

# Medical AC-DC Adapter

## 24V 250W / MEA-250A24C□

# MEA-250A24C□



### Highlights & Features

- Meet Efficiency Level VI
- Safety Approvals to IEC 60601-1 3.1 Ed. & IEC 60950-1
- Compliant with IEC 60601-1-2 3<sup>rd</sup> and 4<sup>th</sup> Ed. Requirements
- IP22 ingress protection rating
- 2 × MOPP isolation
- Suited for Type BF Medical Products

### Safety Standards



CB Certified for worldwide use

<b>Model Number:</b>	MEA-250A24C□
<b>Unit Weight:</b>	1.05kg (37.0 ounces)
<b>Dimensions (W × L × H):</b>	100.0 × 200.0 × 43.0 mm 3.94 × 7.88 × 1.70 inch

### General Description

The MEA-250A24C medical AC-DC desktop type adapter comes with universal AC input voltage range at 90Vac to 264Vac. The 24Vdc/10.42A output adapter complies to the latest IEC/EN 60601-1-2 4th edition requirements. It is certified for EMC standards according to EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment and EN 55032 for Information Technology Equipment (ITE) radio-frequency equipment. MEA-250A24C also has both medical and ITE safety approvals including UL/cUL and IEC 60950-1, CB certification and CCC approval. Designs are fully compliant with RoHS Directive 2011/65/EU for environmental protection.

### Model Information

Medical AC-DC Adapter

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
MEA-250A24C H-A	90-264Vac	24Vdc	10.42A

### Model Numbering

					CC Code	
MEA –	250	A	24	C	H-	A
Delta Medical Desktop Adapter	Max wattage in the product series (may be lower at some voltage)	Family Code	Output Voltage (Single Output) 24 – 24V	Input Connector Type C – C14	Plug Type: 6 pins mini-fit Cable Length: 1.5m	Delta Standard

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### Specifications

#### Input Ratings / Characteristics

Nominal Input Voltage	100-240Vac
Input Voltage Range	90-264Vac
Nominal Input Frequency	50-60Hz
Input Frequency Range	47-63Hz
Input Current (max.)	4A @ 115Vac, 2A @ 230Vac
Average Efficiency (typ.)	90%, Reference Fig. 1
Standby Power (max.)	0.3W @ 115Vac & 230Vac
Inrush Current (typ.)	50A @ 115Vac and 100A @ 230Vac
Touch Current (max.)	0.1mA @ 264Vac NC <sup>1)</sup> , 0.3mA @ 264Vac SFC <sup>2)</sup>
Earth Leakage Current (max.)	0.2mA @ 264Vac NC <sup>1)</sup> , 0.5mA @ 264Vac SFC <sup>2)</sup>

- 1) NC: Normal condition
- 2) SFC: Single fault condition

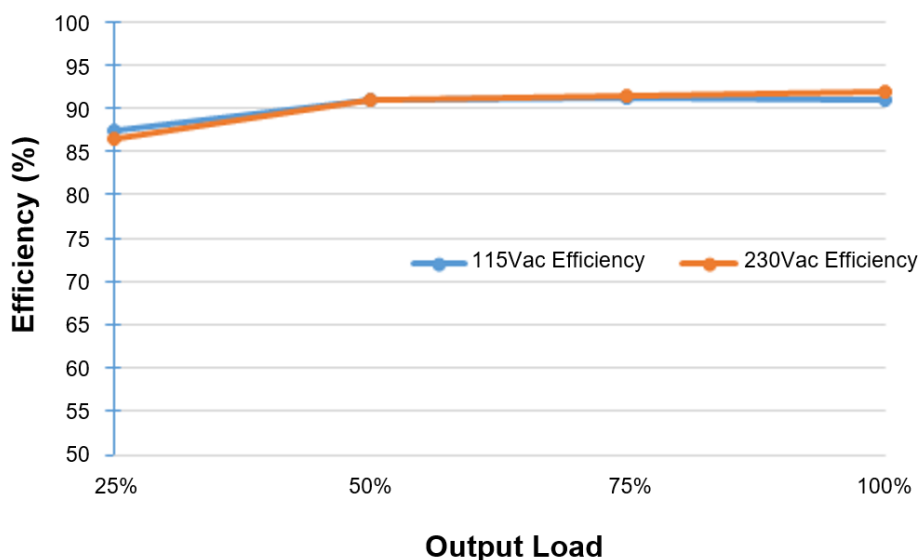


Fig. 1 Efficiency versus Output load

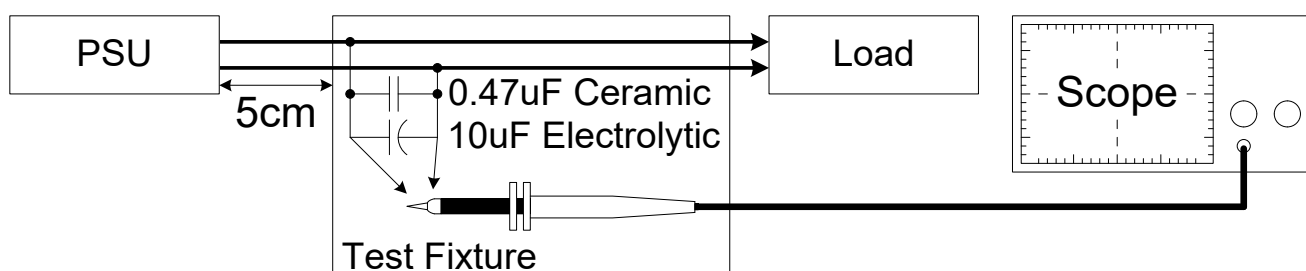
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### Output Ratings / Characteristics

Nominal Output Voltage	24Vdc
Output Total Regulation	± 5%
Output Current	10.42A
Output Power	250W
Line Regulation	± 0.5%
Load Regulation	± 4.5%
Ripple & Noise (max.)	240mVpk-pk @ Rated load
Start-up Time (max.)	3000ms @ 115Vac
Hold-up Time (min.)	10ms @ 100Vac
Dynamic Response (Overshoot & Undershoot O/P Voltage)	± 10% @ 0-50% & 50-100% load; Slew rate 0.25A/μs (@ 100Hz, 50% Duty Cycle)

### Ripple & Noise measurement circuit with 20MHz BW



### Mechanical

Case	PC
Dimensions (W × L × H)	100.0 × 200.0 × 43.0 mm (3.94 × 7.88 × 1.70 inch)
Unit Weight	1.05kg (37.0 ounces)
Cable Length	1500mm
Indicator	YES
Cooling System	NA
Terminal	Input IEC 60320 C14 socket
	Output MOLEX 39-01-2060

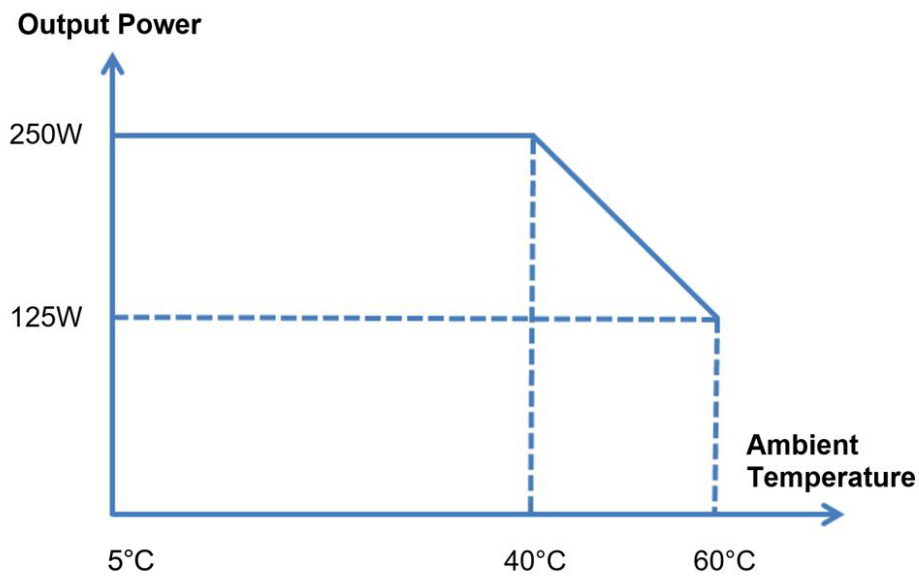
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### Environment

Surrounding Air Temperature	Operating	5°C to +60°C
	Storage	-40°C to +70°C
Power De-rating		> 40°C de-rate power by 2.5% / °C
Operating Humidity		5-95% RH (Non-Condensing)
Operating Altitude		5,000 meters (16,400 feet)
Shock Test	Non-Operating	50G, 11ms, 3 shocks for each direction
Vibration	Non-Operating	5-500Hz, 2.09Grms, 20 minute for each three axis

### Power De-rating Curve



### Protections

Overvoltage (max.)	120%, Latch Mode
Overload / Overcurrent (max.)	200% of rated load current, Hiccup Mode, (Non-Latching, Auto-Recovery)
Over Temperature	Hiccup Mode, (Non-Latching, Auto-Recovery)
Short Circuit	Hiccup Mode, (Non-Latching, Auto-Recovery)
Degree of Protection	IP22
Protection Against Shock	Class I

### Reliability Data

MTBF (typ.)	500K Hours based on Telecordia SR-332 (at 115Vac, Max. load and 25°C Ambient)
Expected Cap Life Time <sup>1)</sup>	5 Years (115Vac & 230Vac, 100% load @ 25°C)

1) Estimated lifetime when 8 hours operating a day.

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### Safety Standards / Directives

Medical Safety		IEC 60601-1 3.1 edition CB report EN 60601-1 CAN/CSA-C22.2 NO. 60601-1:14, ANSI/AAMI ES60601-1 UL60601-1 (File No. E356265)
ITE Safety		IEC60950-1 (Ed.2,2005), GB4943.1-2011, GB9254-2008, GB17625.1-2012, J60950-1(H29) UL 60950-1 (Ed.2 2014) AS/NZS 60950-1 (2015)
CE		MDD Directive 93/42/EEC
Galvanic Isolation	Input to Output (2XMOPP)	4000Vac
	Input to PE (1XMOPP)	1500Vac
	Output to PE (1XMOPP)	1500Vac (Type BF application rated)

### EMC (Compliant with IEC 60601-1-2 4<sup>th</sup> Ed. Requirements)

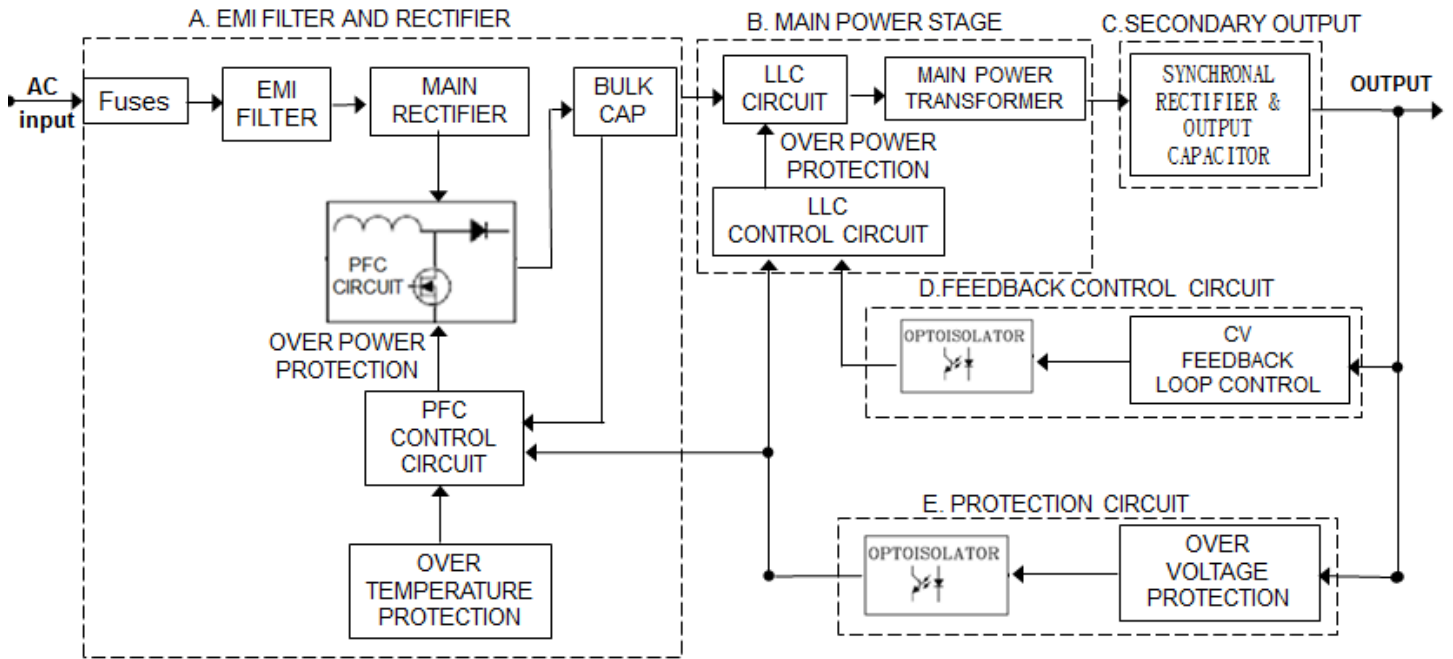
EMC / Emissions		EN55011/EN55032, FCC Title 47: Class B
Harmonic Current Emissions	IEC61000-3-2	Meet Class A and Class D limit
Immunity to		
Voltage Flicker	IEC61000-3-3	
Electrostatic Discharge	IEC61000-4-2	Level 4 Criteria A <sup>1)</sup> Air Discharge: 15kV Contact Discharge: 8kV
Radiated Field	IEC61000-4-3	Criteria A <sup>1)</sup> 80MHz-2700MHz, 10V/m AM modulation 385MHz-5785MHz, 28V/m Pulse mode and other modulation
Electrical Fast Transient / Burst	IEC61000-4-4	Level 3 Criteria A <sup>1)</sup> : 2kV
Surge	IEC61000-4-5	Level 3 Criteria A <sup>1)</sup> Common Mode <sup>3)</sup> : 2kV Differential Mode <sup>4)</sup> : 1kV
Conducted	IEC61000-4-6	Level 2 Criteria A <sup>1)</sup> 150kHz-80MHz, 3Vrms, 6Vrms at ISM bands and Amateur radio bands
Power Frequency Magnetic Fields	IEC61000-4-8	Criteria A <sup>1)</sup> Magnetic field strength 30A/m
Voltage Dips	IEC61000-4-11	Criteria A <sup>1)</sup> 0% U <sub>T</sub> , 0.5 cycle (10ms), 0°/45°/90°/135°/180°/225°/270°/315°/360°  Criteria A <sup>1)</sup> 0% U <sub>T</sub> , 1 cycle (20ms), 0°  Criteria B <sup>2)</sup> 70% U <sub>T</sub> , 25 cycle (500ms), 0°  Criteria B <sup>2)</sup> 0% U <sub>T</sub> , 250 cycle (5000ms), 0°

- 1) Criteria A: Normal performance within the specification limits
- 2) Criteria B: Output out of regulation, or shuts down during test. Automatically restore to normal operation after test.
- 3) Asymmetrical: Common mode (Line to earth)
- 4) Symmetrical: Differential mode (Line to line)

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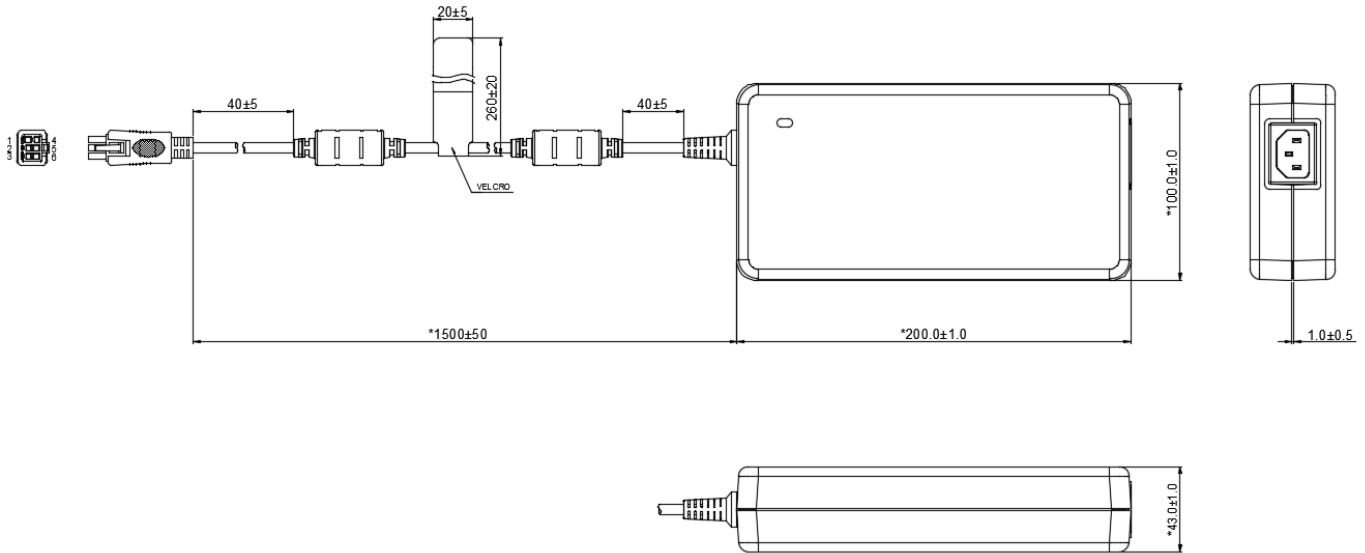
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### Block Diagram



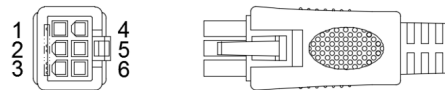
### Dimensions

W × L × H: 100.0 × 200.0 × 43.0 mm



**Note:** The plug's polarity is as following.

DC PLUG: MOLEX, 39-01-2060	
DIN PLUG	POLARITY
P1	V+
P2	V+
P3	V+
P4	RTN
P5	RTN
P6	RTN



#### MATING CONNECTOR

- PCB MOUNT TYPE  
MOLEX, 39-29-1067 (5569 SERIES)
- WIRE CONNECTOR TYPE  
HOUSING: MOLEX, 39-01-3069 (5559 SERIES)  
TERMINAL: MOLEX 5558 SERIES

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### Functions

#### Start-up Time

The time required for the output voltage ( $V_o$ ) to reach 90% of its set value, after the input AC voltage is applied.

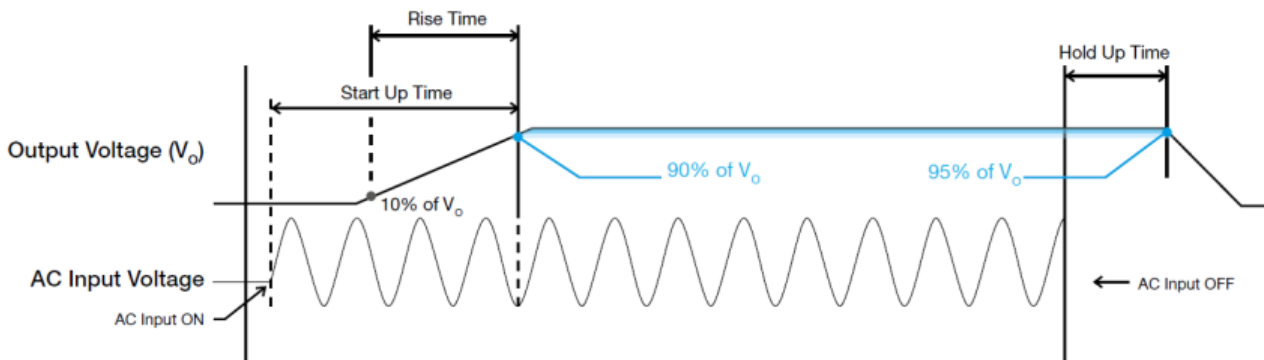
#### Rise Time

The time required for the output voltage ( $V_o$ ) to change from 10% to 90% of its steady state value.

#### Hold-up Time

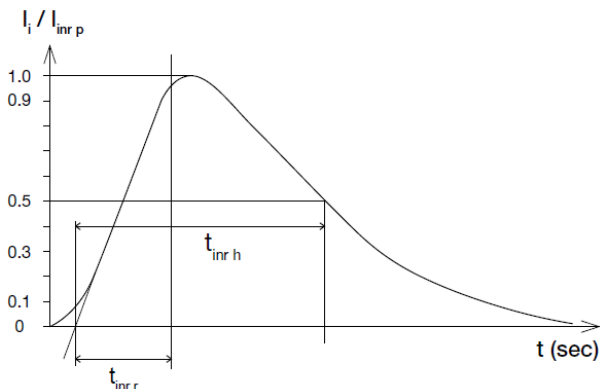
Hold up time is the time when the AC input collapses and output voltage retains regulation for a certain period of time. The time required for the output to reach 95% of its set value, after the input voltage is removed.

#### ■ Graph illustrating the Start-up Time, Rise Time, and Hold-up Time



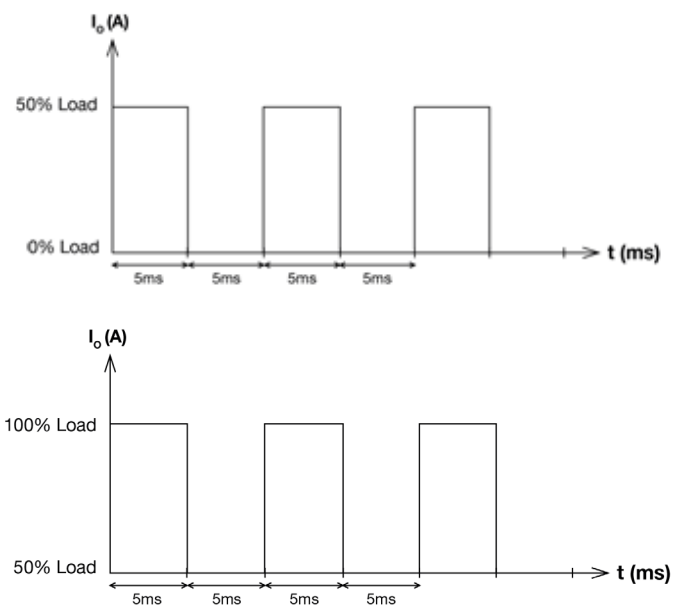
#### Inrush Current

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.



#### Dynamic Response

The power supply output voltage will remain within  $\pm 10\%$  of its steady state value, when subjected to a dynamic load change from 0% to 50% or 50% to 100% of its rated current.

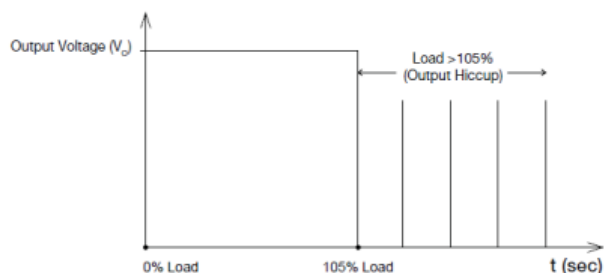


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### Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Protections will be activated when output current ( $I_o$ ) is about 105% - 200%. Upon such an 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.



### Short Circuit Protection (Auto-Recovery)

The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short circuit is removed.

### 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 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

### 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 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 hiccup mode until the input voltage is removed; then, reapplied, and the surrounding air temperature drops to its normal operating temperature.



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### Certificate



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 adapter for medical device.



Delta is approved for the UL Total Certification Program (TCP) approved client laboratory for IEC62368-1. Delta also has participated UL Client Test Data Program (CTDP) for IEC 60601.



Energy star level VI compliance

### 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.

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