

Medical AC-DC Adapter

MEA-300W Series / MEA-300A24C HAA

MEA-300A



Highlights & Features

- Meet Efficiency Level VI
- Safety Approvals to IEC 60601-1, IEC 62368-1
- IP22 Ingress Protection Rating
- Compliant with IEC 60601-1-2 4th Ed. Requirements
- Low touch current (<0.1mA Normal & 0.3mA single fault)
- 2 × MOPP isolation

Safety Standards



CB Certified for worldwide use

Model Number: MEA-300A24C HAA
Unit Weight: 1.06 ± 0.1 kg (2.34 ± 0.22 lb)
Dimensions (W × L × H): 100.0 × 200.0 × 43.0 mm
 3.94 × 7.87 × 1.69 inch

General Description

The MEA-300A24C HAA is external power supply come with universal AC input at 90Vac to 264 Vac. Key features include 0.1 mA low earth leakage and electric shock protection complying with 2 x MOPP. The MEA-300A24C HAA is certified according to EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment and meet EN 55032 for Information Technology Equipment (ITE) radio-frequency equipment. MEA-300A24C HAA has both medical and ITE safety approvals such as IEC 62368 CB certification and CCC approval. Designs are fully compliant with RoHS for environmental protection.

Model Information

Medical AC-DC Adapter

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
MEA-300A24C HAA	90-264 Vac	24 Vdc	12.5 A

Model Numbering

MEA -	300	A	24	C	□	H	A	A
Delta Medical Desktop Adapter	Max wattage in the product series 300 – 300 W	Family Code	Output Voltage (Single Output) 24 – 24 V	Input Connector Type C – C14	Blank	Plug Type: 6 pins mini-fit Cable Length: 1.2 m	Delta Standard	

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Specifications

Model Number	MEA-300A24C HAA
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Input Ratings / Characteristics

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.)	4A @ 115 Vac, 2A @ 230 Vac
Average Efficiency (typ.)	91%
Standby Power (max.)	0.3 W @ 115 Vac & 230 Vac
Inrush Current (typ.)	50A @ 115 Vac and 100A @ 230 Vac
Touch Current (max.)	<0.1 mA @ 264 Vac NC ¹⁾ , 0.3 mA @ 264 Vac SFC ²⁾
Earth Leakage Current (max.)	<0.2 mA @ 264 Vac NC ¹⁾ , 0.3 mA @ 264 Vac SFC ²⁾
Power Factor (typ.)	0.95 @ 115 Vac / 60 Hz, full load 0.90 @ 230 Vac / 50 Hz, full load

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

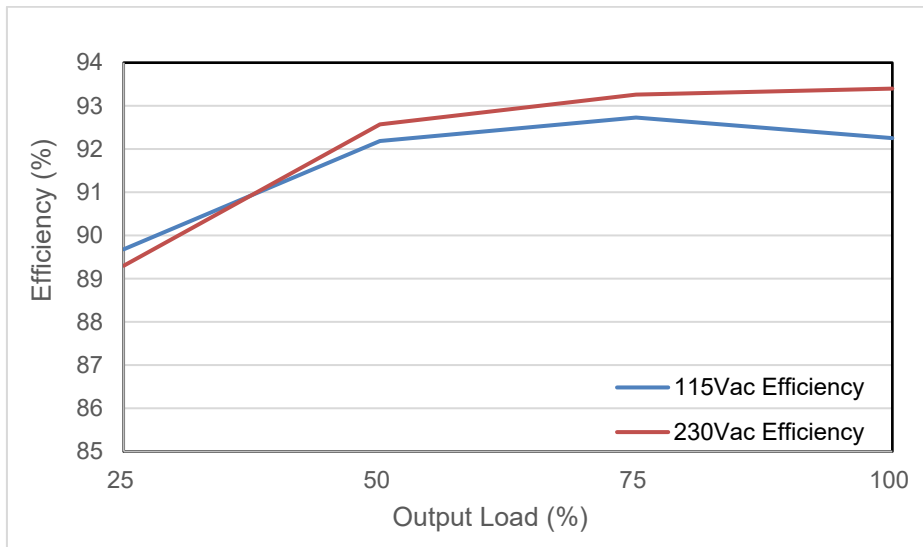


Figure 1: MEA-300A24C HAA Efficiency vs Output Load

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Model Number	MEA-300A24C HAA
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Output Ratings / Characteristics*

Nominal Output Voltage	24 Vdc
Nominal Output Current	12.5 A
Output Power	300 W
Line Regulation	± 0.5%
Load Regulation	± 4.5%
PARD*	240 mVpk-pk @ Rated load
Rise Time (max)	50 ms @ 115 Vac & 230 Vac
Start-up Time (max)	1500 ms @ 115 Vac & 230 Vac
Hold-up Time (typ.)	25 ms @ 115 Vac
Dynamic Response (Overshoot & Undershoot O/P Voltage)	21.6-25.2 V @ 0-50% & 50-100% load; Slew rate 0.25 A/μs (@ 50 Hz / 1 KHz, 50% Duty Cycle)

*PARD is measured with an AC coupling mode, and in parallel to end terminal with 0.1μF ceramic capacitor & 10μF electrolytic capacitor. PSU need to burn in > 5 minutes before test.

Mechanical

Case Chassis / Cover	PC	
Dimensions (W × L × H)	100.0 × 200.0 × 43.0 mm (3.94 × 7.87 × 1.69 inch)	
Unit Weight	1.06 ± 0.1 kg (2.34 ± 0.22 lb)	
Cable Length	1200 mm	
Indicator	Green LED	
Terminal	Input	IEC 60320 C14 socket
	Output	MOLEX 39-01-2060

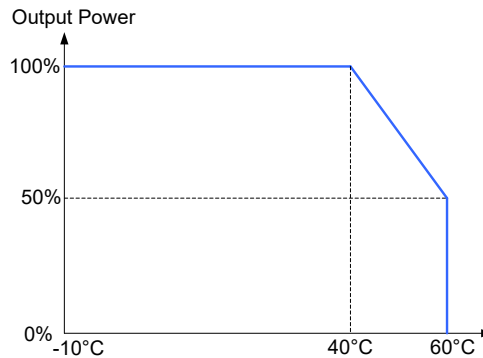
Environment

Surrounding Air Temperature	Operating	-10°C to +60°C
	Storage	-40°C to +85°C
Power De-rating		> 40°C de-rate power by 2.5% / °C
Operating Humidity		10-95% RH (Non-Condensing)
Operating Altitude		Up to 5,000 meters (up to 16,400 feet or 106-54 kPa)
Shock Test	Non-Operating	Half-Sine Wave 50G, 11 ms, 3 shocks for each direction
Vibration	Non-Operating	Random 5-500 Hz, 2.09 Grms, 20 minutes for each three axis

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Power De-rating Curve



Protections

Overvoltage (max.)	130% max of rated output voltage, Latch Mode
Overload / Overcurrent (max.)	160% max of rated load current, Hiccup Mode, (Non-Latching, Auto-Recovery)
Over Temperature	Latch
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 100 Vac, Max. load and 25°C Ambient)
Expected Cap Life Time ³⁾	5 Years (115 Vac, 100% load @ 25°C)

3) Estimated lifetime when 8 hours operating a day.

Safety Standards / Directives

Medical Safety	IEC 60601-1 CB Report, EN 60601-1 ANSI/AAMI ES60601 CAN/CSA-C22.2 No. 60601-1
ITE Safety	EN IEC 62368-1, UL 62368-1, CAN/CSA C22.2 No. 62368 PSE J 62368-1, GB 4943.1, GB/T 9254.1, GB 17625.1 BSMI CNS 15598-1 KC 62368-1 IS 13252 (Part 1)
CE	In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU EN 60601-1: 2006 + A1: 2013 + A2: 2021 & EN 60601-1-2: 2015+ A1:2021
UKCA	In conformance with Electrical Equipment (Safety) Regulations 2016 and Electromagnetic Compatibility Regulations 2016, Medical Devices Regulations 2002(UK MDR 2002)
Galvanic Isolation	Input to Output (2 X MOPP) 4000 Vac Input to PE (1 X MOPP) 1500 Vac Output to PE (1 X MOPP) 500 Vac

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EMC

EMC / Emissions		EN/ BS EN 55011, EN/ BS EN 55032 : Class B CISPR 11, CISPR 32 : Class B KS C 9832 Compliance to FCC Title 47, Class B
Harmonic Current Emissions	IEC 61000-3-2	Meet Class A and Class D limit
Immunity to		
Voltage Flicker	IEC 61000-3-3	
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A ³⁾ Air Discharge: 15 kV Contact Discharge: 8 kV
Radiated Field	IEC 61000-4-3	Criteria A ³⁾ 80 MHz-2700 MHz, 10 V/m AM modulation 385 MHz-5785 MHz, 28 V/m Pulse mode and other modulation
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A ³⁾ : 2 kV
Surge	IEC 61000-4-5	Level 3 Criteria A ³⁾ Common Mode ⁵⁾ : 2 kV Differential Mode ⁶⁾ : 1 kV
Conducted	IEC 61000-4-6	Level 2 Criteria A ³⁾ 150 kHz-80 MHz, 3 Vrms, 6 Vrms at ISM bands and Amateur radio bands
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A ³⁾ Magnetic field strength 30 A/m
Voltage Dips	IEC 61000-4-11	Criteria A ³⁾ 0% U _r , 0.5 cycle (10 ms), 0°/45°/90°/135°/180°/225°/270°/315°/360° Criteria A ⁴⁾ 0% U _r , 1 cycle (20 ms), 0° Criteria A ⁴⁾ 70% U _r , 25 cycle (500 ms), 0° Criteria B ⁴⁾ 0% U _r , 250 cycle (5000 ms), 0°

3) Criteria A: Normal performance within the specification limits

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

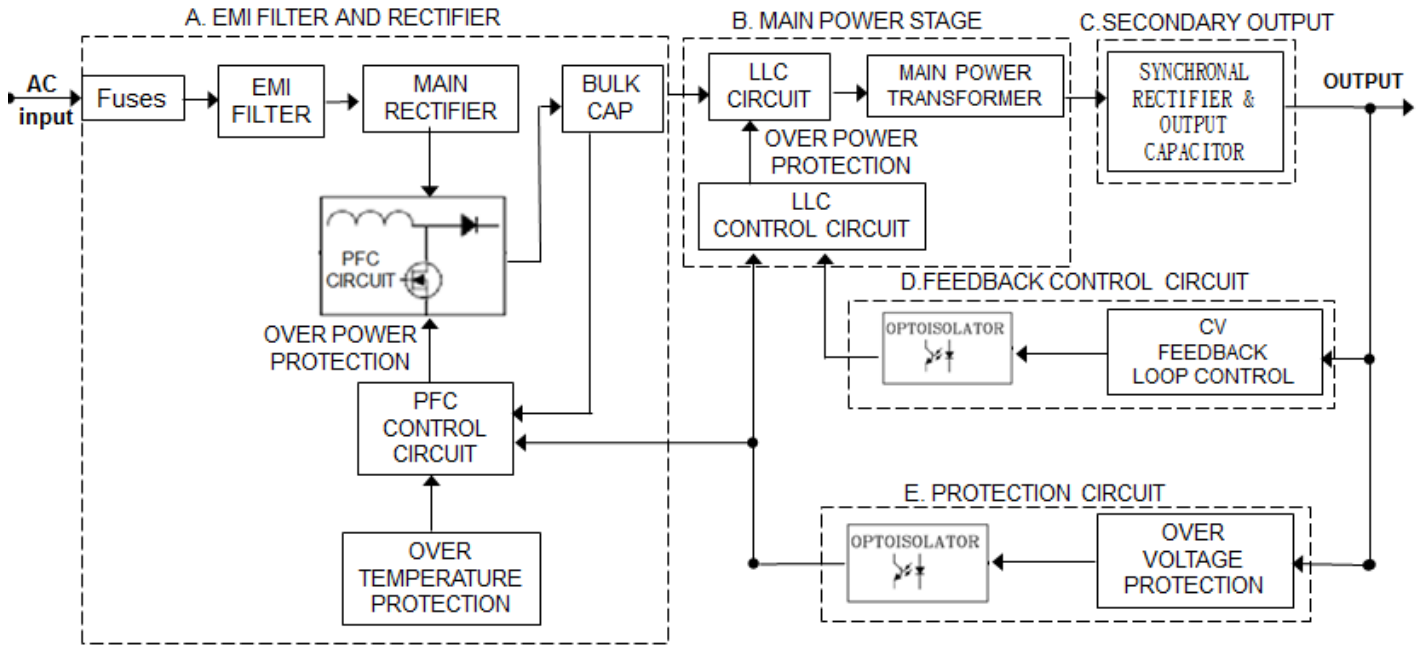
5) Asymmetrical: Common mode (Line to earth)

6) Symmetrical: Differential mode (Line to line)

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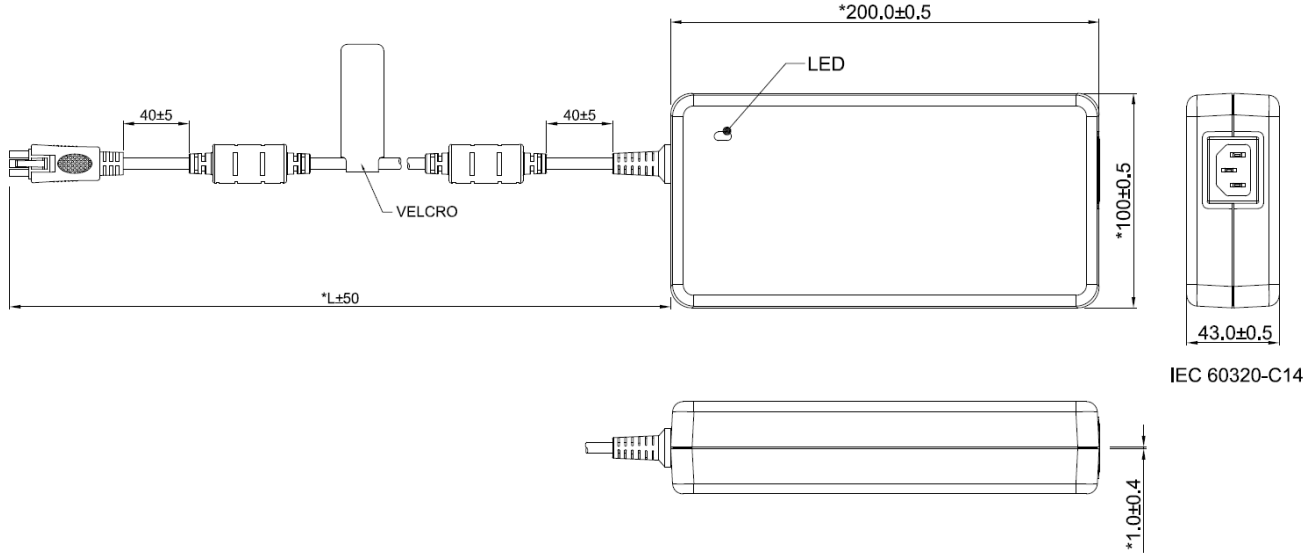
Block Diagram:



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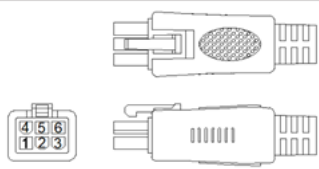
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Dimensions : W x L x H : 100.0 × 200.0 × 43.0 mm (3.94 × 7.87 × 1.7 inch)



(Unit: mm)

DC Output Plug:

Molex 39-01-2060 (4.2mm)	CC Code	Voltage	Cable Type	Cable Length	Pin Assignment	
 <p>Molex 39-01-2060 Equivalent</p>	HAA	24V	UL2464 20AWG x 6C	1.2m	1	+V
					2	+V
					3	+V
					4	-V
					5	-V
					6	-V

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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.

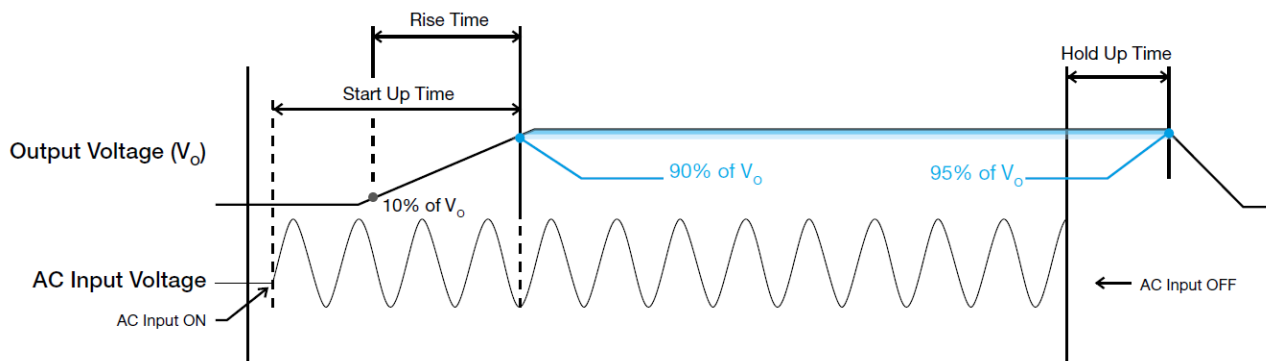
Rise Time

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

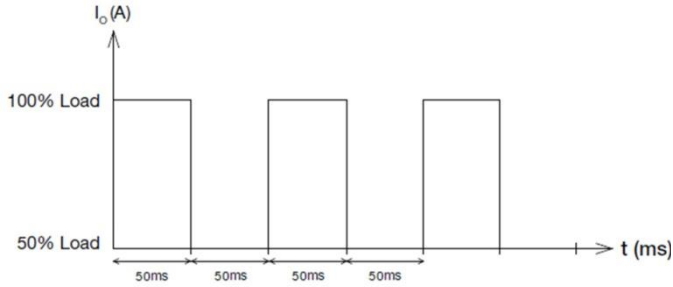


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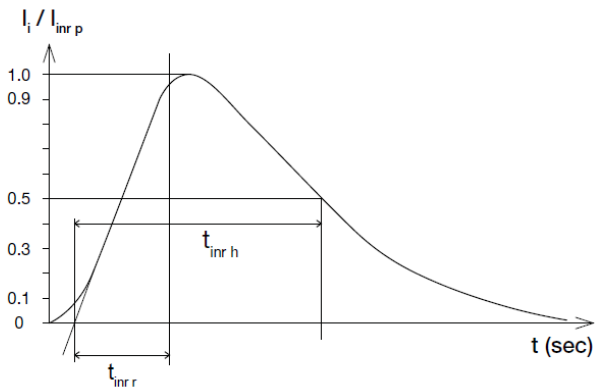
Dynamic Response

The power supply output voltage will remain within 21.6-25.2 V, when subjected to a dynamic load change from 0 to 50% & 50 to 100% of its rated current.



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

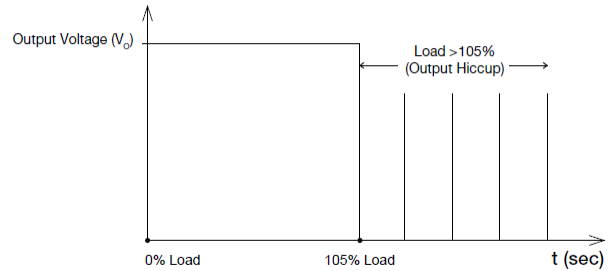
The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 4 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

Short Circuit Protection

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.

Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Protections will be activated when output current is between 105% and 160% of I_o (Max load). 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.



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 latch off and require removal/re-application of input AC voltage in order to restart.

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Certificate



Delta has been certified as meeting the requirement of ISO 13485: 2016 and EN ISO 13485:2016 for the design and manufacture of switching power supply and adaptor for medical device.



Delta is approved for the UL Total Certification Program (TCP) approved client laboratory for IEC 62368-1. Delta also has participated UL Client Test Data Program (CTDP) for IEC 60601.



Meet DOE Level VI Efficiency Requirement.