

# VKMUNV012RD930A



## VividHorse UNV CCT Selectable DC Engine Retrofit Kit with 0-10V Dimming

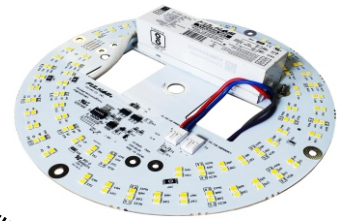
- Universal Voltage (120~277) DC Engine
- CCT Selectable: 2700K, 3000K, 3500K, 4000K, 4500K, 5000K
- CRI90 standard
- Potassium Fluorosilicate (PFS) phosphor LEDs to achieve as high efficacy as today's CRI80 LEDs
- Suitable for open or fully enclosed luminaires
- Suitable for luminaires with plastic and glass lenses
- cULus Classified 1598C
- cULus Recognized 8750
- Energy Star Luminaire 2.2 Listed and CSD<sup>①</sup>

### General Specifications

Input Voltage <sup>②</sup>	120~277VAC (+/- 10%)
Input Current <sup>②</sup>	~0.122A @120V      ~0.055A @277V
Input Power <sup>②</sup>	14.5W
Input PF	>0.98
THD	<20%
Input Frequency	50/60Hz
Module Operating Voltage	33.4VDC
Max Lumen Output @ Full Power <sup>②</sup>	2160 lumens @ 4000K/90CRI
Dimming Type/Range	0-10V / 100% ~ 10%
Beam Angle	120°
Color Rendering Index	CRI (Ra) >=90 / R9 >=50 / TM-30 R <sub>a</sub> >=85 / TM-30 R <sub>f</sub> >=100
Storage Temperature Range	-35°C to 100°C / -31°F to 212°F
Operating Ambient Temperature Range (Ta)	-35°C to 60°C / -31°F to 140°F
Maximum Driver Case Temperature: per UL/ 5 year warranty	90°C (194°F) / 80°C (176°F)
Maximum Module Case Temperature	Safety: 105°C(221°F)/ L70(>60Khrs): 105°C(221°F)/ L90(36Khrs): 96°C(204.8°F)
Estimated Lumen Maintenance	L70= >60,000 hours @ Tc max 105°C / L90= 36,000 hours @ Tc max 96°C
Color Consistency	Binning per ANSI C78.377-2015 @25°C; Typ. 3 SDCM, Max. 5 SDCM
Inrush Current / Duration	5A @ 277V / 100us
Line Regulation / Load Regulation	<1% @100% Load / <3% @100% Load
Total Overall Ripple LF (<300Hz)/ HF(<40kHz) peak to peak	<5% @100% Load
Low Frequency Ripple (120Hz ripple peak to peak)	<5% @100% Load
Flicker Percentage	<7% @100% - 20% Dimming Range <5% @<20% Dimming Range
Flicker P <sub>st</sub> / SVM @ Min. Dimming Level per NEMA 77-2017	P <sub>st</sub> : 3.789    SVM: 0.620
Start-up Time / Standby Power	<500ms / <1W No Load
Overall Size	7.83" Dia. x 0.92"H (199mm Dia. x 23.35mm H)
Wire Type/ Length	18AWG / 12" Black and White wires (Input 120~277VAC) 18AWG / 12" Purple and Pink wires (Dimming 0-10VDC)
LED Quantity	72pcs. CW + 72pcs. WW
Driver Part Number	T1M1UNV0350-15L
Module Part Number	VMU095034RD9TWA
Weight	320g / 0.71lbs.
Packaging: Master Carton	20pcs
Maximum Screw Installation Torque	35in-lb (560in-ozf)
Safety/Compliance	Component: cURus Module File #E351548; Driver File #E342838 DC Engines Retrofit Kits: cULus Classified 1598C File # E365124 RoHS Compliant Dry and Damp Location Energy Star Luminaire 2.2 Listed and CSD <sup>①</sup>
RFI/EMI	FCC Part 15B Consumer, EN55015
Input Surge Test	2.5kV Common and Differential mode (Per ES Ring Wave Test)
Sound Rating / Noise	A / <24 dBA
Output Type	Class 2 (approved for luminaires glass or plastic lenses)
PCB Material / Connector Qty / Em. Connection	CEM1 / 2 / Yes
Warranty	5 years @ Max. Tc 105°C (module) and 80°C (Driver) from the date of manufacture

① See page #5 "Certification Chart" for exact models.

② Measured electrical data per UL file



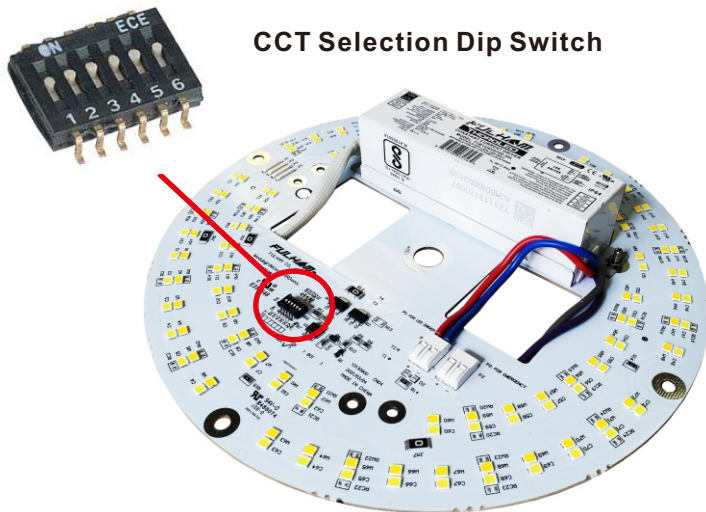
# VKMUNV012RD930A



## CCT Selection Indication

1. The VividHorse DC Engine Retrofit Kit is a dual-channel LED product, that allows for CCT selection via the dip switch on the PCB. Available CCTs include 2700K, 3000K, 3500K, 4000K, 4500K and 5000K.
2. A pre-set CCT will come from the factory. Check the product label or packaging to see the pre-set CCT level.
3. Change the dip switch position to “ON” (1~6) to set the desired CCT level.

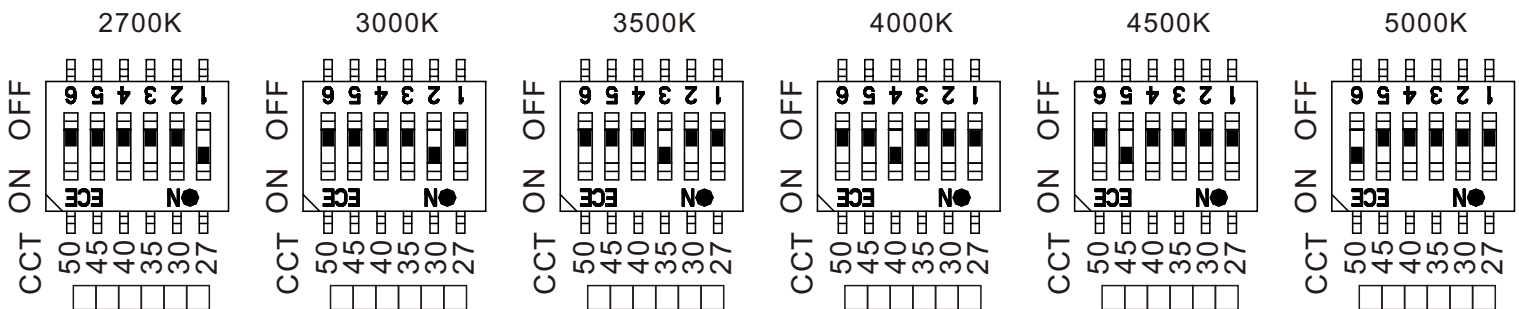
**NOTE: ONLY keep one dip switch in the “ON” position, not doing so may result in an undesired CCT.**

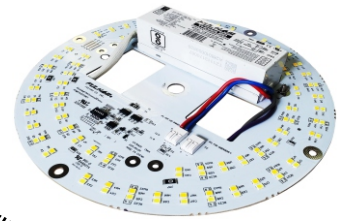


CCT Selection Dip Switch

CCT Indication Table

	1	2	3	4	5	6
<b>2700K</b>	<b>ON</b>	OFF	OFF	OFF	OFF	OFF
<b>3000K</b>	OFF	<b>ON</b>	OFF	OFF	OFF	OFF
<b>3500K</b>	OFF	OFF	<b>ON</b>	OFF	OFF	OFF
<b>4000K</b>	OFF	OFF	OFF	<b>ON</b>	OFF	OFF
<b>4500K</b>	OFF	OFF	OFF	OFF	<b>ON</b>	OFF
<b>5000K</b>	OFF	OFF	OFF	OFF	OFF	<b>ON</b>





# VKMUNV012RD930A

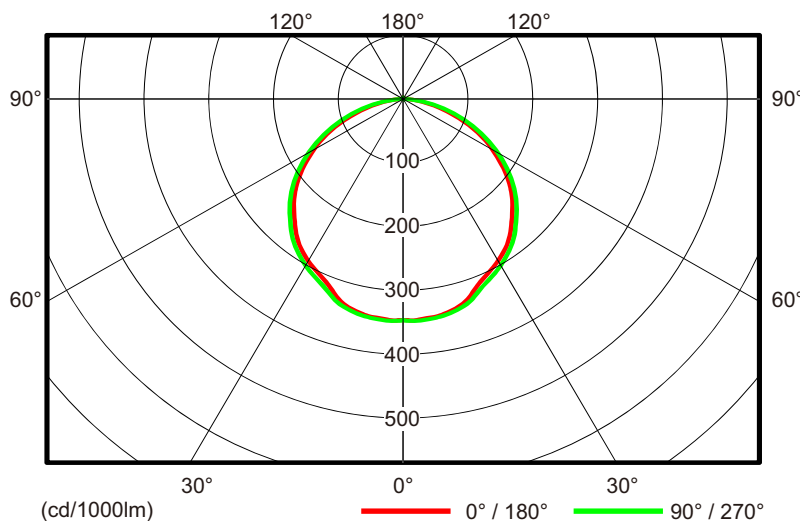


## Electrical and Optical Specifications

CRI	DC Engine Retrofit Kit Part Number	Selected CCT	Input Power	Nominal Luminous Flux @ 90 CRI	Engine Efficacy @ 90 CRI
90	VKMUNV012RD930A	2700K	14.5W	2070 lumens	142 lm/W
		3000K	14.5W	2100 lumens	144 lm/W
		3500K	14.5W	2130 lumens	146 lm/W
		4000K	14.5W	2160 lumens	148 lm/W
		4500K	14.5W	2160 lumens	148 lm/W
		5000K	14.5W	2160 lumens	148 lm/W

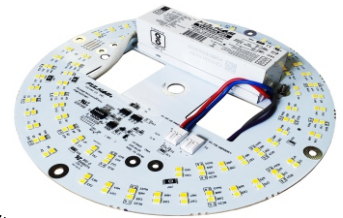
## Light Distribution

Zone	Zone Flux	Zone Flux%	Sum Zone Flux	Sum Zone Flux%
0 ~ 10	67.6	3.3%	67.6	3.3%
10 ~ 20	195.1	9.4%	262.7	12.7%
20 ~ 30	295.4	14.3%	558.1	26.9%
30 ~ 40	364.6	17.6%	922.7	44.5%
40 ~ 50	379.8	18.3%	1302.5	62.8%
50 ~ 60	340.3	16.4%	1642.8	79.3%
60 ~ 70	245.7	11.9%	1888.5	91.1%
70 ~ 80	132.2	6.4%	2020.7	97.5%
80 ~ 90	37.4	1.8%	2058.1	99.3%
90 ~ 180	14.3	0.7%	2072.4	100.0%



### NOTES:

- 1) Electrical and optical specifications are based on Tc mod = 25°C. Reference Amb. Temp. vs Rel. Lum. Flux for other temperatures.
- 2) Performance for these components have been tested in accordance with Energy Star.
- 3) Refer to Energy Star CSD or Luminaires 2.2 for actual measurements on specific part numbers. Energy Star testing is done at elevated case temperature.
- 4) Specifications are subject to change without notice.
- 5) 70CRI & 80CRI are NOT available.



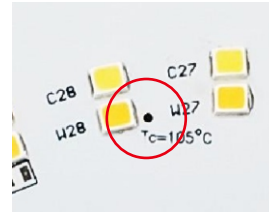
# VKMUNV012RD930A



## Thermal Specifications

### ③ DC Engine Retrofit Kit

Storage Temperature Range	-35°C to 100°C / -31°F to 212°F
Operating Ambient Temperature Range	-35°C to 60°C / -31°F to 140°F
Maximum Driver Case Temperature	90°C / 194°F
Maximum Module Case Temperature	105°C / 221°F

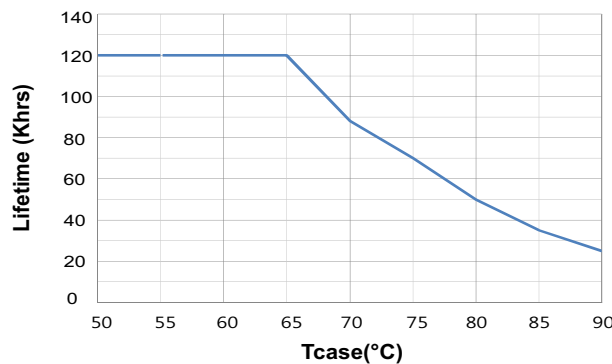


Tc located on module



Tc located on driver

## LED Driver Lifetime vs. Tcase



Failure Rate Info based upon MTBF modeling:  
90% survivals at end of life @ ≤Tc lifetime rating

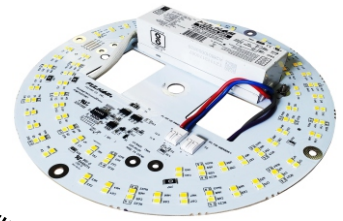
## Thermal De-Rating: Tc vs. Luminous Flux

Module Case Temperature (Tc)	Total Vf Multiplier	Luminous Flux Multiplier
25°C	1.000	1.000
30°C	0.998	0.992
35°C	0.995	0.984
40°C	0.993	0.976
45°C	0.990	0.967
50°C	0.988	0.958
55°C	0.986	0.949
60°C	0.984	0.940
65°C	0.982	0.931
70°C	0.980	0.922
75°C	0.978	0.913
80°C	0.977	0.904
85°C	0.976	0.895
90°C	0.974	0.886
95°C	0.973	0.877
100°C	0.971	0.867
105°C	0.969	0.858

### NOTES:

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

③ Suitable for surface mounted luminaire with minimum dimensions or volume: 10" diameter with a height of 3" or 30 cubic inches



# VKMUNV012RD930A



## Certification Chart

Classification	Model	VKMUNV012RD930A
		YES
		YES (Driver & Module)
		YES
		YES (Exclude 4500K)
		YES (Exclude 4500K)

## Energy Star™ TM-21 Calculator Data

Tc Module	Reported L70	Reported L90
85°C	>60,000 Hrs	40,000 Hrs
96°C	>60,000 Hrs	36,000 Hrs
105°C	>60,000 Hrs	33,000 Hrs

Tc Module	Calculated L70	Calculated L90
85°C	131,000 Hrs	40,000 Hrs
96°C	117,000 Hrs	36,000 Hrs
105°C	106,000 Hrs	33,000 Hrs

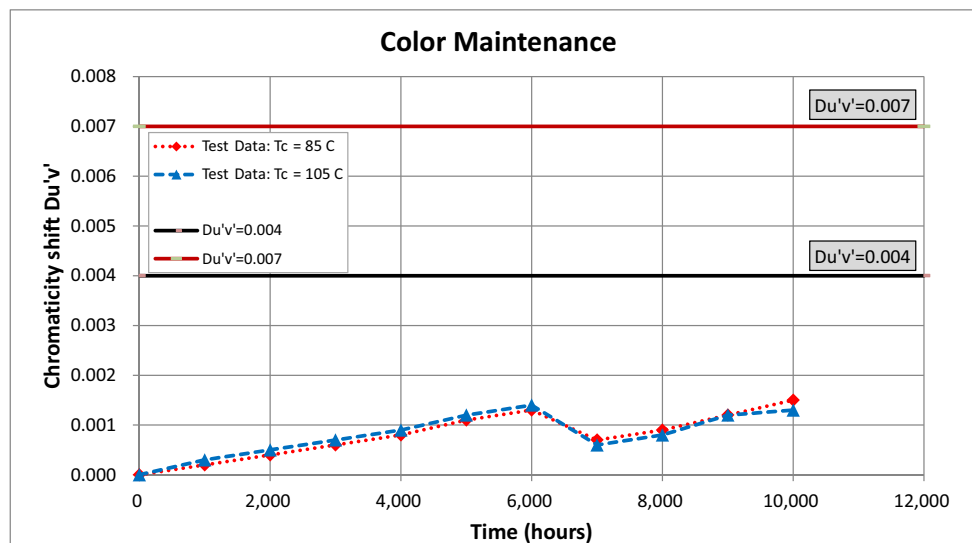
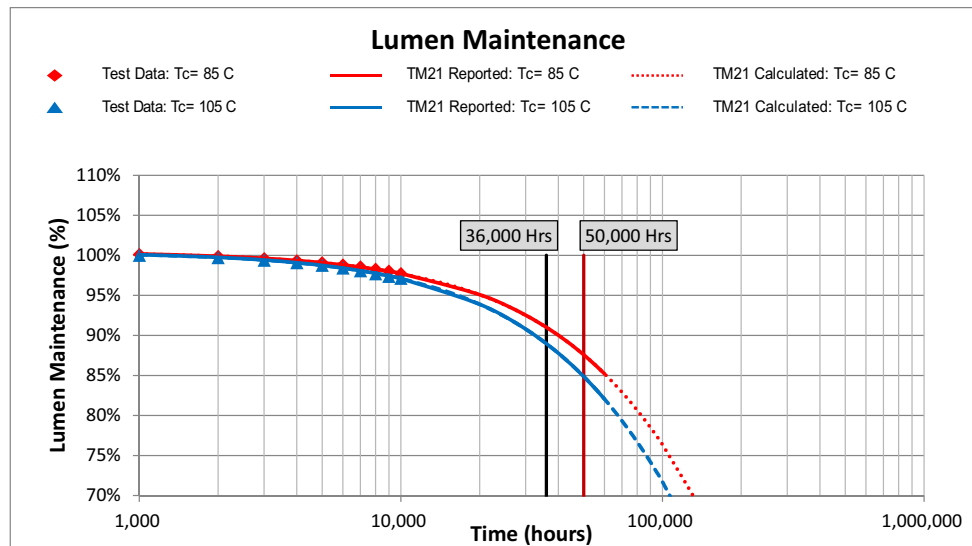
1) Energy Star CSD:

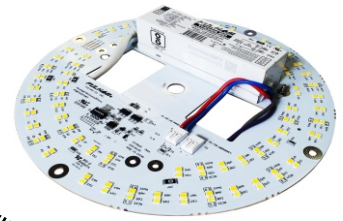
[https://www.energystar.gov/products/lighting\\_fans/certified\\_lighting\\_subcomponent\\_database\\_csd](https://www.energystar.gov/products/lighting_fans/certified_lighting_subcomponent_database_csd)

2) 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](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)

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





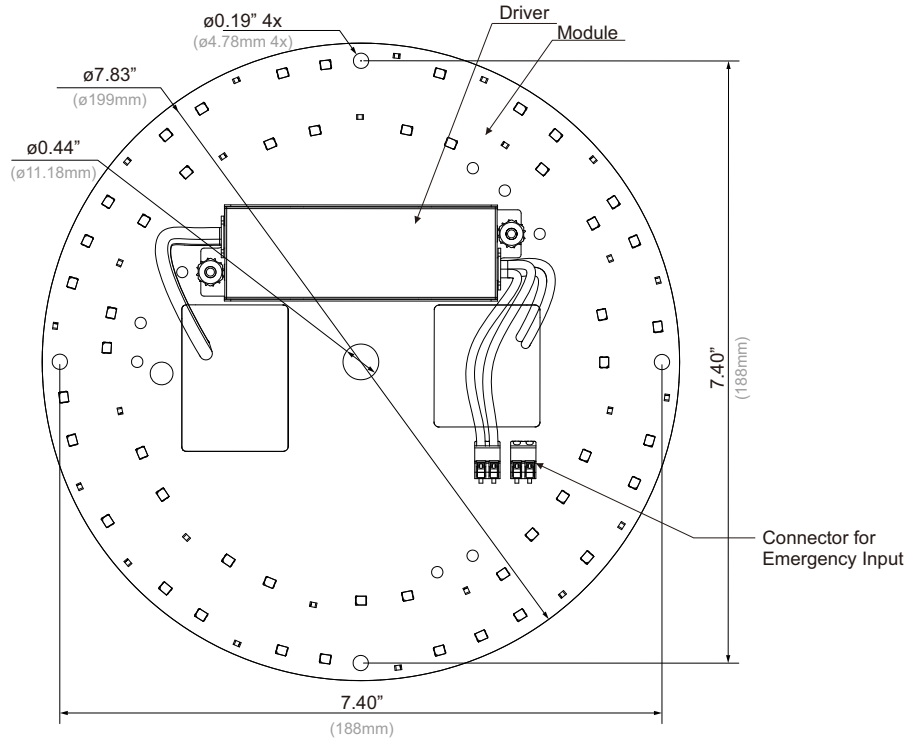
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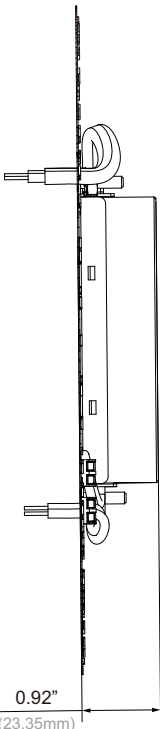
## Mechanical Drawings

(Scale 3 : 5)

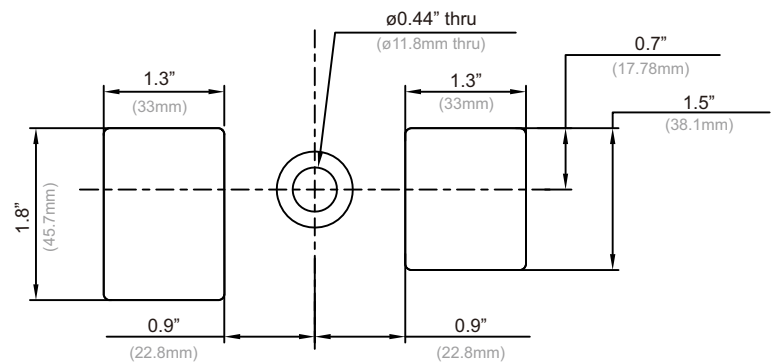
**TOP VIEW**



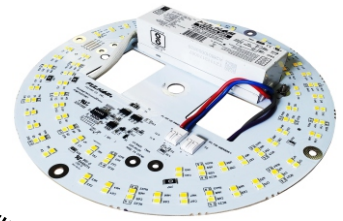
Overall Dimensions	
Diameter	7.83" [199mm]
Height	0.92" [23.35mm]
Wire Length	
AC Input (Black / White)	12" [304.8mm]
0-10V Dimming Purple (10v+) Pink (10V-)	12" [304.8mm]



**SIDE VIEW**



**PARTIAL VIEW**



# VKMUNV012RD930A

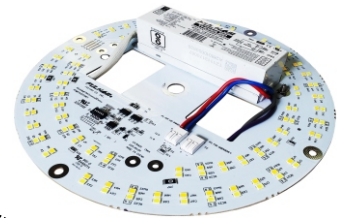


## DC Engine Retrofit Kit Equivalency Chart: FLUO to LED

DC Engine Retrofit Kit (7.8" Round)				CFL					
DC Engine Retrofit Kit Part Number	System Wattage	Lumen Output	Efficacy	CFL Style	Lamp Wattage	# of Lamps	Total Wattage	Lumen Output	Efficacy
VKMUNV012RD930A	14.5W	2160 lm (4K/90CRI)	148 lm/W	Quad	13W	1	13W	775 lm	59 lm/W
					18W	1	18W	1075 lm	
				Triple	13W	1	13W	825 lm	63 lm/W
					18W	1	18W	1020 lm	
				Quad	13W	2	26W	1550 lm	59 lm/W
					26W	1	26W		
				Triple	13W	2	26W	1650 lm	63 lm/W
					26W	1	26W		
				Circline T5	22W	1	22W	1530 lm	69 lm/W
				Circline T9	22W	1	22W	775 lm	35 lm/W

### NOTES:

- 1) LED is a point source and FLUO is 360, there is more light lost with FLUO especially during the reflection. Therefore it is recommended to use a 65 percent of the original light source total lumens when converting FLUO to LED. For example original FLUO lumens of 2000 x .65% = 1300 LED lumens. This is only a recommendation, and the installer should consider other factors for the application.
- 2) For reference only, several factors apply.



# VKMUNV012RD930A



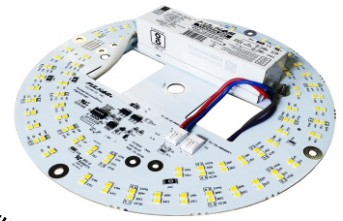
## DC Engine Retrofit Kit with Emergency Options

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

Engine/Kit Part Number	Emer. Driver Part Number	Battery Wattage	Battery Part Number	Harness (mA)	LED Vf (V)	LED If (mA)	Total Power (W)	Total Lum. Output (lm)	Eff. (lm/W)	
VKMUNV012RD930A	FHS2-UNV-36L/ FHS2-UNV-56S	4W	FHSBATT8-AA9 FHSBATL3-1	FHS-HARNESS-125	32.3	125	4.0	734 ☉	182	
	FHSCP-UNV-4W-L	4W	N/A	N/A	32.3	125	4.0	734	182	
	FHSCP-UNV-5WL	5W	N/A	N/A	32.5	155	5.0	932	185	
	FHSCP-UNV-10P-L-SD	5W	FHSBATL3-1.5-SD	N/A	32.5	155	5.0	932	185	
	FHS2-UNV-36L/ FHS2-UNV-56S	6W	FHSBATL6-.6 FHSBATCC3-3-40C (-40°C)	FHS-HARNESS-175	32.6	175	5.7	1062 ☉	186	
	FHSCP-UNV-10P-L-SD	6W	FHSBATL9-.6-SD	N/A	32.7	185	6.0	1126	186	
	FHSCP-UNV-7.8WL	7.8W	N/A	N/A	33.0	236	7.8	1452	187	
	FHS2-UNV-36L/ FHS2-UNV-56S	8W	FHSBATL3-1.5 FHSBATL3-1.5S	FHS-HARNESS-225	32.9	225	7.4	1382 ☉	187	
	FHSCP-UNV-8W-L-SD	8W	N/A	N/A	33.0	242	8.0	1489	186	
	FHSCP-UNV-8W-S-SD	8W	N/A	N/A	33.0	242	8.0	1489	186	
	FHS2-UNV-36L/ FHS2-UNV-56S	10W	FHSBATL9-.6 FHSBATCC3-3-40C (-30°C)	FHS-HARNESS-300	33.4	300	10.0	1848 ☉	185	
		10W(Canada)	FHSBATCC3-3 (-20°C)							
	FHSCP-UNV-10P-L-SD	10W	FHSBATL3-3-SD FHSBATL6-1.5L-SD ☉	N/A	33.4	300	10.0	1848	185	
	FHSCP-UNV-10P-S-SD	10W	N/A	N/A	33.4	300	10.0	1848	185	
	FHSCP-UNV-10W-BLS-SD	10W	N/A	N/A	33.4	300	10.0	1848	185	
	FHSCP-UNV-10W-C-SD	10W	N/A	N/A	33.4	300	10.0	1848	185	
	FHSCP-UNV-10W-L-SD	10W	N/A	N/A	33.4	300	10.0	1848	185	
	FHSCP-UNV-10.7WL	10.7W	N/A	N/A	33.5	320	10.7	1970	184	
	FHSCP-UNV-12W-L-SD	12W	N/A	N/A	33.7	357	12.0	2192	182	
	FHUPS1-UNV-25L-SD	25W	N/A	N/A	33.6	350	11.8	2150	183	
FHUPS1-UNV-50L-SD	50W	N/A	N/A	33.6	350	11.8	2150	183		

### NOTES:

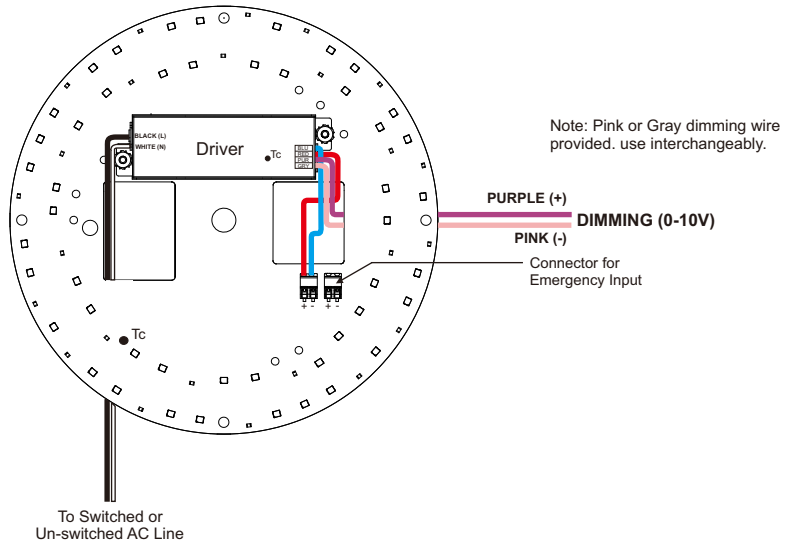
- 1) For reference only, several factors apply.
  - 2) Emergency systems are not UL classified for field installation.
- ☉ These batteries do not include mounting means, separate mounting brackets are available
- ☉ Initial lumen output. Will reduce to no less than ~65% of total lumen output.



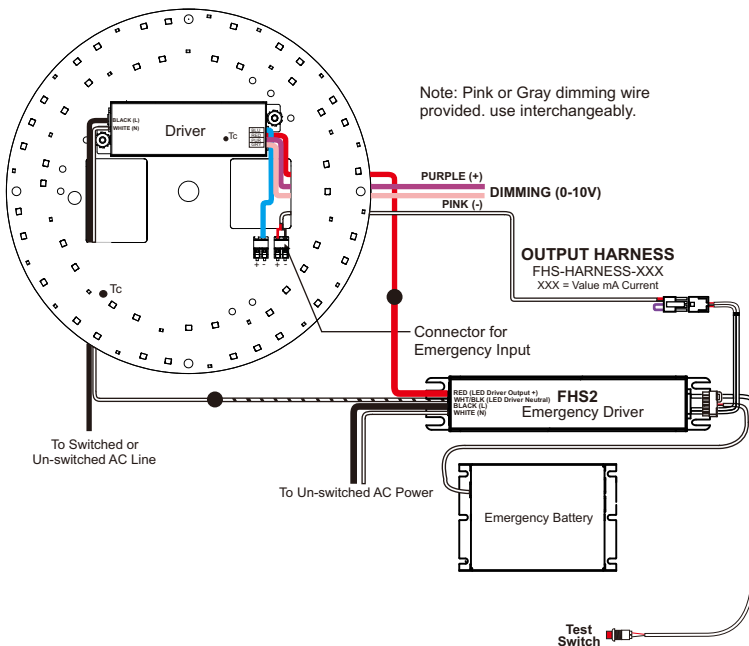
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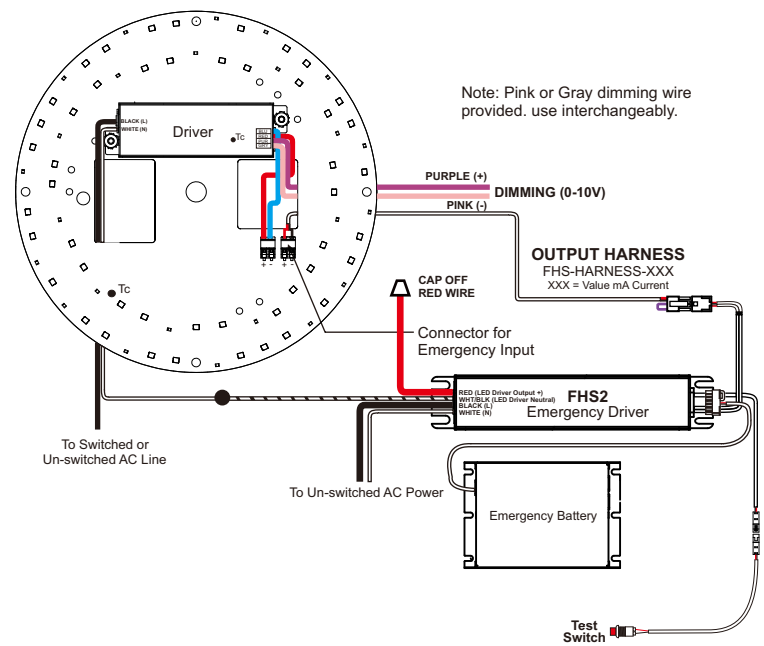
## Wiring Diagram: Standard Option



## Wiring Diagram: HotSpot2 (FHS2) EM- Pass Through (Recommended for non-Fulham LED EM)

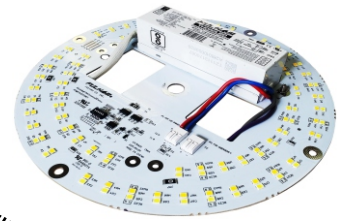


## Wiring Diagram: HotSpot2 (FHS2) EM- In Parallel (Recommended for Fulham LED EM)



### NOTES:

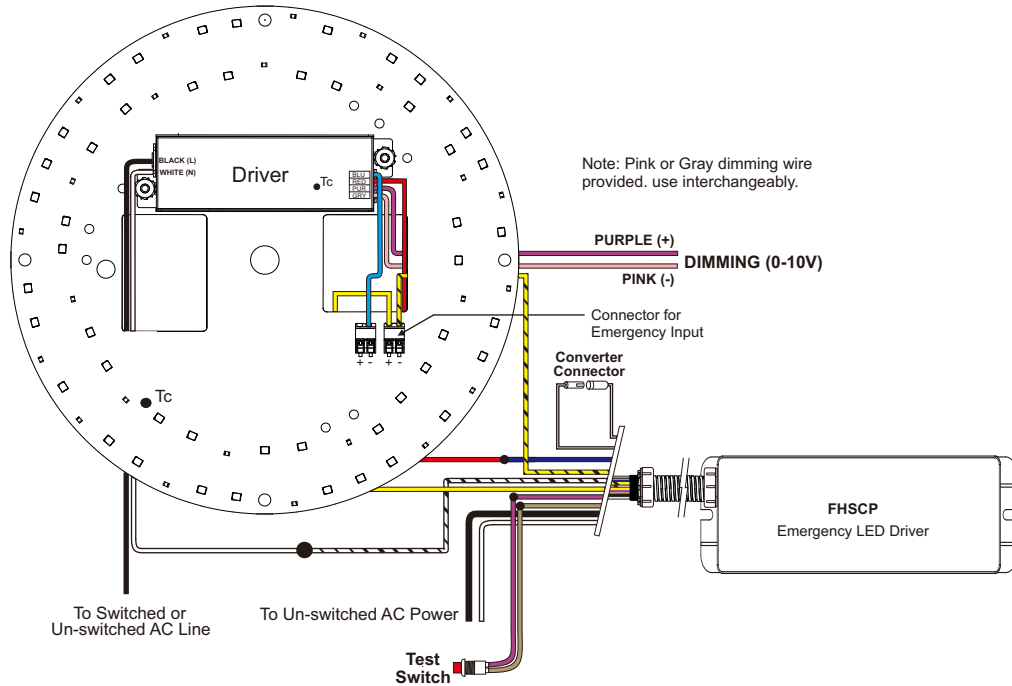
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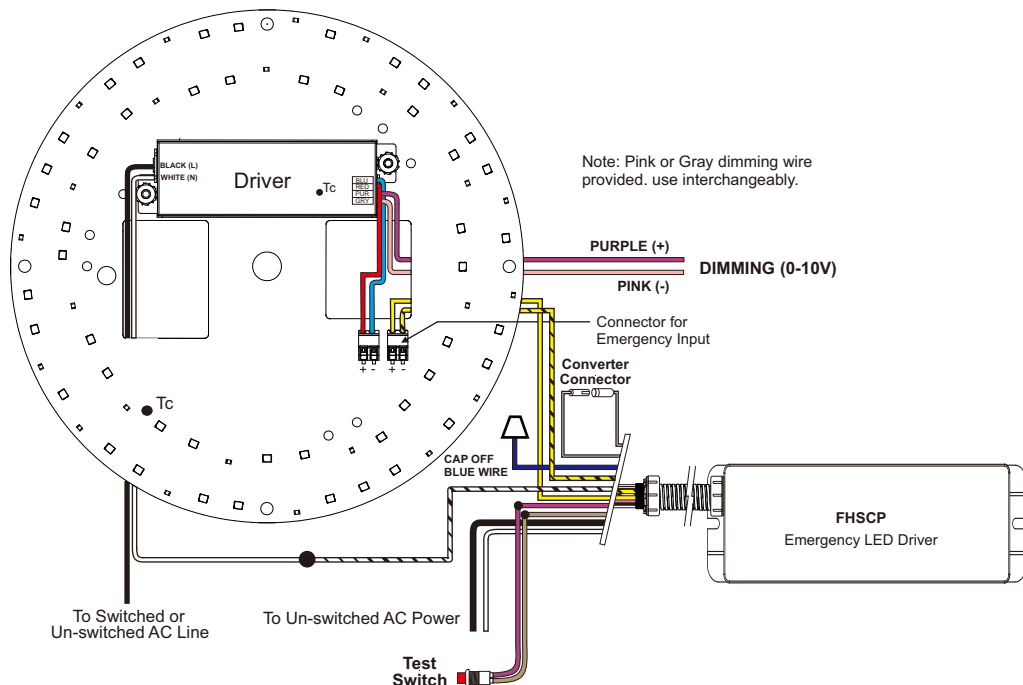
# VKMUNV012RD930A



## Wiring Diagram: Constant Power with conduit (FHSCP) EM- Pass Through (Recommended for non-Fulham LED EM)

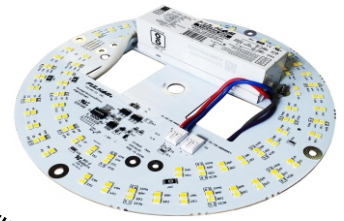


## Wiring Diagram: Constant Power with conduit (FHSCP) EM- In Parallel (Recommended for Fulham LED EM)



**NOTES:**

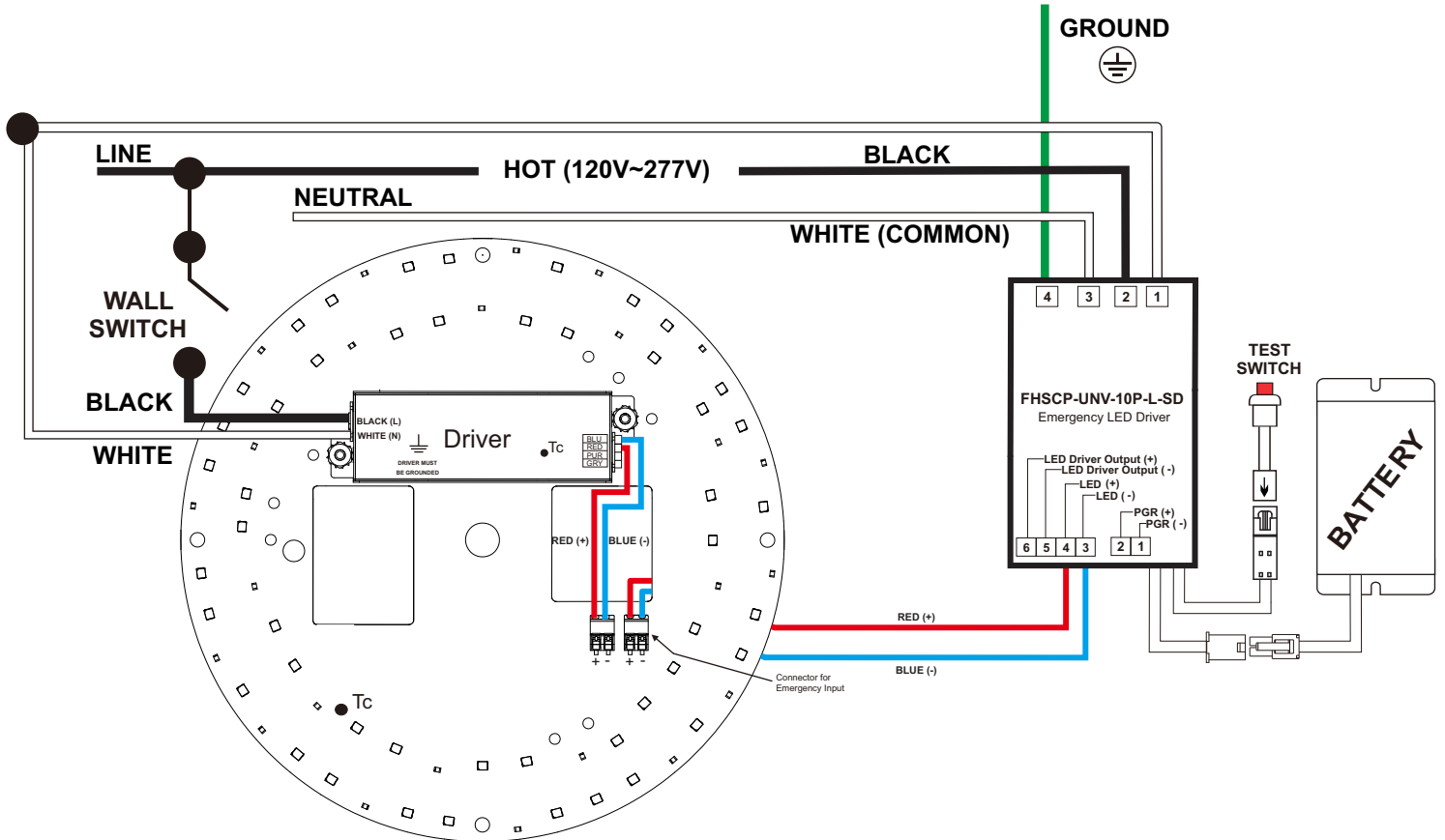
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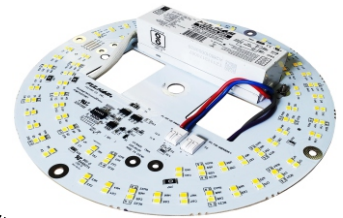


## Wiring Diagram: Parallel Wiring (FHSCP-UNV-10P-L-SD)



### NOTES:

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

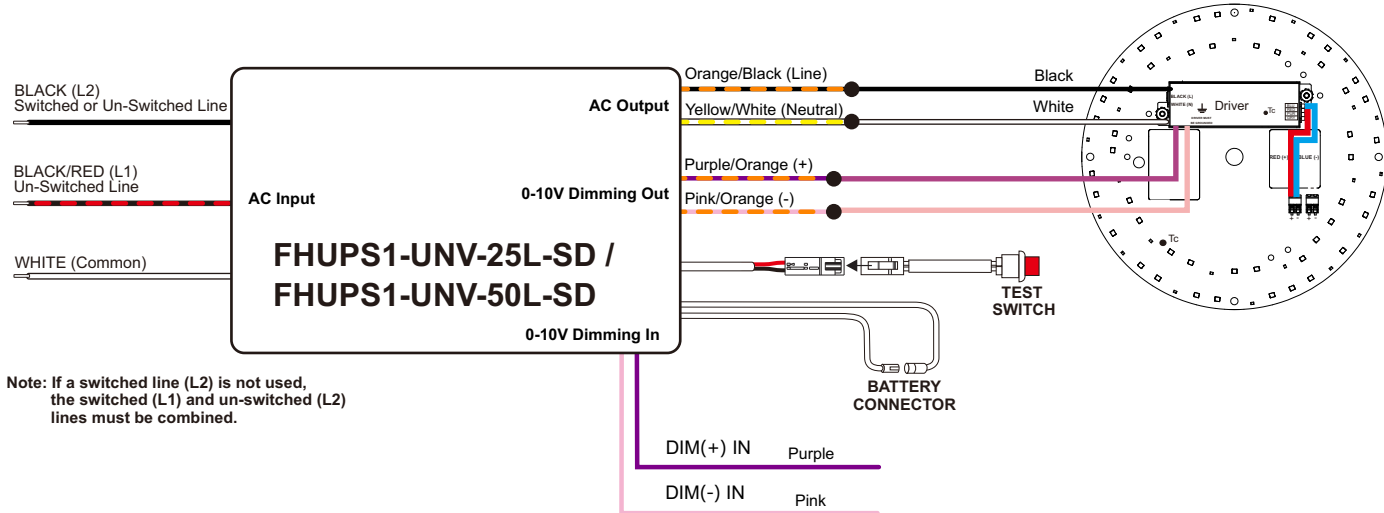


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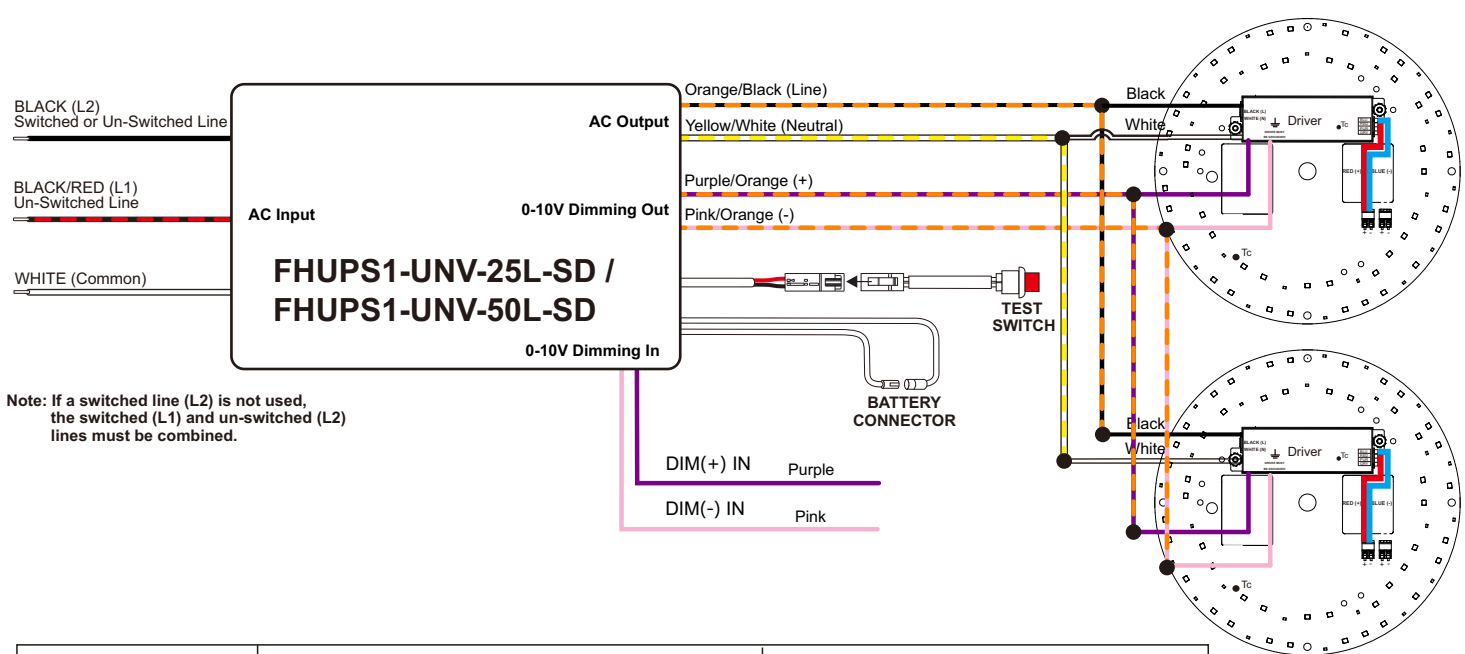


## Wiring Diagram: Parallel Wiring (FHUPS1-UNV-25L-SD / FHUPS1-UNV-50L-SD)

### Single Engine



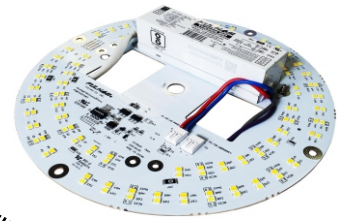
### Multiple Engines



Emergency Driver	Engine connected Qty. [n] for 0-10V Dimming out to Engine <b>NOT</b> connected	Engine connected Qty. [n] for 0-10V Dimming out to Engine connected
FHUPS1-UNV-25L-SD	$n=1$ (EM Power is <u>14.5W</u> each)	$n=2\sim 10$ (EM Power is <u><math>25/n</math></u> W each)
FHUPS1-UNV-50L-SD	$n=1\sim 3$ (EM Power is <u>14.5W</u> each)	$n=4\sim 22$ (EM Power is <u><math>50/n</math></u> W each)

### NOTES:

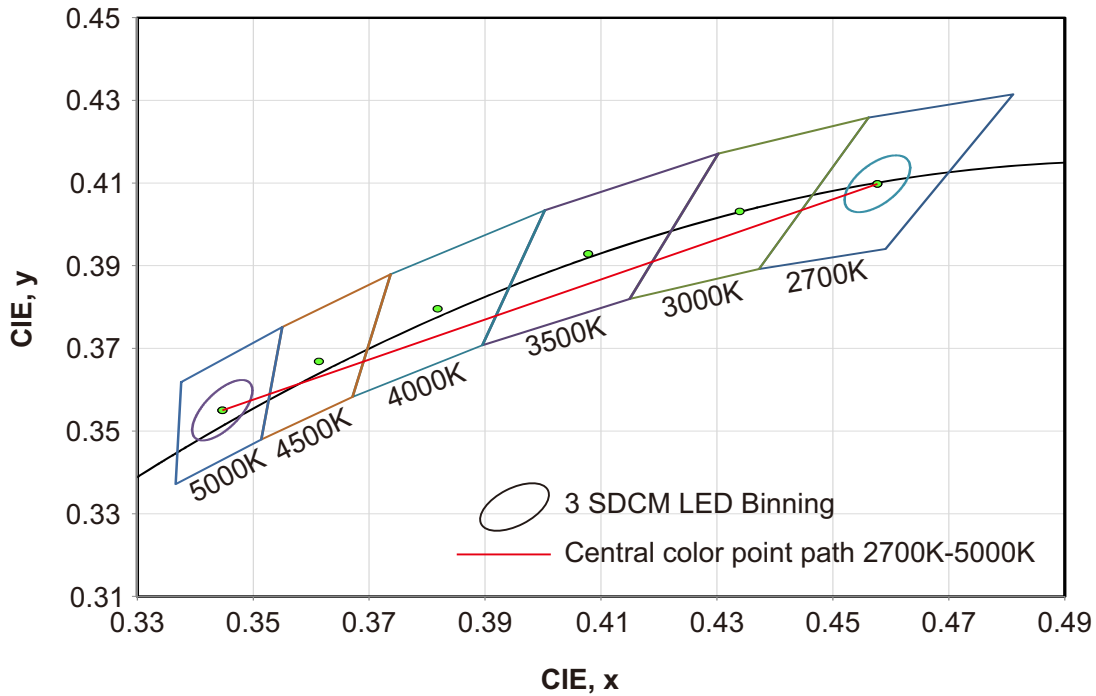
- 1) For reference only, several factors apply.
- 2) Emergency systems are not UL classified for field installation.



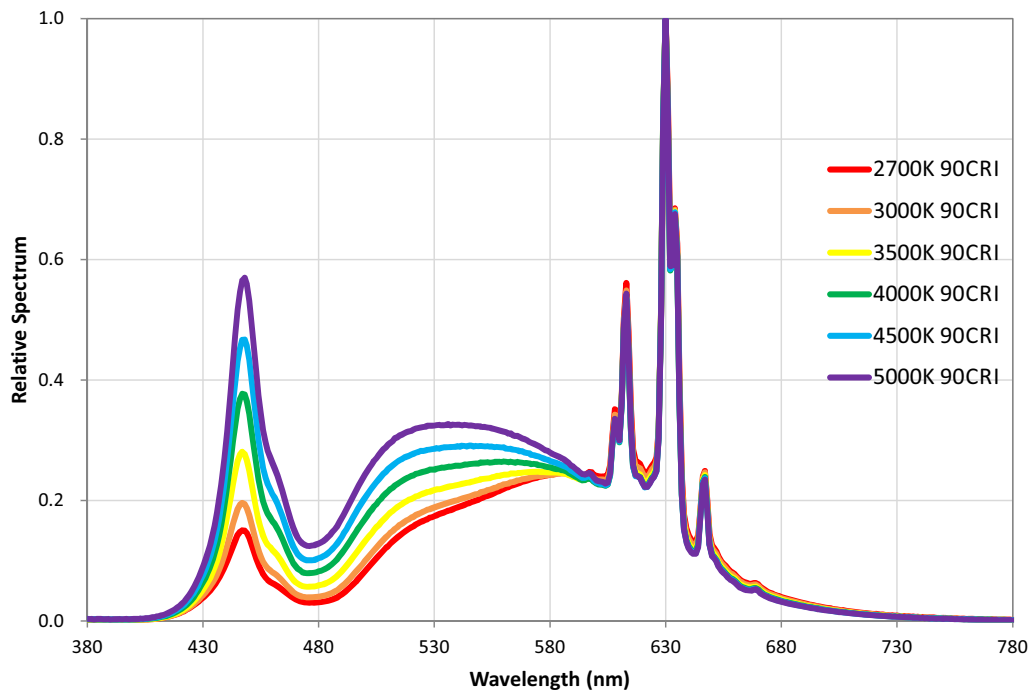
# VKMUNV012RD930A



## Color and Binning

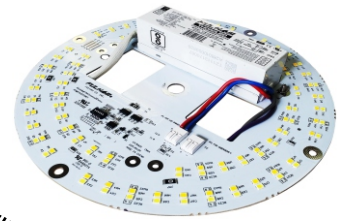


## Optical Spectrum



### NOTES:

- 1) The Color and Binning and Optical Spectrum charts are for reference only. For more detailed info, contact factory.
- 2) Reference Samsung 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.



# VKMUNV012RD930A



## Guidelines

### Reduced Flicker Operation Feature

- DC 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.

### Termination Notes

- A luminaire disconnect UL listed connector is included, as part of DC Engine Retrofit Kit 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:



### Environmental Rating

- DC Engine Retrofit Kit are rated for dry and damp locations.

### 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 4 mounting holes to ensure good contact between back side of DC Engine Retrofit Kit and mounting surface. Refer to max specified torque for installation. Suggested screw sizes: #5 or M3 Pan Head screw.

### Electrostatic Sensitive Product (ESD)

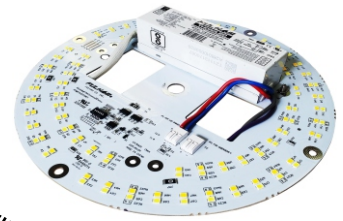
- Fulham LED products should be handled with proper measures to protect against any potential ESD damage.
- When servicing, personnel should be ground and direct contact with LED should be avoided.

### Thermal Management

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

### Wiring

- Intended for UNV (120-277V) application ONLY.
- Connect the Black wire from the DC Engine Retrofit Kit to the building Line by using the proper connectors or wire nuts.
- Connect the White wire from the DC Engine Retrofit Kit to the building/source Neutral by using the proper connectors or wire nuts.
- DC Engine Retrofit Kit and luminaire must be grounded.



# VKMUNV012RD930A



## Part Number Matrix

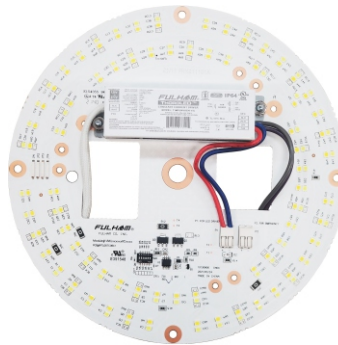
**V K M UNV 012 RD 9 30 A**

**Product Line**  
 V = VividHorse<sup>®</sup>
**Compliance**  
 K = DC Engine Retrofit Kit (cULus Classified)
 **Dimming**  
 M = 0-10V
 **Input Voltage**  
 UNV = 120V~277V
 **Estimated Power**  
 012 = 12W (Typ. 14.5W)
 **Shape**  
 RD=Round
 **CRI**  
 9 = 90
 **Color Temperature**  
 30 = CCT Selectable, Factory Default 3000K

- Ⓢ Standard Product offering. Default CCT setting is 3000K.
- Ⓢ DC Engine Retrofit Kit includes mounting hardware, retrofit labels, and installation instructions.

## Product Image: 14.5W Round DC Engine Kit

VKMUNV012RD930A



This luminaire has been modified and can no longer operate the originally intended lamp. REPLACE ONLY WITH FULHAM ELECTRONIC CO. : VKMUNV012RD930A

Ce luminaire a été modifié et ne peut plus utiliser la lampe prévue à l'origine. REMPLACER UNIQUEMENT AVEC FULHAM ELECTRONIC CO. : VKMUNV012RD930A

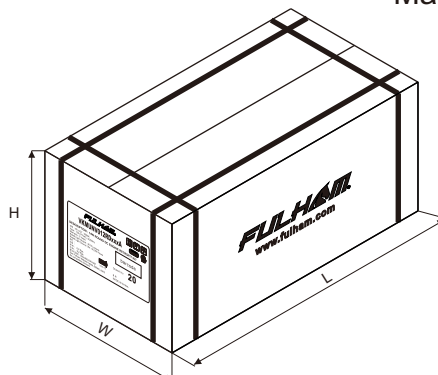


### Hardware Kit: TLC-HW08

UNV DC Engines Retrofit Kits with 0-10V Dimming : Hardware, Quick disconnect, Labels & Installation Instructions

## Packaging

### Master Carton



OUTER DIMENSION		
L	W	H
21.65"(550mm)	15.75"(400mm)	9.45"(240mm)
Net Weight	Gross Weight	QUANTITY
14.52 lbs. (6.6 kg)	20.24 lbs. (9.2 kg)	20pcs.