

Medical AC-DC Adapter

VPS-030AAC Serie / VPS-030AAC□



030AAC

Highlights & Features

- VPS-030AAC05, 12, 15, 24 Meet Efficiency Level VI
- Safety Approvals to IEC 60601-1 & IEC 62368-1
- Compliant with IEC 60601-1-2 4th Ed. Requirements
- Meets Limited Power Source (LPS) requirements
- Low touch current. Suitable for type BF applications
- Detachable AC plug with multiple country options
- IP22 ingress protection rating
- 2 × MOPP isolation
- 500K hours MTBF

Safety Standards



CB Certified for worldwide use

Model Number: VPS030AAC□ □□
Unit Weight: 150 grams
Dimensions (W × L × H): 53.5 × 88.0 × 27.5 mm
 2.11 × 3.46 × 1.08 inch

General Description

The VPS series of external power supply comes with universal AC input at 85 Vac to 264 Vac. Other features include low touch current, risk management report available and the electric shock protection comply with 2 × MOPP. The VPS series is certified for EMC standards according to EN/BS EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment and EN/BS EN 55032 for Information Technology Equipment (ITE) radio-frequency equipment.

The VPS series come with both medical and ITE safety approvals including UL/cUL and IEC 60950-1 CB certification as a Limited Power Source (LPS), and CCC approval. Designs are fully compliant with RoHS Directive for environmental protection.

Model Information

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Model Number	Input Voltage Range	Efficiency Level	Rated Output Voltage	Rated Output Current
VPS -030AAC05	85-264Vac	Level VI	5 Vdc	3 A
VPS -030AAC12		Level VI	12 Vdc	2 A
VPS -030AAC15		Level VI	15 Vdc	2 A
VPS -030AAC24		Level VI	24 Vdc	1.25 A

Model Numbering

VPS –	030	AAC	□	□	□	□
Medical Power Supply	Max wattage in the product series	Family Code	Output Voltage (Single Output) - 05 for 5 V - 12 for 12 V - 15 for 15 V - 24 for 24 V - 12 for 12 V - 15 for 15 V	Blank	Revision Code DC plug type and output cable length A: 2.1 x 5.5 x10mm DC plug B: 2.1 x 5.5 x12mm DC plug	Revision Code Country duck-head type A: China B: United States/JP C: European D*: United Kingdom B*: United States C: European D*: United Kingdom

* The United Kingdom duck-head is only available for VPS-030AAC15 AD & VPS-030AAC15 BD model; VPS-030AAC15 BB is not applicable.

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Specifications

Model Number	VPS-030AAC05	VPS-030AAC12	VPS-030AAC15	VPS-030AAC24
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Input Ratings / Characteristics

Nominal Input Voltage	100-240 Vac				
Input Voltage Range	85-264 Vac				
Nominal Input Frequency	50-60 Hz				
Input Frequency Range	47-63 Hz				
Input Current (max)	115 Vac	0.5 A	0.6 A	0.8 A	0.8 A
	230 Vac	0.3 A	0.4 A	0.6 A	0.6A
Average Efficiency (min)	115 Vac	81.4%	86.21%	87.0%	87.0%
	230 Vac				
Standby Power (max)	115 Vac	0.1W	0.1 W	0.1 W	0.1 W
	230 Vac				
Inrush Current (typ.)	60 A @ 115 Vac and 100 A @ 230 Vac				
Touch Current (max)	0.1 mA @ 264 Vac NC ¹⁾ , 0.3 mA @ 264 Vac SFC ²⁾				
Output-PE (protective earth) leakage current for Type BF application (max)	0.1 mA @ 264 Vac NC ¹⁾ , 0.5 mA @ 264 Vac SFC ²⁾				

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

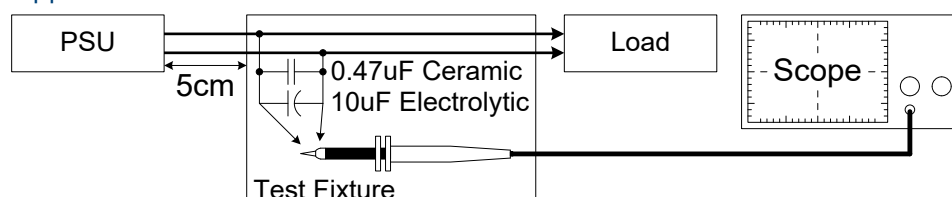
Model Number	VPS-030AAC05	VPS-030AAC12	VPS-030AAC15	VPS-030AAC24
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Output Ratings / Characteristics

Nominal Output Voltage	5 Vdc	12 Vdc	15 Vdc	24 Vdc
Output Total Regulation	±6%			
Output Current	3 A	2 A	2 A	1.25 A
Output Power	15 W	24 W	30 W	30 W
Line Regulation	±1%			
Load Regulation	±5%			
Ripple & Noise (max)	100 mVpk-pk @ Rated load	150 mVpk-pk @ Rated load	200 mVpk-pk @ Rated load	200 mVpk-pk @ Rated load
Start-up Time (max)	3000 ms @ 115 Vac			
Hold-up Time (min)	10 ms @ 115 Vac			
Dynamic Response (Overshoot & Undershoot O/P Voltage)	±10% @ 50-100% load			
Capacitive load (max)	4700 uF			

*Periodic and Random Deviation.

Ripple & Noise measurement circuit with 20 MHz BW



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Model Number	VPS-030AAC05	VPS-030AAC12	VPS-030AAC15	VPS-030AAC24
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Mechanical

Case Chassis	PC		
Case Cover	PC		
Dimensions (W × L × H)	53.5 × 88.0 × 27.5 mm (2.11 × 3.46 × 1.08 in)		
Unit Weight	150 grams (5.3 ounces)		
Indicator	NA		
Cooling System	NA		
Terminal	Input	Detachable type AC plug	
	Output	Barrel type. Dimensions 2.1 × 5.5 × 10 mm (see page 5)	

Environment

Surrounding Air Temperature	Operating	0°C to +40°C
	Storage	-40°C to +85°C
Operating Humidity	5 - 95% RH (Non-Condensing)	
Operating Altitude	5,000 meters (16400 feet)	
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	

Protections

Overvoltage (max)	150%, Latch Mode
Overload / Overcurrent (max)	250% 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 II

Reliability Data

MTBF (min)	500 K Hours based on Telecordia SR-332 (at 100 Vac, Max. load and 25°C Ambient)
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Safety Standards / Directives

Medical Safety	IEC 60601-1, EN 60601-1, CAN/CSA-C22.2 No. 60601-1, ANSI/AAMI ES 60601-1 UL 60601-1			
ITE Safety	IEC 60950-1, IEC 62368-1, GB4943.1, GB 9254, GB 17625.1 UL 60950-1, LPS (Limited Power Source)			
CE	In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU EN 60601-1: 2006 + A11: 2011 + A1: 2013 + A12: 2014 & EN 60601-1-2: 2015			
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	4000 Vac		

EMC (Compliant with IEC 60601-1-2 4th Ed. Requirements)

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

1) Criteria A: Normal performance within the specification limits

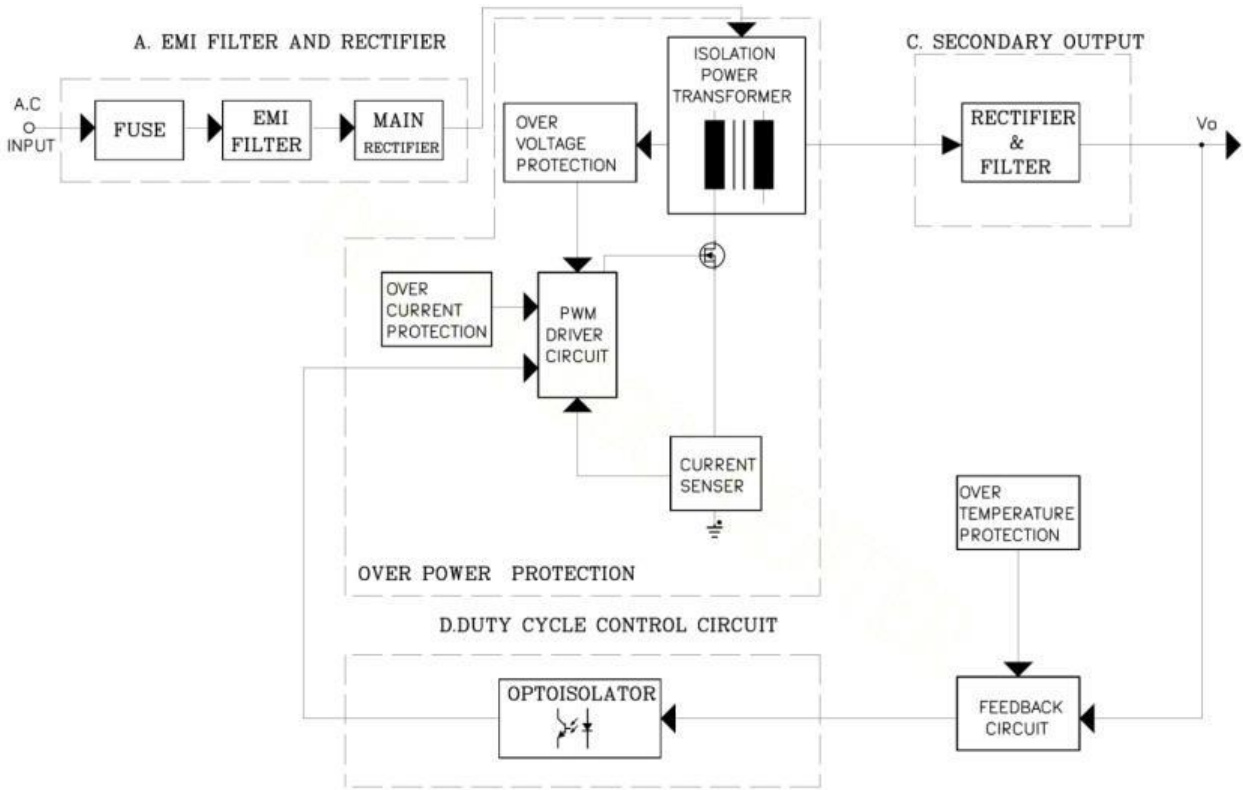
2) Criteria B: Output out of regulation, or shuts down during test. Automatically restore to normal operation after test.

3) Symmetrical: Differential mode (Line to line)

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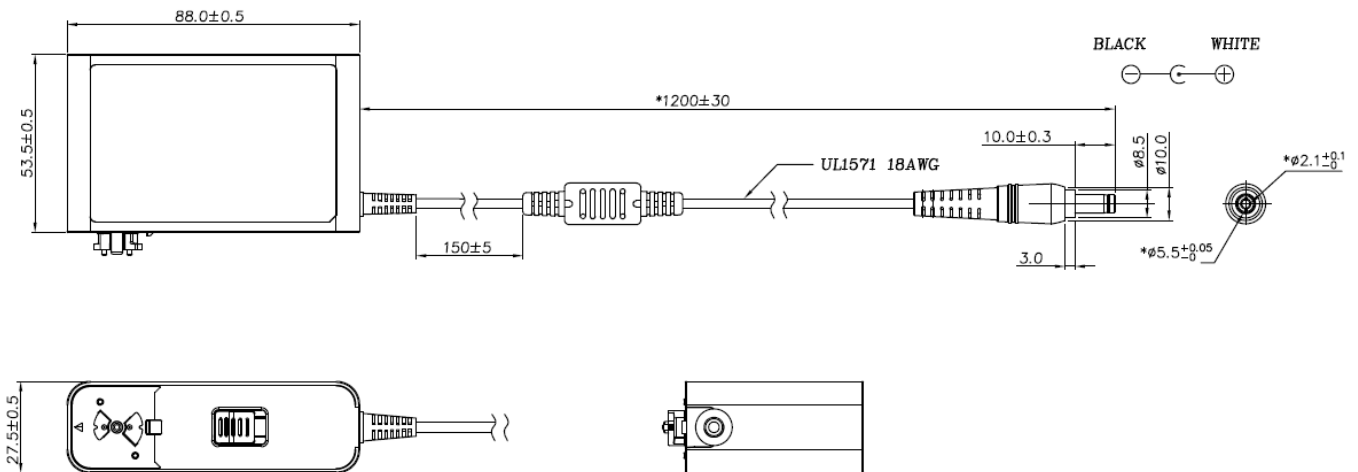
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Block Diagram



Dimensions

W × L × H: 53.5 × 88.0 × 27.5 mm

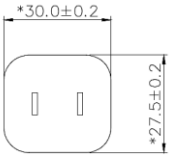
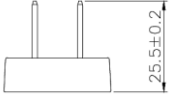

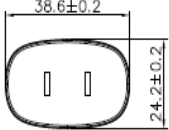
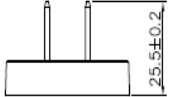
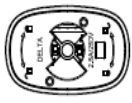
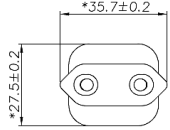
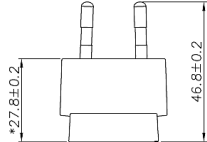
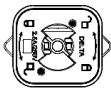

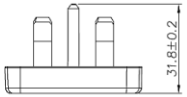
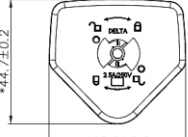


Note:
The plug's polarity is $\ominus - \ominus - \oplus$

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Duck Head Type:

CN type	US/JP type	EU type	UK type
  	  	  	  

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.

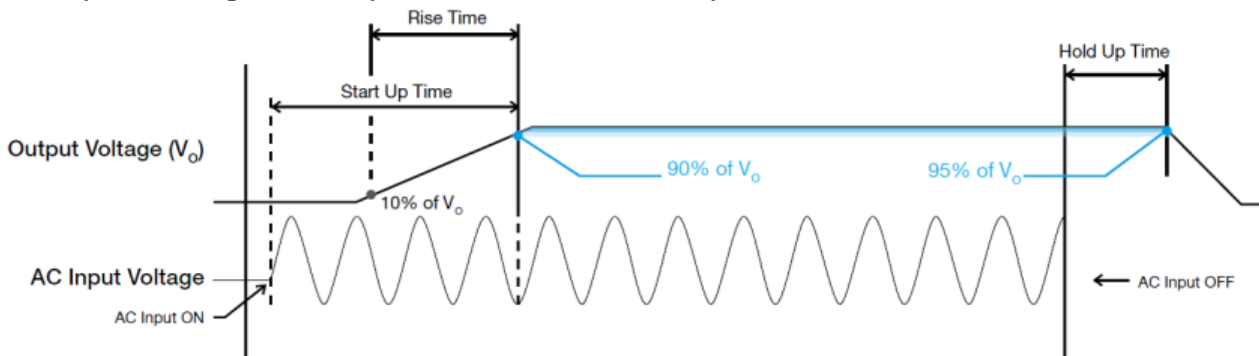
Rise Time

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



All parameters are specified at 25°C ambient unless otherwise indicated.

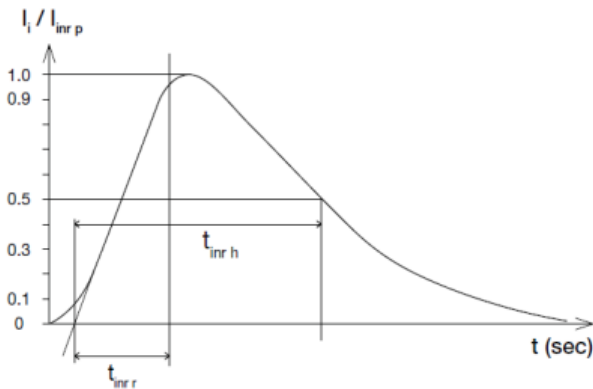


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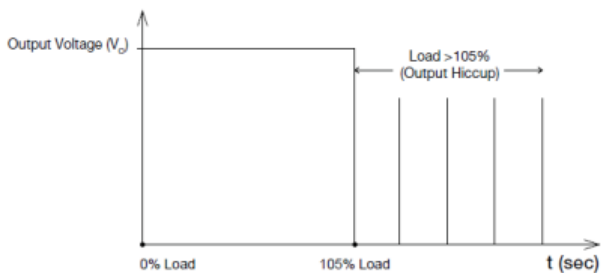
Inrush Current

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.



Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Protections will be activated when output current is between 110% and 250% 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.



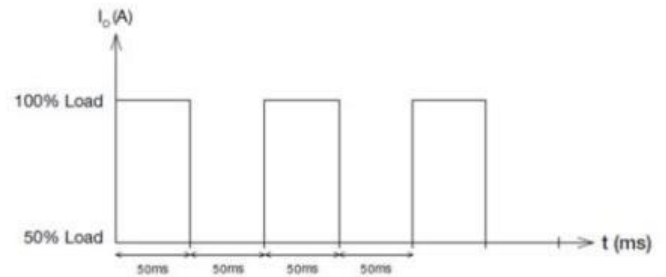
Additionally, if the I_o is <250% but >110% for a prolong period of time (depending on the load), the Over Temperature Protection (OTP) will be activated due to high temperature on critical components. The power supply will then go into hiccup mode until the fault is removed; and, the input voltage is removed, then reapplied.

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.

Dynamic Response

The power supply output voltage will remain within $\pm 3\%$ of its steady state value, when subjected to a dynamic load change from 50 to 100% of its rated current.



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 3 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.