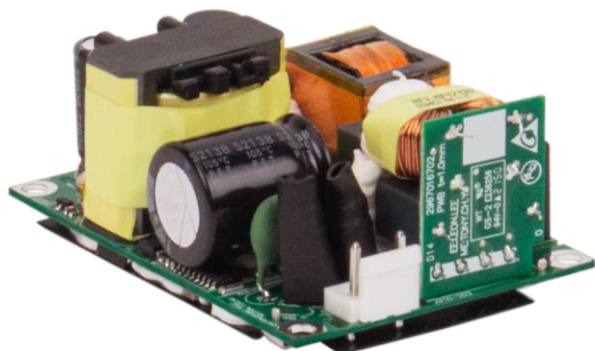


# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

# MEP-120A



### Highlights & Features

- 2" x 3" x 1.2" Package with base
- Up to 16.67 W/inch<sup>3</sup> power density
- Up to 120 W output with natural convection cooling
- Up to 150 W peak power for 10 sec
- No Load Consumption < 0.21 W
- Up to 70 °C Ambient Operation
- Up to 700KHrs MTBF
- 2 x MOPP Isolation
- Suited for Type BF Medical Products.
- Class B Conducted and Radiated EMI
- IEC60601-1-2 4<sup>th</sup> Edition Immunity Compliance

### Safety Certifications



|                                |   |
|--------------------------------|---|
| <b>Model Number:</b>           | MEP-120A□J BNA                                |
| <b>Unit Weight:</b>            | 0.14 kg (0.308 lb)                            |
| <b>Dimensions (W x L x H):</b> | 50.8 x 76.2 x 31 mm<br>(2.0 x 3.0 x 1.2 inch) |

### General Description

The MEP-120A offers 120 W output power and 4 output voltage of 12 V, 15 V, 18 V and 24 V in a 2" x 3" footprint. It supports up to 150W peak power for 10 seconds and features a wide operating temperature ranging from -30°C to +70°C. With low no load power consumption < 0.21 W and electric shock protection complying with 2 x MOPP, the MEP-120A offers reliable power supply for type BF medical equipment. The MEP-120A is certified with medical, ICT and home appliance safety approvals, including UL/ TUV/ CE/ UKCA and CB certification, as well as EMC approvals to EN 55032 Class B. It is applicable to type BF medical products, IT equipment and household appliances.

### Model Information

| Model Number    | Input Voltage | Output Voltage | Max Continuous Current |
|-----------------|---------------|----------------|------------------------|
| MEP-120A12J BNA | 90-264 Vac    | 12 Vdc         | 9.5 A                  |
| MEP-120A15J BNA | 90-264 Vac    | 15 Vdc         | 8.0 A                  |
| MEP-120A18J BNA | 90-264 Vac    | 18 Vdc         | 6.67 A                 |
| MEP-120A24J BNA | 90-264 Vac    | 24 Vdc         | 5.0 A                  |

### Model Numbering

|                                |                               |             |  |                                 |          | CC Code                                 |
|--------------------------------|-------------------------------|-------------|--|---------------------------------|----------|---|
| <b>MEP –</b>                   | <b>120</b>                    | <b>A</b>    | <b>□</b>                                     | <b>J</b>                        | <b>□</b> | <b>BNA</b>                              |
| ME: Delta Medical Power Supply | Max Wattage in Product Series | Family Code | Output Voltage (Single Output)               | Family Code<br>J: JST connector | Blank    | Delta Standard,<br>No conformal coating |
| P: Open frame                  | 120: 120 W                    |             | 12 – 12V<br>15 – 15V<br>18 – 18V<br>24 – 24V |                                 |          |   |

# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

### Specifications

#### Input Ratings / Characteristics

| Model Number                  | MEP-120A12J                             | MEP-120A15J | MEP-120A18J | MEP-120A24J |       |
|-------------------------------|---|-------------|-------------|-------------|-------|
| Nominal Input Voltage         | 100-240 Vac                             |             |             |             |       |
| Input Voltage Range           | 90-264 Vac                              |             |             |             |       |
| Nominal Input Frequency       | 50-60 Hz                                |             |             |             |       |
| Input Frequency Range         | 47-63 Hz                                |             |             |             |       |
| Input Current (max)           | 1.3 A @ 115 Vac<br>0.9 A @ 230 Vac      |             |             |             |       |
| Efficiency (typ.) @ full load | @ 115 Vac                               | 91.0%       | 91.5%       | 92.0%       | 92.0% |
|                               | @ 230 Vac                               | 93.5%       | 93.5%       | 94.0%       | 94.0% |
| No load Power Consumption     | < 0.21 W @ 115 Vac & 230 Vac            |             |             |             |       |
| Inrush Current (typ.)         | 60 A @ 230 Vac, cold start              |             |             |             |       |
| Earth leakage current (max)   | 0.1 mA @ NC, 1.0 mA @ SFC <sup>*1</sup> |             |             |             |       |
| Touch current (max)           | 0.1 mA @ NC, 0.5 mA @ SFC <sup>*1</sup> |             |             |             |       |
| Power Factor (typ.)           | 0.98 @ 115 V/60 Hz, full load           |             |             |             |       |

\*1 NC: normal condition, SFC: single fault condition

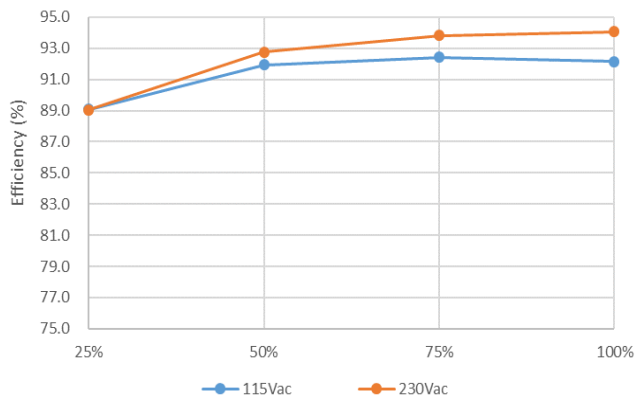


Figure 1-1. Typical efficiency Curve for 12 V

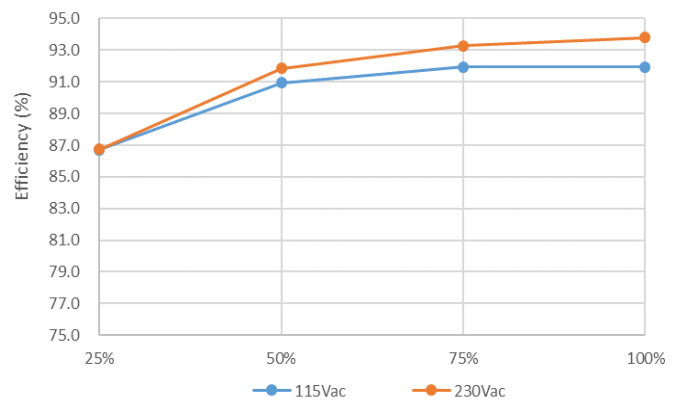


Figure 2-2. Typical efficiency Curve for 15 V

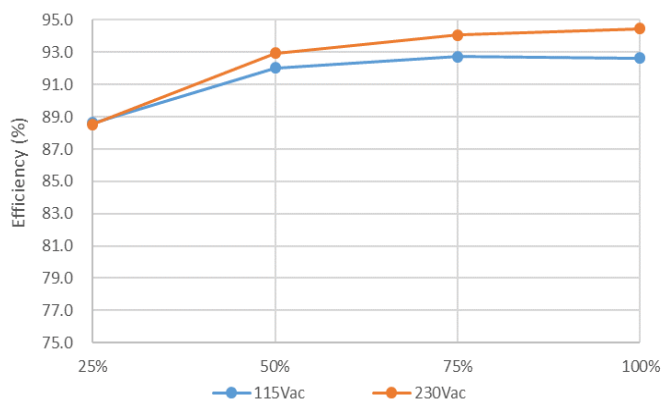


Figure 3-3. Typical efficiency Curve for 18 V

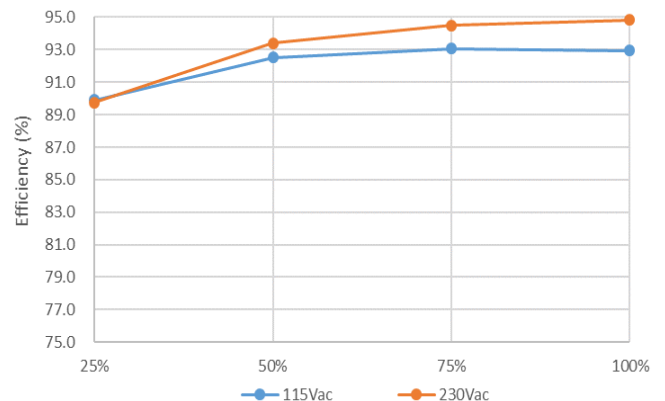


Figure 4-4. Typical efficiency Curve for 24 V

# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

### Output Ratings / Characteristics\*2

| Model Number                |          | MEP-120A12J  | MEP-120A15J | MEP-120A18J | MEP-120A24J |
|-----------------------------|----------|--|-------------|-------------|-------------|
| Output Power (max)          |          | 114 W  |             | 120 W       |             |
| Peak Power (max) for 10 sec |          | 140 W  |             | 150 W       |             |
| Line Regulation (max)       |          | 0.5%   |             |             |             |
| Load Regulation (max)       |          | 1%   |             |             |             |
| PARD <sup>3</sup> (20 MHz)  | ≥ 25 °C  | 100 mVpp   | 120 mVpp    | 150 mVpp    | 150 mVpp    |
|                             | ≥ -30 °C | 300 mVpp   | 360 mVpp    | 450 mVpp    | 450 mVpp    |
| Start-up Time (max)         |          | 1000 ms @ 115 Vac<br>500 ms @ 230 Vac  |             |             |             |
| Hold-up Time (typ.)         |          | 20 ms @ 100% load, with nominal input range  |             |             |             |
| Rise time (max)             |          | 40 ms  |             |             |             |
| Dynamic Response            |          | ± 10% @ with 5-100% load change,<br>(50% duty @ 5 Hz & 10 KHz, 2.5 A/us slew rate) |             |             |             |
| Capacitive load (max)       |          | 8000 uF  |             |             |             |

\*2 For power de-rating from > 50°C to 70°C, see power de-rating on page 5

\*3 PARD is measured with an AC coupling mode, and in parallel to end terminal with 0.1 μF ceramic capacitor & 47 μF electrolytic capacitor.  
PSU need to burn in > 5 minutes when AMB ≤ 0°C

### Mechanical

|                                   |        |  |
|-----------------------------------|--------|--|
| Package                           |        | Open Frame                             |
| Dimensions (W x L x H)            |        | 50.8 x 76.2 x 31 mm (2 x 3 x 1.2 inch) |
| Unit Weight                       |        | 0.14 kg (0.308 lb)                     |
| Cooling System                    |        | Convection                             |
| Terminal                          | Input  | JST: B2P3-VH(LF)(SN) or equivalent     |
|                                   | Output | JST: B4P-VH(LF)(SN) or equivalent      |
| Noise (1 meter from power supply) |        | Sound Pressure Level (SPL) < 25 dBA    |

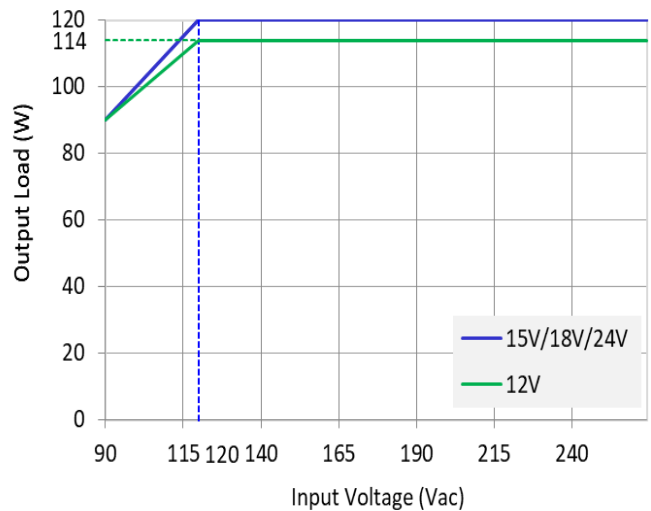
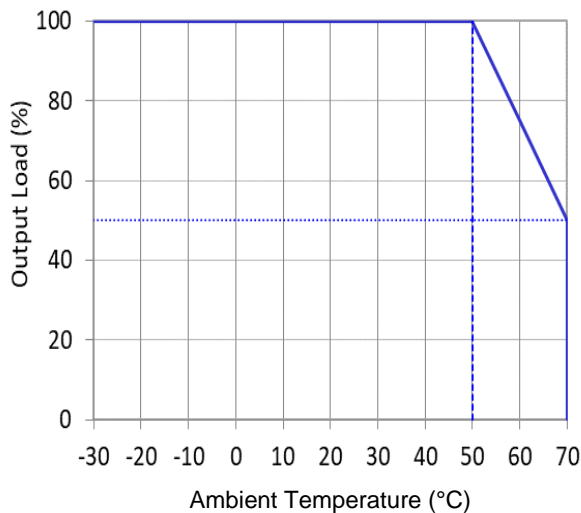
# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

### Environment

|                             |  |                                    |
|-----------------------------|--|------------------------------------|
| Surrounding Air Temperature | Operating  | -30°C to +70°C (-40°C cold start ) |
|                             | Storage  | -40°C to +85°C                     |
| Temperature Power De-rating | Linear power derating from 100% load at 50°C, to 50% load at 70°C with 2.5%/°C<br>Note: see power de-rating curves below                         |                                    |
| Line Power De-rating        | < 120Vac de-rate power by 0.70% / Vac (12 V)<br>< 120Vac de-rate power by 0.83% / Vac (15 V/18 V/24 V)<br>Note: see power de-rating curves below |                                    |
| Operating Humidity          | 5-95% RH (Non-Condensing)  |                                    |
| Operating Altitude          | Up to 5,000 meters (up to 16,400 feet or 106-54 kPa)<br>( 4000 meters for IEC 60335-1, IEC 61558-1 )   |                                    |
| Shock Test (Non-Operating)  | 50 G, 11 ms, 3 shocks for each direction   |                                    |
| Vibration (Non-Operating)   | 5-500 Hz, 2.09 Grms, 20 minute for each three axis   |                                    |
| Over Voltage Category       | II   |                                    |
| Pollution Degree            | 2  |                                    |

### Power De-rating Curve



### Protections

|                            |  |
|----------------------------|--|
| Overvoltage                | Main output 110-150% of rated normal voltage, Latch mode |
| Over load / Over current   | Main output 105-185% of rated current , Hiccup Mode      |
| Over Temperature           | Latch Mode   |
| Short Circuit              | Hiccup Mode (Non-Latching, Auto-Recovery)                |
| Protection Against Shock*4 | Class I & II   |

\*4 applicable to Class II medical equipment which need to be evaluated in the end product assembly

# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

### Reliability Data

|  |                                     |
|--|-------------------------------------|
| MTBF (typ.) at 115 Vac & 230 Vac, 25 °C                    | 700K hrs based on Telecordia SR-332 |
| Operating life (typ.) at 115 Vac & 230 Vac, 50% load, 40°C | 10 years                            |

### Safety Standards / Directives

|  |   |                          |          |                          |          |                           |                                      |
|--|---|--------------------------|----------|--------------------------|----------|---------------------------|--------------------------------------|
| Medical Safety                             | IEC60601-1 CB report<br>TUV EN60601-1<br>ANSI/AAMI ES 60601-1+CAN/CSA-C22.2 No.60601-1  |                          |          |                          |          |                           |                                      |
| ITE Safety                                 | IEC60950-1 CB report<br>IEC62368-1 CB report<br>TUV EN 62368-1<br>UL 62368-1 and CAN/CSA C22.2 No. 62368-1<br>CCC GB 17625.1; GB 4943.1; GB/T 9254.1  |                          |          |                          |          |                           |                                      |
| Home Appliance<br>( for 12 V & 24 V model) | IEC60335-1 CB report<br>IEC61558-1 /-2-16 CB report<br>TUV EN60335-1<br>TUV EN61558-1/-2-16   |                          |          |                          |          |                           |                                      |
| CE   | In conformance with EN 60601-1: 2006 + A11: 2011 + A1: 2013 + A12: 2014 & EN 60601-1-2: 2015  |                          |          |                          |          |                           |                                      |
| UKCA                                       | In conformance with Electromagnetic Compatibility Regulations 2016 and Medical Devices Regulations 2002 Regulations 2016 (UK MDR 2002)  |                          |          |                          |          |                           |                                      |
| Galvanic Isolation                         | <table border="1"> <tr> <td>Input to/Output (2XMOPP)</td> <td>4000 Vac</td> </tr> <tr> <td>Input to/Ground (1XMOPP)</td> <td>2000 Vac</td> </tr> <tr> <td>Output to/Ground (1XMOPP)</td> <td>1500 Vac (Type BF application rated)</td> </tr> </table> | Input to/Output (2XMOPP) | 4000 Vac | Input to/Ground (1XMOPP) | 2000 Vac | Output to/Ground (1XMOPP) | 1500 Vac (Type BF application rated) |
| Input to/Output (2XMOPP)                   | 4000 Vac  |                          |          |                          |          |                           |                                      |
| Input to/Ground (1XMOPP)                   | 2000 Vac  |                          |          |                          |          |                           |                                      |
| Output to/Ground (1XMOPP)                  | 1500 Vac (Type BF application rated)  |                          |          |                          |          |                           |                                      |

# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

## EMC

|                                   |                |  |
|-----------------------------------|----------------|--|
| EMC / Emissions                   |                | EN55032, CISPR 32 AS/NZS CISPR32 & CISPR11 Class B<br>Compliance to EN55014-1, CISPR 14-1, AS/NZS CISPR 14 Class B<br>Note: Class A Radiated Emission for Class II connection without earth connection   |
| Harmonic Current Emissions        | IEC 61000-3-2  | Meet Class A limit   |
| Voltage Flicker                   | IEC 61000-3-3  |  |
| Immunity to                       |                |  |
| Electrostatic Discharge           | IEC 61000-4-2  | Level 4 Criteria A <sup>1)</sup><br>Air Discharge: 15 kV<br>Contact Discharge: 8 kV  |
| Radiated Field                    | IEC 61000-4-3  | Criteria A <sup>1)</sup><br>80 MHz-2700 MHz, 10 V/m AM modulation  |
| Electrical Fast Transient / Burst | IEC 61000-4-4  | Level 3 Criteria A <sup>1)</sup> : 2 kV  |
| Surge                             | IEC 61000-4-5  | Level 3 Criteria A <sup>1)</sup><br>Common Mode <sup>3)</sup> : 2 kV<br>Differential Mode <sup>4)</sup> : 1 kV   |
| Conducted                         | IEC 61000-4-6  | Level 2 Criteria A <sup>1)</sup><br>150 kHz-80 MHz, 3 Vrms, 6 Vrms at ISM bands and<br>Amateur radio bands   |
| Power Frequency Magnetic Fields   | IEC 61000-4-8  | Criteria A <sup>1)</sup><br>Magnetic field strength 30 A/m   |
| Voltage Dips                      | IEC 61000-4-11 | 0% residual; 1 cycle, Criteria A <sup>1)</sup><br>40% residual; 10 cycle, Criteria B <sup>2)</sup><br>70% residual; 25 cycle, Criteria B <sup>2)</sup>   |
| Voltage Dips <sup>5)</sup>        | IEC 60601-1-2  | Criteria A <sup>2)</sup><br>0% U <sub>T</sub> , 0.5 cycle (10 ms),<br>(0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°, 360°)<br>Criteria B <sup>2)</sup><br>0% U <sub>T</sub> , 1 cycle (20 ms), 0°<br>Criteria B <sup>2)</sup><br>70% U <sub>T</sub> , 25 cycle (500 ms), 0°<br>Criteria B <sup>2)</sup><br>0% U <sub>T</sub> , 250 cycle (5000 ms), 0° |

1) Criteria A: Normal performance within the specification limits

2) Criteria B: Output out of regulation, or shuts down during test. Automatically restored to normal operation after test.

3) Asymmetrical: Common mode (Line to earth)

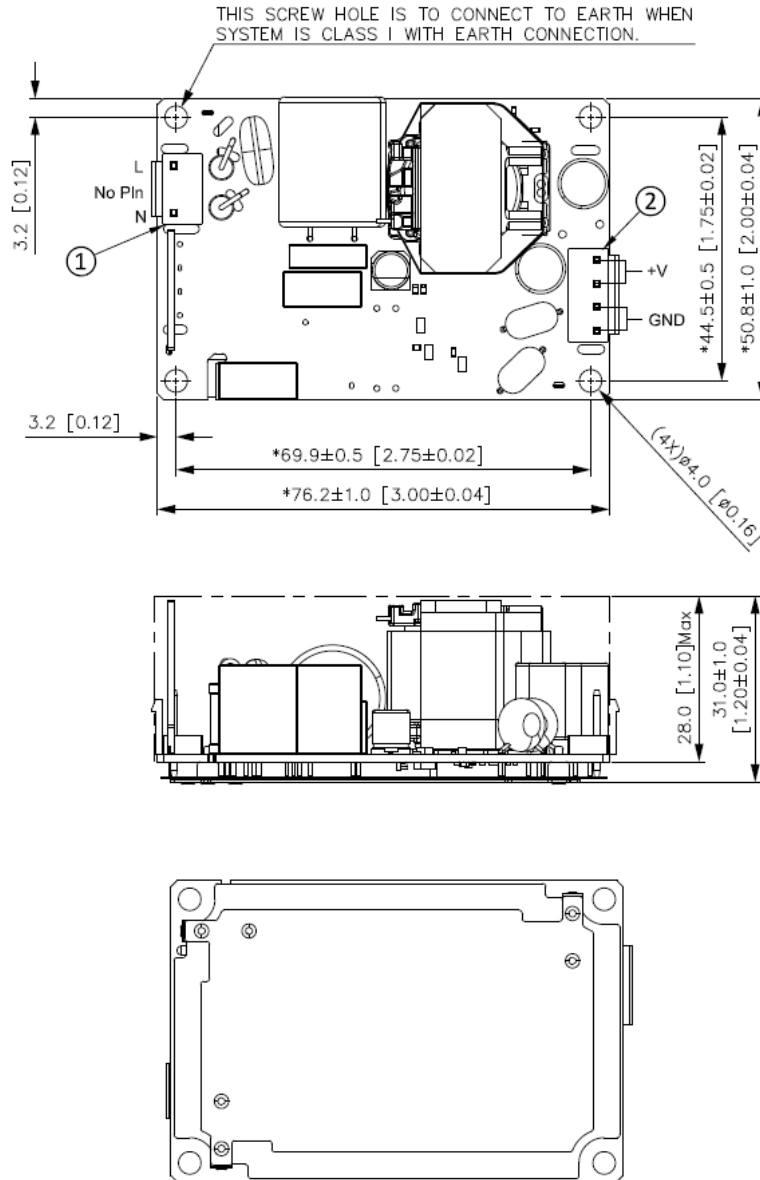
4) Symmetrical: Differential mode (Line to line)

# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

### Dimensions

L x W x H: 50.8 x 76.2 x 31.0 mm (2 x 3 x 1.2 inch)



### Notes:

- All dimensions are in millimeters and inches.

### Connector Definition and Pin Assignment:

| No | Item                       | Part No.                      | Mating                       |
|----|----------------------------|-------------------------------|------------------------------|
| 1  | AC input connector(CN1)    | JST, B2P3-VH<br>or equivalent | JST, VHR-3N<br>or equivalent |
| 2  | DC output connector(CN101) | JST, B4P-VH<br>or equivalent  | JST, VHR-4N<br>or equivalent |

# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

### Functions

#### Start-up Time

The time required for the output voltage to reach 90% of its final steady state value, after the input voltage is applied.

#### Rise Time

The time required for the output voltage to change from 10% to 90% of its final steady state value.

#### Hold-up Time

Time between the collapse of the AC input voltage, and the output falling to 90% of its steady state value.

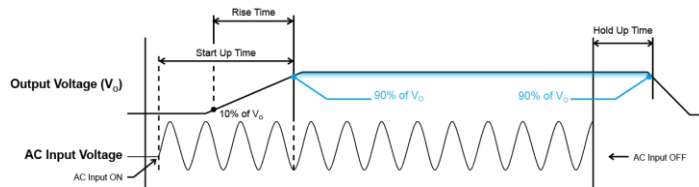


Figure 2. Time Sequence

#### Dynamic Response (Main Output)

The power supply output voltage will remain within  $\pm 10\%$  of its steady state value, when subjected to a dynamic load 5% to 100% of its rated current.

##### ■ 5% to 100% Load

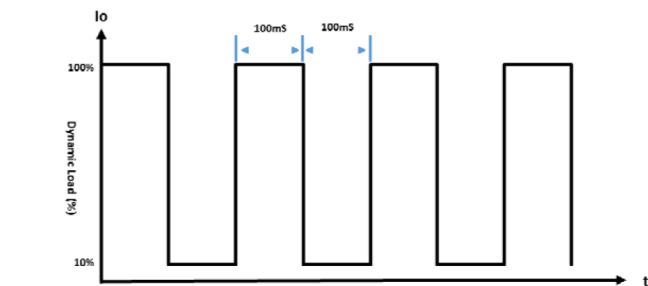


Figure 3-1. Dynamic Load (5 Hz)

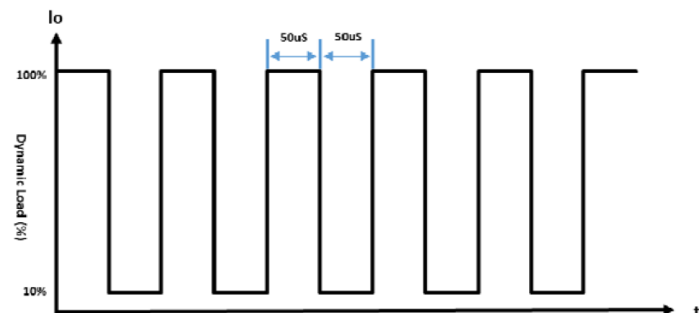


Figure 3-2. Dynamic Load (10K Hz)

#### Inrush Current

Inrush current is the input current that occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent cycles of AC voltage.

#### Overvoltage Protection

The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 5 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

#### Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Protections will be activated before output current under 175% of  $I_o$  (Max load). Upon such occurrence,  $V_o$  will start to drop. Once the power supply has reached its maximum power limit, the protection will be activated and the power supply will go into "Hiccup mode" (Auto-Recovery). The power supply will recover once the fault condition causing the OLP and OCP is removed and  $I_o$  is back within the specified limit.

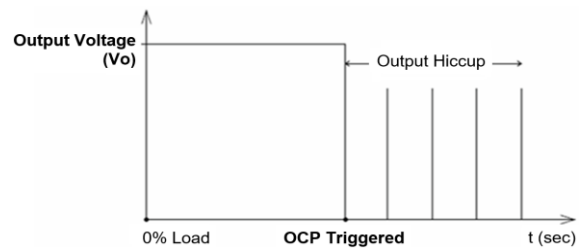


Figure 4. Hiccup at OLP/OCP

Additionally, if the  $I_{out}$  is  $>100\%$  for a prolonged period of time (depending on the load), the Over Temperature Protection (OTP) may be activated due to high temperature on critical components. The power supply will then go into latch mode.

#### Short Circuit Protection

Output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", The power supply will return to normal operation after the short circuit is removed.

#### Over Temperature Protection

As mentioned above, the power supply also has Over Temperature Protection (OTP). This is activated when the overload condition persists for an extended duration and the output current is below the overload trigger point but  $>100\%$  load. In the event of a higher operating temperature condition at 100% load, the power supply will run into OTP when the surrounding air temperature is higher than the operating temperature. When activated, the output voltage will go into latch mode until the input voltage is removed; then, reapplied, and the surrounding air temperature drops to its normal operating temperature.



# Medical / Industrial AC-DC Power Supply

## 120 W Convection 2" x 3" / MEP-120A□J BNA

### Certificate



All Delta Medical Power products conform to the European directive 2011/65/EU.  
ROHS is the abbreviation for "Restriction of the use of certain hazardous substances"



Delta has been certified as meeting the requirement of ISO 13485: 2003 and EN ISO 13485:2012 for the design and manufacture of switching power supply and adaptor for medical device.



In addition to a UL Total Certification Program (TCP) approved client laboratory for IEC60950 and IEC60065. Delta also has participated UL Client Test Data Program (CDTP) for IEC 60601

### Attention

Delta provides all information in the datasheets on an "AS IS" basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalog and datasheets, the datasheets shall prevail (please refer to [www.DeltaPSU.com](http://www.DeltaPSU.com) for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

Delta reserves the right to make changes to the information described in the datasheets without notice.

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