PRODUCT FEATURES

· Class 2 power supply
· UL Class P
· Ripple ≤ 5% @ 20% & 100% load
· Constant voltage mode with over-current protection
· IP20-rated case with silicone-based potting
· Max. case temperature (Tc) 90℃
· Lifetime: 5 years min at 85℃ case temperature
· EMI : Compliant with FCC CFR Title 47 Part 15 Class B at 120 Vac & Class A at 277 Vac
· Surge protection
  - IEC61000-4-5 : 2 kV line to line/2 kV line to earth
  - 2.5 kV ring wave: ANSI/IEEE c62.41.1-2002 & c62.41.2-2002 category A
· Complies with ENERGY STAR®, DLC (DesignLight Consortium®) and CA Title 24 technical requirements

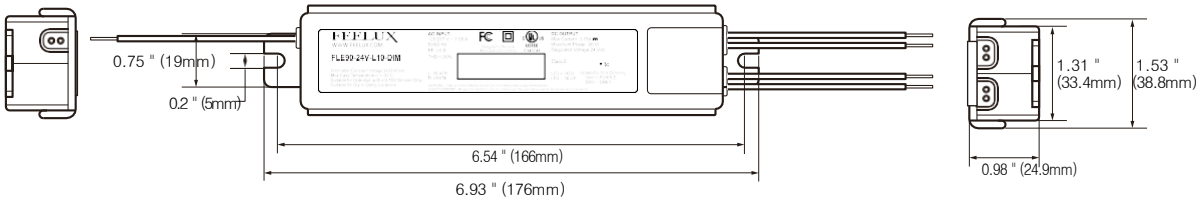
c UL us LISTED FC Class 2

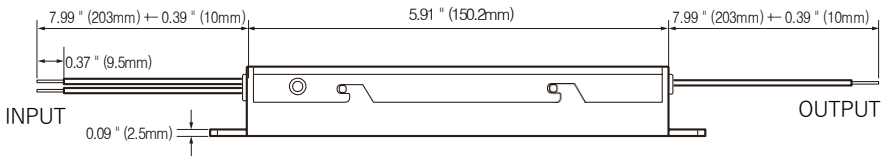
SPECIFICATION

Model Name	Nominal Input Voltage	Wattage	Nominal Output Voltage	Max. Output Current	Efficiency	Max. Case Temperature	THD	Power Factor	Dimming Method	Dimming Range	Startup Time
FLE90-24V-L10-DIM	120 & 277 Vac	90 W	24 Vdc	3.75, 1.9 A	up to 90% typical	90°C (measured at the hot spot)	< 20%	> 0.9	0 - 10 V	1 - 100%	300 ms typical

OUTLINE DRAWINGS

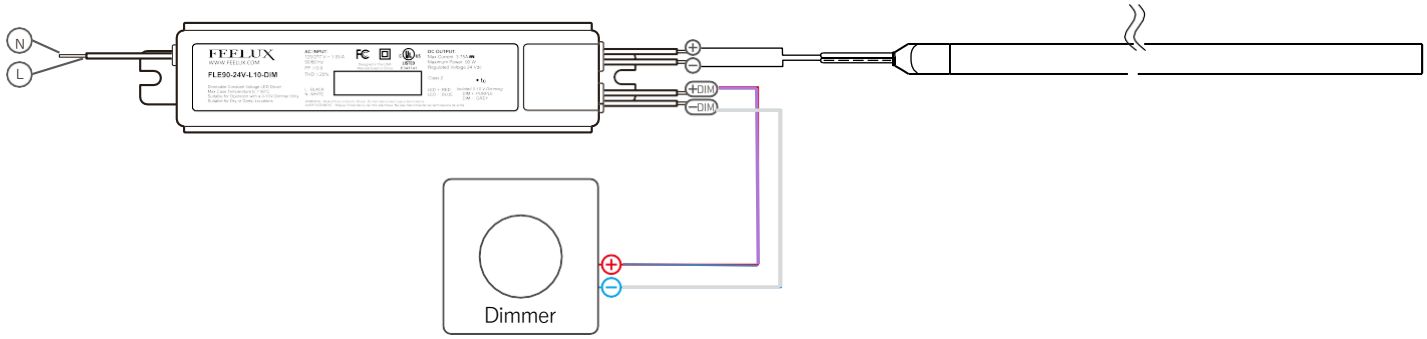
Model Name	Wattage (W)	Lenght (L)	Width (W)	Height (H)	Volume
FLE90-24V-L10-DIM	90 W	5.91 ″ (150.2mm)	1.53 ″ (38.8mm)	0.98″(24.9mm)	8.86 in3 (145.1㎤)





INPUT	OUTPUT	DIMMING
18AWG N:WHITE L:BLACK	18AWG LED+ : RED LED- : BLUE	22AWG DIM+ : PURPLE DIM- : GREY

WIRING DIAGRAM



SPECIFICATION

1. INPUT SPECIFICATION (@25°C ambient temperature)

	Units	Minimum	Typical	Maximum	Notes
Input Voltage Range (Vin)	Vac	90	120, 277	305	· At maximum load, as specified in section 1
Input Frequency Range	Hz	47	60	63	
Input Current (Iin)	A			1.05 A @ 120 Vac 0.48 A @ 277 Vac	
Power Factor (PF)		0.9	> 0.9		· At nominal input voltage · From 100% to 60% of maximum rated power
Inrush Current	A	Meets NEMA-410 requirements			· At any point on the sine wave and 25°C
Leakage Current	μA			400 μA @ 120 Vac 920 μA @ 277 Vac	· Measured per IEC60950-1
Input Harmonics	Complies with IEC61000-3-2 for Class C equipment				
Total Harmonics Distortion (THD)				20%	· At nominal input voltage · From 100% to 60% of maximum rated power · Complies with DLC (Design Light Consortium) technical requirements
Efficiency	%	-	up to 90%	-	
Isolation	The AC input to the main DC output is isolated and meets Class II reinforced/double insulation power supply				

2. OUTPUT SPECIFICATION (@25°C ambient temperature)

	Units	Minimum	Typical	Maximum	Notes
Output Voltage (Vout)	Vdc	16.4 32.0	24 48		· See ordering information for details
Output Current (Iout)	A			24 Vdc: 3.75 A 48 Vdc: 1.9 A	
Output Voltage Regulation	%	-5		5	· At nominal AC line voltage · Includes load and voltage set point variations.
Output Voltage Overshoot	%	-	-	10	· The driver does not operate outside of the regulation requirements for more than 500 ms during power on with maximum load.
Ripple Voltage	≤ 5% of rated output voltage for each model				· Measured at maximum load and nominal inpout voltage. · At 20% & 100% load
Dimming Range (% of Iout)	%	1		100	· Dimming is a function of the output voltage and is achieved through decreasing Vout. · The dimming range is dependent on each specific dimmer and LED load. It may not be able to achieve 1% dimming with some dimmers or LED loads. · Refer to section 6 for additional information regarding the 0-10V dimming characteristics of the FLE90 series.
Start-up Time	ms		300	500	· Measured from application of AC line voltage to 100% light output · Complies with ENERGY STAR® luminaire specification and CA Title 24
Isolation	The main DC output is certified and tested per UL8750 Class 2 or LED Class 2				

3. ENVIRONMENTAL CONDITIONS

	Units	Minimum	Typical	Maximum	Notes
Operating Ambient Temperature (Ta)	°C	-10		40	· When mounted to insulating material such as wood or drywall with junction box such that at Ta ≤ 40°C Tc does not exceed 85°C
Maximum Case Temperature (Tc)	°C			+90	· Case temperature measured at the hot spot • tc
Storage Temperature	°C	-40		+85	
Humidity	%	5	-	95	· Non-condensing
Cooling	Convection cooled				
Acoustic Noise	dBA			22	· Measured at a distance of 1 foot (30 cm)
Mechanical Shock Protection	per EN60068-2-27				
Vibration Protection	per EN60068-2-6 & EN60068-2-64				
MTBF	> 200,000 hours when operated at nominal input and output conditions, and at Tc ≤ 85°C				
Lifetime	5 years at Ta ≤ 40°C. Tc ≤ 85℃ maximum case hot spot temperature				

4. EMC COMPLIANCE AND SAFETY APPROVALS

EMC Compliance			
Conducted and Radiated EMI	Compliant with FCC CFR Title 47 Part 15 Class B at 120 Vac & Class A at 277 Vac		
Harmonic Current Emissions		IEC61000-3-2	For Class C equipment
Voltage Fluctuations & Flicker		IEC61000-3-3	
Immunity Compliance	ESD (Electrostatic Discharge)	IEC61000-4-2	6 kV contact discharge, 8 kV air discharge, level 3
	RF Electromagnetic Field Susceptibility	IEC61000-4-3	3 V/m, 80 – 1000 MHz, 80% modulated at a distance of 3 meters
	Electrical Fast Transient	IEC61000-4-4	± 2 kV on AC power port for 1 minute, ± 1 kV on signal/control lines
	Surge	IEC61000-4-5	± 2 kV line to line (differential mode) /± 2 kV line to common mode ground (tested to secondary ground) on AC power port, ± 0.5 kV for outdoor cables
		ANSI/IEEE c62.41.1-2002 & c62.41.2-2002 category A, 2.5 kV ring wave	
	Conducted RF Disturbances	IEC61000-4-5	3V, 0.15-80 MHz, 80% modulated
	Voltage Dips	IEC61000-4-11	>95% dip, 0.5 period; 30% dip, 25 periods; 95% reduction, 250 periods

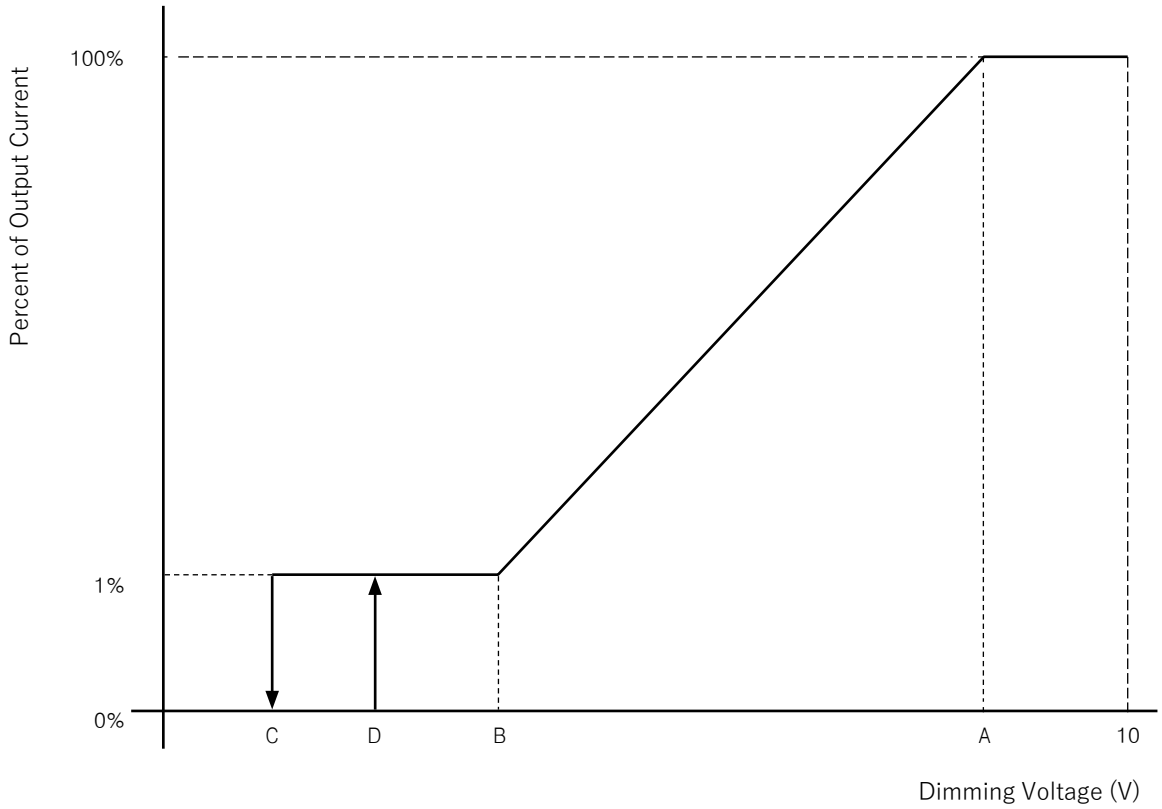
Safety Agency Approvals	
UL	UL8750 listed, Class 2, Class P
cUL	CAN/CSA C22.2 No. 250.13-14 LED equipment for lighting applications

Safety					
	Units	Minimum	Typical	Maximum	Notes
Hi Pot (High Potential) or Dielectric voltage-withstand	Vdc	4400			· Insulation between the input (AC line and Neutral) and the output · Tested at the RMS voltage equivalent of 3110 Vac

5. 0-10 V DIMMING CONTROL (@25°C ambient temperature)

The FLE series exhibits a non-linear dimming profile with 1% minimum dimming and dim-to-off. Dimming is achieved by decreasing the output voltage of the driver. In the default non-linear 0-10 V dimming profile, 10 V to 8.2 V=100% of Vmax, 1.5 V to 0.7 V=65% of Vmax, and <0.7 V=dim-to-off. Each point in the non-linear dimming profile (points A-D in figure 1) can be programmed using the programming software.

	Units	Minimum	Typical	Maximum	Notes
+Dim Signal, -Dim Signal	The FLE series operate only with 0-10V dimmers that sink current. The method to dim the output current of the driver is done via the +Dim/-Dim Signal pins. The +Dim/-Dim signal pins can be used to adjust the output setting via a standard commercial wall dimmer, an external control voltage source (0 to 10 Vdc), or a variable resistor when using the recommended number of LEDs. The dimming input permits 1% to 100% dimming with dim-to-off.				
Dimming Profile (see figure 1)	Programmed upper output voltage limit between 10 V and 8.2 V, Linear between 8.2 V and 1.5 V, Programmed lower output voltage limit between 1.5 V and 0.7 V, Output voltage off below 0.7 V.				
Dimming Range	%	1		100	
High Level Voltage - A	V	8.1	8.2	8.3	
Low Level Voltage - B	V		1.5		
Dim to Off - C	V	0.6	0.7	0.8	
Dim to Off Hysteresis - D	V			+0.2	
Current Supplied by the +Dim Signal Pin	mA			1	
Output Voltage Tolerance While Being Dimmed	%			± 8	The tolerance of the output voltage while being dimmed is ≤ +/-8% until down to 1.5 V.
Isolation	The 0-10 V circuit is isolated from both the AC input and the main DC output. UL8750 Supplement SF compliant.				



6. COMPATIBLE 0-10 V DIMMERS

Mfg.	Model	Mfg.	Model	Mfg.	Model
Lutron	NFTV	Lutron	DVTV	Lutron	DVSTV
Lutron	RMJS-8T	Lightoller	SR1200ZTUNV	Cooper	SF10P-W
Leviton	IP710-LFZ	Leviton	IP710-DL		

7. PROTECTION FEATURES

Input Over Current Protection

The FLE series incorporates a primary AC line fuse for input over current protection to prevent damage to the LED driver and meet product safety requirements as outlined in Section 6.

Short Circuit and Over Current Protection

The FLE series is protected against short-circuit such that a short from any output to return shall not result in a fire hazard or shock hazard. The driver shall hiccup as a result of a short circuit or over current fault. Removal of the fault will return the driver to within normal operation. The driver shall recover, with no damage, from a short across the output for an indefinite period of time.

Internal Over temperature Protection

The FLE series is equipped with internal temperature sensor on the primary power train. Failure to stay within the convection power rating will result in the power supply reducing the available current (fold back) below the programmed amount. The main output current will be restored to the programmed value when the temperature of the built-in temperature sensor cools adequately.

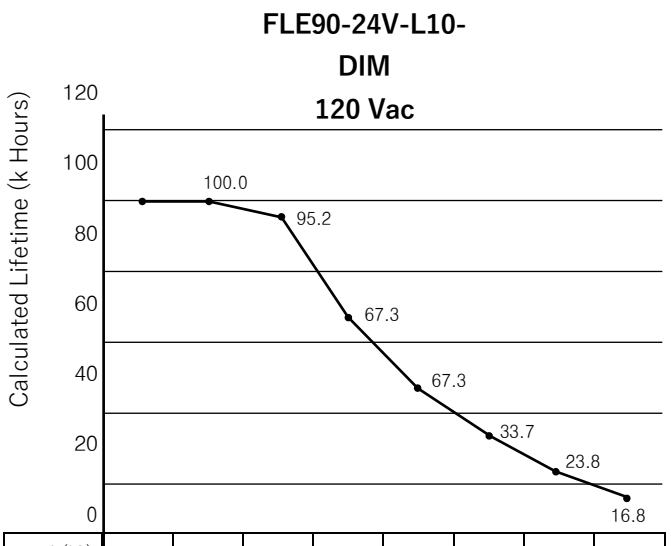
Output Open Load Protection

When the LED load is removed, the output voltage of the FLE series is typically limited to 1.3 times the maximum output voltage of each model.

8. PREDICTED LIFETIME VERSUS CASE AND AMBIENT TEMPERATURE

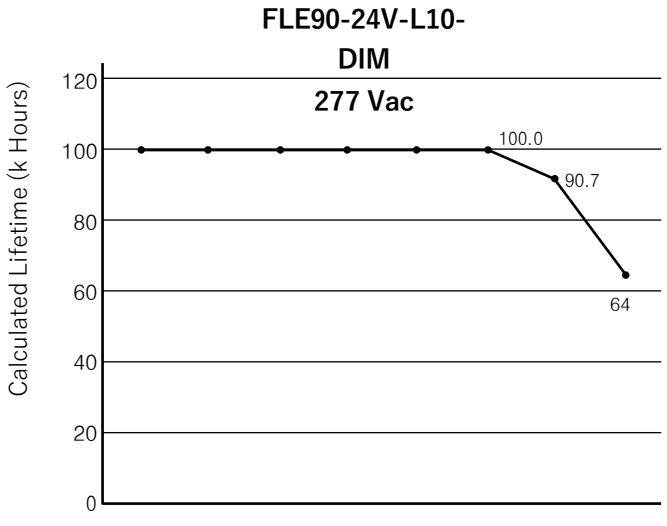
Lifetime is defined by the measurement of the temperatures of all the electrolytic capacitors whose failure would affect light output under the nominal LED load and worst case AC line voltage. The graphs in figures 2 and 3 are determined by the electrolytic capacitor with the shortest lifetime, among all electrolytic capacitors. It represents a worst case scenario in which the LED driver is powered 24 hours/day, 7 days/week. The lifetime of an electrolytic capacitor is measured when any of the following changes in performance are observed:

1) Capacitance changes more than 20% of initial value
2) Dissipation Factor (tan δ): 150% or less of initial specified value
3) Equivalent Series Resistance (ESR): 150% or less of initial specified value
4) Leakage current: less of initial specified value



Tamb(°C)	25	30	35	40	45	50	55	60
Tcase(°C)	68	73	78	83	88	93	98	103

Note : With Baseplate dimension of 195mm x 60mm x 3mm



Tamb(°C)	25	30	35	40	45	50	55	60
Tcase(°C)	55	60	65	70	75	80	85	90

Note : With Baseplate dimension of 195mm x 30mm x 5mm

Notes:

- The ambient temperature $T_{ambient}$ and the differential between $T_{ambient}$ and T_{case} mentioned in the above graphs are relevant only as long as both the driver and the light fixture are exposed to the same ambient room temperature. If the LED driver is housed in an enclosure or covered by insulation material, then the ambient room temperature is no longer valid. In this situation, please refer only to the case temperature T_{case}.
- It should be noted the graph "Lifetime vs. Ambient Temperature" may have an error induced in the final application if the mounting has restricted convection flow around the case. For applications where this is evident, the actual case temperature measured at the Tc point in the application should be used for reliability calculations.

MECHANICAL DETAILS

▪ Packaging :	Aluminum case
▪ I/O Connections :	
▪ Models with flying leads :	18 AWG on all leads, 22 AWG on 0-10V dimming wires, 203mm (8 in) long, 105°C rated, stranded, stripped by approximately 9.5 mm, and tinned. All the wires, on both input and output, have a 300 V insulation rating.
▪ Ingress Protection :	IP20 rated
▪ Mounting Instructions :	The FLE driver case must be secured on a flat surface through the two mounting tabs, shown here below in the case outline drawings.