ENERGY RECOVERY PRODUCTS™

ELM030 12-34 W
ELM040 34-40 W
ELM050 41-53 W

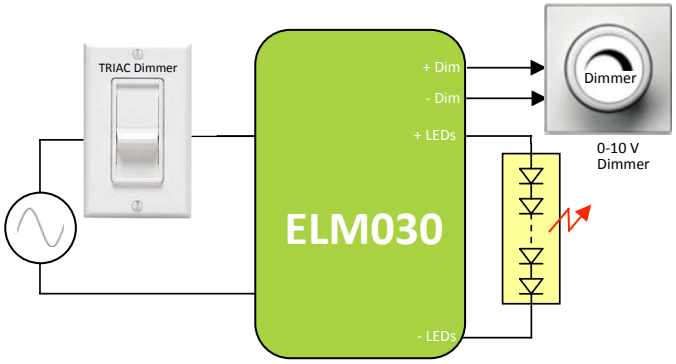
Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

Input Voltage	Max. Output Power	Output Voltage	Output Current	Efficiency	Max. Case Temperature	THD	Power Factor	Dimming Method	Dimming Range
120 & 277 Vac nominal	50 W	10 to 56 Vdc	350 mA to 1.75 A CC	≥ 84% typical	90°C (measured at the hot spot)	< 20%	> 0.9	Forward-Phase, Reverse-Phase & 0 - 10V	10 - 100% (% of Iout)

CC: Constant Current

PRODUCT DESCRIPTION

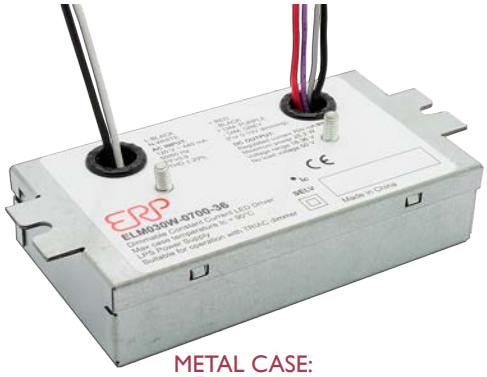
The ELM030/040/050 series of LED drivers is compliant with industry standard phase-cut dimmers, both forward-phase and reverse-phase, and 0–10V dimmers, making it ideally suited for both new constructions and retrofit applications, in Residential or Commercial markets.



TYPICAL APPLICATION DIAGRAM

FEATURES

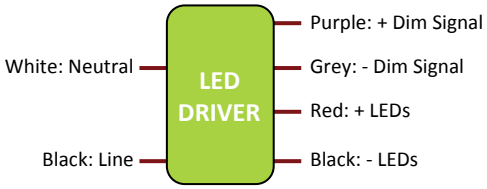
- **NOT RECOMMENDED FOR NEW DESIGNS. For new designs, use the ESM series**
- Compatible with TRIAC (forward-phase or leading-edge) / ELV (reverse-phase or trailing-edge) and 0–10 V dimmers
- 120 and 277 Vac nominal input voltage
- Protections: output open load, over-current and short-circuit (hiccup), and over-temperature with auto recovery
- Conducted and radiated EMI: FCC CFR Title 47 Part 15 compliant with Class B at 120 Vac and Class A at 277 Vac
- Enables ENERGY STAR® and DLC (DesignLight Consortium®) luminaire compliance
- CFL ballast rectangular metal case
- IP20-rated case with silicone-based potting
- 90°C maximum case hot spot temperature
- 50,000 hours lifetime
- Class 2 power supply
- Double-insulated power supply between input and output (class II)
- Worldwide safety approvals



METAL CASE:
ELM030: 110 x 60 x 26 mm (4.33 x 2.36 x 1.02 in)
ELM040/050: 127 x 70 x 28 mm (5 x 2.76 x 1.1 in)

APPLICATIONS

- Troffers
- Downlights
- Low Bay lighting
- Commercial lighting
- Architectural lighting



WIRING DIAGRAM

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

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

	Units	Minimum	Typical	Maximum	Notes
Input Voltage Range (Vin)	Vac	90 240	120 277	132 305	
Input Frequency Range	Hz	57	60	63	
Power Factor (PF)		0.9	> 0.9		At nominal input voltage and nominal LED load (nominal Vout)
Input Current (ELM030)	A	-	-	0.44 A @ 120 Vac 0.19 A @ 277 Vac	
Input Current (ELM040/050)	A	-	-	0.66 A @ 120 Vac 0.29 A @ 277 Vac	
Inrush Current	A			10 A peak	At any point on the sine wave and 25°C
Leakage Current	µA			250 µA @ 120 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 and nominal LED load • Complies with DLC (DesignLight Consortium) technical requirements v2.0
Efficiency		-	84%	-	Measured with nominal input voltage, a full sinusoidal wave form without dimmer connected. Models with full load ratings of ≤20W have an efficiency of ≥75%.
Isolation	Meets UL60950-1 for class II reinforced/double insulation power supply ⧈				

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

	Units	Minimum	Typical	Maximum	Notes
Output Voltage (Vout)	Vdc	10		56	See ordering information for details
Output Current (Iout)	mA	350		1750	See ordering information for details
Output Current Regulation	%	-5	±2.5	5	Includes AC line voltage, load, and current set point variations
Output Current Overshoot	%	-	-	10	The driver does not operate outside of the regulation requirements for more than 500 ms during power on with nominal LED load and without dimmer.
		-	-	15	The driver does not operate outside of the regulation requirements for more than 500 ms during power on with nominal LED load and with dimmer.
Ripple Current	< 25% peak-to-peak of rated output current for each model				• Measured with a nominal LED load and nominal input voltage with no dimming. • Calculated in accordance with the IES Lighting Handbook, 9th edition
Dimming Range (% of Iout)		10%		100%	The dimming range will be dependent on each specific dimmer.
Start-up Time	s			1	The output is within the regulation band within 1 second of AC voltage being applied. This is measured with no incandescent dimmer attached, at nominal input voltage and at nominal load.

Output Controls	
+Dim Signal, -Dim Signal	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 10% to 100% dimming. The voltage on the +Dim input must be ≤ 10V.

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

3 - PROTECTION FEATURES

Output Open Load, Over-Current and Short-Circuit Protection (hiccup), and Over-Temperature Protection with Auto Recovery

4 - ENVIRONMENTAL CONDITIONS

	Units	Minimum	Typical	Maximum	Notes
Operating Case Temperature (Tc)	°C	-30		+90	Case temperature measured at the hot spot •tc on label. See labeling in page 9.
Storage Temperature	°C	-40		+85	
Humidity	%	5	-	95	Non-condensing
Cooling	Convection cooled				
Acoustic Noise	dBA			24	Measured at a distance of 1 meter, without and with approved dimmers.
Mechanical Shock Protection	per EN60068-2-27				
Vibration Protection	per EN60068-2-6 & EN60068-2-64				
MTBF	> 250,000 hours when operated at nominal input and output conditions, and at Tc ≤ 70°C				
Lifetime	50,000 hours at 70°C maximum case hot spot temperature (see hot spot •tc on label in page 9)				

5 - EMC COMPLIANCE AND SAFETY APPROVALS

EMC Compliance			
Conducted and Radiated EMI		FCC CFR Title 47 Part 15 Class B at 120 Vac and 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	3V/m, 80 - 1000 MHz, 80% modulated at 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	± 1 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
	Conducted RF Disturbances	IEC61000-4-6	3 V, 0.15-80 MHz, 80% modulated
	Voltage Dips	IEC61000-4-11	>95% dip, 0.5 period; 30% dip, 25 periods; 95% reduction, 250 periods
Transient Protection	**Ring Wave**		ANSI/IEEE c62.41.1-2002 & c62.41.2-2002 category A, 2.5 kV ring wave

Safety Agency Approvals		
UL	UL8750 recognized	UL60950-1 recognized
cUL	CSA C22.2 60950-1	
CE	IEC61347-2-13 electronic control gear for LED Modules	

Safety					
	Units	**Minimum**	**Typical**	**Maximum**	**Notes**
Hi Pot (High Potential)	Vdc	4242			•Insulation between the input (AC line and Neutral) and the output •Tested at the RMS voltage equivalent of 3000 Vac

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

6 – PHASE-CUT DIMMING

Dimming of the driver is possible with standard TRIAC based incandescent dimmers that chop the AC voltage (as shown in Figure 1), or with ELV dimmers. During the rapid rise time of the AC voltage when the dimmer turns on, the driver does not generate any voltage or current oscillations, and inrush current is controlled. During the on-time of the AC input, the driver regulates the output. The RMS value of the driver output current is proportional to the on-time of the AC input voltage. When operating with an incandescent dimmer, the RMS output current varies depending upon the conduction angle and RMS value of the applied AC input voltage.

The ELM030/040/050 series offers dual dimming compatibility with both TRIAC/ELV and 0–10V dimmers. TRIAC/ELV dimming always has priority over 0-10 V dimming.

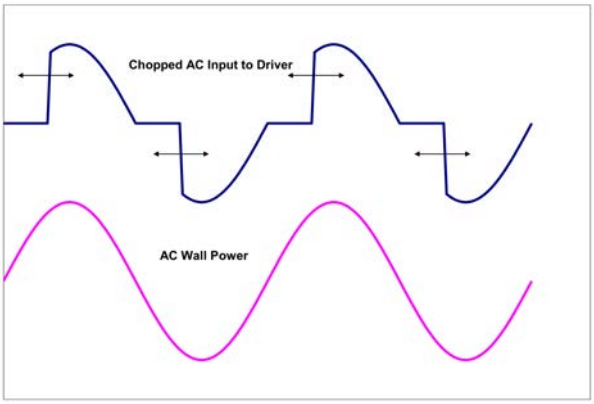


Figure 1

7 - COMPATIBLE PHASE-CUT DIMMERS

120 Vac Nominal Line

- Cooper, Aspire Series (part numbers 9530XXX)
- Leviton, IllumaTech Series (part numbers IPI06-XXX)
- Leviton, Trimatron Series (part numbers 6602-X, 6681-X, 6683-X, 6684-X, 700-X and 705-X)
- Leviton, SureSlide Series (part number 6631)
- Leviton, True Touch Series part number 6606-1LM)
- Lutron Skylark Series (part numbers S-600, S2-LH)
- Lutron, Maestro Series (part number MAW-600)
- Lutron, Diva series (part number DVCL-153)

In addition, the driver series is compatible with Electronic Low Voltage (ELV) dimmers that employ reverse-phase (also known as trailing-edge) control such as:

- Lutron Nova T Series (part number NTELV-600)
- Lutron Faedra (part number FAELV-500-XX)
- Leviton Acenti (part number ACE06-XXX)
- Leviton Vizia (part number VZE04)

277 Vac Nominal Line

- Leviton, IllumaTech Series (part number IPX06-70X)

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

8 - 0-10V DIMMING

The ELM drivers operate only with 0-10V dimmers that sink current. They are not designed to operate with 0-10V control systems that source current, as used in theatrical/entertainment systems. Developed in the 1980's, the 0-10V sinking current control method is adopted by the International Electrotechnical Commission (IEC) as apart of their IEC Standard 60929 Annex E.
This method to dim the driver's output current is done via the +Dim/-Dim signal pins. These signal pins respond to a 1 to 10 V signal, delivering 10% to 100% of the output current based on rated current for each model. A pull-up resistor is included internal to the driver. When the +Dim input is short circuited to the –Dim wire or to the –LED wire, the output current is programmed to ≤ 5% of rated current. If the +Dim input is open circuited, the output current is programmed to 100% of rated current.
When not used, the –Dim wire (grey) and to the +Dim wire (purple) can be capped or cut off. In this configuration, no dimming is possible and the driver delivers 100% of its rated output current. The voltage on the +Dim input must be ≤ 10V.
A fixed or variable resistor can be also used from the dimming input to the return to adjust the output current. Figure 2 and 3 show the relationship of the output current to a resistor connected across the 0-10V dimming input, for the ELM030 and the ELM040/050 series.

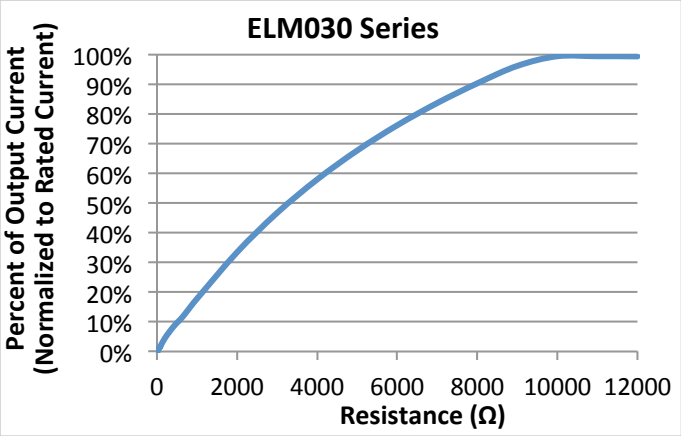


Figure 2

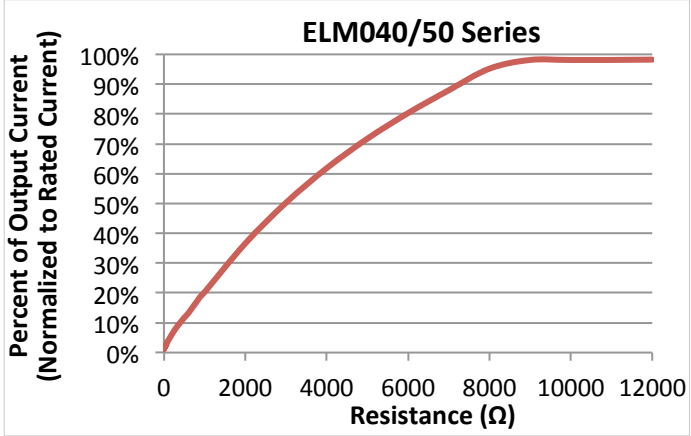


Figure 3

The maximum current supplied by the +Dim signal pin is ≤ 2.5 mA. The tolerance of the output current while being dimmed is +/-5% typical until down to 2V.
Figure 4 shows the relationship of the output current to the dimming input voltage.

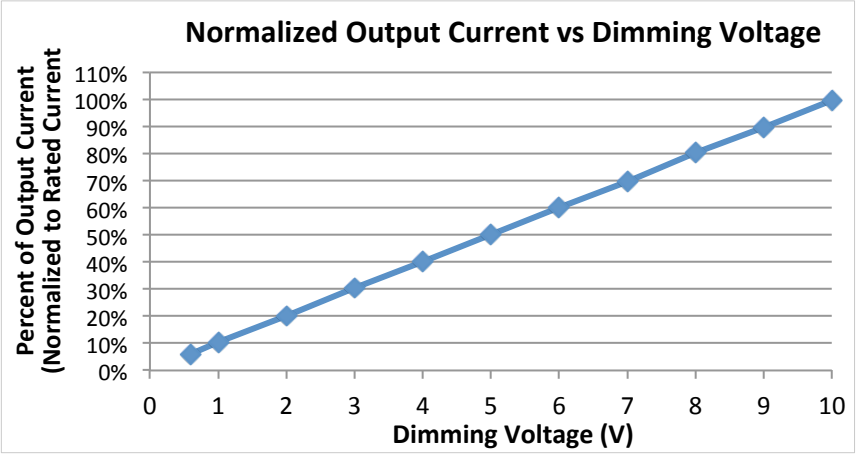


Figure 4

9 - COMPATIBLE 0-10V DIMMERS

- Lutron, Nova Series (part number NFTV)

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

10 - MECHANICAL DETAILS

Packaging: Metal case

I/O Connections: Flying leads, 18 AWG on power leads, 22 AWG on control leads, 203 mm (8 in) long, 105°C rated, stranded, stripped by approximately 9.5mm, and tinned. All the wires, on both input and output, have a 300 V insulation rating.

Ingress Protection: IP20 rated

11 - OUTLINE DRAWINGS: **ELM030 SERIES**

Dimensions: 110 x 60 x 26 mm (4.33 x 2.36 x 1.02 in)

Volume: 310 g (10.47 in^3)

Weight: 171.6 g (10.93 oz)

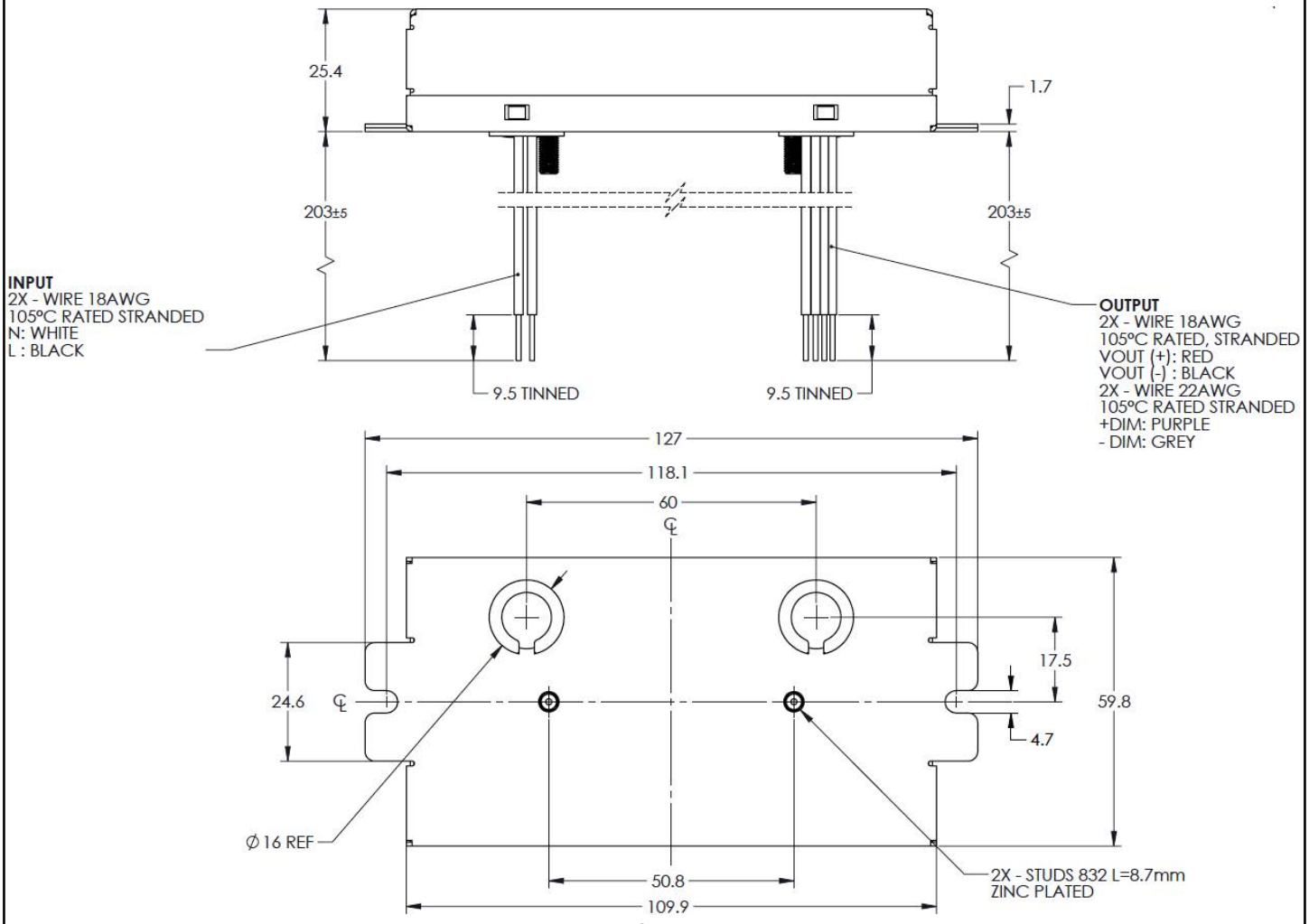


Figure 5

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

12 - OUTLINE DRAWINGS: **ELM040/050 SERIES**

Dimensions: 127 x 70 x 28 mm (5 x 2.76 x 1.1 in)
Volume: 248.9 cm^3 (15.19 in^3)
Weight: 470 g (16.6 oz)

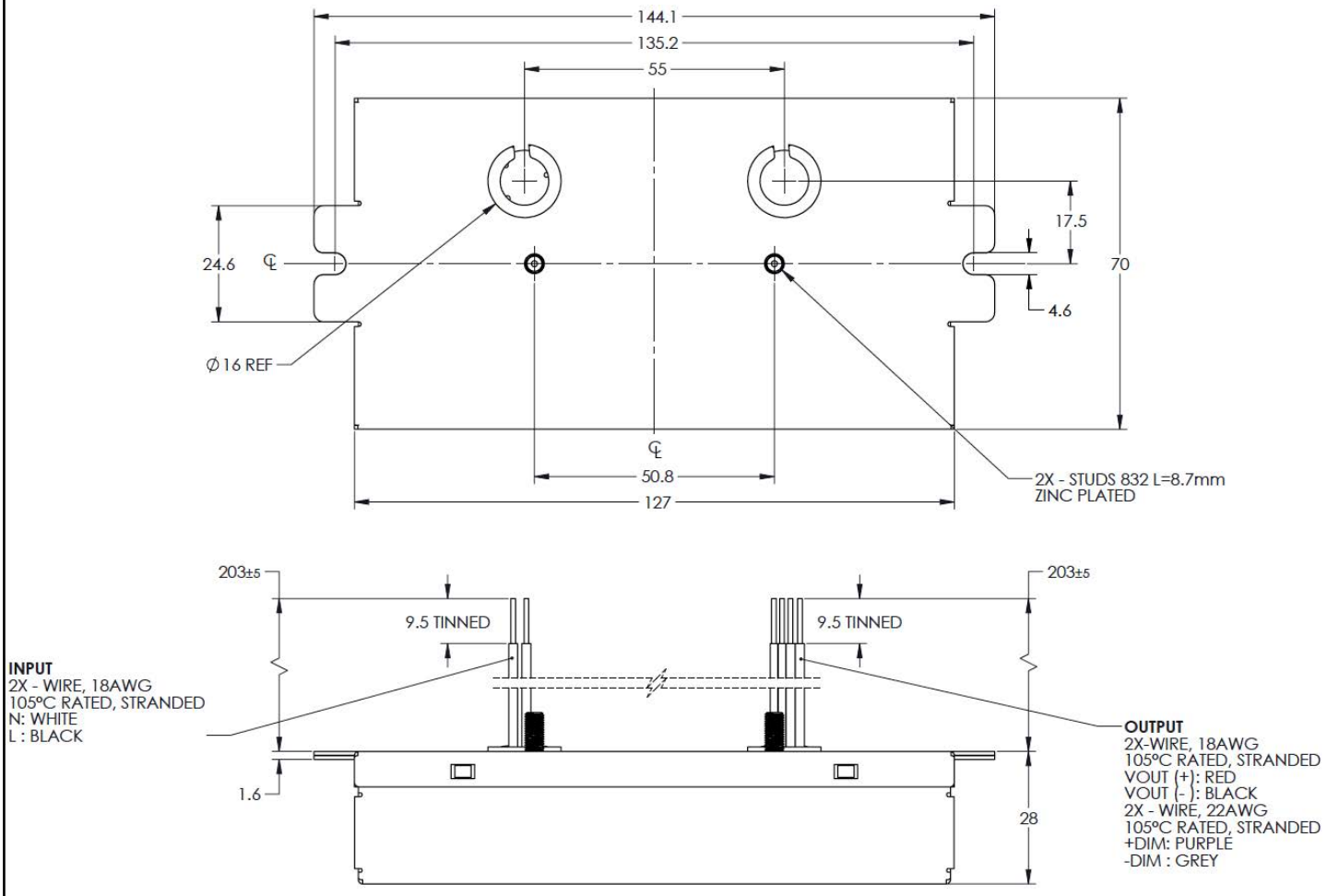


Figure 6

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

13 - ORDERING INFORMATION - MODEL DESCRIPTION

ELM□□□W–□□□□–□□

Series
- 030 (12-34 W)
- 040 (33-40 W)
- 050 (41-53 W)

Nominal Vin
- 120 & 277 Vac

Iout

Vout Max.

ERP Part Number	Nominal Input Voltage Range (Vac)	Iout (mA)	Max Output Power (W)	Vout Min (Vdc)	Vout Nom (Vdc)	Vout Max (Vdc)	No Load Voltage (Vdc)
ELM030: 12 to 34 W							
ELM030W-0300-42	120 & 277	300	12.6	24	37.8	42	50
ELM030W-0350-42	120 & 277	350	14.7	24	37.8	42	50
ELM030W-0350-56	120 & 277	350	19.6	28	50.4	56	60
ELM030W-0440-34	120 & 277	440	15.0	22	30	34	44.2
ELM030W-0500-42	120 & 277	500	21	24	37.8	42	50
ELM030W-0550-41	120 & 277	550	22.6	24	37.8	41	50
ELM030W-0700-24	120 & 277	700	16.8	14	21.6	24	31.2
ELM030W-0700-36	120 & 277	700	25.2	22	32.4	36	46.8
ELM030W-0700-42	120 & 277	700	29.4	24	37.8	42	50
ELM030W-0740-41	120 & 277	740	30.3	24	37	41	50
ELM030W-0800-42	120 & 277	800	33.6	24	37.8	42	50
ELM030W-0840-36	120 & 277	840	30.2	22	30.6	36	46.8
ELM030W-0900-26	120 & 277	900	23.4	13	23.4	26	33.8
ELM030W-0900-38	120 & 277	900	34.2	24	37.8	38	49.4
ELM030W-1000-24	120 & 277	1000	24.0	14	21.6	24	31.2
ELM030W-1750-17.5	120 & 277	1750	30.6	12	15.5	17.5	22.8
ELM040: 33 to 40 W							
ELM040W-0700-48	120 & 277	700	33.6	24	43.2	48	60
ELM040W-0700-56	120 & 277	700	39.2	28	50.4	56	60
ELM040W-0900-42	120 & 277	900	37.8	24	37.8	42	50
ELM040W-1000-38	120 & 277	1000	38	24	34.2	38	49.4
ELM040W-1200-31	120 & 277	1200	37.2	20	27.9	31	40.3
ELM040W-1400-25	120 & 277	1400	35	12.5	22.5	25	32.5
ELM040W-1750-20	120 & 277	1750	35	10	18	20	25
ELM050: 41 to 53 W							
ELM050W-0750-56	120 & 277	750	42	28	50.4	56	60
ELM050W-1000-48	120 & 277	1000	48.0	24	43.2	48	60
ELM050W-1050-42	120 & 277	1050	44.1	24	37.8	42	50
ELM050W-1120-42	120 & 277	1120	47.0	24	37.8	42	50
ELM050W-1200-36	120 & 277	1200	43.2	22	32.4	36	46.8
ELM050W-1200-42	120 & 277	1200	50.4	24	37.8	42	50
ELM050W-1400-32	120 & 277	1400	44.8	21	28.8	32	41.6
ELM050W-1400-38	120 & 277	1400	53.2	24	34.2	38	49.4

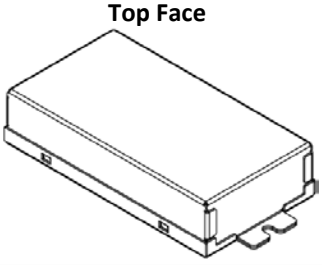
For additional options of output current and output voltage, contact your sales representative or send an email to: SaveEnergy@ERPPowerLLC.com

Constant-Current LED Drivers with Dual Dimming: Forward/Reverse-Phase and 0 - 10 V

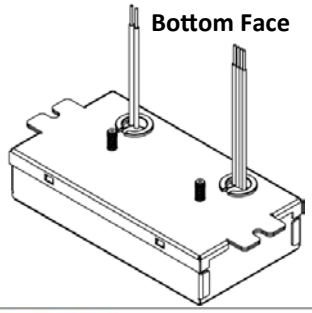
14 - LABELING

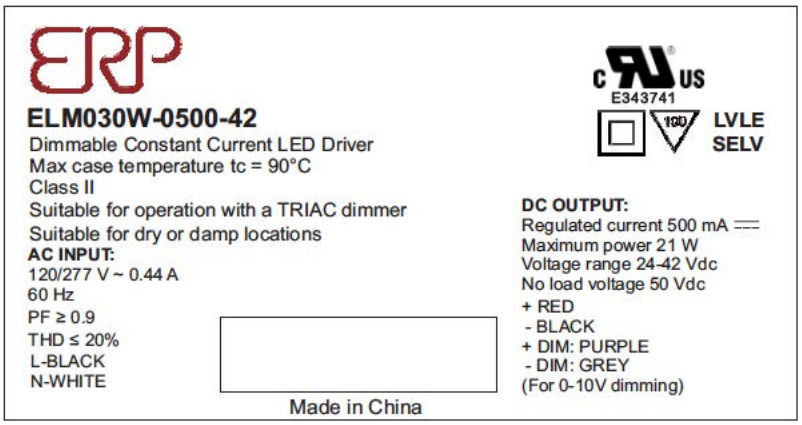
There are two labels on the case of each model in the ELM030/040/050 series: one on the top face and one on the bottom face (face from where the wires exit).
The ELM030W-0500-42 is used as an example to illustrate the typical labels.

Top Face



Bottom Face





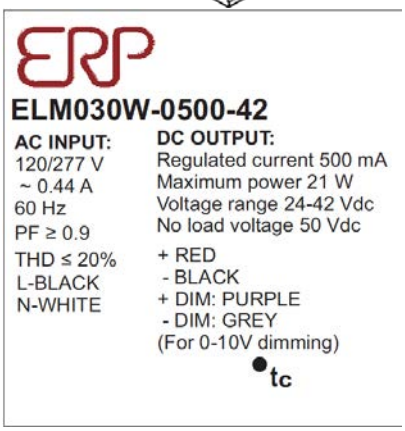


Figure 7

USA Headquarters
Tel: +1-805-517-1300
Fax: +1-805-517-1411
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No. 8 Pingdong Road 2
Zhuhai, Guangdong, China 519060

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