

## NLP110 Medical

Single and  
triple output

**Total Power:** 80 - 110W  
**Input Voltage:** 90 - 264VAC  
**# of Outputs:** Single, triple

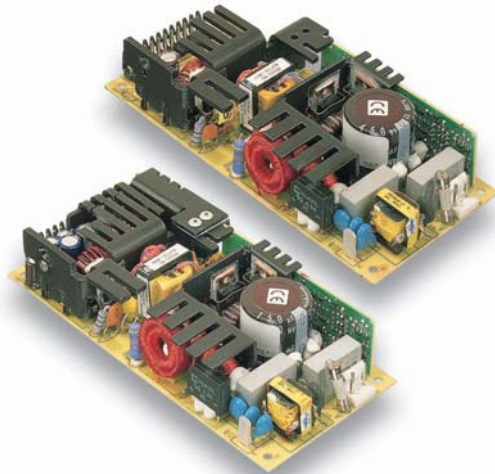
### Special Features

- Provides low voltage outputs
- Compliance to EN61000-3-2 (Power Factor = 0.98)
- Smallest industry standard package 6.5 x 3.0 x 1.26 inches
- 90 Vac to 264 Vac universal input range
- UL, cUL, and VDE safety approvals and CE-Marked to MDD
- Overvoltage and short circuit protection
- VDE0871-A, EN55022-A, EN55011-A conducted noise
- VDE0871-A, EN55022-A, EN55011-A radiated noise
- Meets all applicable and relevant immunity standards EN61000-4-2,4,5 and 6
- Available RoHS compliant
- 2 year warranty

### Safety

VDE0750/IEC60601-1  
and EN60601-1

UL2601-1 and C22.2  
No. 601.1-M90.



The NLP110 is a series of 110 W ac-dc open frame power supplies in a 3 x 6.5 x 1.26 inch package. The NLP110 is power factor corrected to meet EN61000-3-2 and is available in single and multiple output models. The multiple output models have a capability that is unique to the power supply market - they can deliver equal amounts of current on multiple low voltage outputs to support designs that will span the industry transition from 5 V logic to 3.3 V logic. The NLP110 is practically the same size as a 65 Watt 3 x 5 inch product, e.g. NLP65 - the one difference is that the footprint is a mere 1.5 inches longer. The NLP110 is primarily designed for networking applications in 1U shelves or boxes that have a heavy logic content such as access concentrators, midrange routers, LAN switches and shared media hubs. The availability of single output models with high peak load capability also means that the NLP110 can provide a power factor corrected solution for applications currently using the NFS110.



# Specifications

All specifications are typical at nominal input, full load at 25°C unless otherwise stated

| OUTPUT SPECIFICATIONS                |  |  |
|--------------------------------------|--|--|
| Total regulation (Line and load)     | Main output<br>Auxiliary outputs                                       | ±2.0%<br>±5.0%   |
| Rise time                            | At turn-on   | 1.0 s, max.  |
| Transient response                   | Main output<br>75% to 100%<br>step at 0.1 A/μs                         | 5.0% or 250 mV<br>max. dev., 1 ms max.<br>recovery to 1% |
| Temperature coefficient              |  | ±0.02%/°C  |
| Overvoltage protection               | Main outputs   | 125%, ±10%   |
| Short circuit protection             | Cyclic operation   | Continuous   |
| Minimum output current               | Single and multiple  | See table  |
| INPUT SPECIFICATIONS                 |  |  |
| Input voltage range (See Note 6)     | Universal input  | 90-264 Vac   |
| Input frequency range                |  | 47-63 Hz   |
| Input surge current (cold start)     | 120 Vac<br>230 Vac   | 18 A max.<br>35 A max.                                   |
| Safety ground leakage current        | 230 Vac, 50 Hz   | <100 μA  |
| Input current                        | 120 Vac @ 80 W<br>120 Vac @ 110 W<br>230 Vac @ 80 W<br>230 Vac @ 110 W | 0.9 A rms<br>1.3 A rms<br>0.48 A rms<br>0.7 A rms        |
| Input fuse                           | UL/IEC127  | F3.15A H, 250 Vac  |
| EMC CHARACTERISTICS (12)             |  |  |
| Conducted emissions                  | EN55022, FCC part 15   | Level A  |
| Radiated emissions                   | EN55022, FCC part 15   | Level A  |
| Harmonic current emission correction | EN61000-3-2  | Compliant  |
| ESD air                              | EN61000-4-2  | Level 3  |
| ESD contact                          | EN61000-4-2  | Level 3  |

| EMC CHARACTERISTICS (continued) |  |                      |
|---------------------------------|--|----------------------|
| Surge                           | EN61000-4-5  | Level 3              |
| Fast transients                 | EN61000-4-4  | Level 3              |
| Radiated immunity               | EN61000-4-3  | Level 3              |
| Conducted immunity              | EN61000-4-6  | Level 3              |
| GENERAL SPECIFICATIONS          |  |                      |
| Hold-up time                    | 120 Vac, 60 Hz   | 16.7 ms @ 110 W      |
| Efficiency                      | 120 Vac, 80 W (-9905J)   | 75% min.             |
| Isolation voltage               | Input/output<br>Input/chassis                                    | 4000 Vac<br>1500 Vac |
| Approvals and standards         | EN60601-1, IEC60601-1, VDE0750,<br>UL2601-1, C22.2 No. 601.1-M90 |                      |
| Weight                          | 283 g (10 oz)  |                      |
| MTBF (@ 25 °C)                  | MIL-HDBK-217F  | 220,000 hours min.   |

| ENVIRONMENTAL SPECIFICATIONS (9) |  |  |
|----------------------------------|--|--|
| Thermal performance              | Operating ambient, (See derating curve)  | 0 °C to +50 °C   |
|                                  | Non-operating<br>50 °C to 70 °C, ambient,<br>convection cooled<br>0 °C to 50 °C, ambient,<br>convection cooled<br>0 °C to 50 °C ambient,<br>150 LFM forced air<br>Peak (0 °C to +50°C, 60 s) | -40 °C to +85 °C<br>Derate to<br>50% load<br>80 W<br>110 W<br>(See Note 3) |
| Relative humidity                | Non-condensing   | 5% to 95% RH   |
| Altitude                         | Operating  | 10,000 feet max.   |
|                                  | Non-operating  | 30,000 feet max.   |
| Vibration (See Note 8)           | 5-500 Hz   | 2.4 G rms peak   |
| Shock                            | per MIL-STD-810E   | 516.4 Part IV  |

## Specifications Contd.

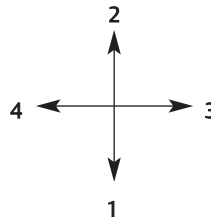
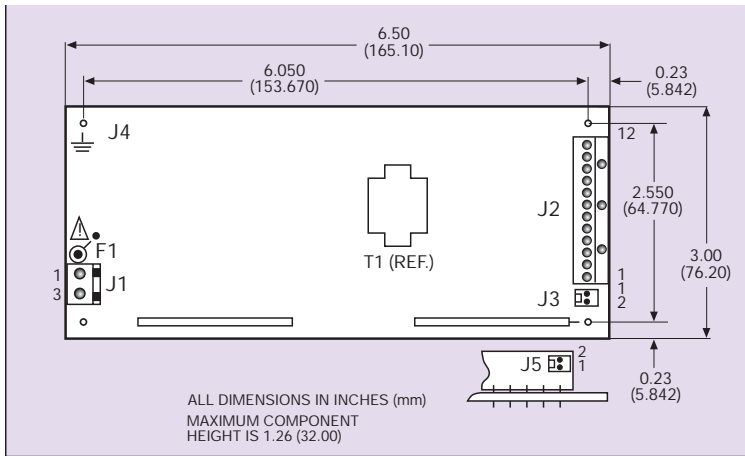
| OUTPUT VOLTAGE | OUTPUT CURRENT |         |             |             | PEAK (4) | RIPPLE (5) | TOTAL REGULATION | MODEL NUMBERS (7,14,15) |
|----------------|----------------|---------|-------------|-------------|----------|------------|------------------|-------------------------|
|                | MIN (6)        | MAX (1) | 150 LFM (2) | 300 LFM (3) |          |            |                  |                         |
| +5 V           | 0.5 A          | 15 A    | 22 A        | 22 A        | 22 A     | 50 mV      | ±2.0%            | NLP110-9605J            |
| +12 V          | 0.3 A          | 6.4 A   | 9.2 A       | 9.2 A       | 11.5 A   | 120 mV     | ±2.0%            | NLP110-9612J            |
| +48 V          | 0 A            | 1.6 A   | 2.3 A       | 2.3 A       | 2.5 A    | 240 mV     | ±2.0%            | NLP110-9617J            |
| +24 V          | 0.2 A          | 3.2 A   | 4.6 A       | 4.6 A       | 6.0 A    | 240 mV     | ±2.0%            | NLP110-9624J            |
| +5 V (A)       | 0.5 A          | 13 A    | 16 A        | 18 A        | 18 A     | 50 mV      | ±2.0%            | NLP110-9693J            |
| +3.3 V (B)     | 0.2 A          | 13 A    | 16 A        | 20 A        | 20 A     | 50 mV      | ±2.0%            |                         |
| +12 V          | 0 A            | 0.65 A  | 1.0 A       | 1 A         | 1 A      | 120 mV     | ±5.0%            |                         |
| +3.3 V (A)     | 0.5 A          | 13 A    | 16 A        | 20 A        | 22 A     | 50 mV      | ±2.0%            | NLP110-9694J            |
| +2.5 V (B)     | 0.1 A          | 13 A    | 16 A        | 20 A        | 22 A     | 50 mV      | ±2.0%            |                         |
| +12 V          | 0 A            | 0.65 A  | 1 A         | 1 A         | 1 A      | 120 mV     | ±5.0%            |                         |
| +12 V (A)      | 0.2 A          | 6.5 A   | 8.5 A       | 8.5 A       | 10 A     | 1200 mV    | ±2.0%            | NLP110-9695J            |
| +3.3 V (B)     | 0.5 A          | 13 A    | 16 A        | 20 A        | 22 A     | 50 mV      | ±2.0%            |                         |
| -12 V          | 0 A            | 0.65 A  | 1 A         | 1 A         | 1 A      | 120 mV     | ±5.0%            |                         |
| +12 V (A)      | 0.2 A          | 6.5 A   | 8.5 A       | 8.5 A       | 10 A     | 120 mV     | ±2.0%            | NLP110-9608J            |
| +5 V (B)       | 0.2 A          | 13 A    | 16 A        | 18 A        | 22 A     | 50 mV      | ±2.0%            |                         |
| -12 V          | 0 A            | 0.65 A  | 1 A         | 1 A         | 1 A      | 120 mV     | ±5.0%            |                         |

### Notes

- Free air convection.  
Multiple output units: maximum continuous output power not to exceed 80 W.  
For -9693J;  $I_{3.3V} = 13 \text{ A max.}; I_{5.0V} = 13 \text{ A max.}; I_{3.3V} + I_{5.0V} \leq 16 \text{ A}$ .  
For -9694J;  $I_{3.3V} = 13 \text{ A max.}; I_{2.5V} = 13 \text{ A max.}; I_{3.3V} + I_{2.5V} \leq 16 \text{ A}$ .  
For -9695J;  $I_{3.3V} = 13 \text{ A max.}; I_{12V} = 6.5 \text{ A max.}; I_{3.3V} + I_{12V} \leq 16 \text{ A}$ .  
For -9608J;  $I_{5.0V} = 13 \text{ A max.}; I_{12V} = 6.5 \text{ A max.}; I_{5.0V} + I_{12V} \leq 16 \text{ A}$ .  
Single output units: maximum continuous output power not to exceed; 75 W on -9605J; 76.8 W on -9612J, -9624J, and -9617J.
- 150 LFM forced air cooling from L4 side.  
Multiple output units: maximum continuous output power not to exceed 105 W.  
For -9693J;  $I_{3.3V} = 16 \text{ A max.}; I_{5.0V} = 16 \text{ A max.}; I_{3.3V} + I_{5.0V} \leq 20 \text{ A}$ .  
For -9694J;  $I_{3.3V} = 16 \text{ A max.}; I_{2.5V} = 16 \text{ A max.}; I_{3.3V} + I_{2.5V} \leq 20 \text{ A}$ .  
For -9695J;  $I_{3.3V} = 16 \text{ A max.}; I_{12V} = 8.5 \text{ A max.}; I_{3.3V} + I_{12V} \leq 20 \text{ A}$ .  
For -9608J;  $I_{5.0V} = 16 \text{ A max.}; I_{12V} = 8.5 \text{ A max.}; I_{5.0V} + I_{12V} \leq 20 \text{ A}$ .  
Single output units: maximum continuous output power not to exceed 110 W for all models.
- 300 LFM forced air cooling from L4 side.  
Multiple output units: maximum continuous output power not to exceed 110 W.  
For -9693J;  $I_{3.3V} = 20 \text{ A max.}; I_{5.0V} = 18 \text{ A max.}; I_{3.3V} + I_{5.0V} \leq 22 \text{ A}$ .  
For -9694J;  $I_{3.3V} = 20 \text{ A max.}; I_{2.5V} = 20 \text{ A max.}; I_{3.3V} + I_{2.5V} \leq 22 \text{ A}$ .  
For -9695J;  $I_{3.3V} = 20 \text{ A max.}; I_{12V} = 8.5 \text{ A max.}; I_{3.3V} + I_{12V} \leq 22 \text{ A}$ .  
For -9608J;  $I_{5.0V} = 20 \text{ A max.}; I_{12V} = 8.5 \text{ A max.}; I_{5.0V} + I_{12V} \leq 22 \text{ A}$ .  
Single output units: maximum continuous output power not to exceed 110 W for all models.
- Peak output current lasting less than 30 seconds with duty cycle less than 5%. During peak loading, output voltage may exceed total regulation limits.
- Figure is peak-to-peak for convection power rating. Output noise measurements are made across a 20 MHz bandwidth using a 6' twisted pair, terminated with a 10  $\mu\text{F}$  electrolytic capacitor and a 0.1  $\mu\text{F}$  ceramic capacitor.
- Minimum load required for correct start-up and operation on single outputs and on main output of multiple versions. Failure to observe minimum load on main output will not allow the supply to start-up correctly. Some electronic test loads have a large delay time before they start drawing current even though the voltage from the supply is present. During this time delay, there is no load on the output and as a result, the supply cannot start-up properly and maintain its correct output voltage. In these instances, a dummy resistive load across the output may be necessary to load the output of the supply until the test load can function correctly and draw the intended minimum load. Minimum load required on auxiliary outputs to maintain regulation.
- For models NLP110-9608J and NLP110-9695J, the 12 V output is floating. For -12 V output, pin 11 on J2 has to be connected to Return making pin 12 the -12 V output
- Three orthogonal axes, random vibration 10 minutes for each axes, 2.4 G rms 5 Hz to 500 Hz.
- For optimum reliability, no part of the heatsink should exceed 110 °C, and no semiconductor case temperature should exceed 120 °C.
- CAUTION: Allow a minimum of 1 second after disconnecting line power when making thermal measurements.
- This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.
- The EMI specifications reference measurements made with the power supply mounted on a grounded metal sheet extending 1 inch beyond each edge, using an unshielded cable. No external filtering required during conducted emissions testing but some applications may require additional filtering to achieve system compliance. A line choke, (ac input cords looped twice through an EMI suppression toroid) was used during radiated emissions testing. Considerable radiated testing in 1U six-sided boxes has shown that units can meet level B in typical systems. Application support is available from the factory to assist with EMI compliance.
- All models require a minimum mounting stand-off of 6.35 mm (0.25 inches) in the end use product.
- The 'J' suffix indicates that these parts are Pb-free (RoHS 6/6) compliant. TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.
- NOTICE: Some models do not support all options. Please contact your local Artesyn representative or use the on-line model number search tool at <http://www.artesyn.com/powergroup/products.htm> to find a suitable alternative.

## Mechanical Notes

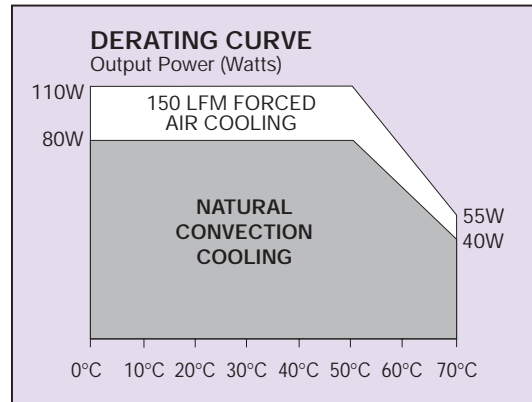
A All dimensions are in inches (mm).



Recommended direction for forced air relative to power supply orientation shown below.

- 1 Optimum.
- 2 Very good.
- 3 Good.
- 4 Not recommended.

| INPUT           |               |
|-----------------|---------------|
| PIN CONNECTIONS |               |
| <b>J1</b>       |               |
| Pin 1           | AC Neutral    |
| Pin 2           | No Connection |
| Pin 3           | AC Line       |
| <b>J3</b>       |               |
| Pin 1           | V (A) Sense + |
| Pin 2           | V (A) Sense - |
| <b>J4</b>       |               |
| Pin 1           | Safety Earth  |
| <b>J5</b>       |               |
| Pin 1           | V (B) Sense + |
| Pin 2           | V (B) Sense - |



| OUTPUT PIN CONNECTIONS |               |                  |
|------------------------|---------------|------------------|
| J2                     | SINGLE        | TRIPLE           |
| Pin 1                  | No Connection | V (B)            |
| Pin 2                  | No Connection | V (B)            |
| Pin 3                  | No Connection | V (B)            |
| Pin 4                  | Return        | Return           |
| Pin 5                  | Return        | Return           |
| Pin 6                  | Return        | Return           |
| Pin 7                  | Return        | Return           |
| Pin 8                  | V (A)         | V (A)            |
| Pin 9                  | V (A)         | V (A)            |
| Pin 10                 | V (A)         | V (A)            |
| Pin 11                 | No Connection | V (C)            |
| Pin 12                 | No Connection | V (C) Return (7) |

### Input and output connectors

**AC (J1) connector type**  
Molex 26-60-4030 or equivalent.

**DC (J2) connector type**  
12 position Molex Spox type 26-48 1125 or equivalent.

**Sense (J3) connector type**  
Molex 22-23-2021 or equivalent.

**Earth (J4) connector type**  
Male 0.250 quick disconnect.

**Sense (J5) connector type**  
Leoco 2421P02H000.

### Mating connectors

**AC (J1) mating connector type**  
Molex 09-50-3031 or equivalent with Molex 08-50-0105 or equivalent crimp terminals.

**DC (J2) mating connector type**  
Molex Spox type 26-03-3121 and contact 08-52-0113.

**Sense (J3) mating connector type**  
Molex 22-01-3027 and contact 08-50-0113.

**Earth (J4) mating connector type**  
Molex 90028.

**Sense (J5) mating connector type**  
Leoco 2420S020000 and contact 2453TPB00V1.

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