Harrison Hydra-Gen Ltd.

Hydraulic Driven AC Generator System

Installation and Maintenance Guide

For Harrison Hydra-Gen Model:

HU04.0PMG-16G5-B-SP42

(6-14-17) - Spec. B
REV-B

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SAFETY PRECAUTIONS

WARNING!

THIS SYMBOL WARNS OF IMMEDIATE HAZARDS OR UNSAFE PRACTICES WHICH WILL RESULT IN SERVERE PERSONAL INJURY OR DEATH.

CAUTION!

THIS SYMBOL REFERS TO A HAZARD OR UNSAFE PRACTICE, WHICH CAN RESULT IN PERSONAL INJURY OR PRODUCT OR PROPERTY DAMAGE.

GENERAL SAFETY

- Electrical equipment and moving parts present potential hazards that may result in serious personal injury. Take care in following these recommended procedures.
- Do not work on this equipment when mentally or physically fatigued.
- Always wear safety glasses.

ELECTRICAL SHOCK

- Disengage power before moving protective shields or touching electrical equipment.
- Use rubber insulating mats placed on dry wood platforms over floors that are metal or concrete.
- Do not wear damp clothing (including wet shoes) or allow skin surfaces to be damp when handling electrical equipment.
- Jewelry is a good conductor of electricity and therefore should be removed when working on electrical equipment.
- Use extreme caution when working on electrical components. High voltages cause injury or death.
- Generator installation and operation must comply with all applicable local, state, and federal codes and regulations.
- Have all electrical installations performed by a qualified licensed electrician.

MOVING PARTS

- Avoid moving parts when working on the unit.
- Do not wear loose clothing when working around rotating components.
- Make sure all the nuts and bolts are secured.
- Keep power shields and guards in position.
- If adjustments must be made while the unit is running, use extreme caution around rotating and/or hot components.

HYDRAULIC FLUID UNDER PRESSURE

- Hydraulic fluid can penetrate the skin, which can result in possible blood poisoning.
- Always shut down the primary engine driving the hydraulic pump before loosening or tightening any fittings.

CLEAN UNIT AND SURROUNDING AREA

- Keep the unit and surrounding area clean.
- Remove all accumulated grease and oil from the unit. **Do not** store anything in the generator compartment. Both can cause generator system problems (overheating, noise, and vibration), eventual generator damage, and are potential fire hazards.

SPECIFICATIONS

UNIT DETAIL

Electrical Specifications

Design	**Brushless**
Regulation	**Capacitor**
Waveform	**Total Harmonic Distortion is <5%**
Insulation	**Class H**
Temperature	**125°c / 40°c (Temp rise over Ambient)**
Power Factor	**1 (Unity) for 1 Phase**
Volts AC	**240 / 120VAC 1PH @ 60 HZ**
Amps	**16.6 / 33.3**
Watts	**4000 watts**
Frequency	**60HZ**
Weight:	**55 lbs**.

HYDRAULIC SYSTEM

Type of oil: Use only premium hydraulic fluid with anti wear, anti foam, and anti rust additives.
See Hydraulic Oil Requirements – Page 4

DRIVE MOTOR

Frequency	**60HZ**
Type	**Gear**
Displacement	**5.29CC (.323 cu/in rev)**
Motor Pressure	**3000 PSI**
Flow (Est.)	**5.03 GPM**
RPM	**3600 RPM**
Max Pressure	**3000 PSI**
Max Return Pressure	**44 psi**

SYSTEM REQUIREMENTS

The generator is designed to work on equipment having a tool circuit with a flow rate of 6 to 8 gpm. A cooler may be required to maintain oil temperature. Make sure you put the generator in an area that will allow fresh air to enter in the rear of the generator and the hot air to escape out the front of the generator. Do not allow the hot air to circle back around to the inlet.

DIMENSION & PLUMBING

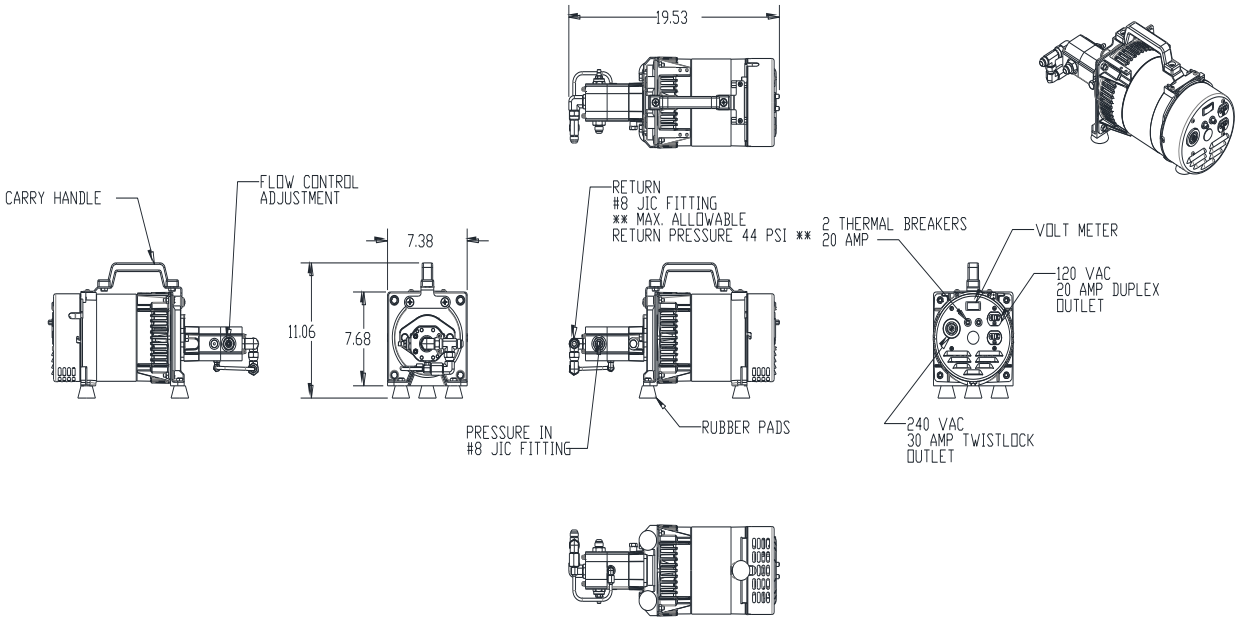
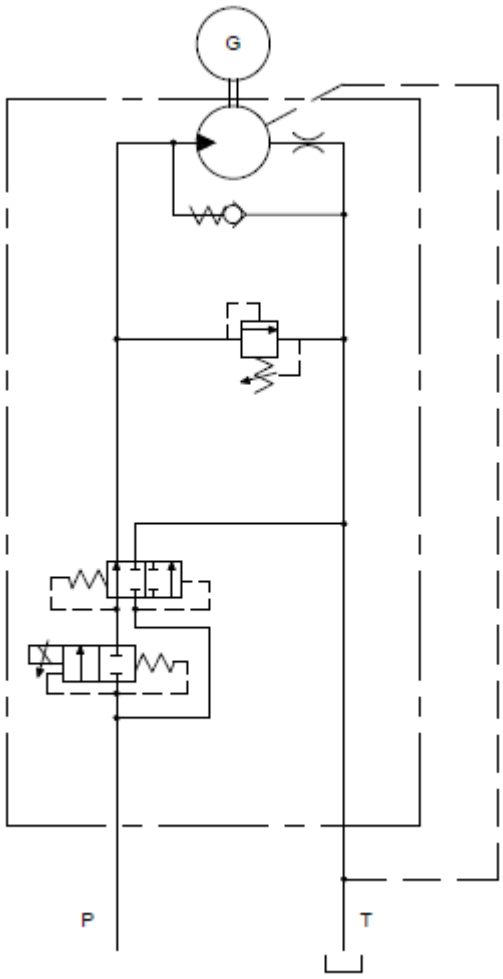


Figure 1: Dimension and Plumbing Ports

HYDRAULIC CIRCUIT



INSTALLATION GUIDE

INSTALLATION CLEANLINESS

⚠ CAUTION!

MAINTAIN OIL CLEANLINESS DURING INSTALLATION. DEBRIS IN A HYDRAULIC SYSTEM MAY DAMAGE INTERNAL COMPONENTS OR CAUSE THE PUMP COMPENSATOR TO STICK, RESULTING IN ERRATIC OPERATION.

- Ensure the work area is free of dirt and always keep ports plugged until hoses are installed.
- Filter oil through a 10 micron (or better) absolute filter before using in the generator. Even a new barrel of oil can contain contamination that is harmful to a hydraulic system.
- Thoroughly flush hoses before connecting. It is best to clean your hoses using an air gun, like the one shown below. See the Accessories page in the Appendix for more information.



Figure 2: Air Gun Projectile Cleaner

HYDRAULIC OIL REQUIREMENTS

Harrison Hydra-Gen recommends a premium anti ware hydraulic oil to be used in the generator system. Dexron III **does not** fall in this category. Dexron is formulated to operate in transmissions and is an excellent fluid for them. We find that although our system will operate with Dexron, it is not the best selection. The weight of the oil is determined by the climate the system is operating in. Using an AW46 will provide good protection in most year round US climate conditions.

A graph of ISO Oil Grades versus applicable fluid temperatures is shown below. The lowest allowed cold start temperature (at 4600 SUS) for each grade is shown as a triangle. The bar represents the ideal viscosity range for that fluid (80-170 SUS). The diamond at the top signifies the upper temperature limit of the fluid (at 60 SUS). Do not exceed this limit for a prolonged time period.

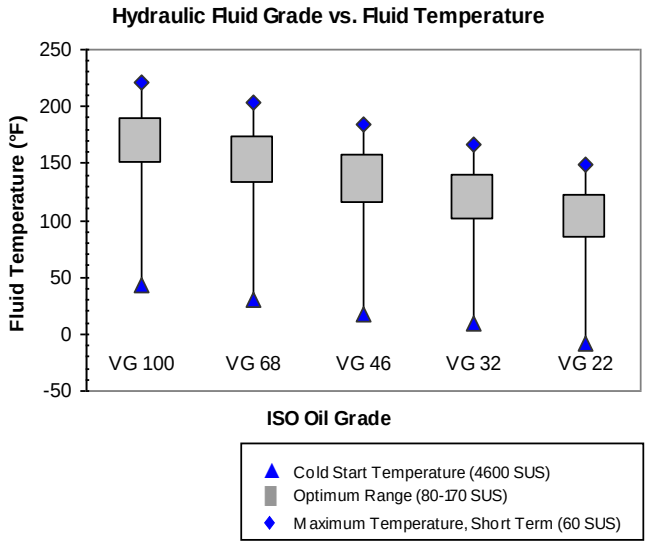


Figure 3: Hydraulic Fluid Selection Graph

The operating temperature of the fluid in the hydraulic generator system is maintained at 120°F to 180°F, depending on the ambient air temperature and load. Fluids with a viscosity rating of less than 60 SUS at this temperature are not acceptable. For cold climates, the oil must not have a rating higher than 4600 SUS. Conditions that allow the fluid to drop in temperature causing the viscosity to be higher than 930 SUS will require warm up procedures before using the system. If there is some uncertainty about the oil that you are using, consult with the manufacturer or distributor of the oil.

Every oil mfg. offer oils that meet the needs of hydraulic systems. An example of good oil is Mobile DTE-25 or equivalent.

HOSE SPECIFICATIONS

The pressure hose must be rated for 3000 PSI. IMPORTANT: The shaft seal is rated at max. pressure of 44 PSI. **Do not exceed 44 PSI on the return port.**

It is important not to cross hoses during installation. We recommend if you are going to use quick couplings that they are installed where someone could not cross up the pressure and return lines. Make sure they are coupled together correctly before turning on the tool circuit.

SETTING FREQUENCY

- Turn the flow control adjustment screw clockwise to close the flow to the generator.
- It is best to use a multimeter that can read frequency. You do not want to operate the generator above **63 HZ**.
- Turn on the tool circuit and slowly turn the flow control adjustment screw counter-clockwise to set the frequency.
- Operate the generator by applying some load to the generator. Using a drill works well. Turn the drill on and off several times. Recheck your frequency and adjust if needed.
- You want to make the final adjustment after the system has reached operating temperature.
- When you make the adjust, it is best to go slightly over the frequency you want and then turn down to the set frequency. Holding the adjustment screw tighten up the jam nut.

ELECTRICAL CONNECTIONS

All wiring must meet applicable local, state, and federal electrical codes. Accordingly, have a qualified electrician install and inspect the wiring. Mount switches and controls securely to prevent damage from vibration and road shock. All switches must be vibration proof to prevent accidental opening and closing of circuits while the vehicle is in motion.

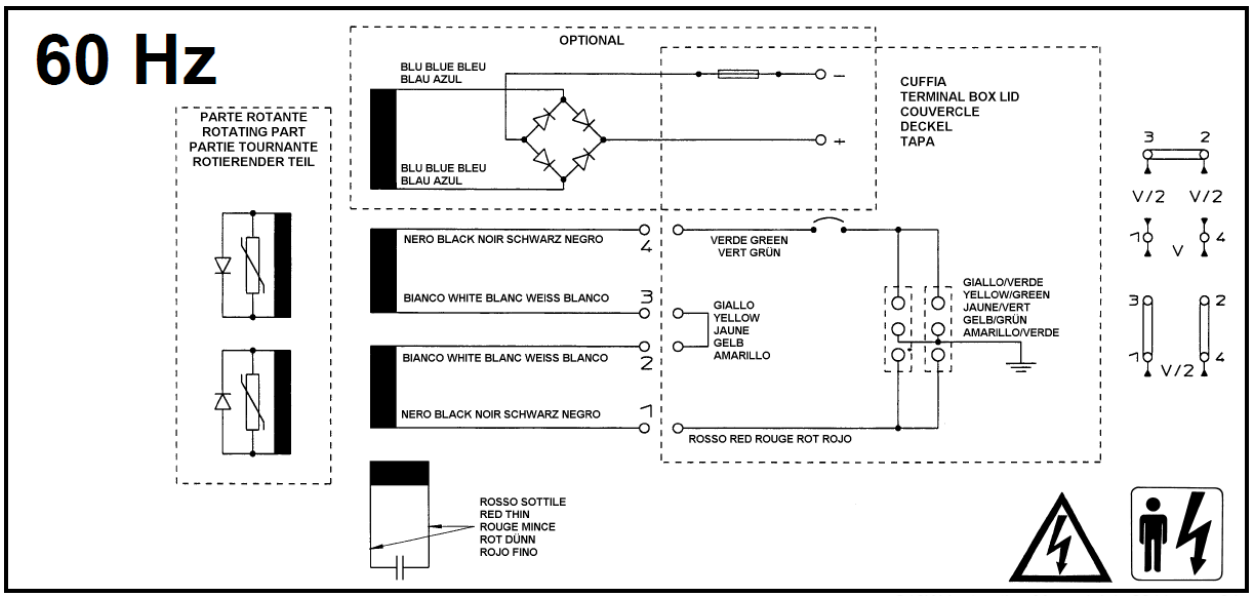
The generator system output conductors must be rated no less than 115% of the nameplate current rating of the generator system. All wires connected to the generator must meet or exceed this insulation rating (See National Electrical Code, NFPA 70). State and local codes specify different grounding requirements for mobile vehicles with electric generator systems. These specific codes must be followed in order to ensure personal protection.

WARNING!

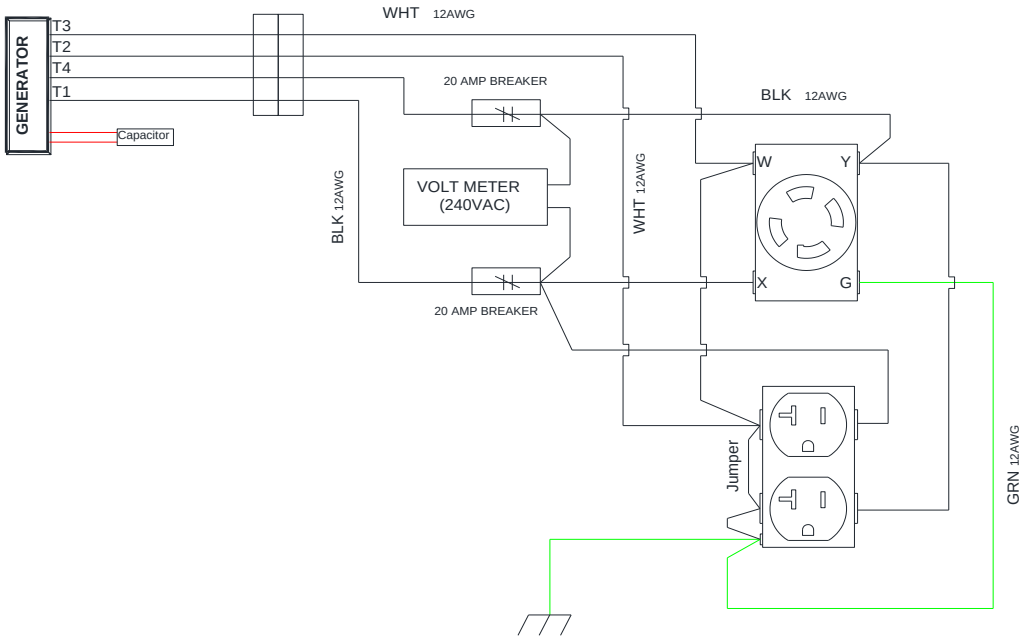
FAULTY ELECTRICAL GROUNDING CAN LEAD TO FIRE OR ELECTROCUTION, RESULTING IN SEVERE PERSONAL INJURY OR DEATH. GROUNDING MUST BE DONE IN ACCORDANCE WITH APPLICABLE CODES.

Generators mounted permanently on a mobile vehicle must be grounded securely to the vehicle frame. In addition, the **neutral conductor of the generator output must be grounded at the generator only.** Remove any grounding tabs or connectors that may be in the distribution panels. This will avoid problems with personnel safety and Ground Fault (GFCI) devices.

ALTERNATOR WIRING DIAGRAM

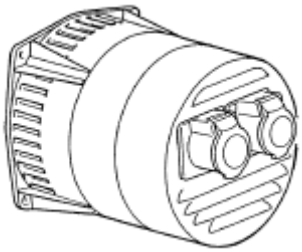


ELECTRICAL WIRING DIAGRAM



MAINTENANCE

MACHINE DESCRIPTION



S16W series alternators are single-phase brushless units. Their operating is highly reliable. These units do not require maintenance since they do not have slip rings or slipping contacts. S16W alternators are made in compliance with the 2006/42, 2006/95, 004/108 directives and their amendments, and the EN 60034-1, CEI 2-3, IEC34-1, VDE 0530, BS 4999-5000, N.F. 51.111 regulations. The end brackets are die-cast in high resistance aluminum alloy; the shaft is in C45 steel and is fitted with a keyed fan. The mechanical protection level meets standard IP21 (upon request higher levels of protection can be supplied). The H-class insulation and windings are impregnated with tropicalized epoxy resins.
The standard generators comply with the specification VDE 0875 degree “N” and with the basic safety requirements of the European regulation on electromagnetic compatibility; by applying the European standards EN 61000-6-3, EN61000-6-1 the above mentioned regulation is complied with.

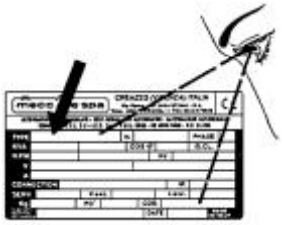
CE

CSA®

cULus INSULATION SYSTEM

INTRODUCTION

The S16W alternators comply with the EEC 2006/42, 2006/95, 2004/108 directives and their amendments; therefore they pose no danger to the operator if they are installed, used and maintained according to the instructions given by Mecc Alte and provided that the safety devices are kept in perfect working conditions. Therefore a strict observance of these instructions is required.
When the alternator is delivered, check that unit conforms to the delivery note and ensure that there are no damaged or defective parts; should there be any, please inform the forwarding agent, the insurance company the seller or Mecc Alte immediately.



Always indicate the generator type and code when contacting Mecc Alte. Any packing materials should be disposed of via correct waste disposal methods. Do not discard waste materials into the environment.

SAFETY REQUIREMENTS

In consulting this use and maintenance manual, you will find several symbols, which have a specific meaning, as illustrated below.

IMPORTANT

This symbol warns the personnel concerned that the described operation may cause damages to the machine if it is not carried out according to the safety standards.

CAUTION



This symbol warns the personnel concerned that the described operation may cause damages to the machine and/or injures to the personnel if it is not carried out according to the safety standards.

WARNING



This symbol warns the personnel concerned that the described operation may cause serious injuries or death to the personnel if it is not carried out according to the safety standards.

DANGER



This symbol warns the personnel concerned that the described operation may immediately cause serious injuries or death to the personnel if it is not carried out according to the safety standards.

HANDLER



This symbol identifies the type of operator in charge of the operation described. This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills about the hoisting means, slinging methods and features and safe handling procedures.

MECHANICAL SERVICE MAN



This symbol identifies the type of operator in charge of the operation described. This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills necessary to perform installation, adjustment, maintenance, cleaning and/or repair operations.

ELECTRICAL SERVICE MAN



This symbol identifies the type of operator in charge of the operation described. This qualification requires a complete knowledge

and understanding of the information contained in the manufacturer's instruction manual as well as specific skills necessary to perform electrical operations such as connections, adjustment, maintenance and/or repair.

SAFETY REQUIREMENTS

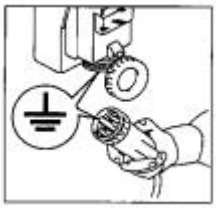
The electrical service man must be able to work even in case electrical cabinets and panels are live.
In case of exceptional operations and upon written request of servicing operations please apply to Mecc Alte authorized centers.
Before any cleaning, lubrication or maintenance operation, ensure that the generator is stationary and disconnected from the power supply.

CAUTION



THE FINAL INSTALLER IS RESPONSIBLE FOR THE INSTALLATION OF ALL THE PROTECTIONS (SECTIONING DEVICES, PROTECTIONS AGAINST DIRECT AND INDIRECT CONTACTS, OVERCURRENT AND OVERVOLTAGE PROTECTIONS, EMERGENCY STOP, ETC.) NECESSARY FOR THE MACHINE TO COMPLY WITH THE EXISTING INTERNATIONAL / EUROPEAN SAFETY REGULATIONS.

This is the reason why you must make sure that the grounding system is in good conditions and in compliance with the regulations of the country where the generator will be installed.



For ground connection, the end bracket is provided with a hole that can be used without necessarily removing the end cover.



The people in charge of the handling must always wear work gloves and safety shoes. In case the generator or the whole plant must be lifted from the floor, the operators must wear a safety helmet.

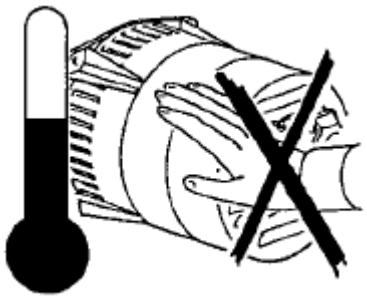


In case of storing, both packed and unpacked alternators shall be stored in a cool and dry room, and shall never be exposed to bad weather.

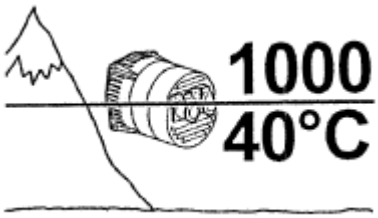
IMPORTANT!
IN CASE THE ALTERNATOR HAS BEEN STORED FOR A LONG TIME AND IN ORDER TO AVOID DAMAGES CAUSED BY HUMIDITY, WE SUGGEST THAT THE INSULATION RESISTANCE OF ALL WINDINGS TO GROUND BE CHECKED INCLUDING THE ROTOR. THE RESULTING DATA MUST BE HIGHER THAN 1 MΩ (EN60204-1). IF DATA ARE NOT HIGHER THAN SAID VALUE, BLOW WARM AIR OVER THE WINDINGS TILL THE ABOVE MENTIONED VALUE IS OBTAINED.



The generator must be installed in an airy room. If there is not enough air, a malfunction or an overheating may occur.



The machine was designed to guarantee the nominal power in environments with a maximum temperature of 40° C, at altitudes lower than 1000 m asl (EN60034-1), unless otherwise specified; for different operating conditions, see the commercial catalog (brochure).



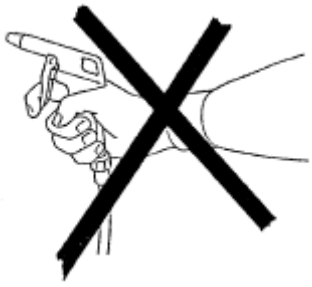
The generator must never be operated with the protective devices removed.
The heat produced by the generators may be very high according to the power generated.
Therefore, do not touch the generator if you do not wear anti-scorch
gloves and, after switching it off, do not touch it until it has cooled down to ambient temperature.



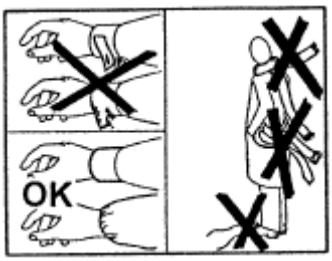
DANGER OF SHORT CIRCUIT



The degree of protection of the generator is IP21; therefore it is made prohibition to use whichever type of hydro-cleaner and to spray liquids over the parts containing electrical components.



Do not clean the inside electric components with compressed air, because this may cause short-circuits or other anomalies.



No person must wear fluttering clothes (such as scarves, bracelets etc.) near the machine and any garment must be fastened with elastic bands at its ends.



Do not lean or sit on the generator for whatever reason.
Keep away from the machine even if all the machine components are protected.
Do not remove the labels for whatever reason; on the contrary, replace them if necessary.
When the machine is worn out, contact the companies in charge of the disposal of ferrous material and do not throw away its parts into the environment.
In case of replacement of spare parts, use original spare parts only.

START UP

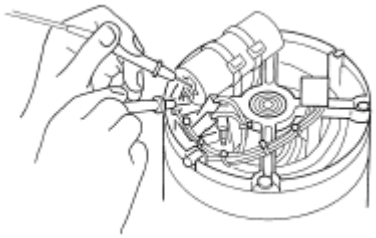
IMPORTANT

Make sure, when starting the machine, that cooling air intake and discharge openings are free and unblocked.
Always use proper plugs and cables to perform the electrical connections to the sockets or to the alternator panel.

THE IMPORTANCE OF SPEED



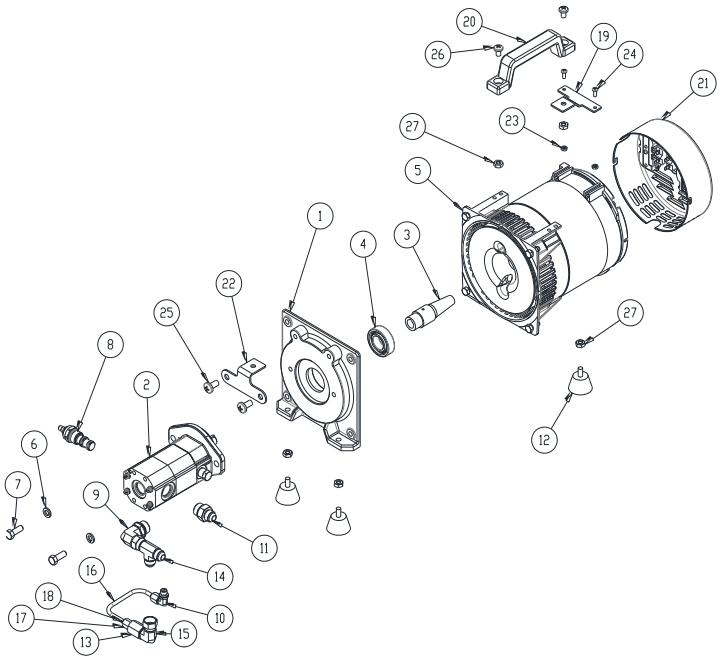
Frequency and voltage depend directly on rotational speed. Its nominal value must therefore be kept as constant as possible, no matter what the load is. Drive-motor speed control systems generally have a small drop in speed between no load and load conditions.
It is therefore recommended to adjust the speed in no-load conditions approx. 3÷4% higher than the nominal speed.
If the generator does not self-excite, it should be excited by applying an alternating voltage of around 50÷230V to the capacitor heads for an instant.



TROUBLESHOOTING

Problems	Causes	Remedies
Generator not rotating	Motor not turning No flow from tool circuit Flow Control not working Broken drive key	Check for proper hydraulic flow Check voltage to coil Bad coil or valve Check and replace
Frequency falls under load	Hydraulic flow to motor falling Bad motor	Check flow to motor is constant Replace motor
Generator does not excite	Low speed Faulty capacitor Breakdown in windings	Check and adjust speed Check and replace Check winding resistance
High no-load voltage	Excessive speed high capacity of capacitor	Check and adjust speed Check and replace
Low no-load voltage	Low speed Faulty rotary diodes Worn windings Low capacity of capacitor	Check and adjust RPM Check and replace Check winding resistance Check and replace
Proper no-load but low loaded voltage	Low speed when loaded Excessive load Short-circuited diodes	Check and adjust RPM Check and repair Check and replace
Proper voltage in no-load conditions but high voltage at load	High speed in loaded condition	Check and adjust speed
Unstable voltage	Poor contacts Uneven rotation	Check connections Check for uniform rotation speed
Noisy generator	Broken bearings Poor coupling	Replace bearings Check and repair

GENERATOR PARTS LIST



HARRISON GENERATOR
HU04.0PMG-16G5-B-SP42
PARTS LIST

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	DQ780-1000	PMG FOOT MOUNT	1
2	HM402-B05G	5 CC GEAR MOTOR	1
3	DQ780-1001	SHAFT ADAPTER	1
4	BR025-6205	BEARING	1
5	MS042-S16W1	4KW GENERATOR 60 HZ	1
6	3/8	LOCK WASHER	2
7	3/8-16 X 1"	HEX HEAD BOLT	2
8	WD880-1039	FLOW CONTROL	1
9	AQ262-1008	#10 SAE TO #8 JIC 90	1
10	AQ262-0404	#4 SAE TO #4 JIC 90	1
11	AQ270-1008	#10 SAE TO #8 JIC	1
12	MM508-2NPG1	RUBBER ISOLATOR	3
13	AQ215-0804	#8 JIC FEMALE TO #4 JIC	1
14	AQ232-0808	#8 RUN TEE	1
15	AQ271-0808	#8 SWIVEL 90	1
16	AQ250-025	1/4" SS TUBE 7.5 INCHES	1
17	AQ129-4000	#4 TUBE NUT	2
18	AQ900-0400	#4 TUBE SLEEVE	2
19	SM515-1296	HANDLE REAR BRACKET	1
20	SP042-0969	HANDLE	1
21	MS035-1041	PMG COVER WITH OUTLETS	1
22	SM515-1295	HANDLE FRONT BRACKET	1
23	10 - 32	HEX HEAD NUT	2
24	10 - 32 X 1/2	PAN HEAD SCREW	2
25	3/8 - 16 X 3/4	PAN HEAD SCREW	2
26	5/16 - 18 X 1/2	PAN HEAD SCREW	2
27	5/16 - 18	HEX NUT	5

APPENDIX