USERS/INSTALLATION MANUAL

PMG Frame 3 singlephase

Power Module Genverter

Inverter for GV 15 & 18 230/50 Hz or 120V/60 Hz

- Excellent choice to replace traditional generator sets
- High efficiency and strong peak power
- Outstanding voltage and frequency stability
- Saving fuel and ensuring smooth running of your genset
- Genverter Power, the best choice for your energy supply

CONTENTS

1. INTRODUCTION

Thanks for choosing our product. The Power Module for Genverter (PMG) is an essential link between your WhisperPower genverter and your AC electrical system. WhisperPower genverters are state-of-the-art systems using very compact and highly efficient Permanent Magnet alternators to produce electric power. Unlike traditional fixed speed generator sets, however, genverters may produce output voltages up to 350 VAC with frequencies as high as 400 Hz. This is where the PMG comes into play, using advanced power electronics to produce a stable sinusoidal AC voltage at 50 Hz, as required by regular 230 V appliances. Safety is enhanced by the low output impedance of the PMG allowing proper circuit protection.

Applicability of this manual

This manual contains important instructions for safe and effective installation, operation, maintenance and, if necessary, troubleshooting of the PMG.
It is therefore obligatory that every person who works on or with the PMG is completely familiar with the contents of this manual, and that he/she carefully follows the instructions and important safety instructions contained herein.

Use of pictograms

Throughout this manual, safety instructions and warnings are marked by pictograms.

WARNING
A WARNING refers to possible injury to the user or significant material damage to the PMG if the user does not (carefully) follow the procedures.

CAUTION!
Special data, restrictions and rules with regard to preventing damage. A procedure, circumstance, etc. which deserves extra attention.

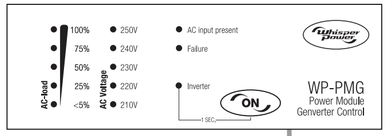
Identification label

Figure 1: Identification label
The identification label is located at the right-hand side of the PMG (see figure 1). Important technical information required for service, maintenance & secondary delivery of parts can be derived from the identification label.

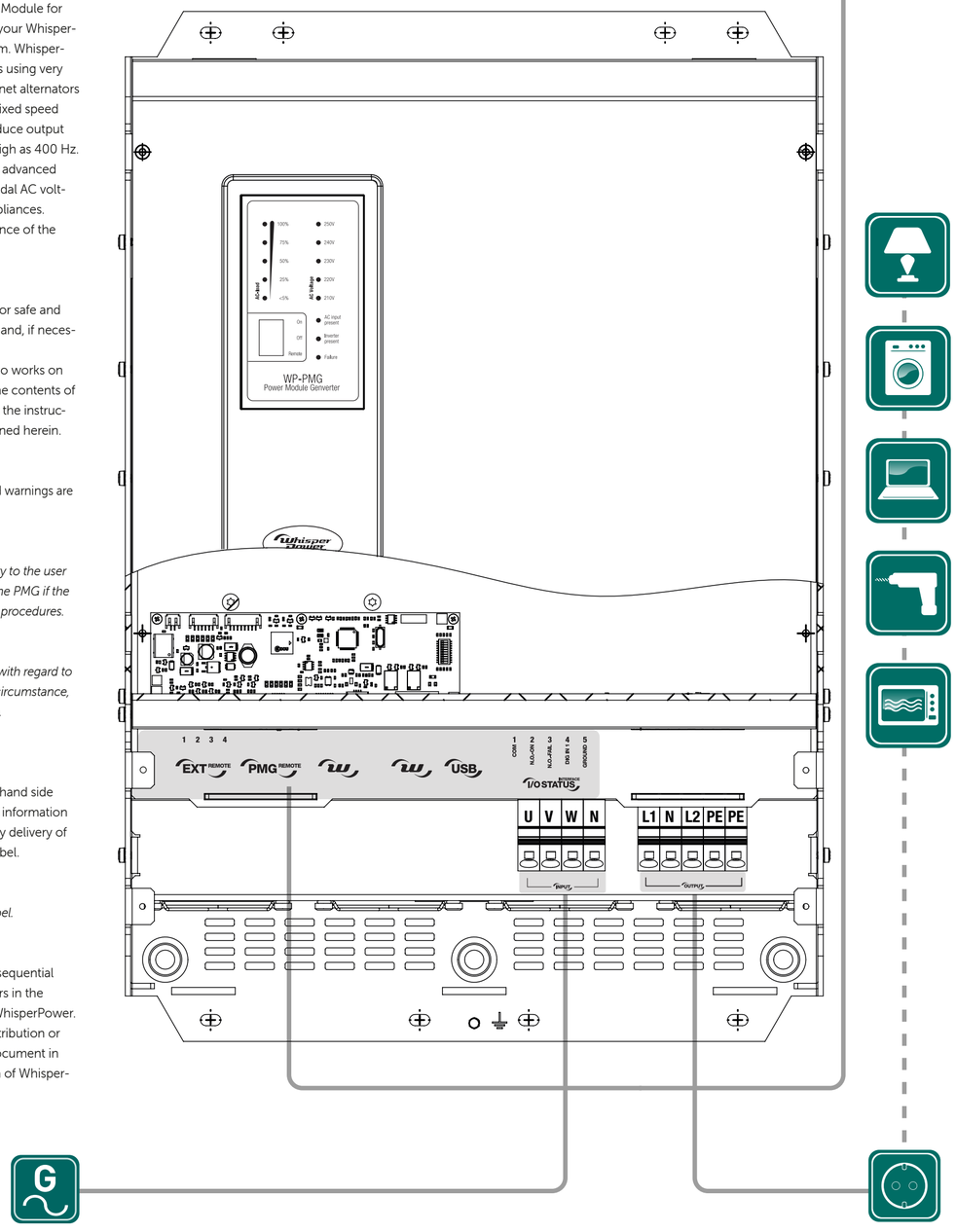
CAUTION!
Never remove the identification label.

Liability

WhisperPower can accept no liability for consequential damage due to use of the PMG, possible errors in the manuals and their results.



Remote Monitoring Panel



Warning regarding life support Applications

This equipment is not sold for applications in any medical equipment intended for use as a component of any life support system unless a specific written agreement pertaining to such intended use is executed between the manufacturer and WhisperPower. Such agreement will require the equipment manufacturer either to contract additional reliability testing of the PMG and/or to commit to undertake such testing as a part of the manufacturing process. In addition the manufacturer must agree to indemnify and not hold WhisperPower responsible for any claims arising from the use of the PMG in the life support equipment.

Guarantee specifications

WhisperPower guarantees that this equipment has been built according to the legally applicable standards and specifications. Should work take place, which is not in accordance with the guidelines, instructions and specifications contained in this user's manual, then damage may occur and/or the unit may not fulfill its specifications. All of these matters may mean that the guarantee becomes invalid. The guarantee is limited to the costs of repair and/or replacement of the product. Costs for installation labour or shipping of the defective parts are not covered by this warranty.

2. IMPORTANT SAFETY INSTRUCTIONS READ AND SAVE THESE INSTRUCTIONS

- To ensure safe and sustainable operation of the PMG, the handling and safety instructions detailed in this manual shall be followed at all times.
- To reduce the risk of electric shock – Do not expose PMG to rain, snow, spray, moisture, excessive pollution and condensing circumstances. To reduce risk of fire hazard, do not cover or obstruct the ventilation openings.
- Do not install the PMG in a non-ventilated room, overheating may result. The PMG was designed for dry and clean environments.
- This product has been designed and tested in accordance with international standards. Only use the equipment for the intended purpose of application. Use of an attachment or spare part not recommended or sold by WhisperPower may result in a risk of fire, electric shock, or injury to persons.
- Bear in mind that all applicable (safety) standards and (local) regulations shall be followed at all times.
- There are no serviceable parts inside the enclosure. Incorrect reassembly may result in a risk of electric shock or fire. Only qualified and authorized installers are permitted to perform installation or maintenance activities that require opening the system.
- The PMG must be provided with an equipment-grounding conductor to the AC-output ground terminal. Grounding of the Neutral conductor and connection of all other wiring must comply with international and local codes and ordinances.

Operation

CAUTION!
Before switching on the first time, the equipment must be installed properly (see next section) and correct settings must be made.

Power On/Off

The Power switch on the control panel implements main control of the PMG output power. Note that it does not control the genverter. When switched to "on" or "remote", the PMG function is switched on, providing controlled output power to connected loads, while displaying assorted operating information. Under normal conditions, the unit is left switched "on", regardless of whether the genverter is running or not.
With the switch in the "remote" position, the PMG is operated from a remote panel and on the unit itself.

CONTROL PANEL INFORMATION	
AC input present	The Genverter is producing power and the PMG is starting up.
Inverter present	The PMG has completed starting up and is supplying 230VAC to your on board appliances.
Failure (red)	The PMG failed to complete the start-up sequence or was shut down during operation. Refer to the Troubleshooting section.
AC Load	A series of five LEDs showing the PMG's output as a percentage* of its rated output. If all five LEDs start blinking, the PMG is overloaded and may shut down at any moment.
AC Voltage	A series of five LEDs showing the PMG's approximate output voltage. In a range from 210V to 250V, the 220V or 230V LED will typically light up.

3. TROUBLESHOOTING

The table below lists possible failure conditions. If the failure LED illuminates, switch off the PMG, adopt the applicable

PROBLEM	POSSIBLE CAUSE	SOLUTION
The failure LED illuminates	Ambient temperature is too high	Move the PMG to a colder position, or reduce the load
	Ventilation is blocked	Improve ventilation
	AC input is out of range	Check generator output voltage and frequency, and correct if necessary
	Too many or too heavy AC consumers	Reduce the load

4. INSTALLATION

General Remarks

Local and/or special regulations may apply depending on the type of installation involved. It is essential that each and every circuit in the electrical system is properly installed by a qualified electrician using all applicable standards.

CAUTION!
- *Risk of electric shock, personal injury, explosion and/or equipment damage*
- *Do not work on the PMG or the electrical installation while it is still connected to a power source.*
- *Never connect the inverter output to a 230 V connection of the public grid.*
- *All electrical safety/shutdown and circuit breaking systems have to be installed separate from the PMG.*

In Europe pleasure craft smaller than 24 m is subject to the EC Recreational Craft Directive, which refers to EN ISO 13297:2012 (Small craft - Electrical systems - Alternating current installations).

When installing a 230 V or a120 V system on a vehicle, be aware that people are not used to have such systems on a vehicle. Put warning signs on wall sockets and on junction boxes. Instruct non-regular users of the vehicle. Warn maintenance personnel of garages servicing the vehicle.

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Location

When looking for a proper position for installing the PMG, all relevant aspects have to be taken into account, in particular:

- The PMG must be installed in a dry and clean place protected from strong vibrations. Do not expose the PMG to dust, rain, snow or liquids of any type. The input being three-phase alternating current, the PMG can be installed at some distance from the Genverter.
- Ensure that ventilation airflow is not obstructed in any way. Keep a free space of 200 mm around the unit.
- The unit's control panel must remain accessible.
- The PMG contains components capable of producing arcs or sparks. To prevent fire or explosion do not install the unit in compartments containing batteries or flammable materials orin locations require ignition protected equipment. Moreover, gases from batteries will corrode and damage the PMG.

List of Materials

The delivery includes the PMG and a WhisperPower remote control panel with its 5 m RJ12 connecting cable. 10 m and 15 m cables are available on request.
Additional materials required:

- Screws / bolts (4 x Ø 6 mm, with plugs if necessary) to mount the unit to a wall.
- A sufficient number of cable clamps suitable for short-circuit installations.
- Ferrules/ cable end sleeves for connecting the various in- and output wires.
- Cable ties, for securing the input and output cables (at least 4, e.g. 140 mm x 3.5 mm).
- An output cable, i.e. any cable of appropriate rating and length to accommodate the application.
- A slow-reacting output fuse (63A recommended).
- If another 230 V source may be available, a transfer switch.
- A grounding cable of sufficient length, fitted with suitable lugs.

Grounding

The housings of the genverter and of the PMG may be grounded at the M6 bolts on the enclosure. Connect by green/yellow cable with proper lugs fitted, to vehicle chassis or proper ground earthing point.
Alternatively or additionally, grounding may be done with a green/yellow wire at the PMG output connection block, marked PE.

Neutral grounding

Making a connection between "neutral" and "ground" of the AC output could be necessary as part of a specific insulation failure protection system. This should only be done by experts when installing such a system.
Shipped from the factory, a strap wire is fitted between L2 and PE, where L2 is internally connected to Neutral and thus providing earthed Neutral, enabling the use of RCD.
For vehicles, methods of protection are subject to rules that may vary depending on the use of the vehicle and local standards. Experts in this field should be consulted.

Transfer Switching

When a connection to the public grid is required, a power source selector much be installed between the PMG and the vessel's/vehicle's electrical system. This so-called transfer switch is an essential safety device allowing all AC consumers to be switched off simultaneously and separating the PMG output from the grid.
WhisperPower recommends the installation of a WP AC Transfer System Switch. By default, this uses grid input. When it detects PMG input, it automatically switches over to generator input after 10 seconds delay time. Even more advanced, a WP WhisperSwitch allows simultaneous input from the genverter and the grid. Refer to the applicable product instructions.

STEP 1: Mounting the unit
- Determine the bolt / screw positions.
- Turn the screws / bolts (Ø 6mm) into the wall but do not tighten them entirely.
- Place the housing over the screws / bolts.
- Fix the housing by fastening the screws securely.

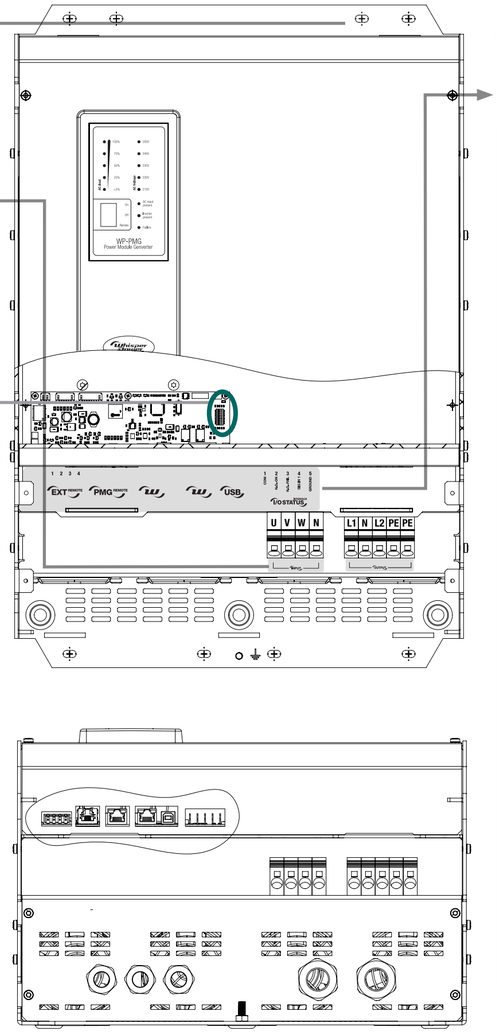
U V W N — INPUT

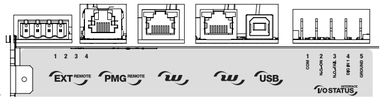
L1 N L2 PE PE — OUTPUT

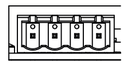
STEP 2: Connecting the genverter cable
- The genverter cable (e.g. 4 x 6 mm2) shall be installed using short-circuit proof cables.
- Remove the cover protecting the terminals by unscrewing the four Torx screws. Provide the genverter cable wires with ferrules and connect the wires to the input terminals as follows:
- brown to U,
- black to V,
- grey to W,
- blue to N, not mandatory, unconnected
- green/yellow if applicable to PE on output connection block.
- Use cable ties of sufficient strength as a strain relief.

STEP 3: Connecting the output cable
- A slow-reacting fuse (63 A recommended) should be installed to protect the installed electrical system. Make sure there is a Residual Current Device between the PMG and any on-board AC equipment and the L2-to-PE strap is placed.
- Provide the output cable wires with ferrules and connect the wires to the output terminals as follows:
- green/yellow to PE,
- brown to L1, this is Line output
- blue to N, this is the Neutral output, internally connected to L2
- Use cable ties of sufficient strength as a strain relief.
- Replace the cover protecting the terminals and tighten the tapping screws.

STEP 4: Connecting the remote control panel (optional)
- The PMG has a local control panel, which is on the unit, and a remote control panel, the installation of which is optional.
- The remote control panel can be mounted either on or in the dashboard. When the remote control is mounted on the dashboard, the back cover can be used as a drill template.
- The connecting cable can exit in any direction through one of the pre-shaped ports in the sides of the plastic case or through a hole in the dashboard. On the PMG, the cable is plugged into the PMG REMOTE port.







The ports above are configured as follows:
- External command (Phoenix MSTBA2.5/4-G-5.08)
1 – GND
2 – ON/OFF switch
3 – 12v ON led
4 – 12v failure led

RJ12 port for WhisperPower Remote Control Panel

RJ45 CAN-Bus port for integrated remote (e.g. bridge) control equipment

USB Type 2 port for setting output parameters

FASTON CC349 contacts for analog controls
1 – COMM
2 – ON STATUS (NO)
3 – ERR STATUS (NO)
4 – INPUT
5 – GND

DIP switches 1-10

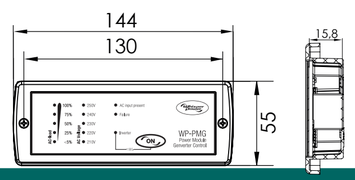
	Version 230 V			Version 120 V		
Function	ON	OFF	Default	ON	OFF	Default
Volt AC - OUT	240 V	230 V	OFF	130 V	120 V	OFF
	220 V		OFF	115 V		OFF
	210 V		OFF	110 V		OFF
Frequency - OUT	60 Hz	50 Hz	OFF	60 Hz	50 Hz	ON
Power AC - OUT	12.1 kVA	15.1 kVA	ON	6.8 KVA	8.4 KVA	ON
	10.1 kVA		OFF	5.8 KVA		OFF
Reduce Peak Current	REDUCE	FULL	ON	REDUCE	FULL	ON
Reserved	-	-	OFF	-	-	OFF
Reserved	-	-	OFF	-	-	OFF
Parallel Relay	ENABLE	DISABLE	OFF	ENABLE	DISABLE	OFF

Advanced features

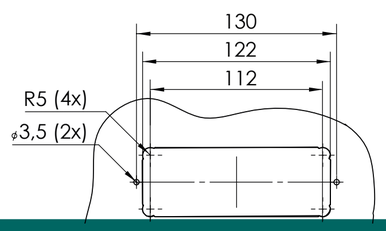
The dipswitches allow a number of advanced settings to made. Voltage optimization is possible using the VAC OUT switches and may save fuel, especially in case of high resistive loads (lighting, heating). High inductive loads such as air-conditioning units, on the other hand, may be handled more easily when the unit is set at 80% or even 67% of its rated output.

These PMGs may be ordered as Twin-Power models for parallel use of generators. Interconnection by high-speed communication cable is required and IO status relay function (pin 3) is redefined to Parallel Request (CLOSE 3s after 80% of maximum power,OPEN 10s after operating below 20% of maximum power).

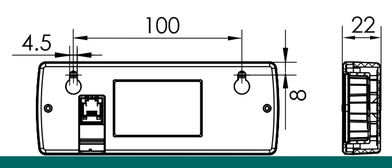
figure 1



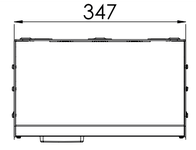
Front and side view remote panel



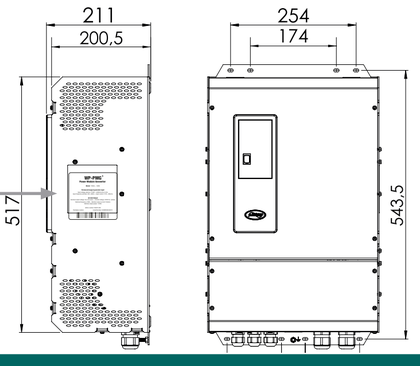
Mounting dimensions remote panel



Rear and side view remote panel



Bottom view PMG



Front and side view PMG

5. SPECIFICATIONS

	POWER MODULE GENVERTER 15KW -230V	POWER MODULE GENVERTER 8KW -120V
Article nr.	60201449 - Parallelable	60201421 - Parallelable
GENERAL SPECIFICATIONS		
Genverter model	Genverter 15, 18	Genverter 15,18
Nominal power	15 kW	8 kW
Nominal apparent power	15 kVA	8 kVA
Input voltage 3*	240..400 V (AC)	240..400 V (AC)
Input frequency	200..400 Hz	200..400 Hz
Maximum input current	32 A	28 A
Output voltage	230 V (AC)	120 V (AC
Output frequency	50 Hz/ 60 Hz	60 Hz (Nom.)
Output current	63 A	70 A
Wire system	L1-N-PE/ L1-N-L2-PE	L1-N-PE
WEIGHT AND DIMENSIONS		
Weight	20 kg	20 kg
Dimensions (h x w x d)	567 x 347 x 211 mm	567 x 347 x 211 mm
Mounting rectangle (h x w)	543.5 x 254 mm	543.5 x 254 mm
OUTPUT SPECIFICATIONS		
Output voltage (AC)	200..240 V (nominal 230 V)	100..120 V (nominal 120 V)
Output voltage stability	+/- 5% (resistive load step 0-100%)	+/- 5% (resistive load step 0-100%)
Voltage THD (total harmonic distortion)	< 3%	< 3%
Output frequency	45..65 Hz (nominal 50 Hz)	55..65 Hz (nominal 60 Hz)
Frequency variations	< 1%	< 1%
Continuous power	15.1 kVA (12kW) Settable 10.1/12.1/15.1 kVA	8.4 kVA Settable 5.8/6.8/8.4 kVA
Peak power	30 kVA, for 1 s	17 kVA, for 1 s
Short circuit protection	yes	yes
Peak efficiency	97%	97%
Nominal efficiency	95% at full load	95% at full load
GENERAL CONDITIONS		
Operating temperature	-20..70 °C (linear de-rating above 40 °C)	
Ventilation	Forced cooling (temperature and load dependent)	
Storage temperature	-40..80 °C	
Relative humidity in operation/storage	up to 95% non-condensing	
Ingress protection	IP23	
Lifetime expectancy at 40°C and nominal load	100 000 hours	
Relay management for parallel operation	Yes (add DIPswitch 10)	
COMPLIANCE		
Directives: EMC 2004/108/EC, LVD 2006/95/EC		
Standards: EN 55022 (emission), EN 61000-3-2 (harmonics), EN 61000-4-11, EN 61000-6-1, EN 61000-6-1 (immunity), EN 60945 (maritime navigation and radio communication), EN 60950 (safety)		

6. WARRANTY TERMS AND CONDITIONS

WhisperPower guarantees that the equipment has been built according to the legally applicable standards and specifications. WhisperPower assures the product warranty of the Power Module for Genverter during two years after purchase, on the condition that all instructions and warnings given in this manual are taken into account during installation and operation.
The warranty is limited to the costs of repair and/or replacement of the product by WhisperPower only. Costs for installation labor or shipping of the defective parts are not covered by this warranty.

7. CE MANUFACTURER'S DECLARATION

We, WhisperPower BV, Kelvinlaan 82, 9207 JB Drachten, Netherlands, hereby declare that:
Product:
60201410 WhisperPower-Power Module for Genverter
Is in conformity with the following provisions of the EC:
2004/108/EC (EMC Directive), the following harmonized standards having been applied:
EN 55022:2010 (Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement)
EN 61000-3-2:2006 (Electromagnetic compatibility [EMC] - Part 3-2: Limits - Limits for harmonic current emissions)
EN61000-6-1:2007 (Electromagnetic compatibility [EMC]. Generic standards. Immunity for residential, commercial and light-industrial environments)
EN 61000-6-2:2007 (Electromagnetic compatibility [EMC] - Part 6-2: Generic standards - Immunity for industrial environments)
EN 60945:2002 (Maritime navigation and radiocommunication equipment and systems)
2006/95/EC (Low Voltage Directive), the following harmonized standard having been applied:
EN 60950: 2000 (Safety of information technology equipment)

M.B. Favot,
C.T.O. WhisperPower B.V.