Powervamp
ADVANCED POWER SOLUTIONS

PV90-3 GPU

FEATURES

- Unity output power factor 90kVA/90kW
- Pluggable power module for easy first line maintenance
- 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 & CAN Connections

OPTIONAL FEATURES

- Billing System
- Second 400Hz output
- 28V DC base module
- Trolley mount
- Bridge mount

90KVA 400Hz FIXED ELECTRICAL GROUND POWER UNIT

Powervamp's latest PV90 Mk3 Converter is designed to meet the demands of the latest generation of aircraft for 90 kW from a 90 kVA FEGP installation.

Continuously delivering a genuine 90 kW (significantly more that the 90 kVA – 72 kW which is the generally quoted power) requires the generous sizing of electrical and electronic components and the ability to dissipate the heat generated at continuous full load.

As a manufacturer and exclusive provider of ground power at major air shows, Powervamp's engineers have been uniquely placed to operate the company's converters on all the world's latest generation aircraft, gaining unrivalled data and experience while working alongside the airframe manufacturers' test and field engineers. In this respect Powervamp is unique. The design of its latest 90 kW unit draws on the experience of its own ground handling team.

*This information is given in good faith

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GREENER POWER

TECHNICAL DATA

PV90-3 GPU	
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

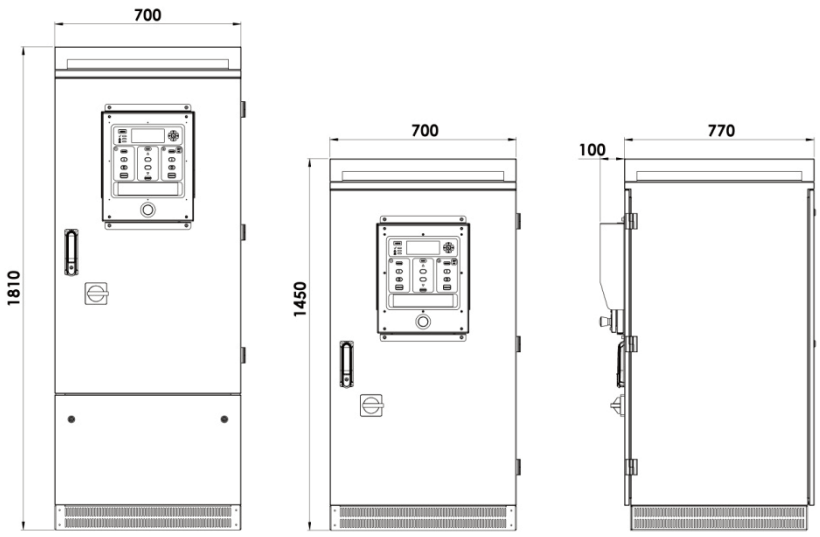
OUTPUT	
Nominal output voltage	200 / 115V Three phase + N + E
Static voltage regulation	< 1%
Nominal output frequency	400Hz (+ / - 0.01%)
Total harmonic distortion	< 3% (2% typical)
Load power factor	0.7 lag – 0.9 lead
Voltage modulation	< 1%
Phase angle symmetry	120° (+ /- 1) for balanced load, 120° (+ / - 2%) 30% unbalanced load
Dynamic response	MIL-STD-704

OVERLOAD
90kVA @ PF1 Continuous
125% for 5 minutes
200% for 5 seconds
250% for 1 second
1100A Peak Inrush

EFFICIENCY	
100% load	> 93%
50% load	> 90%
Standby losses	< 60W
No load losses	< 2kW

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	
Dimensions Height 1810mm	Width 700mm	Depth 770mm	Weight ????????
MTBF		100,000 hours	
MTTR		20 minutes	

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-704
Ground equipment 400 Hz ground power performance requirement	SAE ARP 5015



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 (< 2% 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.

STANDARD FEATURES

High Overload Capability

Modern aircraft demand high overload capability, the PV90-3 offers compatibility with all modern aircraft, in particular: 777 / A380 / 780.

Auto Connect

After ground support press the on button, the system will run for up to 10 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.

SAFETY FEATURES

Neutral Monitoring

The aircraft is referenced to earth via the neutral conductor, this means it's critical that the neutral conductor is not disconnected as this can cause the aircraft body to rise up to an unsafe potential. The PV90-3 monitors the neutral conductor via the interlock cable (or optional reference cable) and disconnects the output in the event of neutral cable failure.

Emergency Stop

An emergency stop button is fitted as standard, when pressed, the output will rapidly disconnect and the system will shut down in a controlled manner.

Aircraft Interlock

Selectable via the control panel, the interlock can be setup for either civil or military interlock types. The interlock ensures output power is not energised unless the plug is connected to the aircraft and the interlock signal is received.

Front Door Interlock

Ensures the front door cannot be opened without isolating the input power.

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.

ENCLOSURE

Three Point Locking System

Hinged front door with Three Point Locking supplied as standard making opening easier and ensuring even pressure is applied to door seals.

Double Door Seals

Dual seals on all doors for improved ingress protection.

Rust Treatment

The enclosure is pre-treated with a rust inhibitor to extend the life of the enclosure.

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.

Secret-till-lit Technology

The PV90-3 offers unique secret-till-lit technology simplifying user operation and allowing the same control panel to be used for various applications. The illustration below shows the combinations available.

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.

Remote Mounting

The control panel is completely isolated from the remainder of the enclosure, as such it is possible to locate the control panel away from the actual system, this is particularly useful for bridge-mount installations.

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

OPTIONAL FEATURES

Billing System (MABS)

Airport Monitoring and Billing System offers real-time interfacing and power usage to airport logistics software allowing the billing of ground power by time and kilowatt. Utilising Landis & Gyr power meters it is possible to achieve 0.2, 0.5 or 1.0 billing class 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.

28VDC Output

In addition to the 400Hz output, a 600A 28VDC Transformer Rectifier Unit (TRU) can be fitted in a base module under the main system. The 28VDC TRU is fitted with line-drop compensation ensuring a stable 28VDC at the plug. The 28VDC 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.

SINGLE 400Hz OUTPUT

DUAL 400Hz OUTPUT

400Hz / 28VDC OUTPUT