



Product Specification

Mid to High Power XL & PL Series

500W-3000W Power Supplies

707251 Rev 7

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1.

Introduction

1.1 Introduction

This specification defines the XL and PL series of universal input, single output, power factor corrected 500W, 650W, 800W, 1500W and 3000W switch mode power supplies. The PL650 through PL3000 models are also programmable. It includes information regarding the mechanical details, cooling requirements, electrical and signal specifications and environmental ranges for storage and operation of the power supply. These supplies achieve very high packaging densities and air convection cooling. All of the XL and PL family models are listed in Table 3-1.

All models of the XL and PL Series can be used as standalone power supplies. Models PL650 through PL3000 may be connected for slope current sharing at parallel operation.



XL500



PL650



PL800



PL1500



PL3000

Figure 1-1 XL and PL Series

1.2 Agency Compliance

Safety	Complies with Standard	Remarks
United States and Canada	UL 60950-1 listed	2 nd edition
European	EN 60950-1:2006+A11	
Dielectric Withstand Voltage	I/P-O/P: 4242Vdc; I/P-GND: 2121Vdc O/P-FG: 0.5K VAC(707VDC=500VAC x 500VAC x $\sqrt{2}$), 1minute Output 56V-12V fan, 56V- 5Vsb and 56V to FG 1.6K VAC(2250VDC), 1minute	This is for POE application that requires isolated 56V power supply (only for XL500-56 POE*)
Isolation Resistance	I/P-O/P, I/P-FG, O/P-FG: > 100M Ω /500Vdc	
EMC	Complies with Standard	Remarks
RFI Emission	EN 55022: 2006 Class B EN 61204-3: 2000 EN 61000-6-3: 2007 EN 61000-3-2: 2006 Class A EN 61000-3-3: 1995+A1:2001+A2: 2005	Emission Standard (All models, except the XL500 series, which is Class A) Limits for harmonic current emission Limitation of voltage fluctuations and flicker in low-voltage supply system
Immunity:	EN 55024: 1998+A1:2001_A2:2003 EN 61204-3: 2000 EN 61000-6-1: 2007 IEC 610000-4-2 IEC 610000-4-3 IEC 610000-4-4 IEC 610000-4-5 IEC 610000-4-6 IEC 610000-4-8 IEC 610000-4-11	Immunity standard Electrostatic discharge immunity Radio frequency immunity Electrical fast transient burst immunity Power line surge immunity RF common mode immunity Power frequency magnetic field immunity Voltage dips and short interruptions immunity
Reduction of Hazardous Substances (RoHS)	Complies with Standard	Remarks
EU Council	2011/65/EU	RoHS 2 Directive
Marks of Conformance United States & Canada  Underwriters Laboratories File E211115 TUV  EU Council 		

*The XL500-56 POE model will be released soon.

Table 1-1 Agency Compliance

2.

AC Input

2.1 Input Line Requirements

The following table defines the voltage and frequency requirements for the AC line inputs to the XL and PL models which are capable of supplying full rated power in continuous operation throughout the specified ranges of voltages and frequencies. The power supply will automatically recover from AC power loss and is capable of starting under maximum load at the minimum AC input voltage described below.

Parameter	Minimum	Nominal	Maximum
RMS Input Voltage			
XL500 & PL650 Series	90VAC	100–240VAC	264VAC
PL800 thru PL3000 Series	90VAC	100–240VAC	264VAC
RMS Input Current			
XL500 Series			6.00A/115VAC 3.00A/230VAC
PL650 Series			5.30A/115VAC 2.48A/230VAC
PL800 Series			6.58A/100VAC 2.62A/240VAC
PL1500 Series			12.73A/100VAC 6.36A/240VAC
PL3000 Series			13.93A/100VAC 10.25A/240VAC
Input Frequency	47Hz	50/60Hz	63Hz

Table 2-1 XL/PL Input Parameters

2.2 Input Over Current Protection

The XL and PL series incorporates a primary AC line fuse for input over current protection to prevent damage to the power supply and meet product safety requirements as outlined in Section 1.2.

2.3 Inrush Current Limiting

The cold start inrush current varies by the XL and PL series power supply model. Repetitive ON/OFF cycling of the AC input voltage shall not damage the power supply or cause the input fuse to fail.

Model	Inrush Current
XL500 Series	35A/115VAC, 70A/230VAC
PL650 Series	27A/115VAC, 54A/230VAC
PL800 Series	30A/115VAC, 60A/230VAC
PL1500 Series	30A/115VAC, 45A/230VAC
PL3000 Series	33A/115VAC, 65A/230VAC

Table 2-2 Cold Start Inrush Current

2.4 Low Input Voltage

The application of an input voltage below the minimums specified in Table 2-1 shall not cause damage to the power supply.

2.5 Leakage Current

The leakage current from AC line or AC Neutral inputs to Earth Ground is <1mA/240Vac for models PL650, PL800 and PL3000. For the XL500 models it is <.50mA/240Vac and for the PL1500 models it is <2.5mA/240Vac.

3.

DC Outputs

3.1 Output Voltage Regulation

The DC output voltages shall remain within the Minimum and Maximum limits of Table 3-1 when measured at the power supply connector under all specified line, load and environmental conditions contained herein. The main output (V1) in the single output models (5V thru 60V).

Model	Output	Rated Voltage	Regulation	Minimum (VDC)	Nominal (VDC)	Maximum (VDC)
XL500-12	V1	12	$\pm 1.2\%$	11.86	12.00	12.14
	V2	5		4.50	5.00	5.50
	V3	12		10.20	12.00	13.30
XL500-24	V1	24	$\pm 1\%$	23.76	24.00	24.24
	V2	5		4.50	5.00	5.50
	V3	12		10.20	12.00	13.30
XL500-48	V1	48	$\pm 1\%$	47.52	48.00	48.48
	V2	5		4.50	5.00	5.50
	V3	12		10.20	12.00	13.30
XL500-56 POE*	V1	56	$\pm 1\%$	55.44	56.00	56.56
	V2	5		4.50	5.00	5.50
	V3	12		10.20	12.00	13.30
PL650-05	V1	5	$\pm 1\%$	4.95	5.00	5.05
PL650-12	V1	12	$\pm 1\%$	11.88	12.00	12.12
PL650-15	V1	15	$\pm 1\%$	14.85	15.00	15.15
PL650-24	V1	24	$\pm 1\%$	23.76	24.00	24.24
PL650-27	V1	27	$\pm 1\%$	26.73	27.00	27.27
PL650-48	V1	48	$\pm 1\%$	47.52	48.00	48.48
PL800-12	V1	12	$\pm 2\%$	11.76	12.00	12.24
PL800-15	V1	15	$\pm 2\%$	14.70	15.00	15.30
PL800-24	V1	24	$\pm 2\%$	23.52	24.00	24.48
PL800-30	V1	30	$\pm 2\%$	29.40	30.00	30.60
PL800-36	V1	36	$\pm 2\%$	35.28	36.00	36.72
PL800-48	V1	48	$\pm 2\%$	47.04	48.00	48.96
PL800-60	V1	60	$\pm 2\%$	58.80	60.00	61.20
PL1500-12	V1	12	$\pm 2\%$	11.76	12.00	12.24
PL1500-15	V1	15	$\pm 2\%$	14.70	15.00	15.30
PL1500-24	V1	24	$\pm 2\%$	23.52	24.00	24.48
PL1500-30	V1	30	$\pm 2\%$	29.40	30.00	30.60
PL1500-36	V1	36	$\pm 2\%$	35.28	36.00	36.72
PL1500-48	V1	48	$\pm 2\%$	47.04	48.00	48.96
PL1500-60	V1	60	$\pm 2\%$	58.80	60.00	61.20
PL3000-12	V1	12	$\pm 2\%$	11.76	12.00	12.24

Model	Output	Rated Voltage	Regulation	Minimum (VDC)	Nominal (VDC)	Maximum (VDC)
PL3000-15	V1	15	±2%	14.70	15.00	15.30
PL3000-24	V1	24	±2%	23.52	24.00	24.48
PL3000-30	V1	30	±2%	29.40	30.00	30.60
PL3000-36	V1	36	±2%	35.28	36.00	36.72
PL3000-48	V1	48	±2%	47.04	48.00	48.96
PL3000-60	V1	60	±2%	58.80	60.00	61.20

*The XL500-56 POE model will be released soon.

Table 3-1 XL and PL Output Voltage Specifications

3.2 No Load Operation

The power supply will operate under a no load condition and will not result in damage to the supply. The power supply will remain stable and operate normally after application of loads.

3.2.1 Output Loading for Single Output Models

The output currents listed in Table 3-2 are with the Forced Air internal fan included inside the power supply at no more than 50°C.

Model	Rated V1 Output	Maximum Load
XL500-12	12V	41.5A
XL500-24	24V	20.8A
XL500-48	48V	10.4A
XL500-56 POE	56V	8.9A
PL650-05	5V	100.0A
PL650-12	12V	50.0A
PL650-15	15V	40.0A
PL650-24	24V	27.0A
PL650-27	27V	24.0A
PL650-48	48V	13.6A
PL800-12	12V	66.7A
PL800-15	15V	53.4A
PL800-24	24V	33.5A
PL800-30	30V	26.7A
PL800-36	36V	22.3A
PL800-48	48V	16.7A
PL800-60	60V	13.4A
PL1500-12	12V	125.0A
PL1500-15	15V	100.0A
PL1500-24	24V	62.5A

Model	Rated V1 Output	Maximum Load
PL1500-30	30V	50.0A
PL1500-36	36V	41.7A
PL1500-48	48V	31.3A
PL1500-60	60V	25.0A
PL3000-12	12V	200.0A
PL3000-15	15V	160.0A
PL3000-24	24V	125.0A
PL3000-30	30V	100.0A
PL3000-36	36V	83.5A
PL3000-48	48V	62.5A
PL3000-60	60V	50.0A

Table 3-2 Max Load Currents Single Output Models

3.2.2 High Temperature Derating

The XL500 series can be operated at elevated temperatures by derating the total maximum output power (or current) by 2.5%/°C from 50°C to 70°C. The PL650 and PL1500 models will derate by 4.0%/°C from 50°C to 60°C and the PL3000 models will derate by 5.0%/°C from 50°C to 60°C.

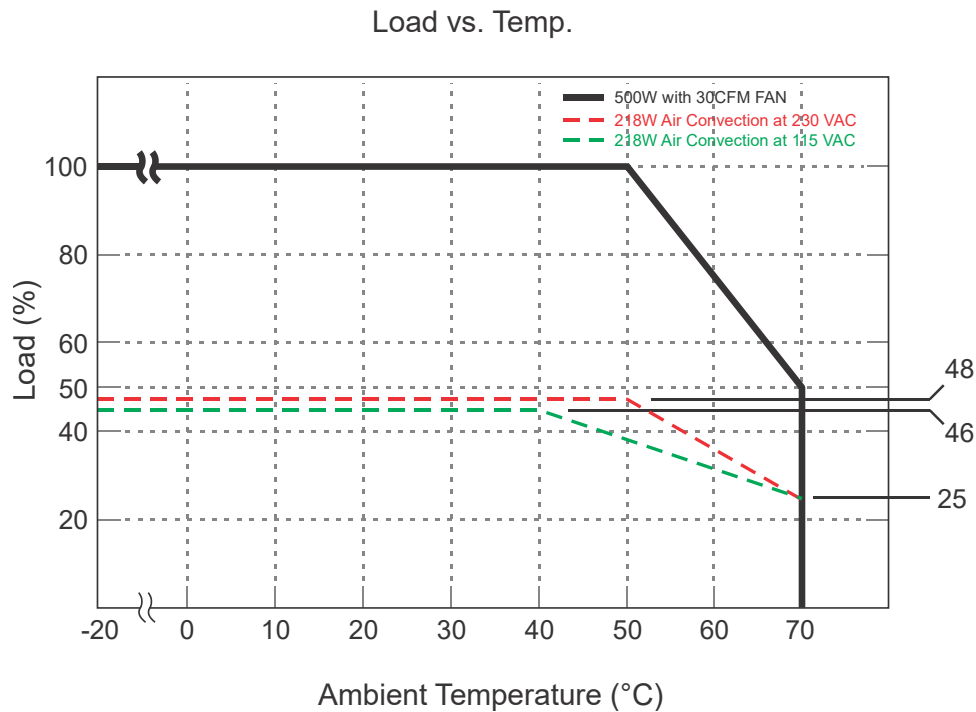


Figure 3-1 Derating Curve: Models XL500-12, 24 and 48

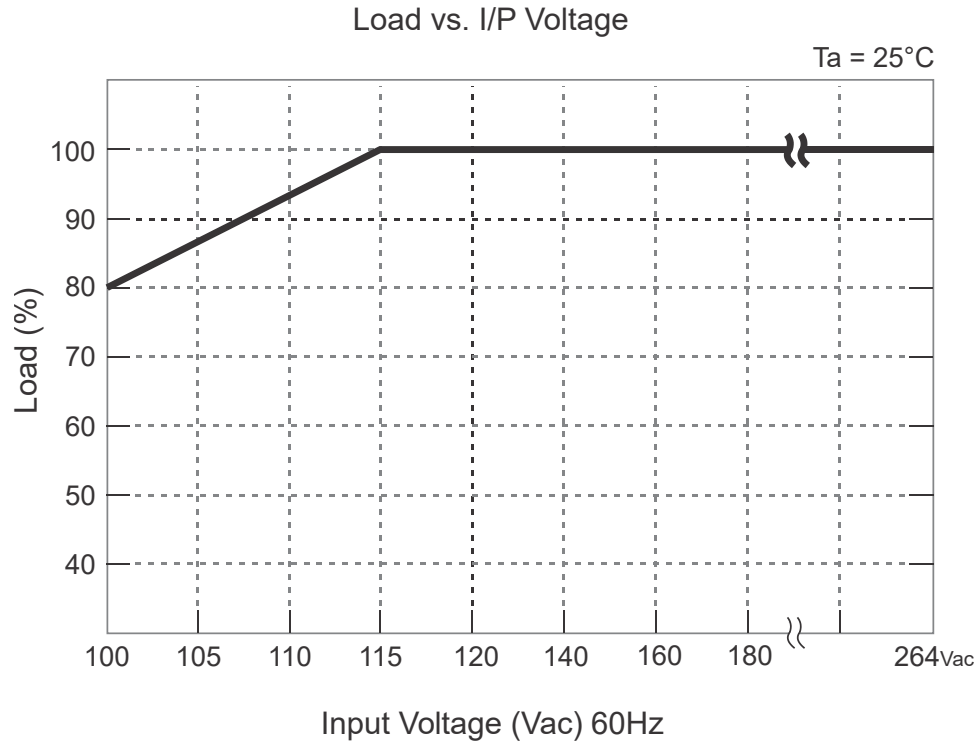


Figure 3-2 Load vs. Input Voltage: Models XL500-12, 24 and 48

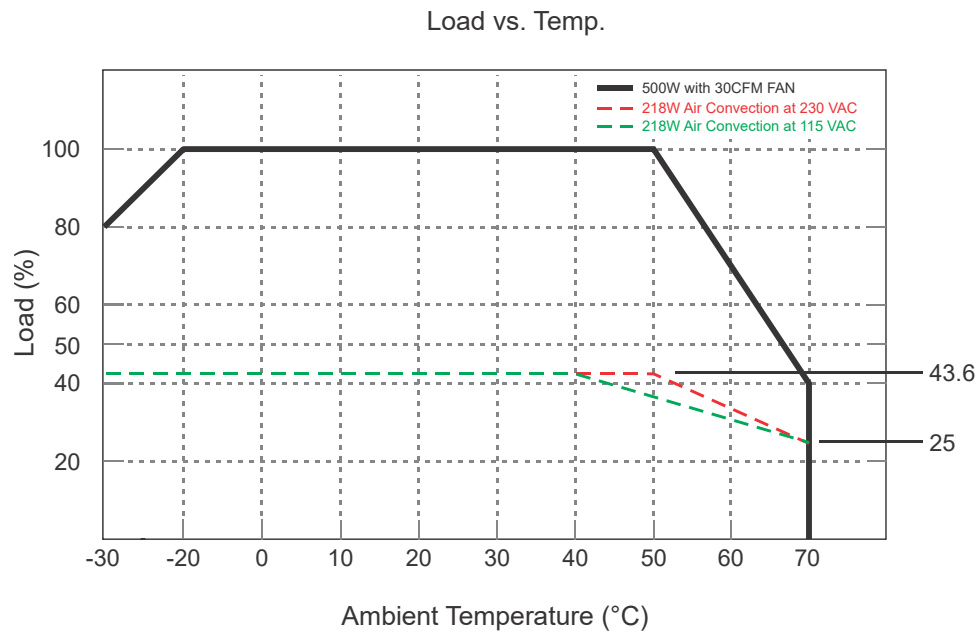


Figure 3-3 Derating Curve: Model XL500-56 POE

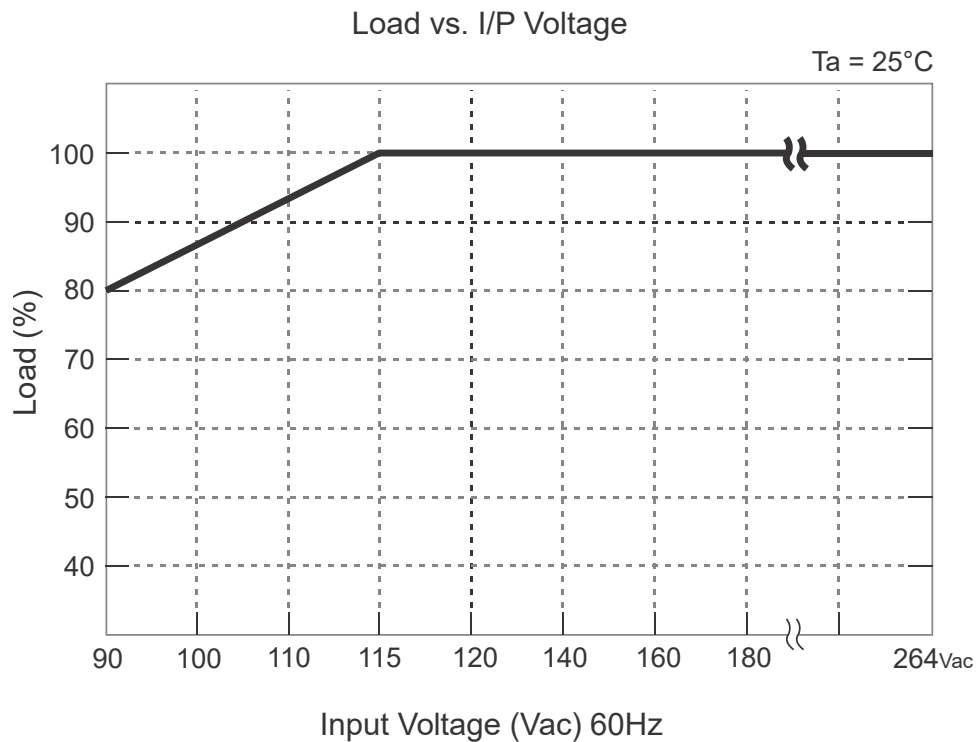


Figure 3-4 Load vs. Input Voltage: Model XL500-56 POE

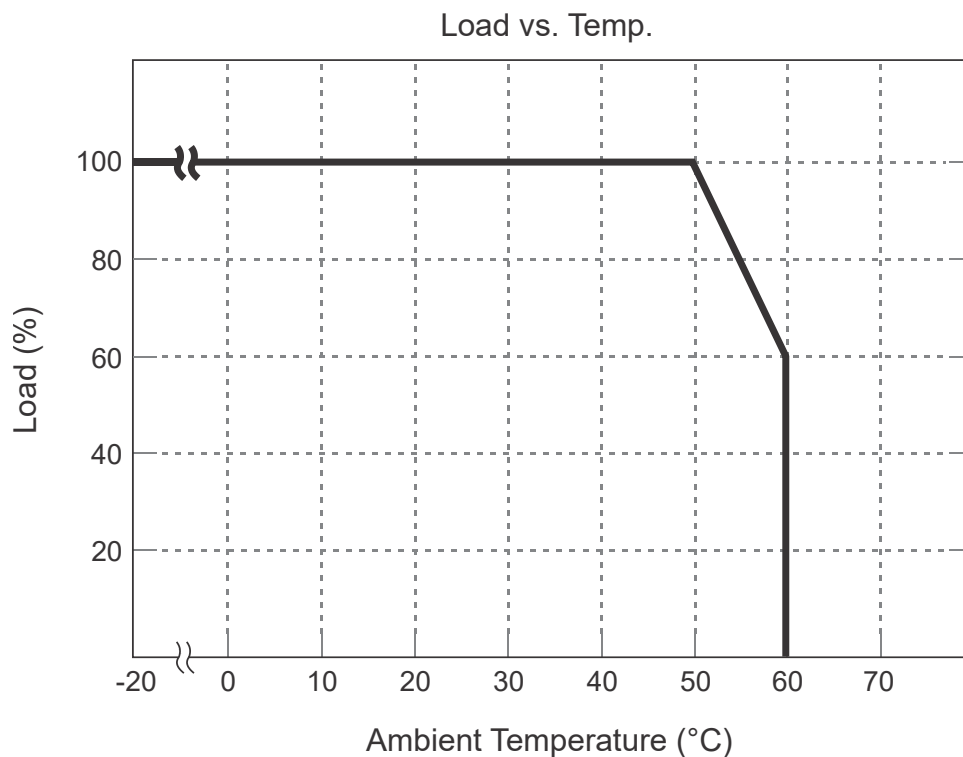


Figure 3-5 Derating Curve: Models PL650, PL800, PL1500 and PL3000

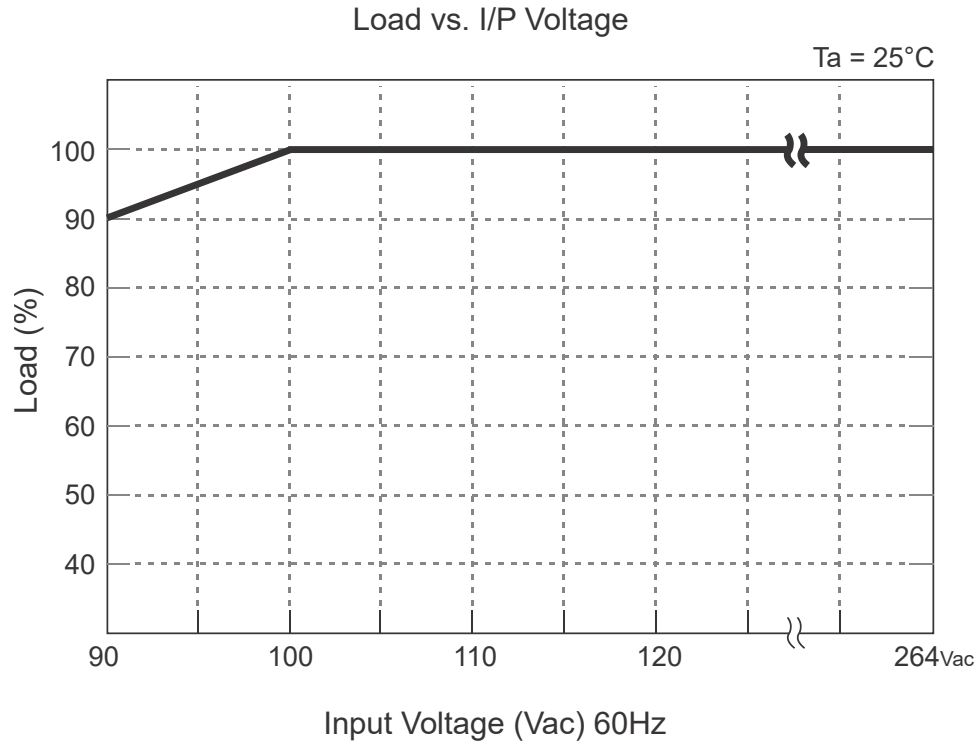


Figure 3-6 Load vs. Input Voltage: Models PL650, PL800, PL1500 and PL3000

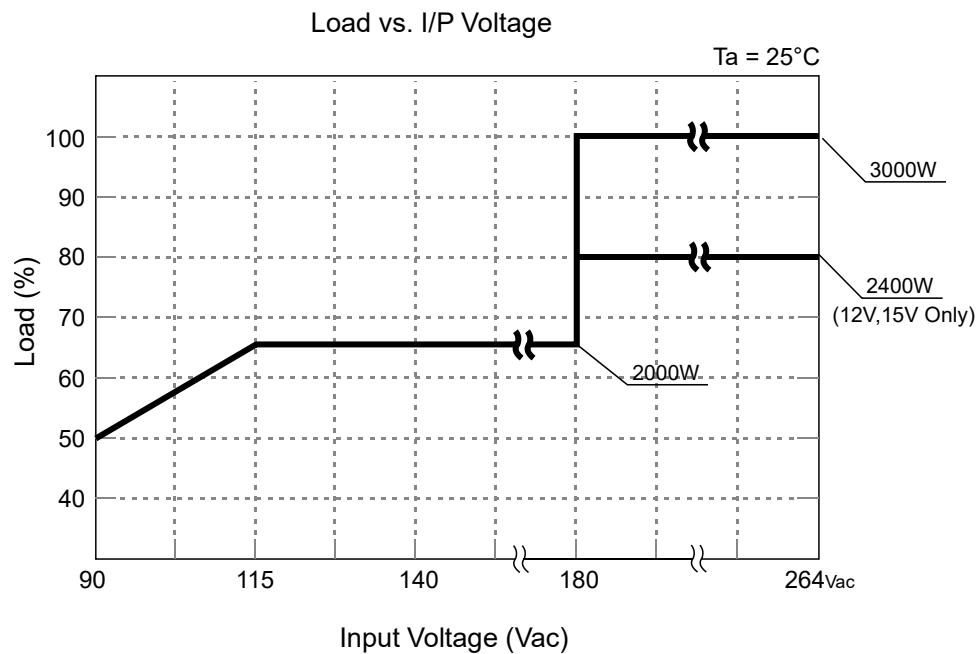


Figure 3-7 Load vs. Input Voltage: PL3000 Series, 12V-60V Models

3.3 Output Current/Power

The maximum available output power is always a function of the cooling airflow and temperature.

3.4 Output Ripple/Noise

Output ripple voltage and noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 0.47uf parallel. The ripple noise is measured from the output pin connectors (V+ and V-).

3.4.1 Ripple/Noise Limits

The ripple voltage of the outputs is measured at the pins of the mating connector. Ripple and noise shall not exceed the limits specified in Table 3-3 under any condition of line voltage and frequency specified in Section 2.1 and DC loading specified in Section 3.2.1.

Model	Output	Voltage	Maximum Ripple+Noise (peak-to-peak)
XL500-12	V1	12V	150mV
XL500-24	V1	24V	240mV
XL500-48	V1	48V	480mV
XL500-56 POE	V1	56V	480mV
PL650-05	V1	5V	150mV
PL650-12	V1	12V	150mV
PL650-15	V1	15V	150mV
PL650-24	V1	24V	150mV
PL650-27	V1	27V	150mV
PL650-48	V1	48V	150mV
PL800-12	V1	12V	120mV
PL800-15	V1	15V	150mV
PL800-24	V1	24V	240mV
PL800-30	V1	30V	300mV
PL800-36	V1	36V	360mV
PL800-48	V1	48V	480mV
PL1500-12	V1	12V	150mV
PL1500-15	V1	15V	150mV
PL1500-24	V1	24V	240mV
PL1500-30	V1	30V	300mV
PL1500-36	V1	36V	360mV
PL1500-48	V1	48V	480mV
PL1500-60	V1	60V	600mV
PL3000-12	V1	12V	150Mv
PL3000-15	V1	15V	150mV
PL3000-24	V1	24V	240mV
PL3000-30	V1	30V	300mV
PL3000-36	V1	36V	360mV
PL3000-48	V1	48V	480mV
PL3000-60	V1	60V	600mV

Table 3-3 Ripple Voltage: XL500 through PL3000

3.4.2 Ripple/Noise Test Setup

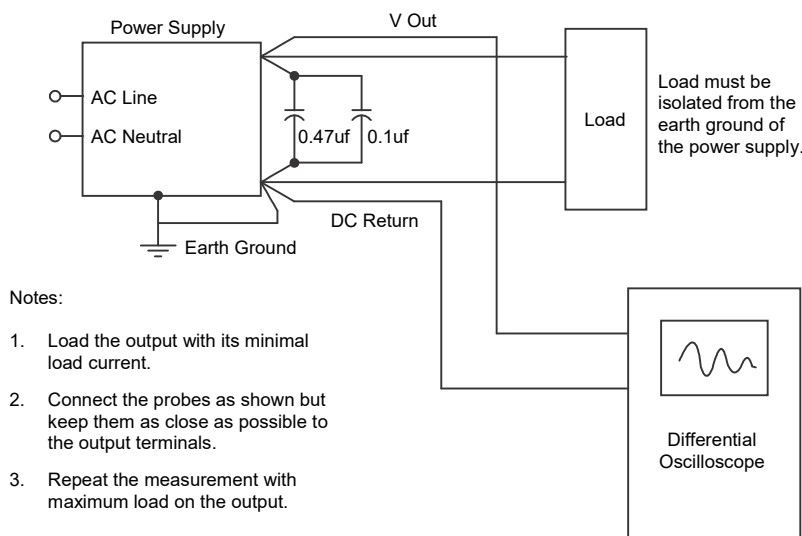


Figure 3-8 Ripple Noise Measurement Setup

3.5 Local and Remote Sensing

Remote sensing is provided to compensate for voltage drops in the V1 (+ Output) and DC RETURN connections to the load. For every model, the 0V Sense input must always be connected to either the DC Return terminal at the load or one of the DC Return pins on the XL500 (except XL500-56 POE), PL650, PL800, PL1500 and PL3000 models. Connecting it to the return side of the load will reduce the voltage drop in the external return wiring.

If the V1 Sense input is left open, the V1 output may not meet its load regulation specification. The V1 output will meet its load regulation specification when the V1 Sense pin is connected to one of the V1 output pins. Connecting the V1 Sense pin to the V1 output at the load will reduce the voltage drop in the external V1 wiring.

3.5.1 Local and Remote Sensing: XL500 and PL650 thru PL3000 Models

Up to 0.5V in the return and the V1 connections may be compensated. Note that CN1 has 8 pins for the XL500 models. CN2 has 24 pins for the PL800, PL1500 and PL3000 models while CN9 has 16 pins for the PL650. Refer to Figure 3-9 through Figure 3-13 which show the required and optional remote sensing connections for the XL500 and PL650 thru PL3000 models. Refer to Table 4-5 for the pin definition of the XL500 and PL650 thru PL3000 connectors.

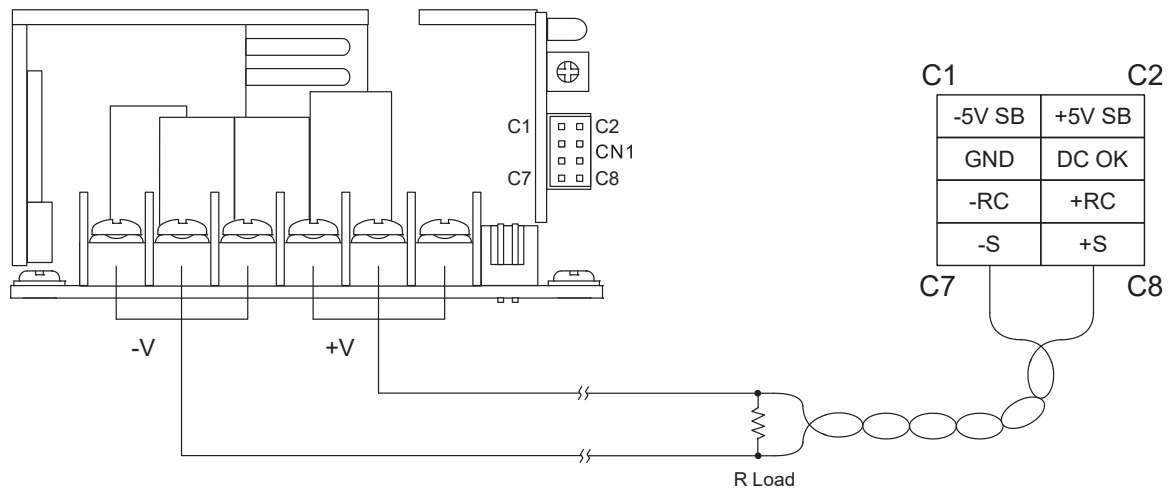


Figure 3-9 Remote Sensing Wiring: XL500-12, -24 and -48

Remote Sense

Local Sense

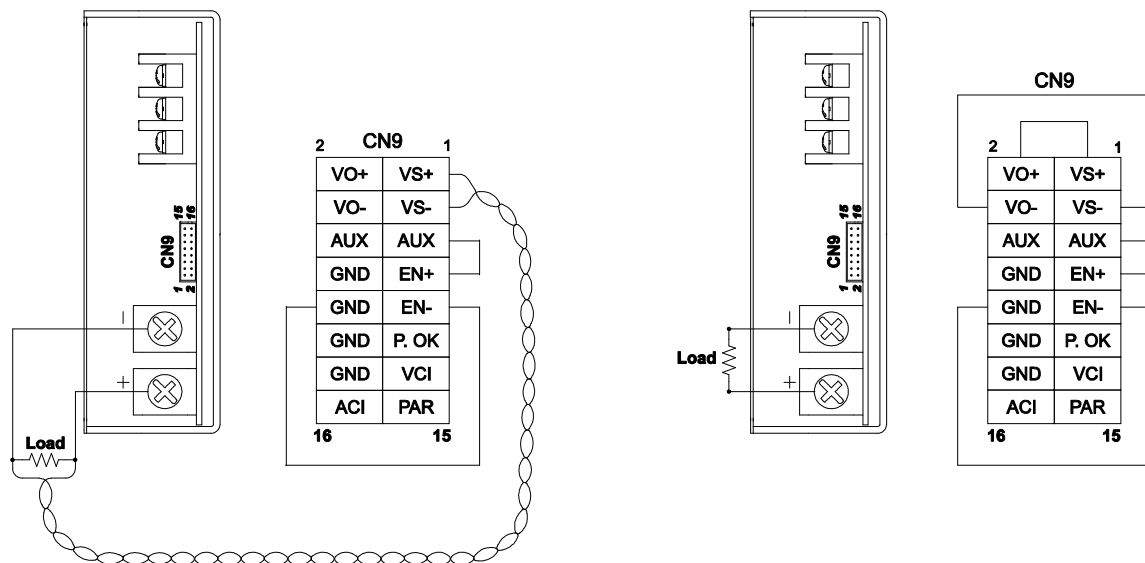


Figure 3-10 Local and Remote Sensing Wiring: PL650

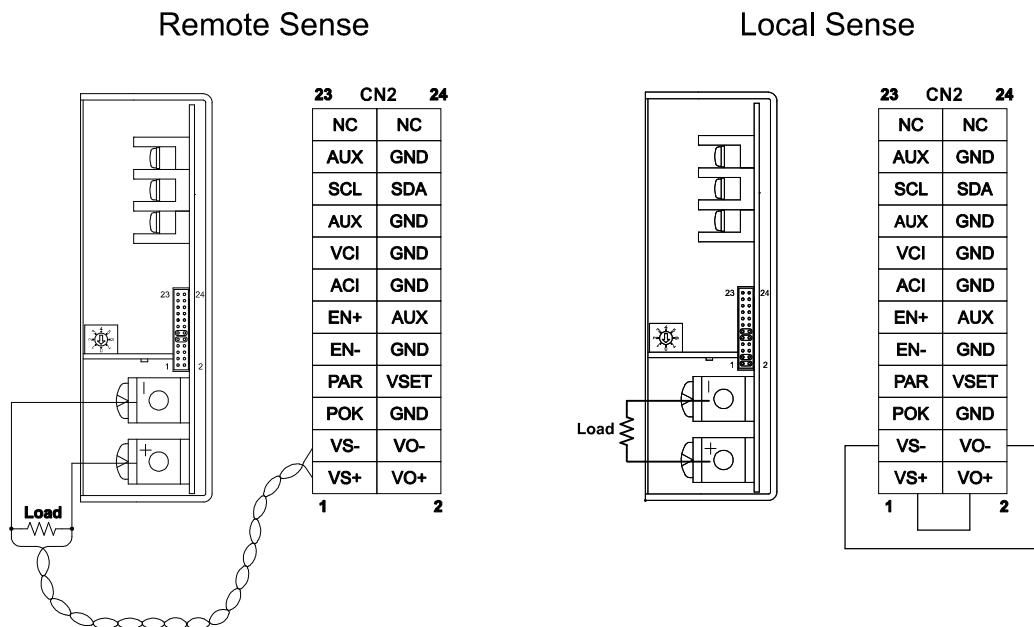


Figure 3-11 Local and Remote Sensing Wiring: PL800

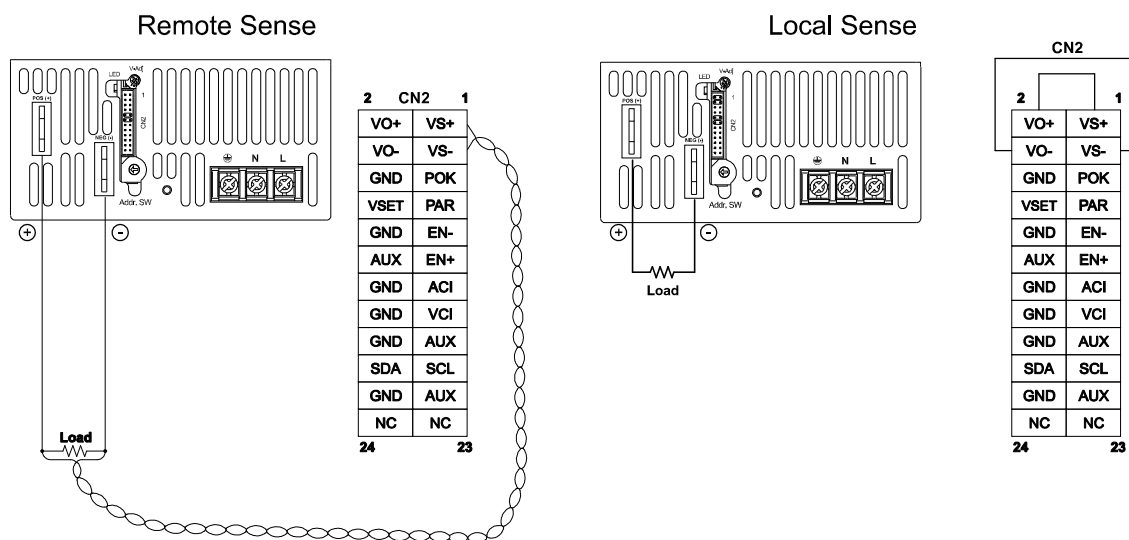


Figure 3-12 Local and Remote Sensing Wiring: PL1500

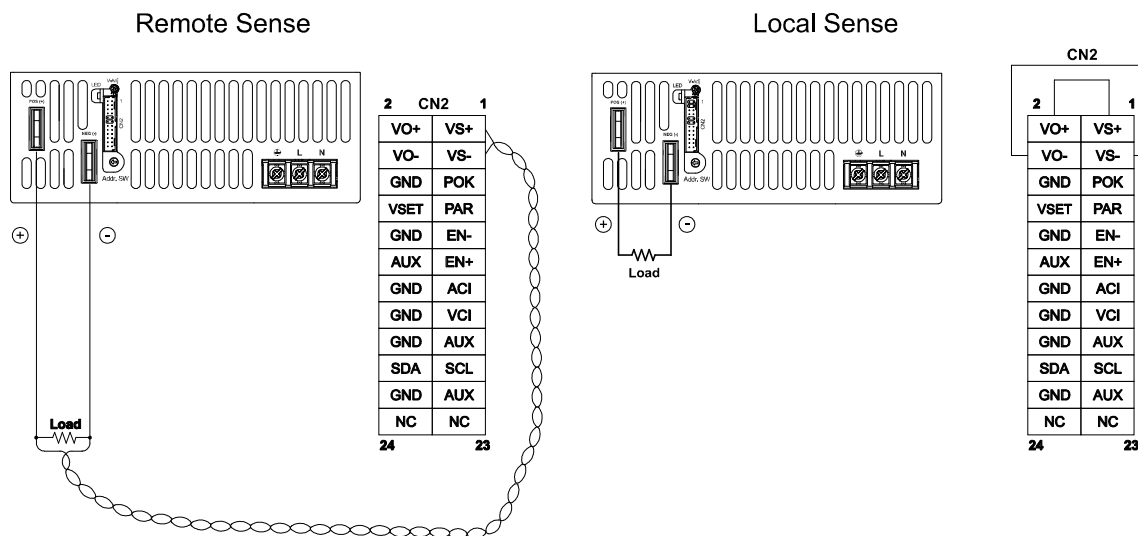


Figure 3-13 Local and Remote Sensing Wiring: PL3000-12 thru -60

3.6 Parallel Operation: PL650 thru PL3000 Models

The PL650, PL800, PL1500 and PL3000 models are available for slope current share. Up to 10 power supplies may be connected in parallel to provide higher output power and for N+1 configurations.

3.6.1 Current Share Connections

The Par (Parallel or CS) and Gnd (Ground) signal (see Table 4-5) of each supply operating in parallel must be connected together. Power sharing does not require the 0V Sense signals connected together. Operating in parallel must be connected together.

3.7 Output Protection

There are three different output protection schemes designed to protect the load and the XL and PL Series from component failures and extraordinary circumstances.

3.7.1 Over Temperature Protection (OTP)

If the PL650 models are operated without adequate cooling they will sense an over-temperature condition by detecting primary and secondary heat and shut themselves down. The power supplies will recover automatically after the temperature goes down to below its maximum operating temperature. The XL500 models will shut down between 110-130°C when they sense an over-temperature condition and will recover automatically after the temperature goes down to below its maximum operating temperature. The PL800, PL1500 and PL3000 models will shut down at 85° +/-5°C if an over temperature is detected on the secondary side of the controller board. They will recover automatically after the temperature goes down to below its maximum operating temperature.

3.7.2 Over Voltage Protection (OVP)

No single fault is able to cause a sustained over voltage condition on any output. When an over-voltage condition occurs, the power supply will shut down and will not restart until AC power is turned off and back on.

Model	Minimum	Nominal	Maximum
XL500-12	14.40V	15.00V	16.80V
XL500-24	28.80V	30.00 V	31.20V
XL500-48	54.20V	56.00V	64.40V
XL500-56 POE	65.20V	68.00V	73.40V
PL650-05	5.75V	6.25V	6.75V
PL650-12	13.80V	15.00V	16.20V
PL650-15	17.25V	18.75V	20.25V
PL650-24	27.60V	30.00V	32.40V
PL650-27	31.05V	33.75V	36.45V
PL650-48	55.20V	60.00V	64.40V
PL800-12	13.56V	14.40V	15.24V
PL800-15	16.95V	18.00V	19.05V
PL800-24	27.12V	28.80V	30.48V
PL800-30	33.90V	36.00V	38.10V
PL800-36	40.68V	43.20V	45.72V
PL800-48	54.24V	57.60V	60.96V
PL800-60	67.80V	72.00V	76.20V
PL1500-12	13.56 V	14.40V	15.24V
PL1500-15	16.95V	18.00V	19.05V
PL1500-24	27.12V	28.80V	30.48V
PL1500-30	33.90V	36.00V	38.10V
PL1500-36	40.68V	43.20V	45.72V
PL1500-48	54.24V	57.60V	60.96V
PL1500-60	67.80V	72.00V	76.20V
PL3000-12	13.56V	14.40V	15.24V
PL3000-15	16.95V	18.00V	19.05V
PL3000-24	27.12V	28.80V	30.48V
PL3000-30	33.90V	36.00V	38.10V
PL3000-36	40.68V	43.20V	45.72V
PL3000-48	54.24V	57.60V	60.96V
PL3000-60	67.80V	72.00V	76.20V

Table 3-4 Over Voltage Protection Limits

3.7.3 Over Current Protection (OCP)

For model XL500: 110~160% rated power or short circuit is constant current limiting. Overload current applied to the output will cause the output to shut down. The power supply will periodically attempt to restart until the over-current condition is removed.

For model PL650: 105~125% rated power or short circuit is constant current limiting. Protection type is Latch style (Recovery after reset AC power on or inhibit).

For models PL800, PL1500 and PL3000: Overload currents applied to the output will cause the output to shut down. The power supply will periodically attempt to restart until the over-current condition is removed. This feature is tested with an ever-increasing load at a rate of 10A/second starting at maximum load. Constant Current limit:> 105% rated power.

3.7.4 Short Circuit Protection

A short circuit is defined as an impedance of less than 0.1 ohms placed between DC RETURN and any output. A short circuit will cause no damage to the power supply, but will cause it to shutdown. The power supply will periodically attempt a restart until the short circuit condition is removed. After successfully restarting, the power supply will operate normally.

3.8 Output Rise Time

All output voltages shall rise from 10% to 90% of nominal output voltage (as specified in Table 3-1) within the specified time for each model. The output voltages waveform must be a monotonic ramp from 10% to 90% of final setpoint within the regulation band under any loading conditions specified in the respective load current tables in Table 3-2.

For the purposes of this specification, a monotonic ramp is defined as always having a positive slope from zero to 10*Vout volts/millisecond. During any 5-millisecond portion of the ramp, its slope must be greater than 5% of its rated voltage per millisecond.

Model	Inrush Current
XL650 Series	60ms at full load
XL500	86ms at full load
PL800 & PL1500 Series	100ms at full load
PL3000 Series	50ms at full load

Table 3-5 Output Rise Time

3.9 Overshoot at Turn On/Turn Off

The output voltage overshoot upon the application or removal of the input mains voltage is less than <5% for all XL and PL models above the nominal voltage. No opposite polarity voltage is present on any output during turn on or turn off.

4. General Specifications

4.1 Environmental

The XL and PL Series meet or exceed the following environmental specifications:

Parameter	Conditions	Specification	Remarks
Temperature	Operating	-30°C to 70°C	XL500
		-25°C to 60°C	PL650, PL800, PL1500 and PL3000
	Non-Operating	-30°C to 85°C	XL500
		-40°C to 85°C	PL650, PL800, PL1500 and PL3000
Relative Humidity	Operating	20-90% Maximum	Non-Condensing
	Non-Operating	95% Maximum	Non-Condensing
Altitude	Operating	6,561 feet MSL Max.	2,000 meters
Vibration	No damage	2.0 G RMS Maximum	XL500, PL650, PL800 and PL1500
		5.0 G RMS Maximum	PL3000 10-500Hz, 10-min/1cycle, 60 min each along x, y, z axis. Mounting: Compliance to IEC60068-2-6 and IEC60068-2-64

Table 4-1 Environmental Specifications

4.2 Mean Time Between Failures

The calculated MTBF of all models is equal to or greater than the specified hours of continuous operation at maximum output loading and worst-case input line voltage with convection cooling at 25°C. N2Power does not warrant the MTBF to be representative of any particular unit. The MTBF of the power supply is calculated with an 80% confidence level in accordance with (MIL-HDBK-217F). Actual failure rates vary from unit to unit.

Model	MTBF
XL500	160.0K HRS
PL650	166.2K HRS
PL800	112.0K HRS
PL1500	111.0K HRS
PL3000-12 thru -60	60.26K HRS

Table 4-2 MTBF by Model

4.3 Labeling/Marking

The power supply is marked and labeled with the N2Power logo and part number, model number, input and output specifications, production code, appropriate safety agency logos and CE mark. Typical labels are pictured below.

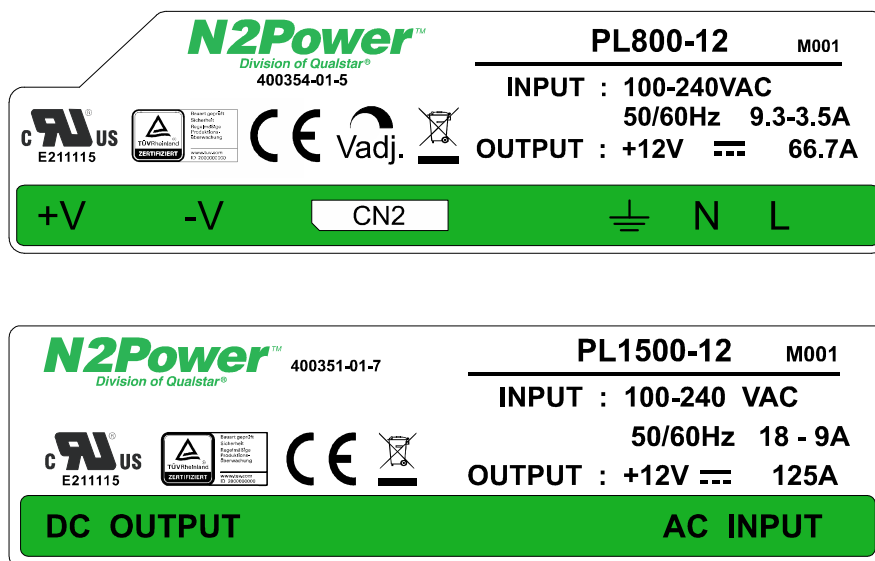


Figure 4-1 Sample XL and PL Labels

4.4 Net Weight

Model:	XL500	PL650	PL800	PL1500	PL3000
Pounds	1.01	4.82	4.55	6.96	10.18
Ounces	16.23	57.87	54.66	83.59	122.20
Kilograms	0.46	1.80	1.70	2.60	3.80

Table 4-3 XL and PL Net Weights

4.5 Mounting

The XL and PL power supplies may be mounted with the following screws. Sizes will vary between models.

Model	Bottom Mounting	Side Mounting
XL500	(open frame)	(open frame)
PL650	M4, length 3	M4, length 6
PL800	M4, length 3	M4, length 6
PL1500	M4, length 5	M4, length 5
PL3000	M4, length 4	M4, length 4

Table 4-4 Mounting Screw Sizes

The power supplies may be mounted on their bottom surface or their sides. See mechanical drawings for mounting hole locations.

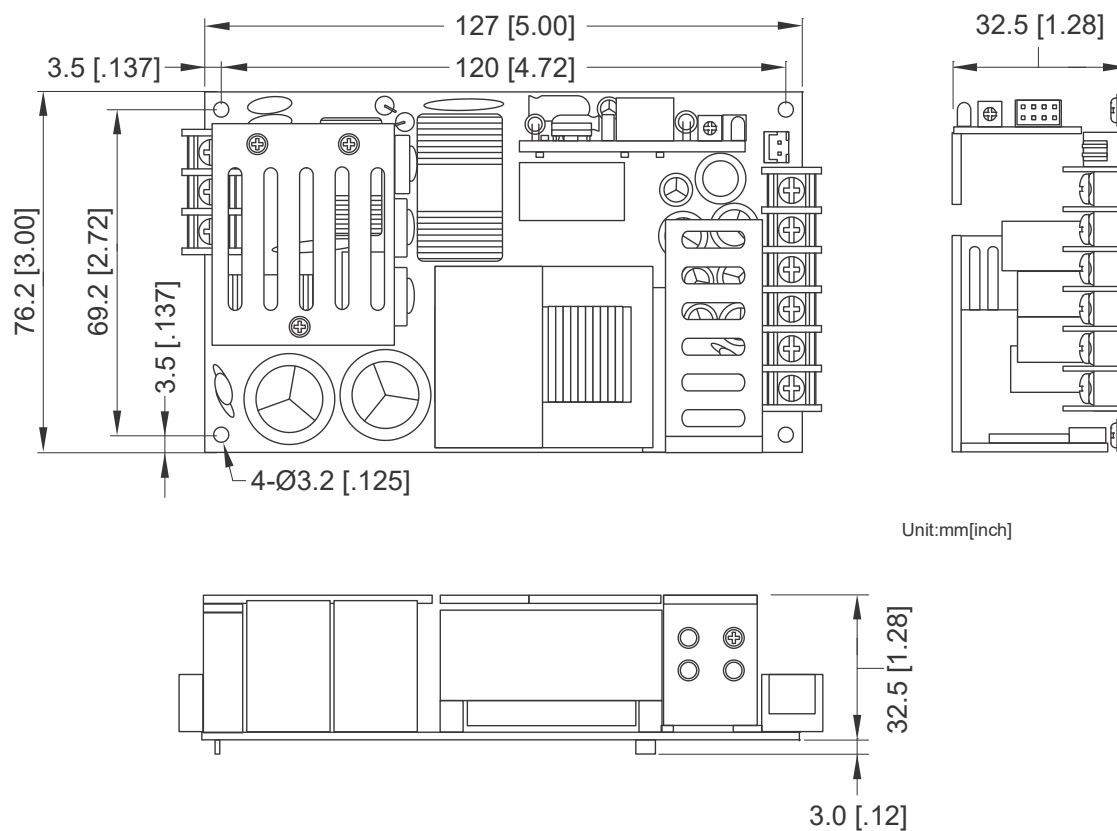
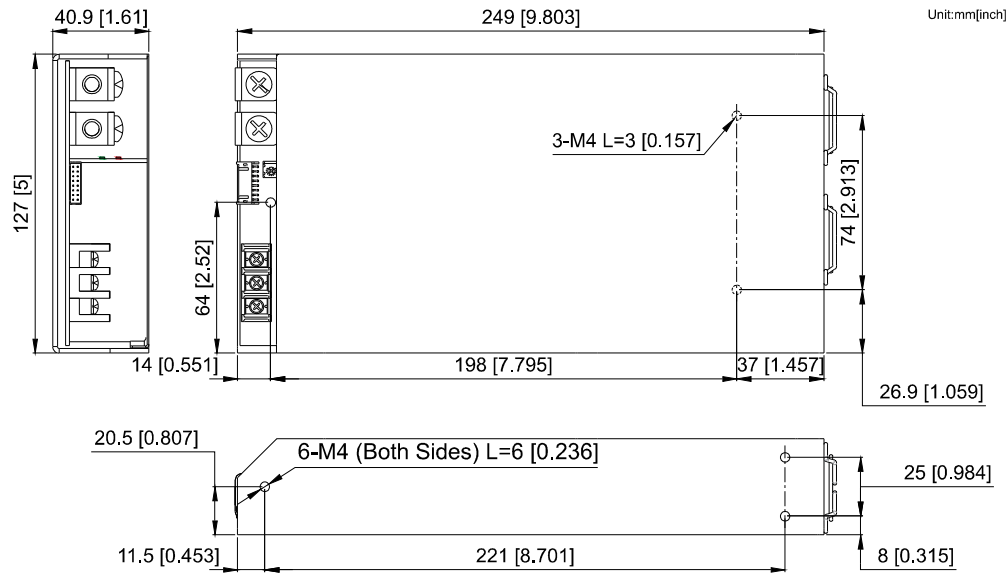
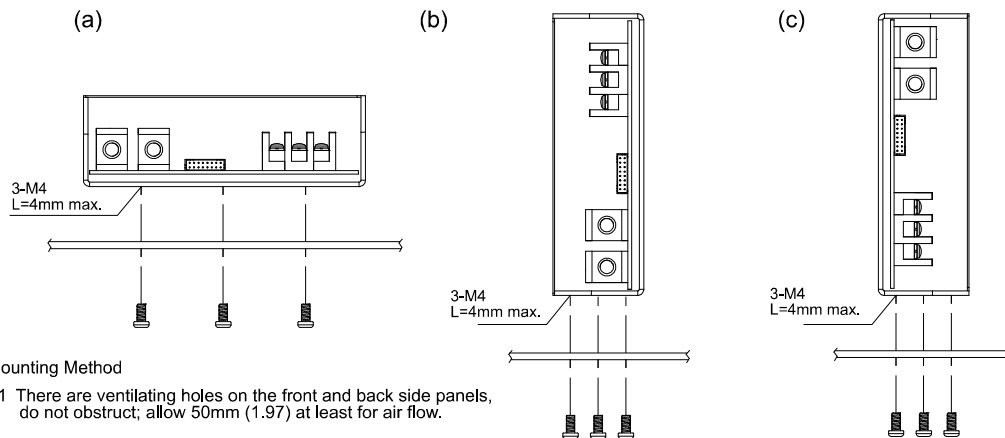


Figure 4-2 XL500 Mounting Hole Locations



1. Mounting Directions

1-1 Recommended standard mounting methods:



2. Mounting Method

2-1 There are ventilating holes on the front and back side panels, do not obstruct; allow 50mm (1.97) at least for air flow.

2-2 Recommended the torque of mounting screw:
 M4 screw: 1.27N • m (13.0kgf • cm)

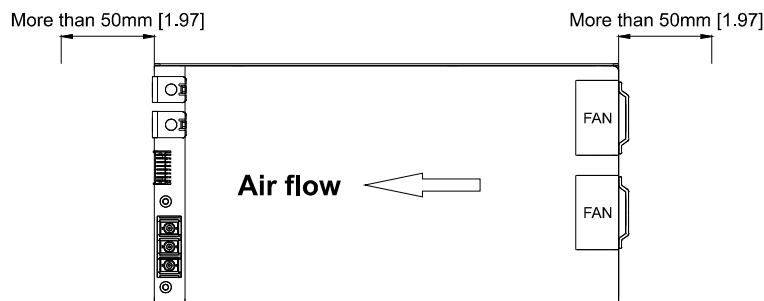


Figure 4-3 PL650 Mounting Hole Locations

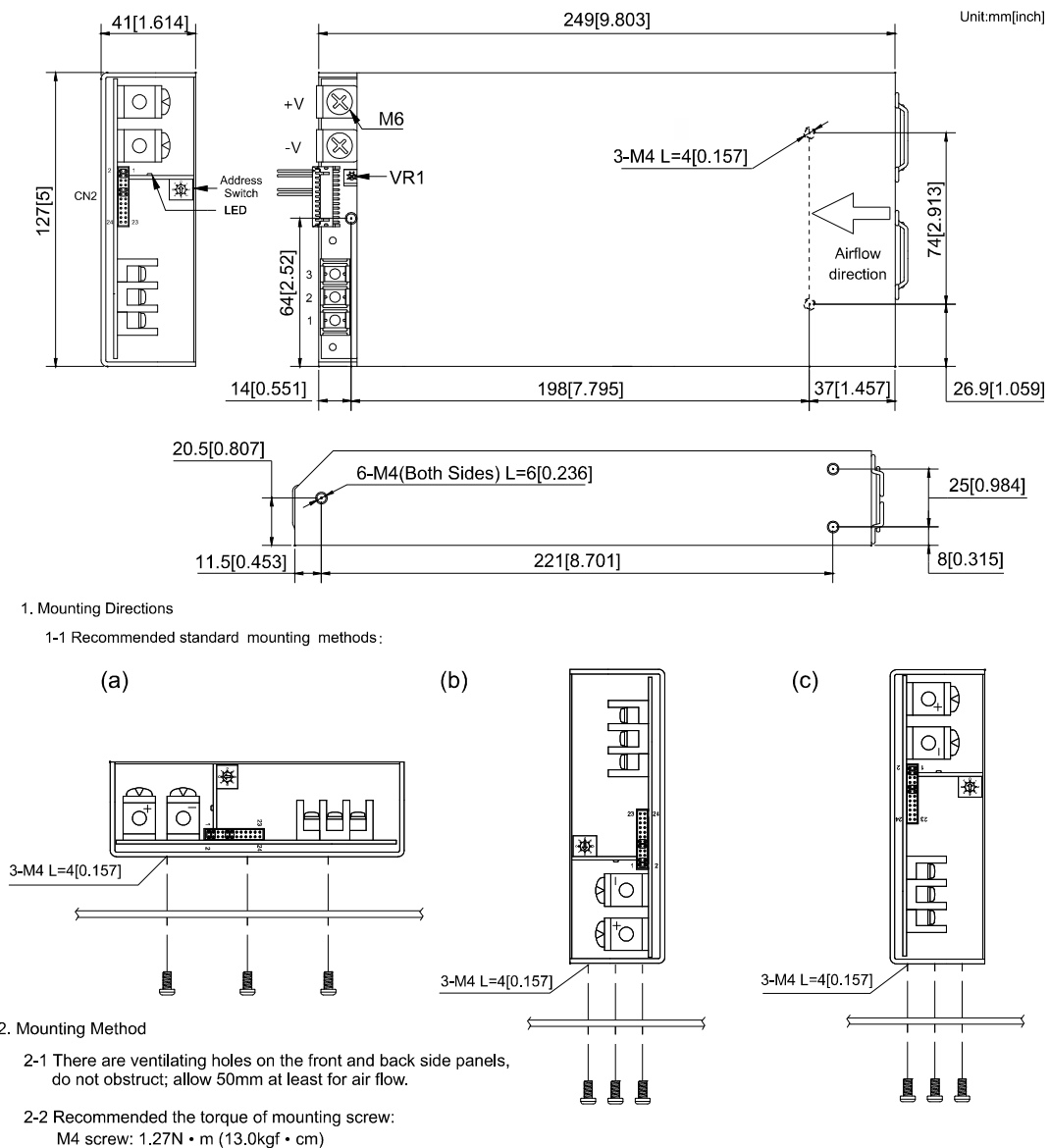
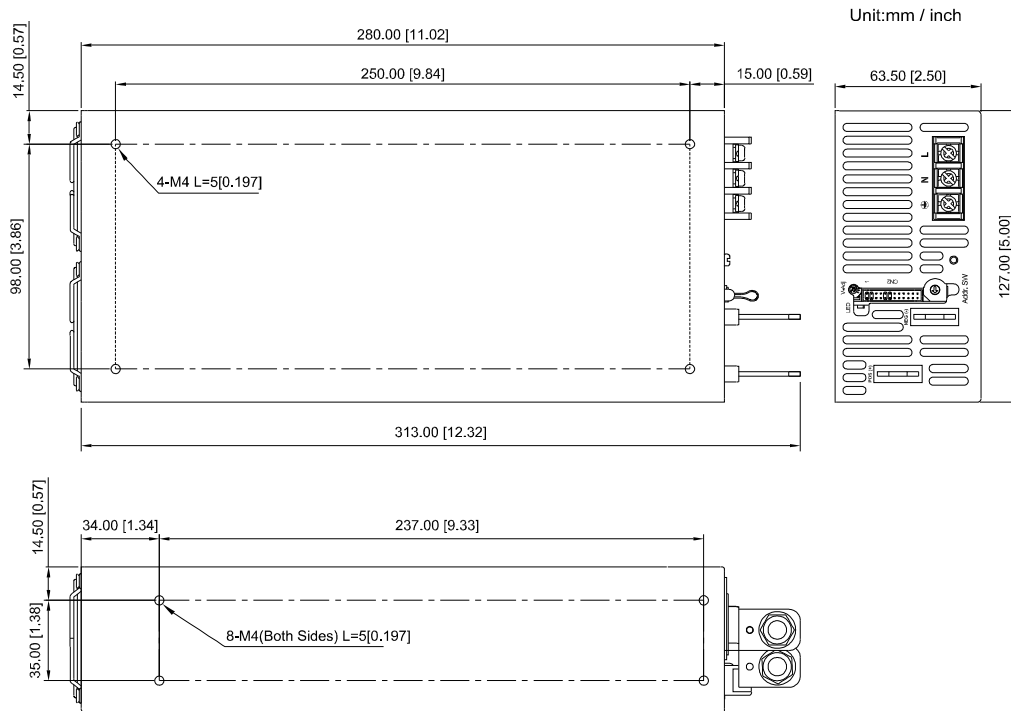
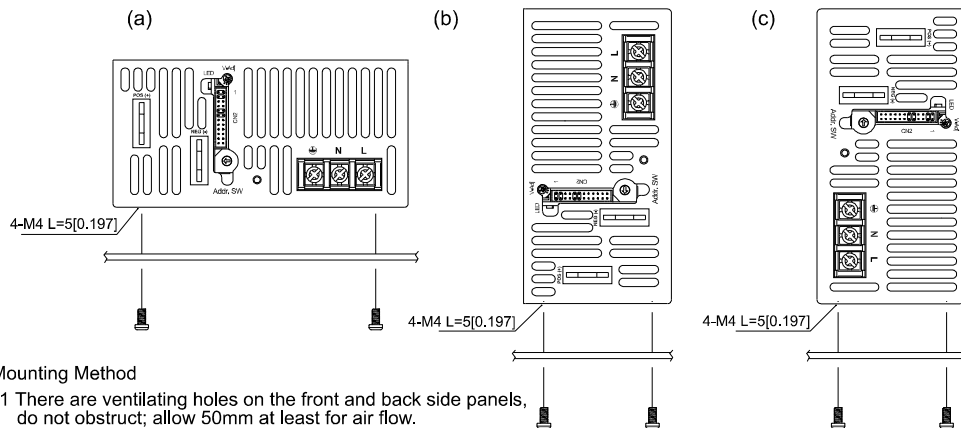


Figure 4-4 PL800 Mounting Hole Locations



1. Mounting Directions

1-1 Recommended standard mounting methods:



2. Mounting Method

2-1 There are ventilating holes on the front and back side panels, do not obstruct; allow 50mm at least for air flow.

2-2 Recommended the torque of mounting screw
M4 screw: 1.27N • m (13.0kgf • cm)

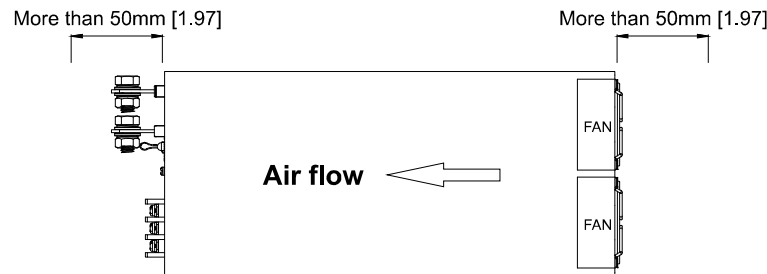
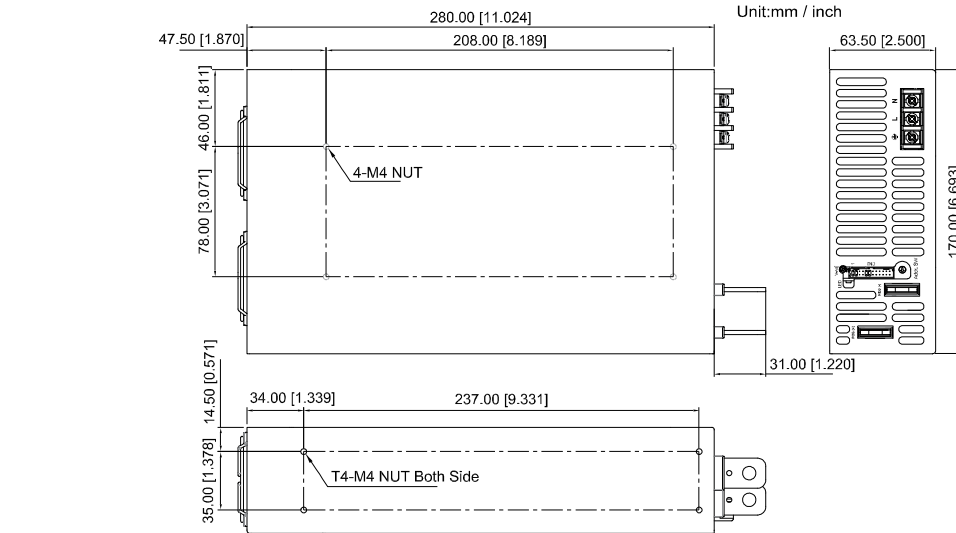
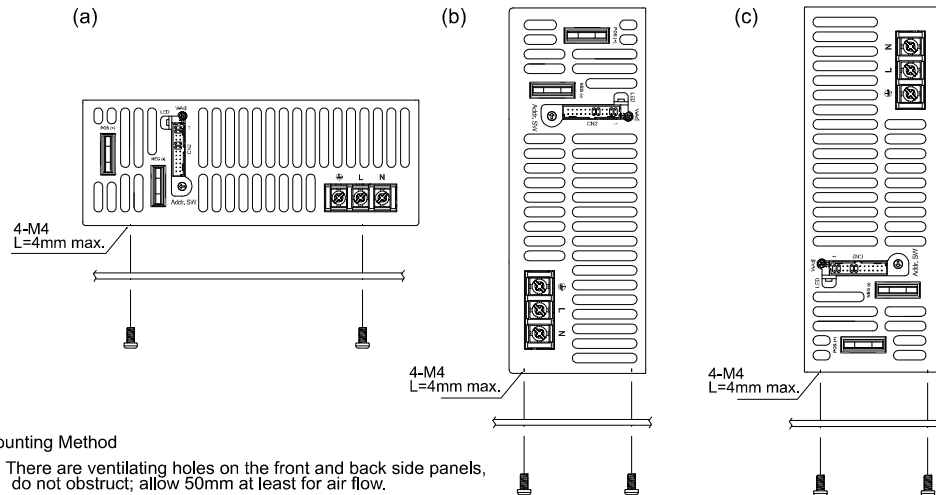


Figure 4-5 PL1500 Mounting Hole Locations



1. Mounting Directions

1-1 Recommended standard mounting methods:



2. Mounting Method

- 2-1 There are ventilating holes on the front and back side panels, do not obstruct; allow 50mm at least for air flow.
- 2-2 The Maximum allowable penetration of screw is 4mm. Incomplete threading should not be penetrated.
- 2-3 Recommended the torque of mounting screw
M4 screw: 1.27N • m (13.0kgf • cm)

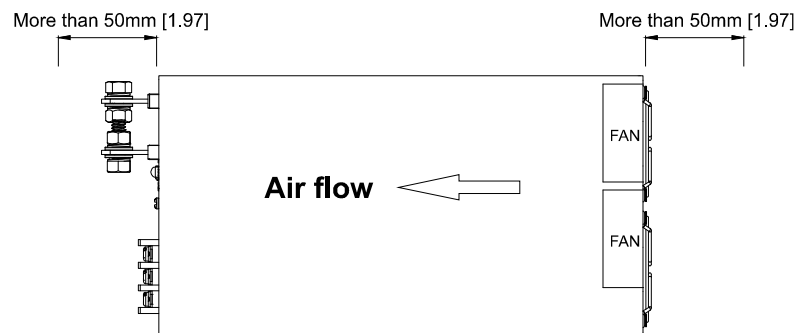


Figure 4-6 PL3000-12 thru -60 Mounting Hole Locations

4.6 Physical Dimensions

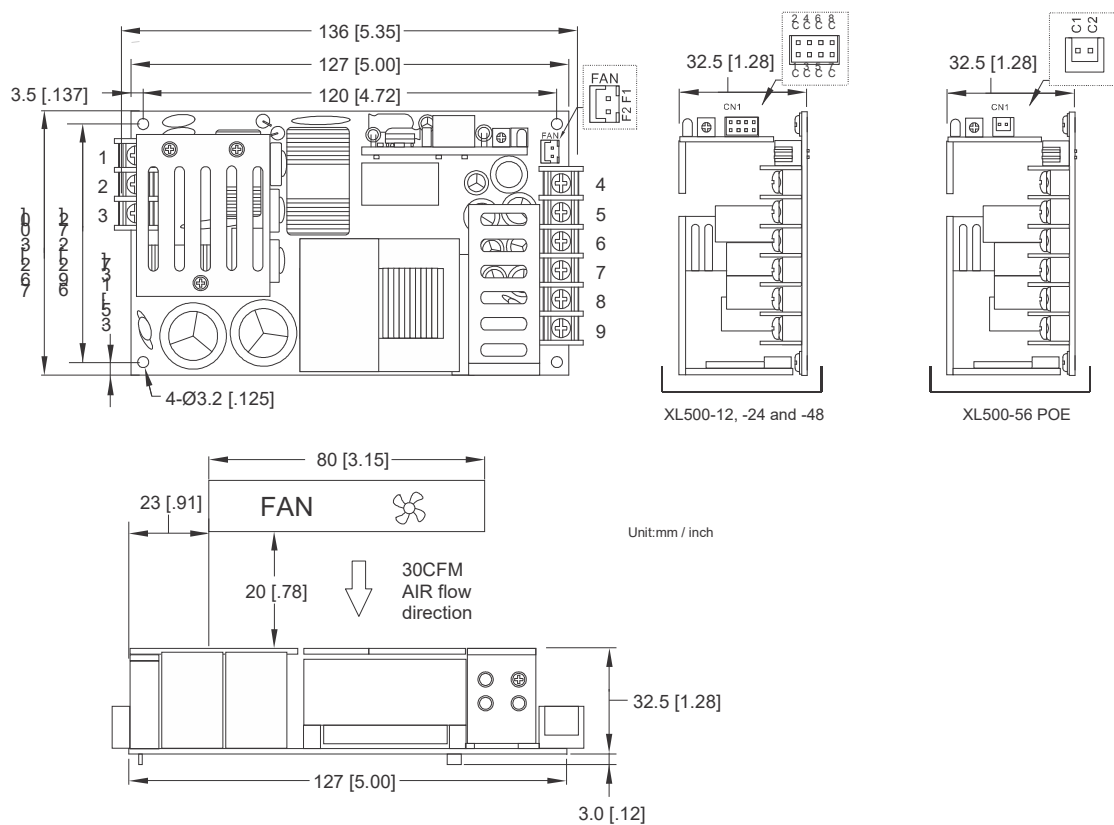


Figure 4-7 XL500 Dimensions

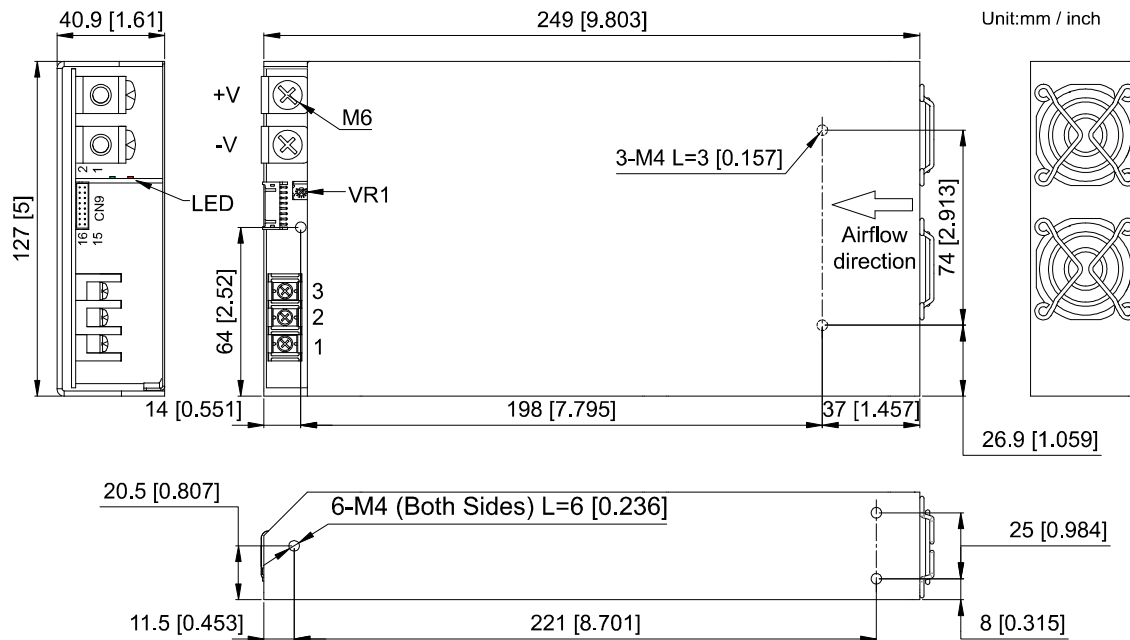


Figure 4-8 PL650 Dimensions

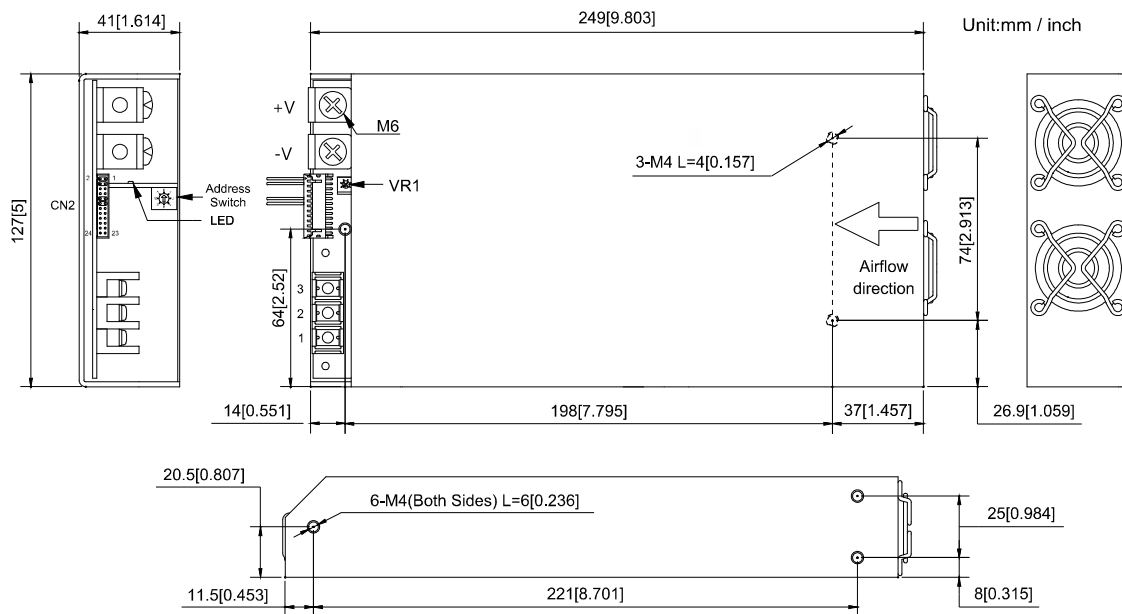


Figure 4-9 PL800 Dimensions

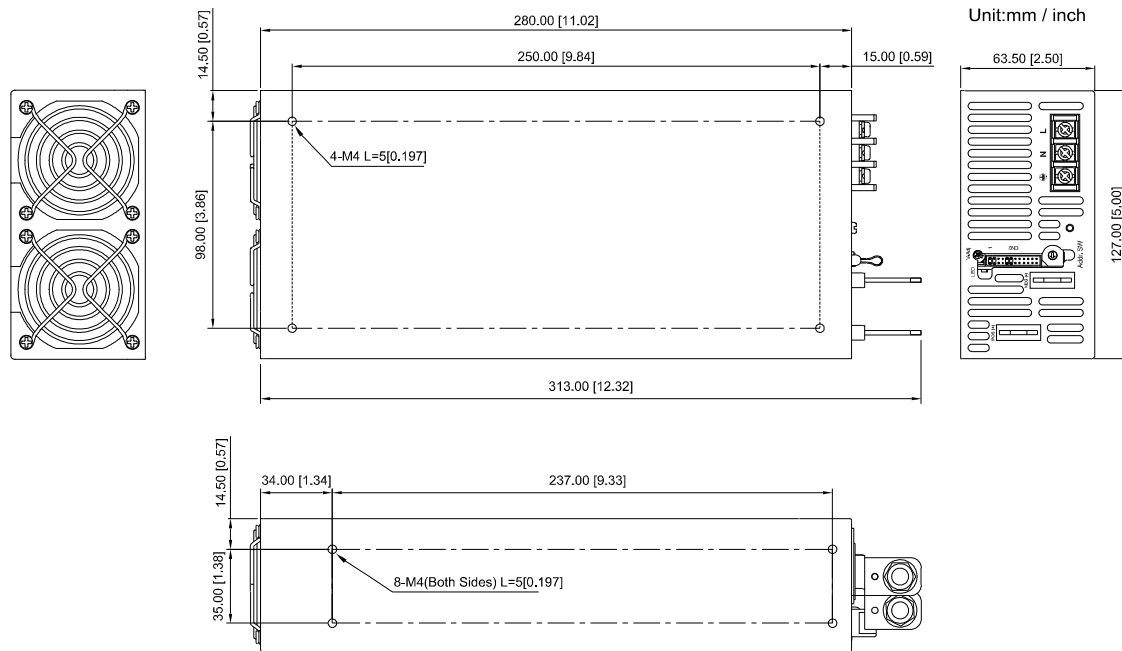


Figure 4-10 PL1500 Dimensions

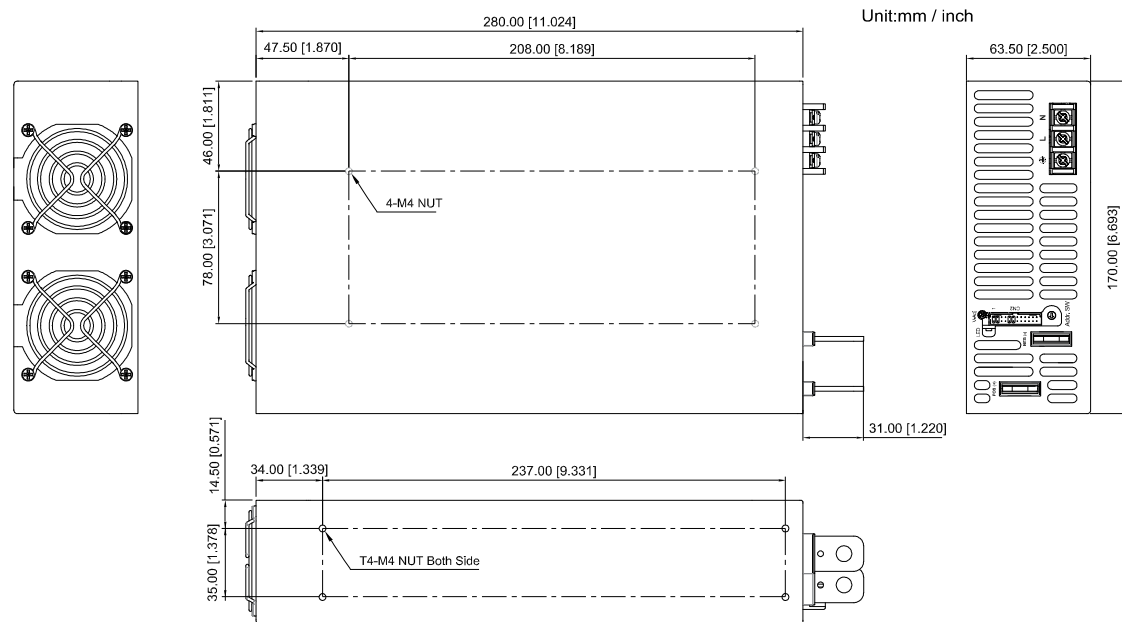


Figure 4-11 PL3000-12 thru -60 Dimensions

4.7 Mating Connectors

The user must furnish all mating connectors. The mating connectors must meet the requirements of all applicable safety agencies (UL and/or TUV).

Model	Designator	Connector	Mating Housing	Terminal
XL500	CN4 (DC Output)	JST S8B-PHDSS- or equivalent	PHDR-08VS	SPHD-002T-P05
XL500 56V POE	FAN2 (DC Output)	JST Z2B-ZRDSS- or equivalent	ZHR-2	SZH-002T-P05
PL650	CN9 (DC Output)	JST S16B-PHDSS- or equivalent	PHDR-16VS	SPHD-002T-P05
PL800	CN2 (DC Output)	JST S24B-PHDSS- or equivalent	JST PHDR-24VS or equivalent	JST SPHD-002T-P0.5 or equivalent
PL1500	CN2 (DC Output)	JST S24B-PHDSS- or equivalent	JST PHDR-24VS or equivalent	JST SPHD-002T-P0.5 or equivalent
PL3000-12 thru PL3000-60	CN2 (DC Output)	JST S24B-PHDSS- or equivalent	JST PHDR-24VS or equivalent	JST SPHD-002T-P0.5 or equivalent

4.8 Output Grounding

The DC RETURN signal may be connected to the power supply chassis ground (safety earth) screw terminal on the front of the power supplies as shown in Figure 4-12 through Figure 4-16.

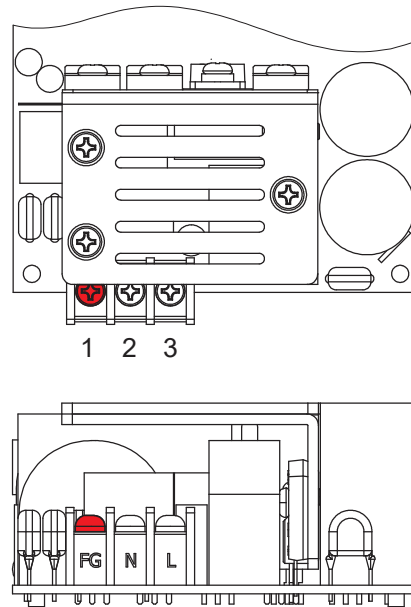


Figure 4-12 XL500 Grounding Location

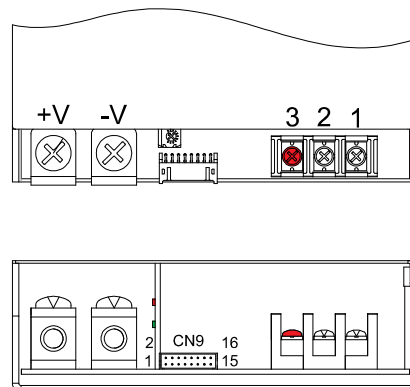


Figure 4-13 PL650 Grounding Location

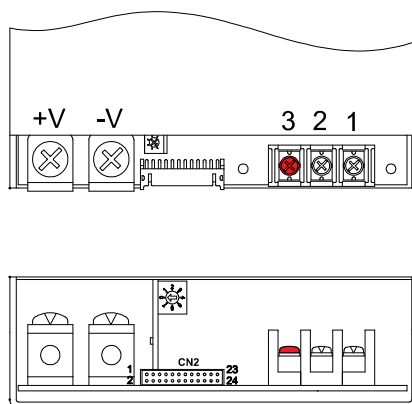


Figure 4-14 PL800 Grounding Location

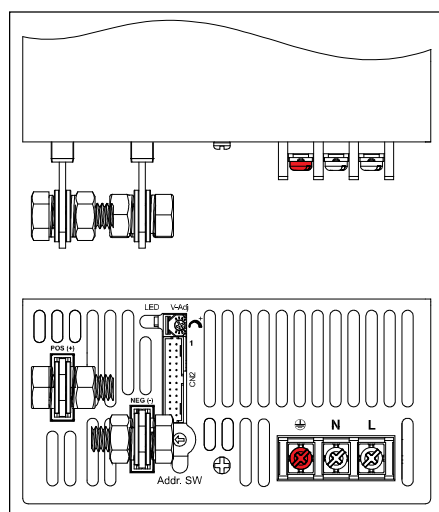


Figure 4-15 PL1500 Grounding Location

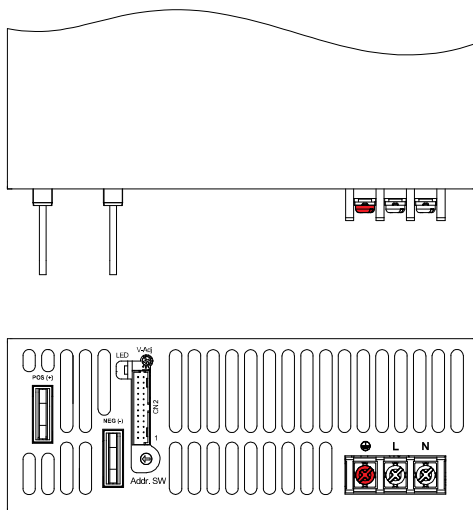


Figure 4-16 PL3000-12 thru -60 Grounding Location

4.9 Signal Pin Definitions

Model	Connector	Pin No.	Assignment
XL500	AC Input Terminal	1	FG
		2	AC/N
		3	AC/L
		4,5,6	+DC out
		7,8,9	-DC out
	Connector (FAN)	F1	+12V
		F2	-12V
	CN1	C1	-5VSB
		C2	+5VSB
		C3	GND
		C4	DC OK
		C5	-RC
		C6	+RC
		C7	-S
		C8	+S
XL500-56 POE	AC Input Terminal	1	FG
		2	AC/N
		3	AC/L
		4,5,6	+DC out
		7,8,9	-DC out
	Connector (FAN)	F1	+12V
		F2	12V_return
	CN1	C1	+5VSB
		C2	-5VSB

Model	Connector	Pin No.	Assignment
PL650	AC Input Terminal	1	AC/L
		2	AC/N
		3	FG
	CN9	1	Remote Voltage Sense (-)
		2	Local output voltage sense
		3	Remote voltage sense (+)
		4	Local output voltage sense (-)
		5,6	+5V/0.5A Aux Power
		7	Remote ON/OFF (+)
		8,10,12,14	Ground
		9	Remote ON/OFF (-)
		11	Power OK
		13	V Program
		15	I Program
PL800	AC Input Terminal	1	AC / L
		2	AC / N
		3	FG
	CN2	1	Positive Output Voltage
		2	Remote Sense (+)
		3	Remote Sense (-)
		4	Negative Output Voltage
		5	Power OK
		6	Ground
		7	Parallel operation current share
		8	Aux output setting
		9	Inhibit ON/OFF (-)
		10	Ground
		11	Inhibit ON/OFF (+)
		12	+5V/0.5A or 9V/0.3A Aux Power
		13	I Program
		14	Ground
		15	V Program
		16	Ground
		17	+5V/0.5A or 9V/0.3A Aux Power
		18	Ground
		19	Serial Clock used in the I2C interface
		20	Serial Data used in the I2C interface
		21	+5V/0.5A or 9V/0.3A Aux Power
		22	Ground
		23	For RS232 Transmission function
		24	For RS232 Receiver function
PL1500	AC Input Terminal	1	AC/L
		2	AC/N

Model	Connector	Pin No.	Assignment
		3	FG
		1	Positive Output Voltage
		2	Remote Sense (+)
		3	Remote Sense (-)
		4	Negative Output Voltage
		5	Power OK
		6	Ground
		7	Parallel operation current share
		8	Aux output setting
		9	Inhibit ON/OFF (-)
		10	Ground
		11	Inhibit ON/OFF (+)
		12	+5V/0.5A or 9V/0.3A Aux Power
		13	I Program
		14	Ground
		15	V Program
		16	Ground
		17	+5V/0.5A or 9V/0.3A Aux Power
		18	Ground
		19	Serial Clock used in the I2C interface
		20	Serial Data used in the I2C interface
		21	+5V/0.5A or 9V/0.3A Aux Power
		22	Ground
		23	For RS232 Transmission function
		24	For RS232 Receiver function
		3	FG
PL3000	AC Input Terminal	1	AC/L
		2	AC/N
		3	FG
	CN2	1	Positive Output Voltage
		2	Remote Sense (+)
		3	Remote Sense (-)
		4	Negative Output Voltage
		5	Power OK
		6	Ground
		7	Parallel operation current share
		8	Aux output setting
		9	Inhibit ON/OFF (-)
		10	Ground
		11	Inhibit ON/OFF (+)
		12	+5V/0.5A or 9V/0.3A Aux Power
		13	I Program
		14	Ground

Model	Connector	Pin No.	Assignment
		15	V Program
		17	Ground
		18	+5V/0.5A or 9V/0.3A Aux Power
		19	Serial Clock used in the I2C interface
		20	Serial Data used in the I2C interface
		21	+5V/0.5A or 9V/0.3A Aux Power
		22	Ground
		23	For RS232 Transmission function
		24	For RS232 Receiver function

Table 4-5 XL/PL Signal Pin Definitions

5.

Efficiency

The efficiencies for the XL and PL power supplies are listed below. They were measured at full load, 25C, at 230AC.

Model:	Output	Load	AC	Efficiency
XL500	12V	20.0A	230VAC	88%
XL500	24V	10.0A	230VAC	90%
XL500	48V	5.0A	230VAC	92%
XL500	56V	8.9A	230VAC	92%
PL650	5V	100.0A	230VAC	83%
PL650	12V	50.0A	230VAC	88%
PL650	15V	40.0A	230VAC	88%
PL650	24V	27.0A	230VAC	90%
PL650	27V	24.0A	230VAC	90%
PL650	48V	13.6A	230VAC	91%
PL800	12V	66.7A	230VAC	89%
PL800	15V	53.4A	230VAC	90%
PL800	24V	33.5A	230VAC	92%
PL800	30V	26.7A	230VAC	92%
PL800	36V	22.3A	230VAC	92%
PL800	48V	16.7A	230VAC	92%
PL800	60V	13.4A	230VAC	93%
PL1500	12V	125.0A	230VAC	89%
PL1500	15V	100.0A	230VAC	90%
PL1500	24V	62.5A	230VAC	92%
PL1500	30V	50.0A	230VAC	92%
PL1500	36V	41.7A	230VAC	92%
PL1500	48V	31.3A	230VAC	92%
PL1500	60V	25.0A	230VAC	93%
PL3000	12V	200.0A	230VAC	88%
PL3000	15V	160.0A	230VAC	89%
PL3000	24V	125.0A	230VAC	91%
PL3000	30V	100.0A	230VAC	91%
PL3000	36V	83.5A	230VAC	92%
PL3000	48V	62.5A	230VAC	92%
PL3000	60V	50.0A	230VAC	93%

Table 5-1 XL and PL Output Currents at Rated Efficiency

6.

Signals

6.1 DC_OK

The DC_OK signal is the signal that is driven by an open-collector transistor. The electrical specifications for the DC_OK outputs are described in Table 6-1.

Signal Type	
Power On Delay	Model XL500-12 to 48 <186ms Model XL500-56 <208ms Models PL800, PL1500 & PL3000 <800ms
Rise Time	Model XL500-12 to 48 <86ms/230VAC at full load Model XL500-56 <66ms/230VAC at full load Model PL650 <60ms/230VAC at full load Models PL800 & PL1500 <100ms/230Vac at full load Model PL3000 <50ms/230VAC at full load
PS DC_OK Output	Models PL650, PL800, PL1500 & PL3000 open drain signal low when PSU turns on. Maximum sink current: 20Ma. Maximum drain voltage: 40V. Models XL500-12 to 48 DC_OK Output Voltage: 4.95V~5.49V TTL: output low voltage 0~0.4V; high voltage 2.4V~5V; 4.95V~5.49V >2.4V, above V oH, Logic is 1

Table 6-1 XL and PL Status and Control Signal Specifications

6.2 DC OK LED

A green LED on models PL650 through PL3000 illuminates when DC-OK signal is true (high).

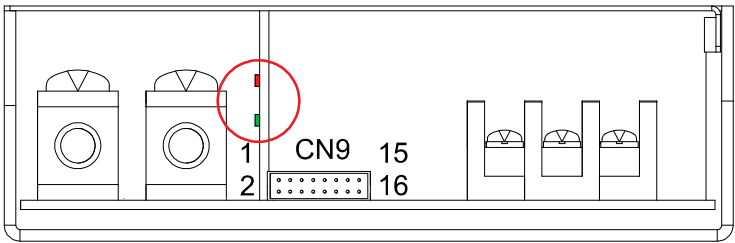


Figure 6-1 PL650 LED Location

Green LED	Signal	Status
Solid		Power OK
Slow Blink		Power Standby
Red LED	Signal	Status
Fast Blink		Over Voltage Protection (OVP) Over Load Protection (OLP)
Solid		Output Short Circuit Protection (SCP) Under Voltage Protection (OVP)
Slow Blink		Over Temperature Protection (OTP)
Intermittent Blink		Fan Failure
Interlace Blink		Power Failure

Table 6-2 PL650 LED Status Modes

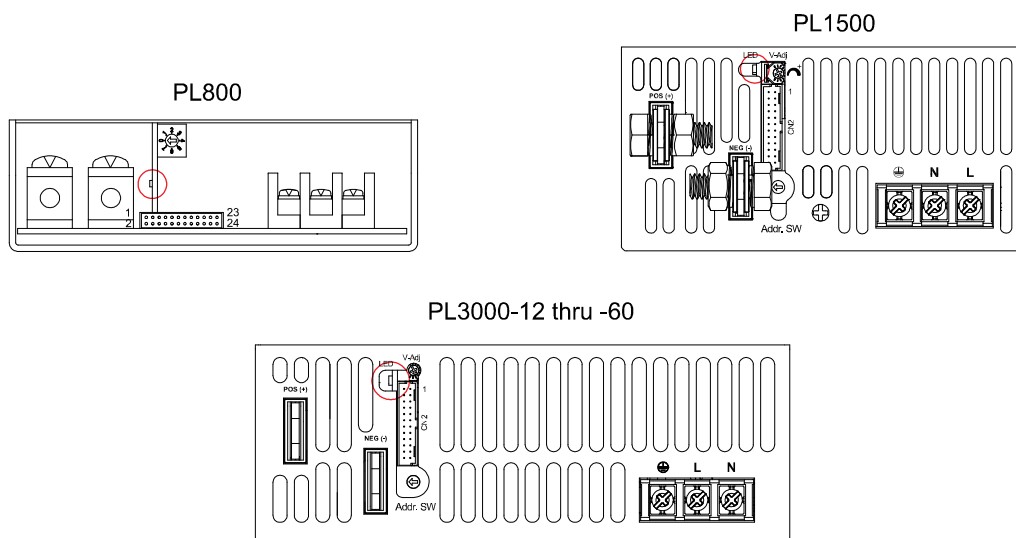


Figure 6-2 PL800, PL1500 and PL3000-12 thru -60 LED Locations

LED	Signal	Status
Solid (Green)		Power OK (Local mode)
Solid (Orange)		Power OK (Remote mode)
Slow Blink (Green)		Power Standby
Fast Blink (Red)		Over Voltage Protection (OVP)
Solid (Red)		Over Load Protection (OLP)
Slow Blink (Red)		Over Temperature Protection (OTP)
Intermittent Blink (Red)		Fan Failure
Interlace Blink (Red)		Power Failure

Table 6-3 PL800, PL1500 and PL3000-12 thru -60 LED Status Modes

6.3 Voltage Hold-Up Time

The power supply will maintain output regulation per Table 3-1 despite a loss of input power. The Hold-Up Time is as follows:

Models	Hold-Up Time
XL500	8ms/230VAC at full load
PL650	16ms/230VAC at full load
PL800, PL1500 & PL3000	14ms/230VAC at full load

Table 6-4 Hold-Up Time by Model

7.

Ordering Information

The following table provides the N2Power part numbers that should appear on your purchase order and will appear on any N2Power correspondence:

Model Number	V1	N2Power Part Number
XL500-12	12V	400525-01-0
XL500-24	24V	400525-02-8
XL500-48	48V	400525-03-6
XL500-56 POE	56V	400525-04-4
PL650-05	5V	400353-01-7
PL650-12	12V	400353-02-5
PL650-15	15V	400353-03-3
PL650-24	24V	400353-04-1
PL650-27	27V	400353-05-8
PL650-48	48V	400353-06-6
PL800-12	12V	400354-01-5
PL800-15	15V	400354-02-3
PL800-24	24V	400354-03-1
PL800-30	30V	400354-04-9
PL800-36	36V	400354-05-6
PL800-48	48V	400354-06-4
PL800-60	60V	400354-07-2
PL1500-12	12V	400351-01-7
PL1500-15	15V	400351-02-5
PL1500-24	24V	400351-03-3
PL1500-30	30V	400351-04-1
PL1500-36	36V	400351-05-8
PL1500-48	48V	400351-06-6
PL1500-60	60V	400351-07-4
PL3000-12	12V	400350-01-3
PL3000-15	15V	400350-02-1
PL3000-24	24V	400350-03-9
PL3000-30	30V	400350-04-7
PL3000-36	36V	400350-05-4
PL3000-48	48V	400350-06-2
PL3000-60	60V	400350-07-0

Table 7-1 XL and PL Part Numbers

All XL and PL power supplies are RoHS compliant For warranty information refer to www.n2power.com. Direct all questions, orders or requests for quotation as follows:

N2Power Order Desk:	orders@n2power.com	805-583-7744 x112
Fax (Attention N2Power):		805-583-7749
Sales:	sales@n2power.com	805-583-7744 x122
Technical Support:	techsupport@n2power.com	805-583-7744 x119
Address:	130 W. Cochran St., Suite C	Simi Valley, CA 93065