

40 Watt - LFHL40W Series

FLICKER FREE LED DRIVER WITH DEEP DIMMING FOR HAZARDOUS LOCATIONS



UL TYPE HL
LFHL40W
40W

Model: LFHL40W Series

- Drive Mode: Flicker Free Constant Current or Voltage
- Technology: PFC Corrected 2-Stage Switch Mode
- Output Power: 40W Max.
- Input Voltage: 90 to 305VAC, 50/60Hz
- Output Voltage: 6 - 130VDC
- Output Current: 300-3330mA
- Auxiliary Output: 12V @ 200mA Max.
- 0-10V Deep Dimming (1V-10V): 0% - 100%, Dim & Auxiliary connections are part of the secondary circuit

Environmental

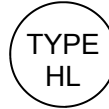
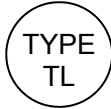
1. Operating temperature: Tc 90C Maximum. Reference -30 to +60°C ambient
2. UL Type TL (Tref Max/Meas. Tref): 90/70°C
3. Storage temperature range: -40 to +85°C
4. Humidity (non-condensing): 5% - 90%RH
5. Cooling: Convection
6. Vibration Frequency: 5-55Hz/2g, 30 minutes
7. Impact resistance: 1g/s
8. MTBF@ 25°C: 452,000 hours @ Full Load per MIL-217F Notice 2.
9. UL Type HL Rated for Hazardous Locations

Safety and Compliance

1. UL8750 Type HL, EN61347, CSA 22.2 safety compliant
2. FCC, 47CFR Part 15 Class B, EN55015 compliant
3. Water resistant and Dust Proof Design: IP66, NEMA4, for Dry, Damp, Wet Locations.
4. Small compact plastic case.
5. Safety Isolation between Primary and Secondary
6. Meets EN61000-3-2 & EN61000-3-3 Class C
7. Protection: output over-voltage, output over-current, output short circuit, auto-recovery.
8. EN61000-4-5: 2kV/4kV 8/20 µsec surge protection.

Electrical Specifications at 25°C

- Input voltage range: 90 to 305VAC
- Frequency: 47 - 63HZ
- Power Factor: ≥ 0.90 at $\geq 50\%$ Load, 120Vac/230Vac/277Vac 50/60Hz
- THD%: $\leq 20\%$ at $\geq 50\%$ Load, 120Vac/230Vac/277Vac 50/60Hz
- Inrush current: <50A at 25C, 277Vac, cold start, Max. Load
- Input current: 0.56A Maximum
- Efficiency: 86% typical at 230Vac Output & Auxiliary Full Load
- Auxiliary (+Yellow/-Gray): 12V@200mA Maximum
- Line & Load regulation accuracy: $\pm 3\%$
- Leakage current: 700uA typical; Hold up time: half cycle



IP66



Constant Current Versions

Part Number ^(2,5)	US Class 2	CN Class 2	UL Types	Output Voltage Range	Output Constant Current	Current Accuracy	Output Power Maximum	Typical Efficiency ⁽¹⁾
LFHL40W-130-C0300	NO	NO	TL & HL	65 - 130 VDC	300 mA	$\pm 5\%$	40W	87%
LFHL40W-114-C0350	NO	NO	TL & HL	57 - 114 VDC	350 mA	$\pm 5\%$	40W	86%
LFHL40W-100-C0400	NO	NO	TL & HL	50 - 100 VDC	400 mA	$\pm 5\%$	40W	86%
LFHL40W-89-C0450	NO	NO	TL & HL	45 - 89 VDC	450 mA	$\pm 5\%$	40W	84%
LFHL40W-57-C0700	YES	YES	TL & HL	28 - 57 VDC	700 mA	$\pm 5\%$	38W	84%
LFHL40W-48-C0830	YES	YES	TL & HL	24 - 48 VDC	830 mA	$\pm 5\%$	40W	84%
LFHL40W-45-C0900	YES	YES	TL & HL	23 - 45 VDC	900 mA	$\pm 5\%$	40W	84%
LFHL40W-40-C1000	YES	YES	TL & HL	20 - 40 VDC	1000 mA	$\pm 5\%$	40W	83%
LFHL40W-36-C1100	YES	YES	TL & HL	18 - 36 VDC	1100 mA	$\pm 5\%$	40W	83%
LFHL40W-30-C1400	YES	YES	TL & HL	15 - 30 VDC	1400 mA	$\pm 5\%$	42W	83%
LFHL40W-24-C1670	YES	YES	TL & HL	12 - 24 VDC	1670 mA	$\pm 5\%$	40W	83%
LFHL40W-22-C1820	YES	YES	TL & HL	11 - 22 VDC	1820 mA	$\pm 5\%$	40W	82%
LFHL40W-18-C2200	YES	YES	TL & HL	9 - 18 VDC	2200 mA	$\pm 5\%$	40W	82%
LFHL40W-12-C3330	YES	YES	TL & HL	6 - 12 VDC	3330 mA	$\pm 5\%$	40W	82%

Notes:

1. Typical efficiency measured at 230VAC input, Output full load, Aux full load 12@200mA
2. For dimmable versions add designator to the end of the part number: For Example: LFHL40W-18-C2200-RD is 0-10V dimmable version. -RD 0-10V & Resistance dimmable version comes with an extra two wires +Purple/-Gray on the output side.
3. -RD 0-10V Dimming is compatible with most quality 0-10V wall dimmers and direct 0-10V analog signal. See page 3 for details.
4. +Yellow/-Gray Auxiliary output is +12VDC at 200mA.
5. For Constant Voltage versions drop -CXXXX so LFHL40W-12 is part number for constant voltage version.

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Constant Voltage Versions

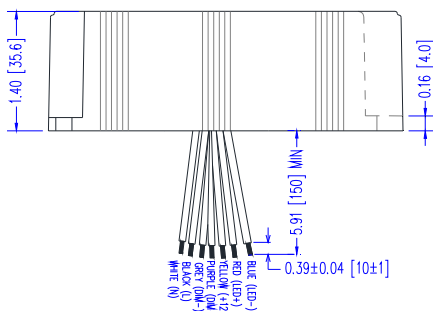
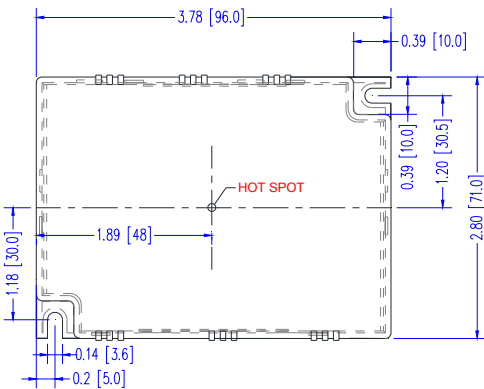
Part Number	US Class 2	CN Class 2	Output Constant Voltage	Output Current Range 50-100%	Voltage Accuracy	Output Power Maximum	Typical Efficiency ⁽¹⁾
LFHL40W-130	NO	NO	130 VDC	150 - 300 mA	± 5%	40W	87%
LFHL40W-114	NO	NO	114 VDC	175 - 350 mA	± 5%	40W	86%
LFHL40W-100	NO	NO	100 VDC	200 - 400 mA	± 5%	40W	86%
LFHL40W-89	NO	NO	89 VDC	225 - 450 mA	± 5%	40W	84%
LFHL40W-57	YES	NO	57 VDC	350 - 700 mA	± 5%	40W	84%
LFHL40W-48	YES	NO	48 VDC	415 - 830 mA	± 5%	40W	84%
LFHL40W-45	YES	NO	45 VDC	450 - 900 mA	± 5%	40W	84%
LFHL40W-40	YES	YES	40 VDC	500 - 1000 mA	± 5%	40W	83%
LFHL40W-36	YES	YES	36 VDC	550 - 1100 mA	± 5%	40W	83%
LFHL40W-30	YES	YES	30 VDC	700 - 1400 mA	± 5%	42W	83%
LFHL40W-24	YES	YES	24 VDC	835 - 1670 mA	± 5%	40W	83%
LFHL40W-22	YES	YES	22 VDC	910 - 1820 mA	± 5%	40W	82%
LFHL40W-18	YES	YES	18 VDC	1100 - 2200 mA	± 5%	40W	82%
LFHL40W-12	YES	YES	12 VDC	1665 - 3330 mA	± 5%	40W	82%

Mechanical Dimensions: Inches [mm]

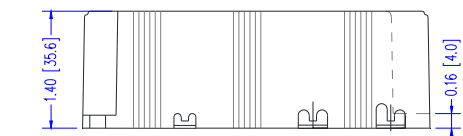
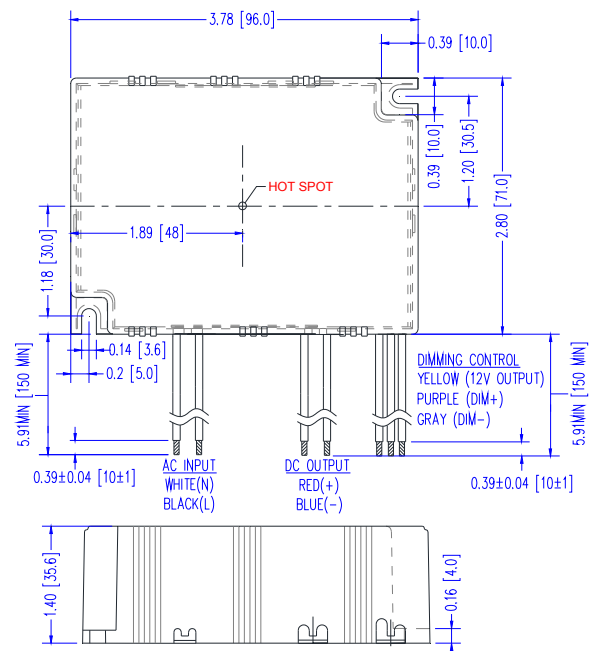
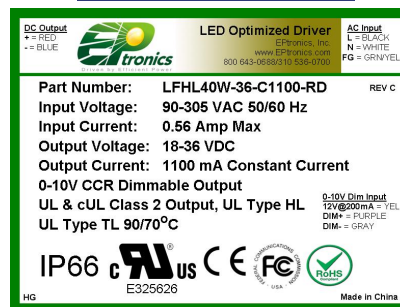
STANDARD LEAD-OUTS ARE FROM BOTTOM

Material: Black 5VA Plastic Case
Fully Encapsulated
Weight: 364 grams (12.9 oz) Typical

ALTERNATE LEAD-OUTS FROM SIDES



Labeling Example



For Example:
LFHL40W-36-C1100-SE is non dimmable version
LFHL40W-36-C1100-RDSE is 0-10V dimmable version
LFHL40W-36-C1100-PDSE is PWM dimmable version

Custom designs available. Please consult with the factory.

Specifications subject to change without notice

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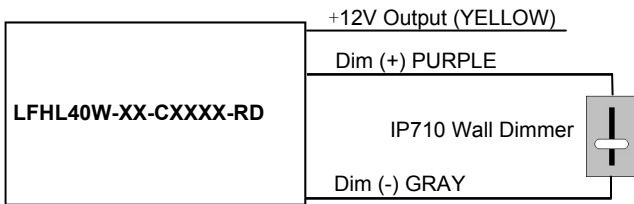
-RD, 0-10V & Resistance Dimming Scheme

Parameters	Minimum	Typical	Maximum
12V Auxiliary Output (Yellow Wire)	11V	12.0V	13.0V
12V Auxiliary Output Source Current (Yellow Wire)	0mA	—	200mA
Absolute Voltage Range on 0-10v Input (Purple Wire)	-2.0V	—	+15V
Source Current out of 0-10V Purple Wire	0mA	—	1.5mA

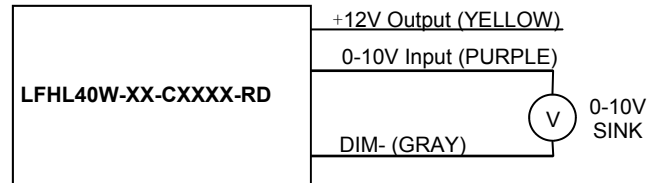
Notes

1. -RD 0-10V dimmable version comes with 3 wires Yellow/Purple/Gray on the output side.
2. -RD version is compatible with most 0-10V Wall Slide dimmers and direct 0-10V analog signal. Recommended dimmer is Leviton IP710 or equivalent connected between Purple and Gray wires. Yellow is not used for dimming.
3. -RD 0-10V dimmable version output will be 100% with Purple/Gray open and minimum with Purple/Gray Shorted.

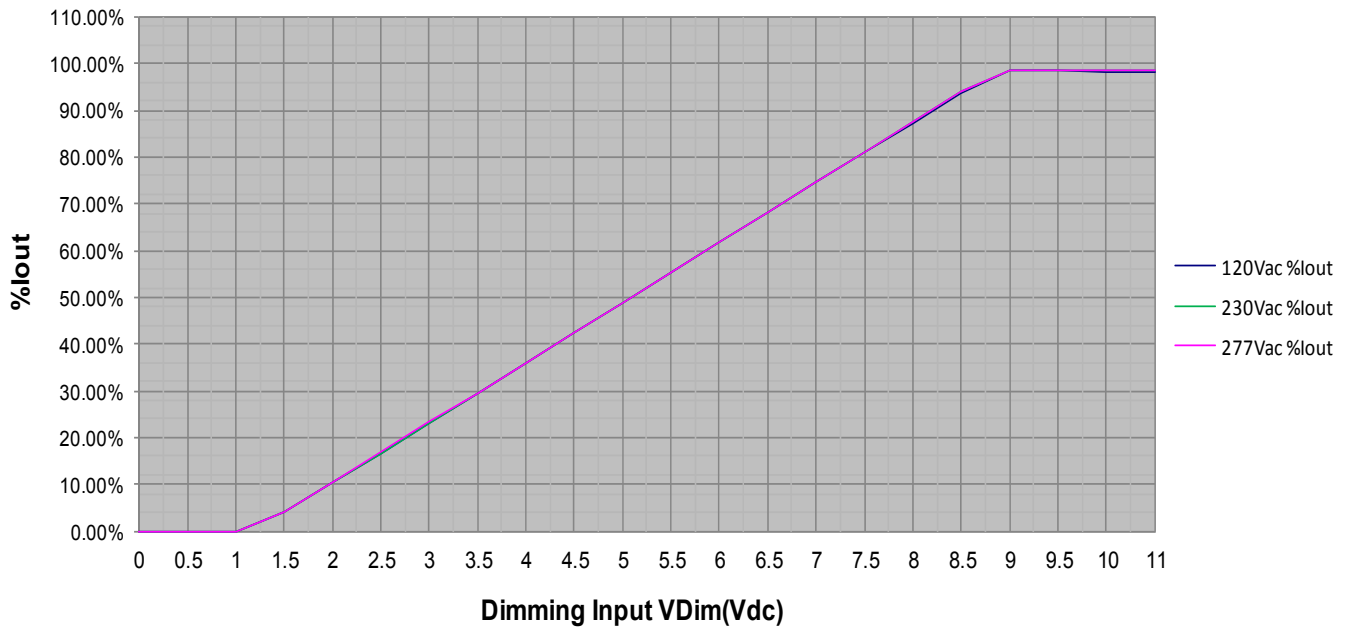
-RD3 3-Wire Resistance Dimming Scheme



-RD3 3-Wire 0-10V Dimming Scheme



% Output Current Vs. 0-10V DC Dimming Input



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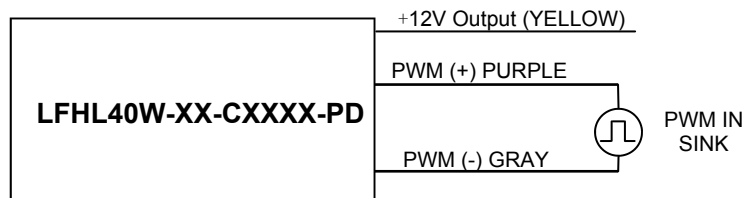
-PD 2-Wire CCR PWM Positive Dimming Scheme

Parameters	Minimum	Typical	Maximum
Absolute Maximum Voltage Range on PWM Input (Purple Wire)	-2.0V	10V	+15V
Input LOW Level Voltage Range (Purple Wire)	-2.0V	0V	+5.5V
Input HIGH Level Voltage Range (Purple Wire)	+9.0V	10V	+15V
Source Current out of PWM Input (Purple Wire)	0mA	—	1.5mA
PWM Input Signal Frequency	500Hz	—	1500Hz
PWM Input Signal Positive Duty Cycle	0%	10-90%	100%

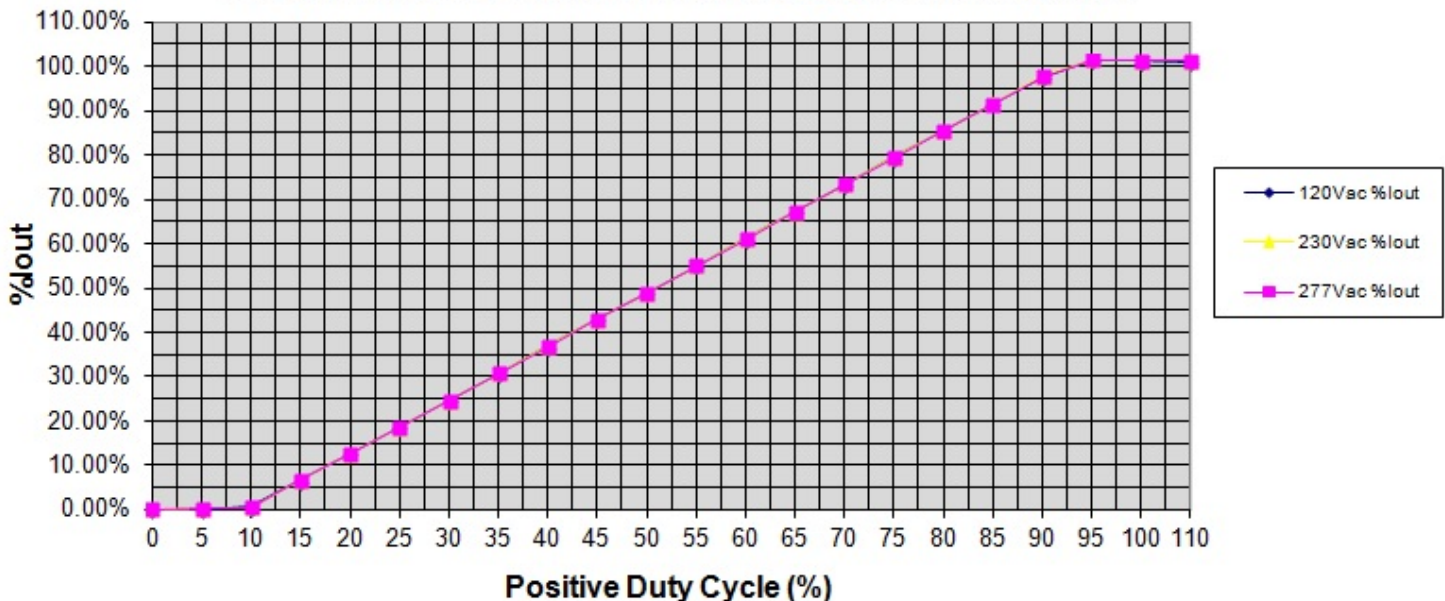
Notes

1. -PD PWM Dimmable version comes with an extra 3 wires Yellow/Purple/Gray on the output side.
2. -PD PWM Dimmable version is not intended to dim below about 1% @ 0% Duty Cycle or 10% @ 10% Duty Cycle
3. -PD PWM dimmable version output will be 100% with Purple/Gray open and minimum with Purple/Gray Shorted.

-PD 2-Wire PWM Positive Dimming Scheme



%Output Current vs. 1.0 kHz Postive Duty Cycle Dimming Input



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Input Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Input Voltage	90 Vac	—	305 Vac	120, 230, 240, 277 Vac Nominal Values
Input Frequency	47 Hz	—	63 Hz	50/60Hz Nominal
Input AC Current	—	—	0.56 A	Measured at 120Vac/60Hz Input, Output & AUX Full load.
	—	—	0.22 A	Measured at 230Vac/60Hz Input, Output & AUX Full load.
	—	—	0.18 A	Measured at 277Vac/60Hz Input, Output & AUX Full load.
Inrush Current (Peak)	—	—	50A	Measured at 277Vac/60Hz Input, Output Full Load, Ta 25°C, Cold Start 50% I _{peak} duration ~750 µsec (1/2*I _p ² *t)
Inrush Current (I ² t)	—	—	0.94 A ² s	
Leakage Current	—	—	0.28mA	Measured at 120Vac/60Hz Input, Output Full load.
	—	—	0.75mA	Measured at 277Vac/60Hz Input, Output Full load.
THD	—	—	20%	Measured at 120, 230, 277Vac Input, Output ≥50% Load
Power Factor (PF)	0.90	—	—	Measured at 120, 230, 277Vac Input, Output ≥50% Load

Output Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
DC Output Voltage	Per Table	—	Per Table	Per Tables on Page 1
DC Output Constant Current	-5%	Per Table	+5%	Per Tables on Page 1
Auxiliary Output Voltage	11	12	13	Auxiliary is +Yellow/-Gray (Do Not Cross Connect with Driver Output)
Auxiliary Output Current	0	—	200mA	Auxiliary is +Yellow/-Gray (Do Not Cross Connect with Driver Output)
Output Power	—	—	Per Table	Per Tables on Page 1 (+ [12V@200mA, 2.4W Auxiliary])
Ripple & Noise (V _{pk-pk})	—	—	3% V _o	20 MHz BW, Full load output in parallel with 0.1 µF ceramic & 10 µF Electrolytic.
Ripple (I _{pk-pk})	—	—	5% I _o	20 MHz BW, Full load output in parallel with 0.1 µF ceramic & 10 µF Electrolytic. 120 Hz component (Flicker Free)
Start-up Time	—	400 mS	750 mS	Measured at 120Vac/60Hz Input, Output Full load.
Hold-up Time	—	30 mS	—	Typical @ 277Vac Input, Output Full load.

Environmental Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Case Temperature (T _c)	-30 °C	—	+90 °C	Measured at location specified on case.
Operating Temperature (T _a)	-30 °C	—	+60 °C	This is a reference range. T _c controls temperature range.
Storage Temperature (T _s)	-40 °C	—	+85 °C	Non operating temperature range.
Operating Humidity	—	—	95% RH	Relative Humidity, non-condensing.
Vibration	5 Hz	—	55 Hz	2G, 10 minutes/1 cycle, period 30 minutes, each along X, Y, Z axis.
MTBF	452,000 Hours	—	—	MIL-HDBK-217F Notice 2, T _a = 25C, Output Full Load.

Protection Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Output Short Circuit (SCP)	—	—	—	No Damage, Auto recovery after short is removed.
Output Over Current (OCP)	—	—	108% I _o	Constant Current Limiting circuit.
Output Over Voltage (OVP)	—	—	120% V _o	No Damage, Auto recovery after fault is removed.

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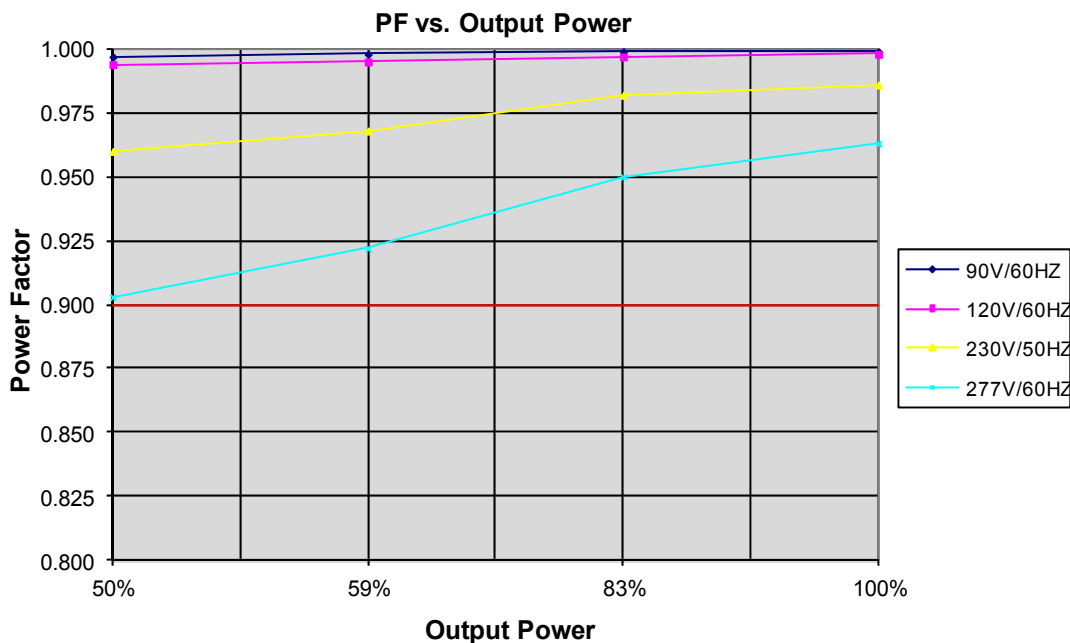
Safety Compliance

Safety	Notes/Standards
UL/cUL UL TYPE HL & TL	UL8750, UL1310 for UL Class 2 & CAN/CSA C22.2 No. 250.13, UL Type HL, UL Type TL 90/70 °C
CE	EN61347-1, EN61347-2-13
Withstand Voltage	Input to Output: 3750 Vac
Isolation Resistance	Input to Output: >100 MΩ, 500VDC @ 25 °C, 70 % RH
Dimming & Aux Circuit	+12V Yellow/Dim+ Purple/Dim- Gray are considered part of the secondary circuit.
FG	Input ground connection is used for EMC purposes only. It is not a safety ground.

EMC Compliance

Standard	Notes/Conditions
FCC, 47CFR Part 15	Class B
EN 55015	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.
EN 61000-3-2	Part 3-2: Limits for harmonic current emissions Class C, ≥80% Rated Power
EN 61000-3-3	Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker.
EN 61000-4-5	Part 4-5: Surge Immunity test, 2 kV L-N, 4 kV L-FG & N-FG
Energy Star	Energy Star transient protection: Ballast or driver shall comply with ANSI/IEEE C62.41.1-2002 and ANSI/IEEE C62.41.2-2002, Category A operation. The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode.

Power Factor Curves (Typical)



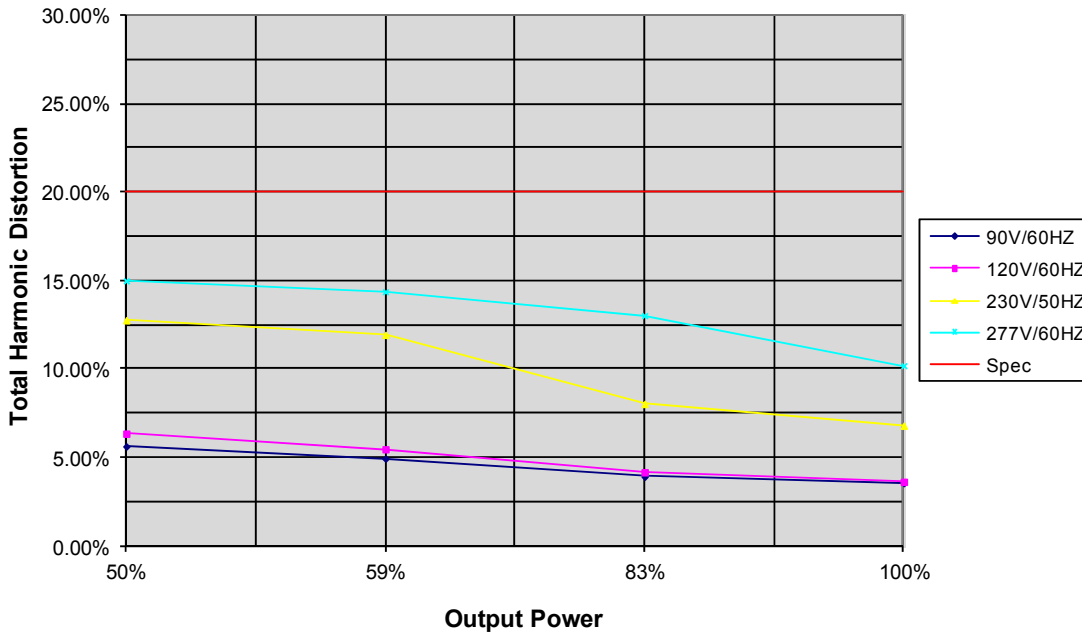
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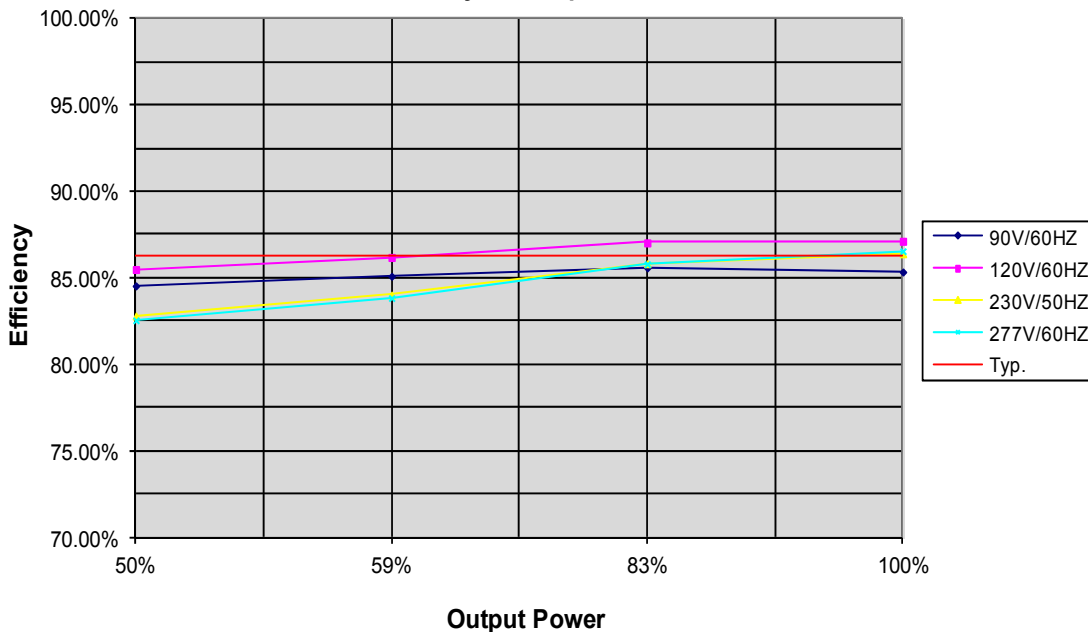
THD Curves (Typical)

THD vs. Output Power



Efficiency Curves (Typical)

Efficiency vs. Output Power

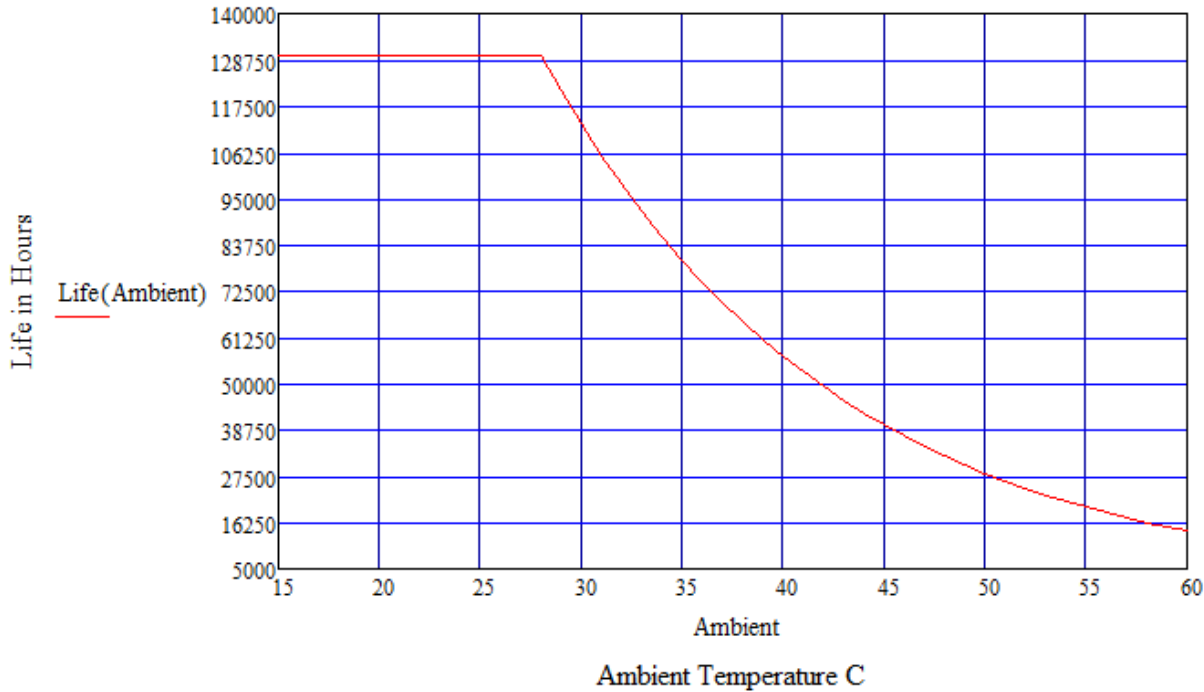


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Life vs. Ambient Temperature

LFHL40W Estimated Life Full Load @ 120Vac



Life vs. Case (Tc) Temperature

LFHL40W Estimated Life Full Load @ 120Vac

