



TET120021RDXXX1, TET120025RDXXX1
TKT120021RDXXX1, TKT120025RDXXX1
TEMUNV021RDXXX1, TEMUNV025RDXXX1
TKMUNV021RDXXX1, TKMUNV025RDXXX1

120VAC / Universal Input Round LED DC Engines and LED DC Engine Retrofit Kits

- High Density, high brightness chip array
- Suitable for open or fully enclosed luminaires
- Suitable for luminaires with plastic and glass lenses
- Constant Current module design for maximum efficacy
- 120VAC dedicated or UNV options
- TRIAC/ELV or 0-10V Dimmable
- Class 2 Lighting System
- UL Recognized (DC Engine option)
- UL Classified (DC Engine Retrofit Kit option)
- Energy Star Luminaire 2.0 Certified Subcomponent Database (CSD) (for rebate programs)*
- Energy Star Luminaire 2.0 Listed (for rebate programs)*

General Specifications

Input Voltage [Ⓞ]	TET/TKT: 120V;50/60 Hz	TEM/TKM: 120~277V;50/60Hz
Input Current [Ⓞ]	21RD = 0.175A Max @120VAC	25RD = 0.208A Max @120VAC
	21RD = 0.075A Max @277VAC	25RD = 0.090A Max @277VAC
Input Power [Ⓞ]	21RD = 20.1W	25RD = 24.8W
Energy Star Input Power (Measured)	21RD = 19.1W (ES Lum. V2.0)	25RD = 23.5W (ES CSD)
Input PF	>.98	
THD	<20%	
Module Operating Voltage	21RD: 24.2V	25RD: 30.2V
Max Lumen Output @ Full Power [Ⓞ]	21RD = 2305 lumens; 25RD = 2880 lumens @ 4000K / 80CRI / 25°C	
Dimming Type / Range	Leading Edge (TRIAC) or Trailing Edge (ELV) or 0-10V / 100% ~ 10%	
Beam Angle	120°	
CRI	80, 90	
Storage Temperature Range	-35°C to 100°C / -31°F to 212°F	
Operating Ambient Temperature Range (Ta)	Engine: -35 to +50°C / -31 to +122°F; Kit: -35 to +45°C / -31 to +113°F	
Maximum Driver Case Temperature (Tc driver)	TET/TKT: 88°C TEM/TKM: 90°C	
Maximum Module Case Temperature (Tc module)	L70: Tc max=85°C (Ts=90°C) / L90: Tc max=85°C (Ts=90°C)	
Estimated Lumen Maintenance	L70: >60,000Hrs / L90: 40,000Hrs	
Color Consistency	Binning per ANSI C78.377-2011 @ 25°C; 7 SDCM	
Overall Size	9" diameter x 1.2" H	
Weight	TET/TKT: 320g	TEM/TKM: 330g
Driver Part Number	TET/TKT: T1T11200700-30L	TEM/TKM: T1M1UNV0700-30L
DC Module Part Number	21RD: TM64RD05XX-2X1	25RD: TM80RD05XX-2X1
Maximum Screw Installation Torque	35 inch - ounces	
Safety/Compliance	DC Engines: cURus (File # E351548: PTL126X20www [Ⓞ] ; Driver File # E342838)	
	DC Engines Retrofit Kits: cULus File # E365124	
	Energy Star Luminaire 2.0 Certified Subcomponent Database (CSD)*	
	Energy Star Luminaire 2.0 Listed*	
	Class 2 Lighting System	
	RoHS Compliant	
RFI/EMI	TET/TKT: FCC Part 15B Consumer,	
	TEM/TKM:FCC Part 15B Consumer, EN55015	
Sound Rating / Noise	A / <24 dBA	
Thermal Feedback	No	
Service Life	50,000hrs @ Ta <= 45°C (Tc mod <=85°C; Tc driver <= 75°C)	
Warranty	5 years @ Max. Tc from the date of manufacture	

* See page #4 "Certification Chart" for exact models.
[Ⓞ] Measured electrical data per UL file
[Ⓞ] www = PCB Rev #



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Part Numbering Matrix

T **E** **T** **120** **021** **RD** **40** - **0** **1**

<p>Compliance E = LED DC Engines (UL Recognize) K = DC Engine Retrofit Kit (UL Classified)</p>	<p>Control T = TRIAC/ELV M = 0-10V</p>	<p>Engine Input Voltage 120 = 120VAC UNV = 120~277VAC</p>	<p>Engine Input Power 021 = 21W 025 = 25W</p>	<p>Color Temperature 27 = 2700K 30 = 3000K 35 = 3500K 40 = 4000K 50 = 5000K</p>	<p>Configuration 0 = 80 CRI 1 = 90 CRI 2 = 80 CRI + Conf Coat 3 = 90 CRI + Conf Coat</p>
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Electrical and Optical Specifications

Color Temperature	Part Number	Input Power	Nominal Luminous Flux @ 90 CRI	Nominal Luminous Flux @ 80 CRI	Efficacy @ 80 CRI
3000K	TET120021RD30x1 TKT120021RD30x1 TEMUNV021RD30x1 TKMUNV021RD30x1	19.1W	1716 lumens	2145 lumens	112 lm/W
	TET120025RD30x1 TKT120025RD30x1 TEMUNV025RD30x1 TKMUNV025RD30x1	23.5W	2084 lumens	2605 lumens	110 lm/W
4000K	TET120021RD40x1 TKT120021RD40x1 TEMUNV021RD40x1 TKMUNV021RD40x1	19.1W	1844 lumens	2305 lumens	120 lm/W
	TET120025RD40x1 TKT120025RD40x1 TEMUNV025RD40x1 TKMUNV025RD40x1	23.5W	2304 lumens	2880 lumens	122 lm/W

Luminous Flux De-Rating: CCT and CRI Multipliers

	2700K	3000K	3500K	4000K	5000K
CRI 80(R9> 0)	0.92	0.96	0.98	1.00	1.09
CRI 90(R9>50)	0.74	0.75	0.76	0.78	0.83

NOTES:

- 1) Performance based on Tc mod = 25°C. See thermal de-rating chart (pg. 3) for higher temperature operation.
- 2) Electrical and optical specifications are based on a 2700K model and at Energy Star elevated case temperature
- 3) Nominal luminous flux at 90 CRI are calculated values, not measured.
- 4) Refer to Energy Star CSD or Luminaires 2.0 for actual measurements on specific part numbers.
- 5) Performance for these components have been tested in accordance with Energy Star.
- 6) Nominal lumen output and efficacy is calculated for standard options. Reference CCT & CRI vs Luminous Flux chart for lumen ratio calculation.
- 7) Specifications are subject to change without notice.

- ③ Standard Product offering (All other options are made to order with MOQ and lead time)
- ④ LED Engine Retrofit Kit includes mounting hardware, retrofit labels, and installation instructions.
- ⑤ TET/TKT: TRIAC/ELV Dimmable available only in 120VAC Input, TEM/TKM: 0-10V Dimmable available only in Universal Input.

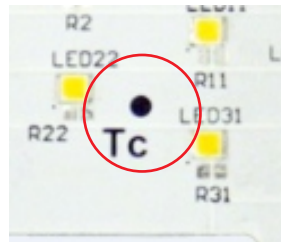


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Thermal Specifications

	LED Engine	① LED Engine Retrofit Kit
Storage Temperature Range	-35°C to 100°C / -31°F to 212°F	-35°C to 100°C / -31°F to 212°F
Operating Ambient Temperature Range	-35°C to 50°C / -31°F to 122°F	-35°C to 45°C / -31°F to 113°F
Maximum Driver Case Temperature (Tc)	88°C / 190.4°F	90°C / 194°F
Maximum Module Case Temperature (Tc)	L70: 85°C / 185°F; L90: 85°C / 185°F	L70: 85°C / 185°F; L90: 85°C / 185°F



Tc located on module



Tc located on driver

Thermal De-Rating: Tc vs. Luminous Flux vs. Total Vf Multiplier

Module Case Temperature (Tc)	Luminous Flux Multiplier	Total Vf Multiplier
25°C	1.000	1.000
30°C	0.995	0.997
35°C	0.989	0.993
40°C	0.984	0.990
45°C	0.978	0.986
50°C	0.973	0.983
55°C	0.964	0.979
60°C	0.959	0.976
65°C	0.951	0.976
70°C	0.942	0.972
75°C	0.937	0.969
80°C	0.929	0.965
85°C	0.921	0.962
90°C	0.910	0.958
95°C	0.901	0.958
100°C	0.890	0.955

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.

① Suitable for wall sconce luminaire with minimum dimensions: 10.5" diameter with a height of 1.3".



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Certification Chart

Energy Star™ TM-21 Calculator Data

Model	TxT120021RDxxx1 TxMUNV021RDxxx1	TxT120025RDxxx1 TxMUNV025RDxxx1
Classification		
	YES	
	YES	
	TKxxx021RDxxx1 TKxxx025RDxxx1	
	TKMUNV021RDxxx1 TKMUNV025RDxxx1	
	TxT120021RDxxx1 TxMUNV021RDxxx1	TxT120025RDxxx1 TxMUNV025RDxxx1
Class 2 Lighting System	YES	

Tc Module	Reported L70	Reported L90
55°C	>60,000 Hrs	>60,000 Hrs
85°C	>60,000 Hrs	40,000 Hrs
100°C	>60,000 Hrs	24,000 Hrs
Tc Module	Calculated L70	Calculated L90
55°C	345,000 Hrs	96,000 Hrs
85°C	166,000 Hrs	40,000 Hrs
100°C	109,000 Hrs	24,000 Hrs

Product Image: 9" Round DC Engine Kit



CAUTION: THIS LUMINAIRE HAS BEEN MODIFIED TO OPERATE LED LAMPS. DO NOT ATTEMPT TO INSTALL OR OPERATE FLUORESCENT LAMPS IN THIS LUMINAIRE.	Model: TKxxx02xRDxxx-1 Information: Replace only with: DRIVER MODEL #: T1x1xxx0700-30L LED MODULE #: TMxxRD05xx-2x1
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LED Engine Retrofit Kit
only: Hardware and Labels

NOTES:

- Energy Star CSD:
https://www.energystar.gov/products/lighting_fans/certified_lighting_subcomponent_database_csd
- 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

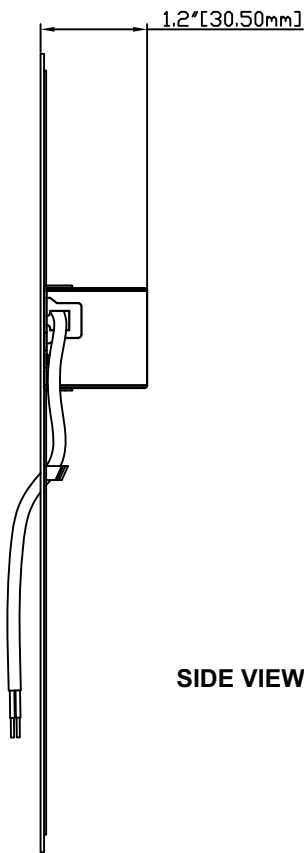
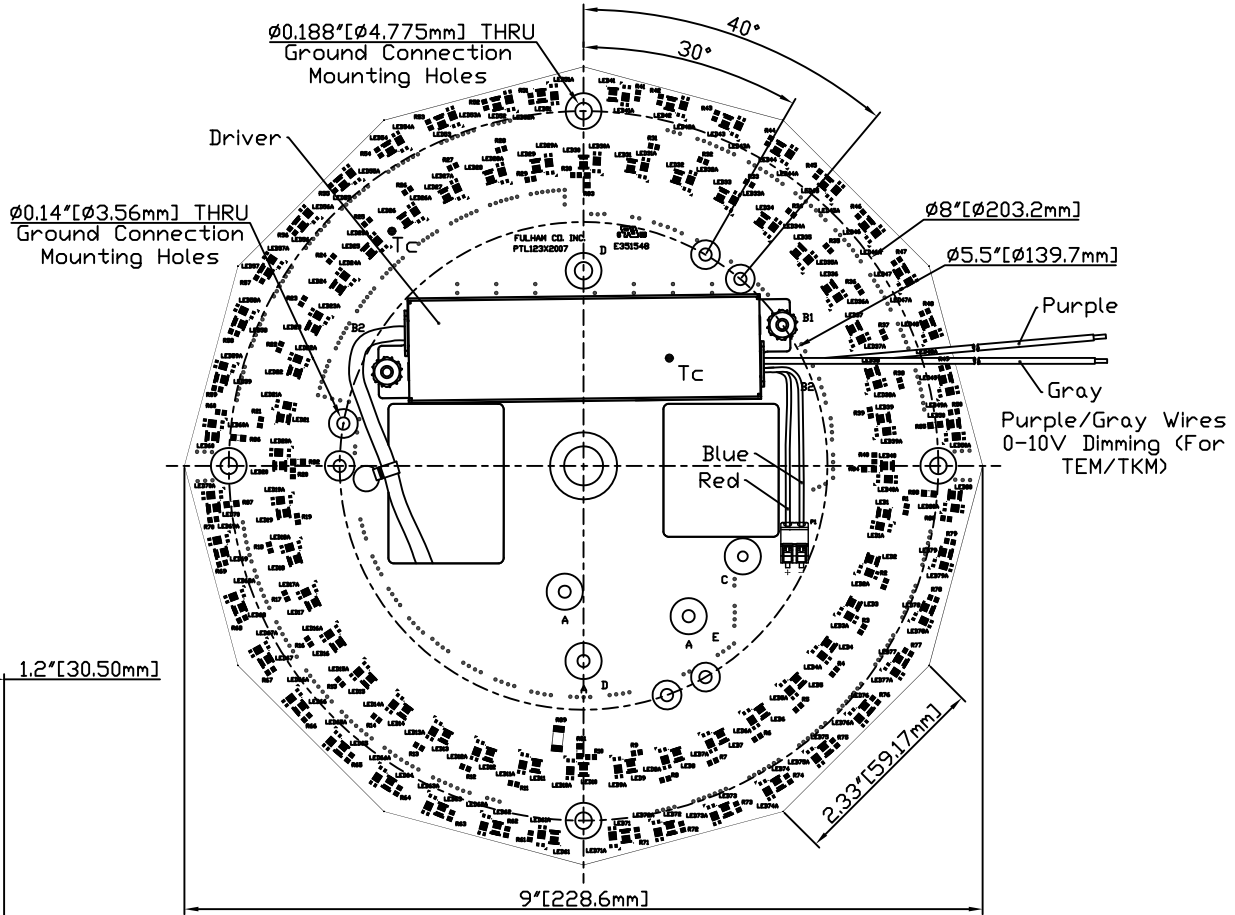


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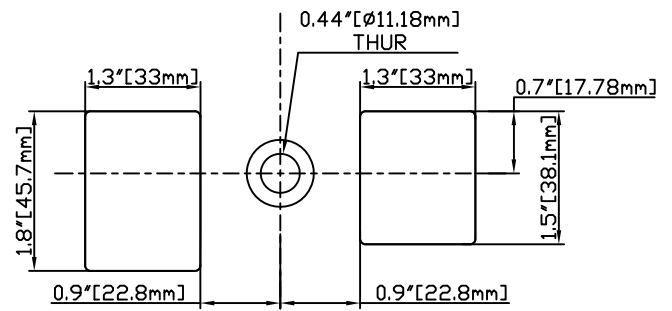


Mechanical Drawings

TOP VIEW



SIDE VIEW



PARTIAL VIEW

Wire Length - Inches

AC Input - Black / White	12
0-10V Dimming - Purple (10V+) / Gray (10V-)	12

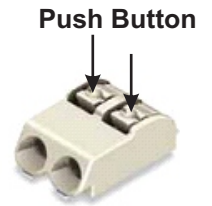


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Guidelines

Termination Notes

- If connectors are used, use solid wire size 24 – 18 AWG, rated at a minimum 50V, minimum 105°C, and stripped to length between 6-7 mm (0.24-0.28 inches).
- Push button for insertion of conductor and for easy removal of wires.
- Connector not for multiple use



Fastening Notes

- If fastening by screw hole, use any screw with diameter less than 0.185 in (4.7mm). Use all available screw holes to ensure good contact between back side of module and mounting surface. Refer to max specified torque for installation. Suggested screw sizes: #6 or M4 Pan Head screw.
- If fastening using double-sided tape, start with clean, 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.

Environmental Rating

- LED DC Engines Modules are rated for dry locations, unless option for conformal coating is requested.
- Conformal coating is Acrylic/RTV based and rated for Environment and Moisture Protection per IPC-CC-830.

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.
- Use of thermal grease, paste, pad, or other material interface is highly recommended.

Polarity Notes

- LED 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 LED modules are marked with "+" for positive and "-" for negative.

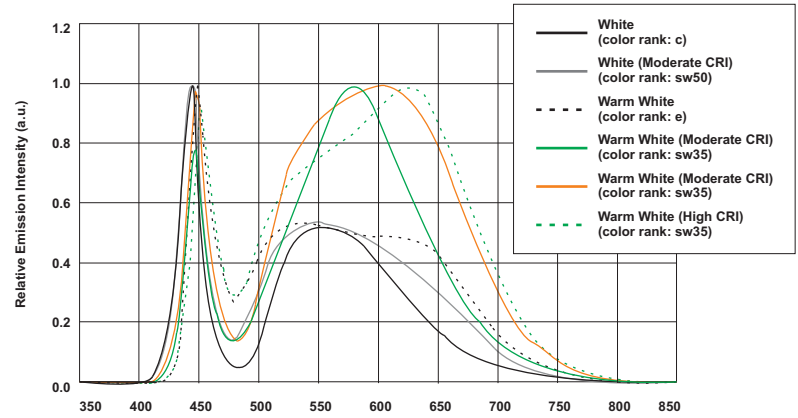
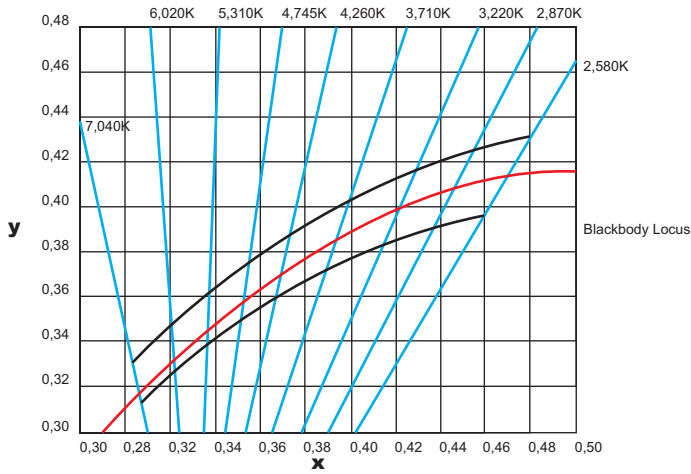


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Color and Binning

Optical Spectrum



NOTES:

- 1) The Color and Binning and Optical Spectrum charts are for reference only. For more detailed info, contact factory.
- 2) Reference Nichia Chromaticity Diagram for Color and Binning. Binning per ANSI C78.377-2011 @ 25°C; 7 SDCM.
- 3) The Optical Spectrum values vary depending on product type and color rank.
- 4) Driver included.



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Compatible Tested Dimmers

(Contact Fulham for other alternatives)

T1T11200700-30L (TRIAC or ELV Dimmers): TET / TKT Models

Manufacture	Model	Type
Leviton	IPI06-1LM	TRIAC (Leading Edge)
Leviton	VPI06-1LT	TRIAC (Leading Edge)
Lutron	DV-600P	TRIAC (Leading Edge)
Lutron	MAW-600H	TRIAC (Leading Edge)
Lutron	S-603PR	TRIAC (Leading Edge)
Lutron	DV603PG	TRIAC (Leading Edge)
Lutron	LG-603P	TRIAC (Leading Edge)
Lutron	LG-600P	TRIAC (Leading Edge)
Levinton	6631-L	TRIAC (Leading Edge)
Levinton	6681	TRIAC (Leading Edge)
Lutron	CTCL-153DD	TRIAC (Leading Edge)
Lutron	S-600P	TRIAC (Leading Edge)
Lutron	TG-600P	TRIAC (Leading Edge)
Levinton	IPI10	TRIAC (Leading Edge)
Levinton	6161	TRIAC (Leading Edge)
Pass & Seymour	D703-PLAV	TRIAC (Leading Edge)

NOTES:

1) Driver included.



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DC Engine Equivalency Chart

DC Engine/Kit (9" Round)				CFL					
Engine/Kit Part Number	System Wattage	Lumen Output	Efficacy	CFL Style	Lamp Wattage	# of Lamps	Total Wattage	Lumen Output	Efficacy
TET120021RDxx01	19.1W	2300 lm (4K/80CRI)	120 lm/W	Quad	13W	3	39W	2325 lm	59 lm/W
TKT120021RDxx01					18W	2	36W	2150 lm	59 lm/W
TEMUNV021RDxx01				Triple	13W	3	39W	2475 lm	59 lm/W
					18W	2	36W	2040 lm	56 lm/W
TKMUNV021RDxx01				32W	1	32W	2040 lm	63 lm/W	
TET120025RDxx01	23.5W	2800 lm (4K/80CRI)	119 lm/W	Triple	42W	1	42W	2720 lm	64 lm/W
TKT120025RDxx01					Circline T9	40W	1	40W	1975 lm
TEMUNV025RDxx01				Triple		42W	1	42W	2720 lm
TKMUNV025RDxx01					Circline T9	40W	1	40W	1975 lm

NOTES:

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



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DC ENGINES/KITS WITH EMERGENCY OPTIONS

NOTE: Emergency systems are not UL classified for field installation.

Engine/Kit Part Number	Emer. Driver Part Number	Wattage	Battery Part Number	Harness (mA)	Total Vf (V)	Total Power (W)	Total Lum. Output (lm)*	Eff. (lm/W)
TET120021RDxx01	FHS2-UNV-36L	4W	FHSBATT8-AA9 FHSBATL3-1	FHS-HARNESS-100	21.7	3.3	525	162
TKT120021RDxx01		6W	FHSBATL6-.6	FHS-HARNESS-250	21.9	5.5	870	159
TEMUNV021RDxx01		8W	FHSBATL3-1.5 FHSBATL3-1.5S	FHS-HARNESS-350	22.2	7.8	1215	156
TKMUNV021RDxx01								
TET120025RDxx01	FHS2-UNV-36L	4W	FHSBATT8-AA9 FHSBATL3-1	FHS-HARNESS-100	26.9	2.7	440	164
TKT120025RDxx01		6W	FHSBATL6-.6	FHS-HARNESS-200	27.2	5.4	875	161
TEMUNV025RDxx01		8W	FHSBATL3-1.5 FHSBATL3-1.5S	FHS-HARNESS-250	27.4	6.9	1090	159
TKMUNV025RDxx01								

NOTES:

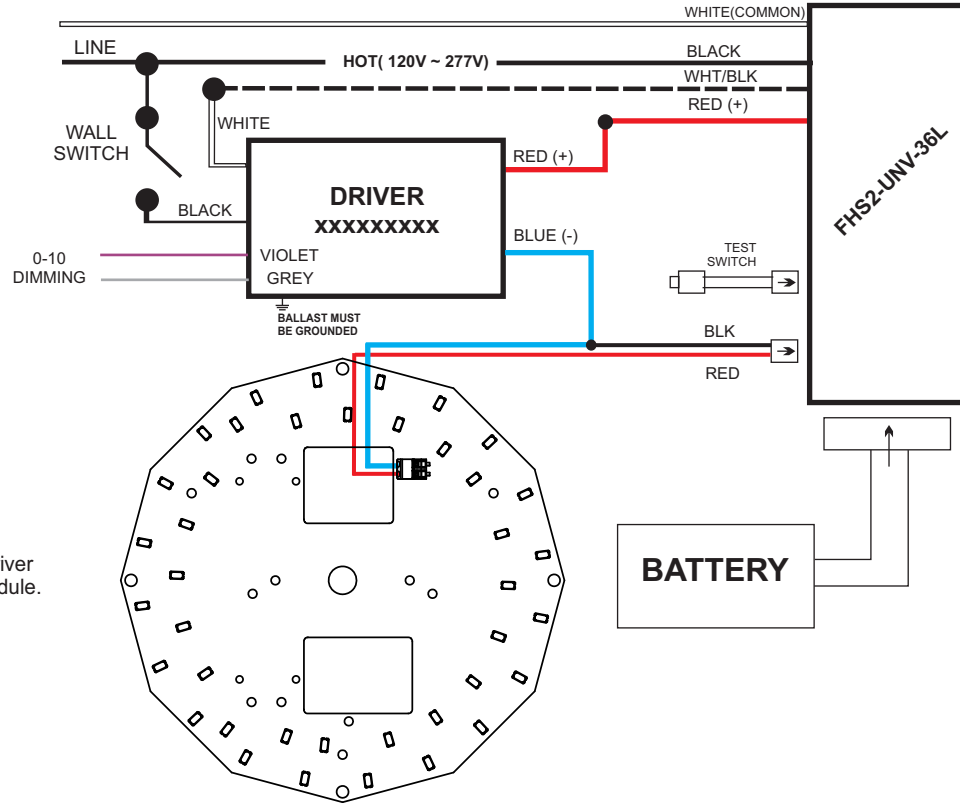
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Wiring Diagram: with Emergency System



NOTE: For illustration purposes, LED driver is shown separate from LED module.

NOTES:

1) For illustration purposes, LED driver is shown separate from LED module.