Powervamp
ADVANCED POWER SOLUTIONS

PV90-3

90kVA 400Hz FIXED ELECTRICAL GROUND POWER UNIT

Powervamp's third generation PV90 GPU meets the specific demands of modern aircraft by delivering a genuine 90kW output from its 90kVA unit.

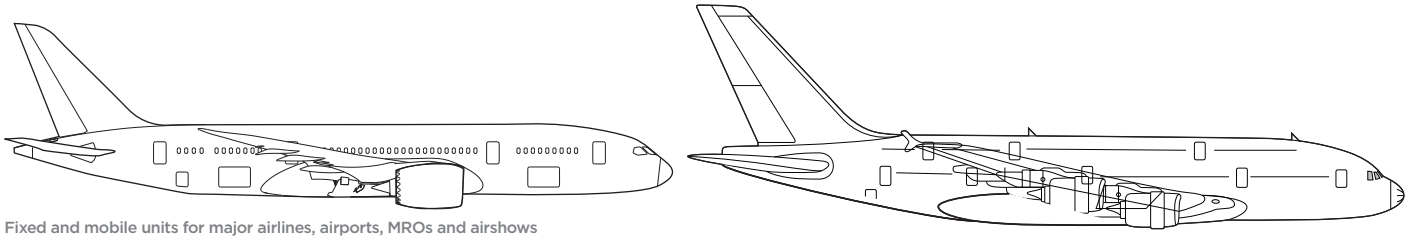
Powervamp is unique in the UK in being both software designer and manufacturer of its industry leading solid state GPUs. Its philosophy is to engineer unparalleled reliability, achieved by generously sized electrical and electronic components.

With all power stage components in a single pull-out module – replaceable in minutes – downtime and fault finding are no longer a problem. In the pressured front line operating environment of airports the PV90-3 is a converter that does not require the support of trained technicians. Powervamp's PV90-3 is designed to be a zero downtime GPU requiring a minimum of planned maintenance.

The Powervamp PV90-3 start power unit features an extra large high-definition integrated display with simple controls that allow interrogation of all parameters and functions such as automatic line drop compensation.

The PV90-3's features include connectivity and integration with existing communication platforms supporting a large variety of communication methods which can be used with Powervamp's Monitoring and Billing System (MABS™).

Typical aircraft:* Airbus A380, A340, A319, Boeing B787, B777, 747, B767, Bombardier Global Express, or power plants of a similar specification



Fixed and mobile units for major airlines, airports, MROs and airshows

PV90-3

Features

- Unity output power factor 90kVA/90kW
- Pluggable power module for easy first line maintenance
- Stainless steel enclosure as standard
- High quality output suitable for all aircraft
- Low input harmonic distortion (<8%)
- Unique tactile key board with secret legend
- Unique super-large display for instant viewing and operator comfort
- Unique marine IP65 all weather controls
- IP 55 enclosure suitable for outdoor use
- Automatic line drop compensation
- Comprehensive easy-to-use intelligent control panel
- Data logging
- Civil or military use
- RS232, LAN, Bluetooth and GPRS connections
- Designed to operate with the most complex of interlocks, including A380, B787

System operation

Input Isolator Switch

Fitted with terminal shrouds and mechanical door interlock, this ensures maximum user safety as the door cannot be opened until the switch is in the off position. Once this switch is in the on position, the system is in standby ready for use, no complicated start sequence required!

Rectifier

The rectifier supplies low ripple DC to the inverter section using rugged 12-pulse technology, the rectifier offers near unity input power factor (> 0.97) with low harmonic content (< 8%).

Near Unity Power Factor = Lower input current

Low Harmonic Content = Less strain on the electrical infrastructure

Inverter

The inverter converts the DC supplied from the rectifier into high quality 400Hz AC using the latest PWM technology, the PV90-3 inverter is highly efficient whilst providing a clean output (< 3% THD) suitable for all aircraft.

Output Transformer

Using high grade steel ensures a compact, lightweight and efficient transformer which acts as a filter and also provides the required galvanic isolation.

Output Contactor

Complete with interlock, the output contactor ensures power is isolated from the plug until the aircraft is ready to accept power.

PV90-3: specified to provide ground power at the Paris International Airshow 2015

Standard features

High Overload Capability

Modern aircraft demand high overload capability, the PV90-3 offers compatibility with all modern aircraft, in particular: 777/A380/787.

Auto Connect

After ground support press the on button, the system will run for up to 5 minutes, if during this time the pilot requests ground power, power is automatically connected without any further intervention from ground support.

Automatic Line-drop Compensation

The automatic line-drop compensation ensures each phase is individually adjusted to achieve the correct voltage at the aircraft plug. The compensation can be adjusted easily via the user interface panel (when in service mode).

Remote Control/Monitoring Connections

Remote on/off/monitoring allows the system to be controlled and monitored from a distance either from the aircraft plug or via remote switches at the end of a cable carrier system.

Filter maintenance

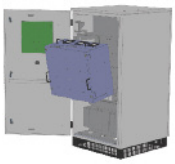
Removable polyurethane foam filter cartridge can be replaced whilst GPU running, minimising downtime during routine maintenance.

Modular design

Pluggable Power Module

One of the most outstanding features of the PV90-3 is the pluggable Power Module. In unlikely event of system failure, the “HEART” of the system can be easily replaced by first line maintenance staff in a matter of minutes.

Power module plugged in



Power module removed

The Power Module contains all power devices and control PCB’s which means there is a one-fix solution for almost any fault. So no matter where you are in the world, repairing the PV-90-3 is possible without the need for site attendance by factory trained engineers.

Powervamp guarantees turn-around times for warranty repairs of PV90-3 Power Modules and also operate a service exchange system for when your PV90-3’s warranty expires. Powervamp recommend one spare Power Module for every 5 systems in operation.

PV90-3

Enclosure

Double Door Seals

Dual seals on all doors for improved ingress protection.

Rust Treatment

Stainless steel enclosure as standard. For heavy duty trailer mount option the trailer is made from galvanised steel.

Paint Finish

Powder Coat paint finish suitable for outdoor use. Standard colour is RAL7035, other colours available.

Control panel

LCD Screen

A large blue-backlit LCD screen provides detailed information of the supply and output parameters. Intelligent system status updates are also displayed providing the user with live system and interlock information.

Status Indication

High Intensity LED status indicators provide instant status overview:
GREEN: System Healthy
AMBER: System in Alarm
RED: System Fault

Menu Function

Simple menu navigation allows easy access to additional features and settings.

Easy Robust Operation

Large rubber ON/OFF buttons offer easy robust control of the system in all weather conditions.

Data-logger

Real time data logging of system operations as well as alarm data. Each entry is date stamped for accurate diagnosis. Output power consumption is also logged at 5 minute intervals.

Protections

The PV90-3 is packed with electronic protections to ensure that the system protects the user/aircraft and system during abnormal conditions.

- No Break Power Transfer (NBPT)
- Output Neutral Monitoring
- Output Overload
- Output Short Circuit
- Output Under/Overvoltage
- Output Current Limit
- Over Temperature
- Aircraft Interlock
- Input Supply Monitor (voltage & frequency)
- Input Phase Rotation

Single 400Hz output | **Dual 400Hz output** | **400Hz/28V DC output**

PV90-3: in operation at London CIty Airport

Optional features

Monitoring and Billing System (MABS™)

The Powervamp MABS™ system offers real time interfacing and power usage to airport operations software allowing the monitoring and billing of ground power by time and/or kilowatt. The system can be configured by either input mains power or output load power. Utilising calibrated meters 0.2, 0.5 or 1.0 billing classes are available to suit individual airport requirements.

Dual 400Hz Output

A second 400Hz output complete with the necessary controls, interlock and hardware can be factory fitted allowing two aircraft to be connected to the same PV90-3 GPU. Each output is fully rated at 90kVA/90kW although the combined load should not exceed the system rating.

28V DC Output

In addition to the 400Hz output, a 600A 28V DC Transformer Rectifier Unit (TRU) can be fitted in a base module under the main system. The 28V DC TRU is fitted with line-drop compensation ensuring a stable 28V DC at the plug. The 28V DC TRU is capable of supplying up to 2000A overload for engine starts.

Base Module

For improved cable entry, the PV90-3 can be supplied with a base module which raises the system by approximately 350mm.

Remote Monitoring

The PV90-3 can be supplied with a MODBUS interface suitable for most building management systems. It is also possible to interface with other protocols, please contact our sales team with project specific requirements.

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Specifications

Output active power (kW)	90.0
Apparent output power (kVA)	90.0

INPUT

Number of phases	3
Nominal input voltage	400V 3 Wire + E (+/- 10%)
Nominal input frequency	50/60Hz (+/- 10%)
Rectification topology	12 Pulse
Current distortion	< 8% @ 100% load
Power factor	> 0.97 @ 100% load
Inrush current	N/A
Maximum input circuit breaker	160A

OUTPUT

Crest Factor	1.414% ± 0.04
Nominal output voltage	200/115V Three phase + N + E
Voltage regulation	<0.5%
Nominal output frequency	400Hz (+/- 0.01%)
Total harmonic distortion	< 3% (2% typical)
Load power factor	0.7 lagging and 0.95 leading
Voltage modulation	<1%
Phase angle symmetry	120° (+/- 1) for balanced load, 120° (+/- 2%) 30% unbalanced load
Dynamic response	MIL-STD-704F

EFFICIENCY

100% load	> 92%
50% load	> 89%
Standby losses	< 200W
No load losses	< 3kW

OVERLOAD

100% 90kVA@PF1		Continuous
125%		10 mins
150%		60s
200%		30s
300%		10s
400%	1100A Peak Inrush	1s

GENERAL

Operating temperature	-40°C to +50°C
Altitude	2000m before de-rating
Protection level	IP55
Colour	RAL 7035 (other colours available)
Noise Level	< 65dBA @ 1m
MTBF	100,000 Hrs
MTTR	10 mins
Filtration	Polyurethane foam media (20PPI), washable and flame retardant to FMV22 302

DIMENSIONS

Standard 90 kVA

Dimensions mm	H 1450 (57in)	W 700 (27.5in)	D 770 (30in)
Weight	600kg (1323 lbs)		

90kVA with 28V DC module (fitted underneath)

Dimensions mm	H 1810 (71in)	W 700 (27.5in)	D 770 (30in)
Weight	800kg (1764 lbs)		

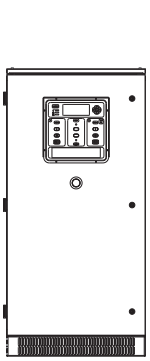
STANDARDS

Safety	EN 62040-1
Emissions	EN 61000-6-3
Immunity	EN 61000-6-2
Specification for 400 Hz aircraft power	DFS400
Aircraft ground support electric supplies	ISO 6858
General requirements for ground support equipment	BS 2G 219
Aircraft electric power characteristics	MIL-STD-704F
Ground equipment 400 Hz ground power performance requirement	SAE ARP 5015 and SAE AIR 5387

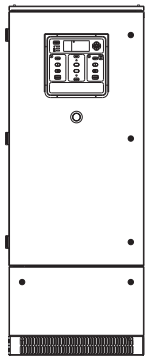
Optional features

- Monitoring and Billing System (MABS™)
- Load power metering
- Second 400Hz output
- 28V DC base module
- Heavy duty trailer mount
- Heavy duty castor mount
- Input cable side entry option
- Hard-wired power input cable
- 400Hz 6-pin output cable and connector

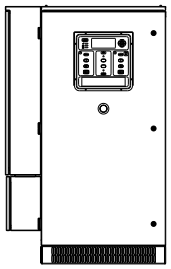
PV90-3 configuration options



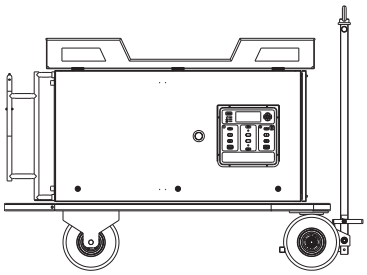
Fixed installation



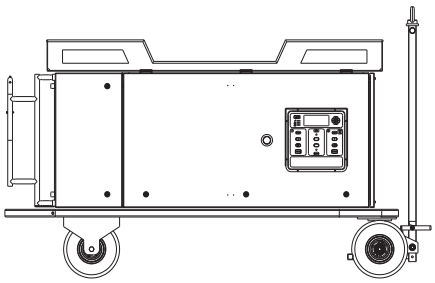
Fixed installation with 28V DC module



Fixed installation with side cable entry



Mobile towable



Mobile towable with 28V DC module

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