C (Ts=90°C)		
Maximum Lens Temperature	90°C (194°F)		90°C (194°F)



Tc located on module

Thermal De-Rating: Tc vs. Luminous Flux

Module Case Temperature (Tc)	Luminous Flux Multiplier
25°C	1.000
30°C	1.000
35°C	0.991
40°C	0.972
45°C	0.963
50°C	0.953
55°C	0.944
60°C	0.935
65°C	0.925
70°C	0.916
75°C	0.897
80°C	0.888
85°C	0.879
90°C	0.869
95°C	0.850
100°C	0.841



NOTES:

- 1) Refer to LED Engine Retrofit Kit Installation Instructions for further detail.
- 2) This LED Engine Kit can retrofit any luminaire with a length/height greater or equal to the minimum dimensions shown on the Installation Instructions.
- 3) This LED Engine Kit can be used with luminaires similar to the one illustrated on the Installation Instructions.

④ Suitable for ceiling luminaire with minimum dimensions: 8.5" diameter with a height of 1.1".

TAT120023ACxxxA
TJT120023ACxxxB
TJT120023ACxxxC



Certification Chart

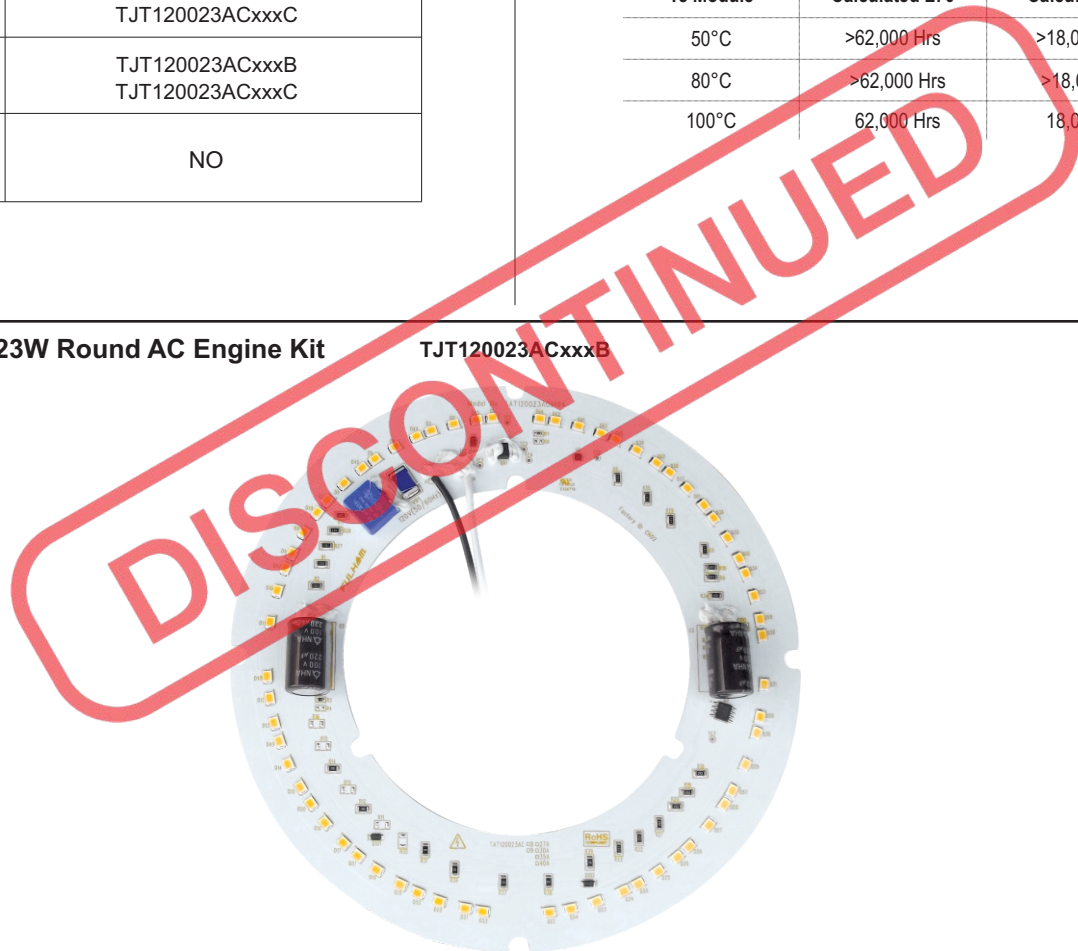
Energy Star™ TM-21 Calculator Data

Model	TAT120023ACxxxA TJT120023ACxxxB TJT120023ACxxxC
Classification	
RoHS COMPLIANT	YES
cUL US	YES
CLASSIFIED cUL US	TJT120023ACxxxB TJT120023ACxxxC
ENERGY STAR Listed	TJT120023ACxxxB TJT120023ACxxxC
ENERGY STAR CSD	NO

Tc Module	Reported L70	Reported L90
50°C	>54,000 Hrs	>18,000 Hrs
80°C	>54,000 Hrs	>18,000 Hrs
100°C	>54,000 Hrs	18,000 Hrs
Tc Module	Calculated L70	Calculated L90
50°C	>62,000 Hrs	>18,000 Hrs
80°C	>62,000 Hrs	>18,000 Hrs
100°C	62,000 Hrs	18,000 Hrs

Product Image: 23W Round AC Engine Kit

TJT120023ACxxxB



CAUTION - THIS LUMINAIRE HAS BEEN MODIFIED TO OPERATE LED LAMPS. DO NOT ATTEMPT TO INSTALL OR OPERATE FLUORESCENT LAMPS IN THIS LUMINAIRE.

NOTICE - THIS LUMINAIRE HAS BEEN MODIFIED AND CAN NO LONGER OPERATE THE ORIGINALLY INTENDED LAMP (WITH RESPECT TO FIRE AND SHOCK ONLY) FOR USE ONLY WITH PRODUCTS DESCRIBED AND INSTALLED IN ACCORDANCE WITH THE INSTRUCTION PROVIDED WITH THIS RETROFIT KIT.



LED Engine Retrofit Kit
only: Hardware and Labels

NOTES:

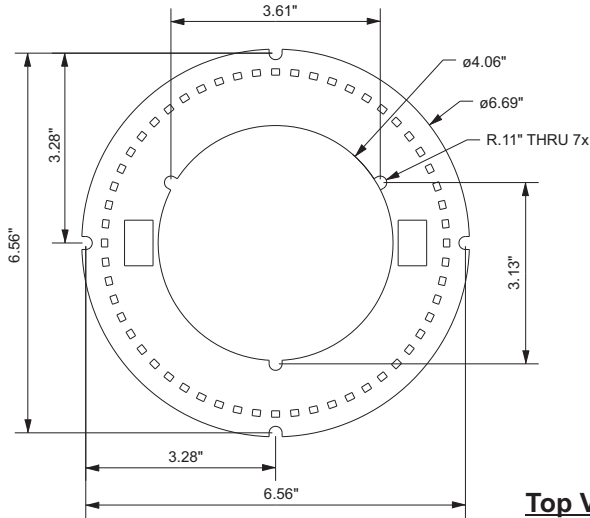
1) Energy Star Listed:

https://www.energystar.gov/productfinder/product/certified-light-fixtures/results?scrollTo=342&search_text=fulham&fixture_type_isopen=&markets_filter=United+States&zip_code_filter=&product_types=Select+a+Product+Category&sort_by=light_output_lumens&sort_direction=asc&page_number=0&lastpage=0

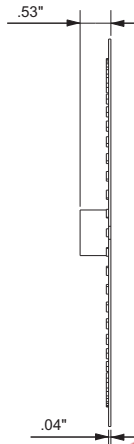


Mechanical Drawings

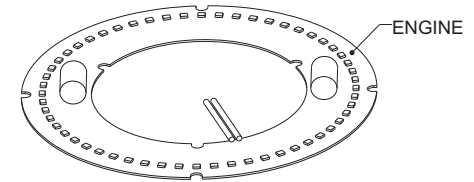
TAT120023ACxxxA
(Engine Only)



Top View

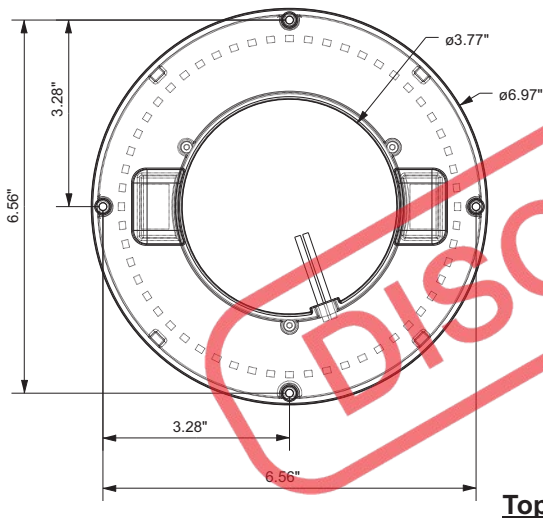


Side View

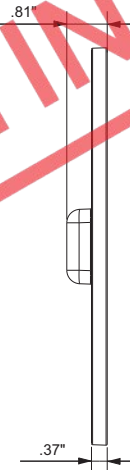


Exploded View

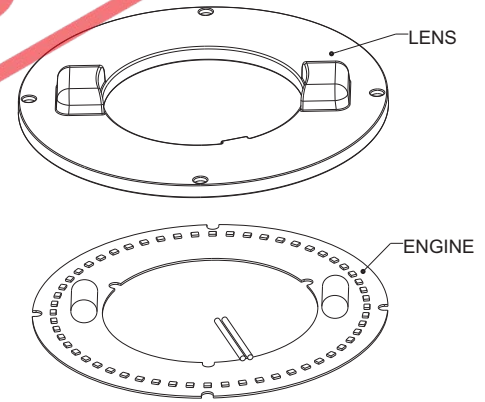
TJT120023ACxxxB
(Engine + Lens)



Top View

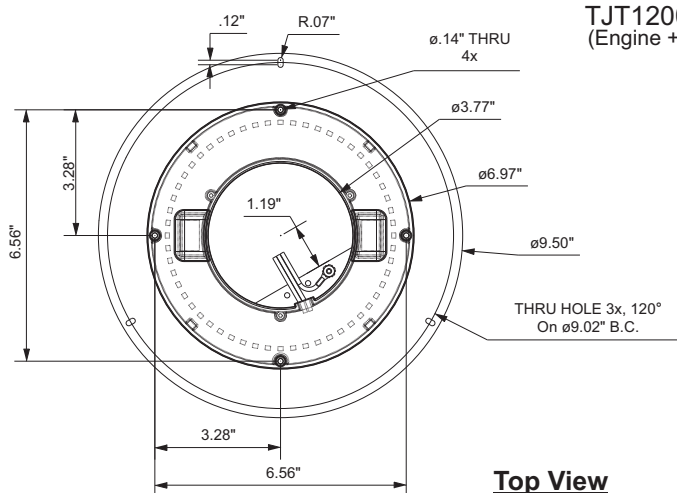


Side View

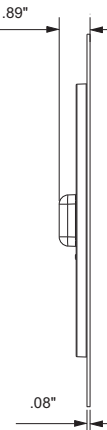


Exploded View

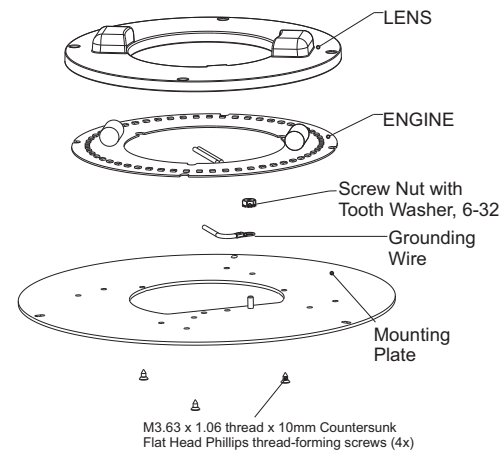
TJT120023ACxxxC
(Engine + Lens + Plate)



Top View



Side View



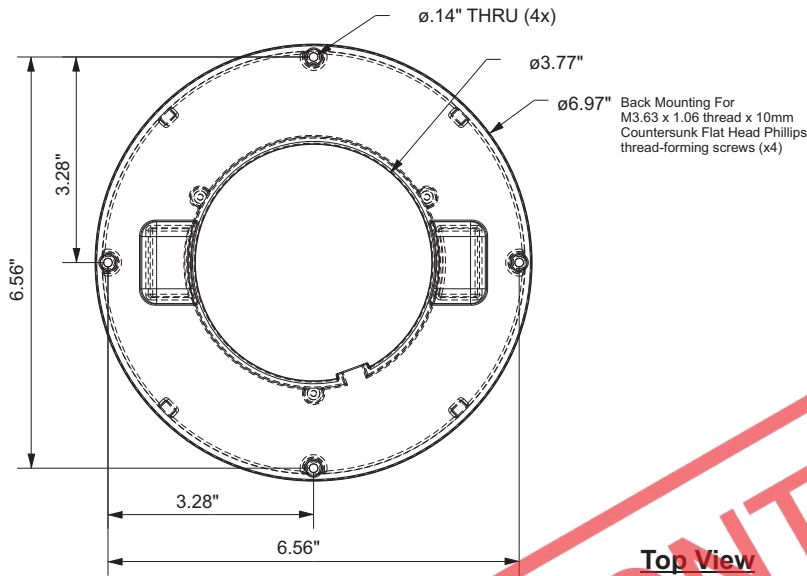
Exploded View



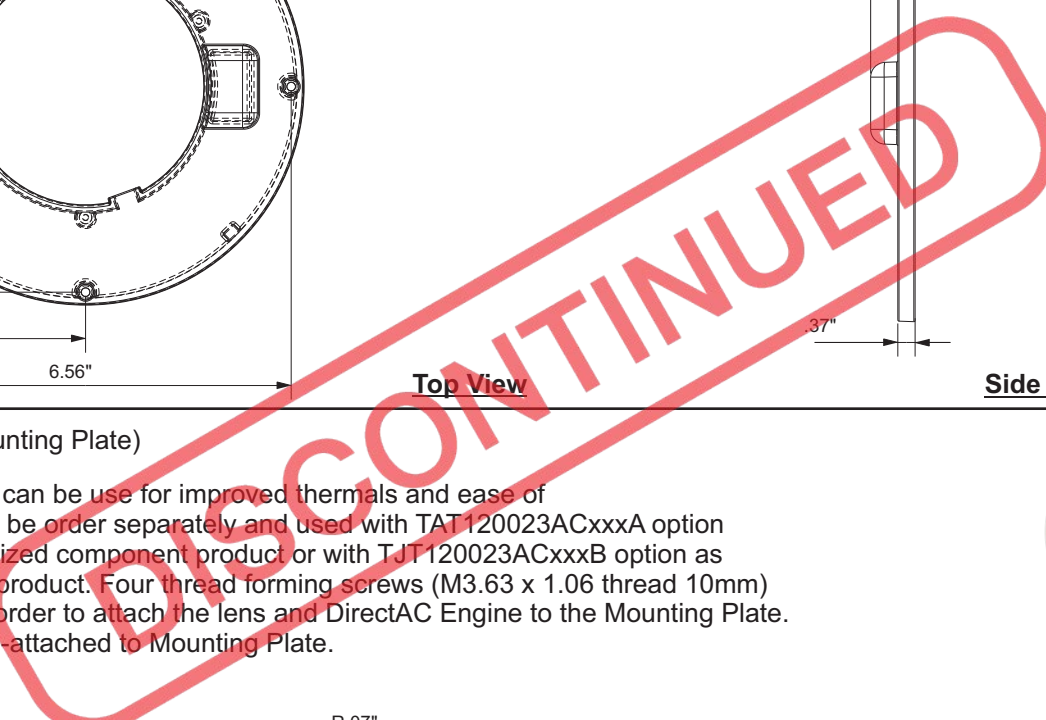
Accessories

TLEOPT120-008 (Lens)

- Clear polycarbonate protective lens acts as a high voltage barrier and meets the 5VA Flame rating. It can be order separately and used with TAT120023ACxxxA option as UL Recognize component product. Hardware not included.

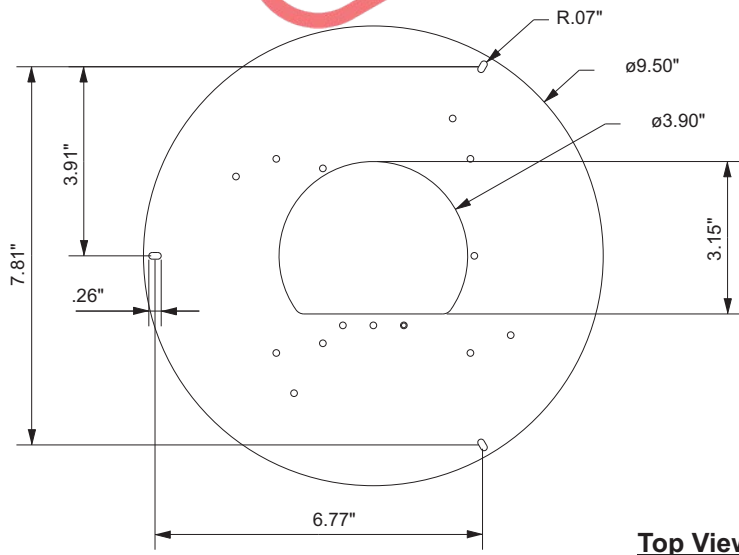


Lens
71g



TLE-HSK-006 (Mounting Plate)

- Mounting Plate, can be use for improved thermals and ease of mounting. It can be order separately and used with TAT120023ACxxxA option as a UL Recognized component product or with TJT120023ACxxxB option as a UL Classified product. Four thread forming screws (M3.63 x 1.06 thread 10mm) are provided in order to attach the lens and DirectAC Engine to the Mounting Plate. Ground wire pre-attached to Mounting Plate.



Mounting Plate
223g

Grounding Stud
PEM FHS-632-6



Guidelines

Reduced Flicker Operation Feature

- DirectAC Engine models have added circuitry to help reduce the Flicker when operated on the 50/60Hz power lines. The Flicker percentage on these models is below 30% when operated at line voltage, per CEC requirement. Dimming by line voltage devices may increase the Flicker percentage as the power levels are reduced.

Hi-Pot Testing (Caution)

- All DirectAC Engine models are Hi-Pot tested on the Fulham production line. We advise NOT to apply AC Hi-voltage Dielectric test to LED products as this may damage the sensitive electronic components as well as the LEDs. Please inspect the connection wires for any nicks or cuts in the insulation during and after installation.

Termination Notes

- A luminaire disconnect UL listed connector is included, as part of Fulham's retrofit kit only, to meet Energy Star requirements.
- Use solid wire size 18AWG/12" per pole, rated at max 600V load and 105°C operating temperature.
- Strip wires to 11-13mm (0.47in.).
- Connector not for multiple use.
- For additional information on Wago's 873 Series Lumi-Nuts® connector, please visit: http://www.wago.com/infomaterial/wago_ebook/51261593/flipviewerxpress.html



Environmental Rating

- DirectAC Engines are rated for dry and damp locations.

IC Over Temperature Control

- DirectAC Engine models have built in Thermal management, if the unit experiences higher than normal ambient temperatures the circuit by design will reduce the drive current to the LED there by reducing the thermal impact on the LED's.

Fastening to Luminaire

- When installing by "mounting thru holes" (recommended), use any screw with diameter less than 0.13in. [3.4mm]. Mount on a flat surface and use all 3 mounting holes to ensure good contact between back side of Engine and mounting surface. Refer to max specified torque for installation. Suggested screw sizes: #5 or M3 Pan Head screw.

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

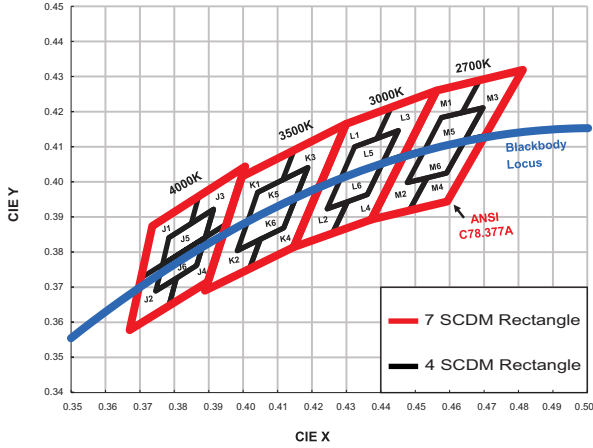
- Proper thermal management should be employed to ensure life and reliability of product.

Wiring

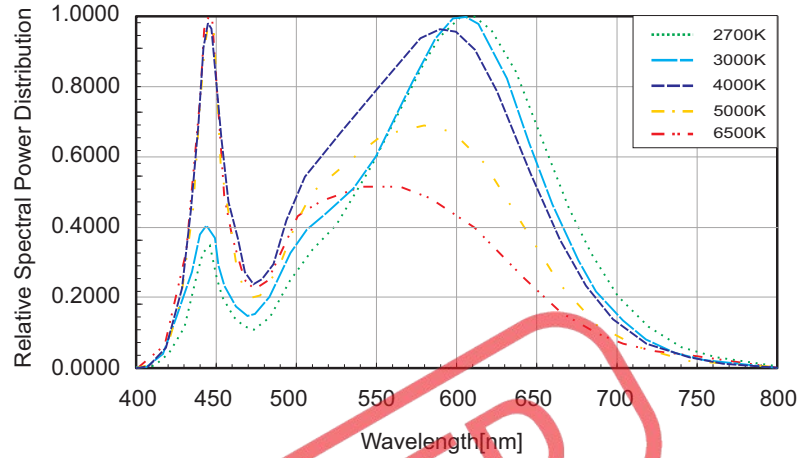
- Intended for 120V application ONLY.
- Connect the Black wire from the DirectAC Engine to the building Line by using the proper connectors or wire nuts.
- Connect the White wire from the DirectAC Engine to the building/source Neutral by using the proper connectors or wire nuts.
- DirectAC Engine does not need grounded, but the luminaire must be grounded.



Color and Binning



Optical Spectrum

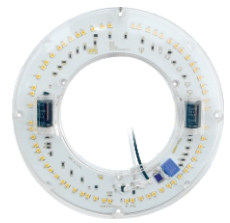


DISCONTINUED

NOTES:

- 1) The Color and Binning and Optical Spectrum charts are for reference only. For more detailed info, contact factory.
- 2) Reference Bridgelux Chromaticity Diagram for Color and Binning. Binning per ANSI C78.377-2011 @ 25°C; 4 SDCM.
- 3) The Optical Spectrum values vary depending on product type and color rank.

TAT120023ACxxxA
TJT120023ACxxxB
TJT120023ACxxxC



Compatible Tested Dimmers

(Contact Fulham for other alternatives)

(TRIAC or ELV Dimmers)

Manufacture	Model	Type
Leviton	ILLUMATECH IPL06	TRIAC (Leading Edge)
Lutron	NOVA T NTLV-600	TRIAC (Leading Edge)
Lutron	SLYLARK S-600	TRIAC (Leading Edge)
Leviton	IG4005 6631	TRIAC (Leading Edge)
Lutron	LUMEA LG-600P	TRIAC (Leading Edge)
Leviton	VPE06	(ELV) Trailing Edge
Lutron	SELV-303P	(ELV) Trailing Edge



TAT120023ACxxxA
TJT120023ACxxxB
TJT120023ACxxxC



DirectAC Engine Equivalency Chart

DirectAC Engine/Kit (23W)				CFL					
Engine/Kit Part Number	System Wattage	Lumen Output	Efficacy	CFL Style	Lamp Wattage	# of Lamps	Total Wattage	Lumen Output	Efficacy
TJT120023AC8xxB	23W	2470 lm (4K/80CRI)	107 lm/W	Quad	13W	3	39W	2475 lm	59 lm/W
					18W	2	36W	2150 lm	
				Triple	13W	3	39W	2535 lm	59 lm/W
					18W	2	36W	2040 lm	
					32W	1	32W	2040 lm	
TJT120023AC8xxC	23W	2470 lm (4K/80CRI)	107 lm/W	Circline T9	42W	1	42W	2720 lm	64 lm/W
					32W	1	32W	1500 lm	
					40W	1	40W	1975 lm	49 lm/W



NOTES:

- 1) For reference only, several factors apply.
- 2) Emergency systems are not UL classified for field installation.



Flicker Test Data Summary

(Test performed by third party lab using, Lutron Skylark S-600-WH dimmer)

With Dimmer at 100%

100% Light Output Percent Amplitude Modulation					
No Filter	40 Hz	90 Hz	200 Hz	400 Hz	1000 Hz
14.72%	0.34%	0.91%	13.24%	13.78%	14.04%
Measurement Period: 1,000 sec			Noise: 23.8 dBA		
Recording Interval: 4.00E-05 sec			Fraction of rated light output: 100%		
Flicker Index:		0.0409			

With Dimmer at 20%

20% Light Output Percent Amplitude Modulation					
No Filter	40 Hz	90 Hz	200 Hz	400 Hz	1000 Hz
13.62%	1.28%	3.65%	12.22%	12.86%	13.26%
Measurement Period: 1,000 sec			Noise: 21.8 dBA		
Recording Interval: 4.00E-05 sec			Fraction of rated light output: 22%		
Flicker Index:		0.0305			

With Dimmer at Minimum Light Output

Minimum Light Output Percent Amplitude Modulation					
No Filter	40 Hz	90 Hz	200 Hz	400 Hz	1000 Hz
10.73%	0.72%	2.73%	9.17%	9.70%	9.93%
Measurement Period: 1,000 sec			Noise: 21.1 dBA		
Recording Interval: 4.00E-05 sec			Fraction of rated light output: 10%		
Flicker Index:		0.0231			

No Dimmer

Light Output Percent Amplitude Modulation					
No Filter	40 Hz	90 Hz	200 Hz	400 Hz	1000 Hz
13.13%	0.29%	0.92%	11.57%	11.72%	11.82%
Measurement Period: 1,000 sec					