W Portable Generator - DeepSea Controller - 120/240V 60 Hz - 1PH - Diesel - IP65 Instruction Manual

Thank you for your purchase of the DPG-20KW-1P-120.240 portable generator from Larson Electronics.

WARNING

Standard Warning (General)

WARNING:

READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.
CRITICAL SAFETY INSTRUCTIONS:

- INSTALLATION SHOULD ONLY BE CONDUCTED BY A QUALIFIED ELECTRICIAN IN ACCORDANCE WITH NEC AND ANY RELEVANT LOCAL BUILDING CODES.
- RISK OF FIRE OR ELECTRIC SHOCK. FIXTURE INSTALLATION REQUIRES KNOWLEDGE OF FIXTURE'S ELECTRICAL SYSTEMS. IF NOT QUALIFIED, CONTACT A QUALIFIED ELECTRICIAN.
- BE CERTAIN ELECTRICAL POWER IS OFF BEFORE AND DURING INSTALLATION AND MAINTENANCE.
- MAKE SURE THE SUPPLY VOLTAGE IS THE SAME AS THE FIXTURE'S RATED VOLTAGE.
- TO PREVENT WIRING DAMAGE OR ABRASION, DO NOT EXPOSE WIRING TO EDGES OF SHEET METAL OR SHARP OBJECTS. SUITABLE FOR DAMP LOCATIONS.

The Larson Electronics DPG-20KW-1P-120.240 portable, brushless generator is a fuel type unit with a powerful 1,800 rpm, four-cylinder diesel engine. It can produce 20 kW (prime) and supports three-phase 120/240V 60 Hz. A Deepsea controller provides operators with robust monitoring options and configurations. This IP65-rated unit boasts a low profile and sturdy design for reliable application in outdoor work sites.

WARNING: MAKE SURE POWER IS TURNED **OFF** BEFORE STARTING THE INSTALLATION OR PERFORMING ANY MAINTENANCE.

RISK OF FIRE/ELECTRIC SHOCK – DISCONNECT POWER AT BREAKER BEFORE INSTALLING OR SERVICING.
RISK OF PERSONAL INJURY – FIXTURE MAY BECOME UNSTABLE OR DAMAGED IF NOT INSTALLED PROPERLY.
RISK OF BURN – ALLOW FIXTURE TO COOL BEFORE SERVICING.

I. OVERVIEW

Diesel Generator consists of a diesel engine, a generator, a control panel and a heat sink. Two types of control panels are available, floor type (i.e. split type) and small box type (i.e. integrated type). The unit features small size, compact structure, light weight and ease of handling. It is a kind of mobile or fixed complete equipment• extensively used for power supply and illumination in industrial mining, postal services, telecommunications, schools, hospitals, field operation and hotels.

This Manual is prepared in order for users to get a brief understanding on the structure, performance, use and maintenance of the unit. Please. refer to respective instruction manuals enclosed with the unit for detailed instructions on the use and care of all elements of diesel engine, generator and control panel.

Due to continuous optimization and improvement of production and products, we reserve the right to improve products' technical performances and specifications without prior notice. Therefore, the user needs to be cautious that the contents in this Manual may be slight different from the product. We sincerely hope that users may reflect all problems found in their use and feedback their precious suggestions for improvement in order for us to improve product quality continuously and serve users better.

2.MODEL DESCRIPTION OF THE UNIT

The codes and description of the nameplate of Diesel Generator are as follows:

U D 200 E A
CD®@@®

CD. Abbreviation of the Company, expressed with the letter; U means UNIV ®· Diesel engine manufacturer, expressed with the letter D,C,P.1s:1v,w:

D means the DEUTZ engine; C means the CUMMINS engine P means the PERKINS engine; IS means the ISUZU engine

Y means the YTO engine; W means the WEICHAI engine; @. Unit's power, expressed with Arabic numerals in. KVA;

©. E means Silent type

®· A means ATS , No A then just key start

3. KEY TECHNICAL PERFORMANCES & USE CONDITIONS OF THE UNIT

3.1.Key technical performances of the unit

( )Power supply type:
A.C.

(2)Rated rotating speed: 1,500/l ,800rpm (3,000/3,600rpm optional)

(3)Rated frequency: 50/60Hz

(4)Rated voltage: line voltage 400V, phase voltage 230V

(5)Powerfactor: cos<!>= 0.8 (lag)

(6)Phase number: 3-phase and 4-wire

(?)Cooling mode: open water circulation cooling or forced closed water circulation via fan and water box.

3.2.Ambient conditions for using the unit

( )Altitude: S:
1 ,000m;

(2)Ambient temperature: ± 5oC - +40 oC;

(3)Relative humidity: s: 60% (20 oC);

(4)No conductive dust or corrosive gas which may destroy metal and insulation;

(5)No risk of explosion; No shaking or bumping;

3.3.Conditions for normal use of the unit

(1) Use clean diesel. Usually, domestically-produced light diesel above #0 Grade is used. The type of antifreeze diesel to be used depends on the local temperature. Prior to use, diesel should go through a long settling or filtering treatment process to eliminate mechanical impurities. The oil tank should be big enough, and is typically required to store the fuel necessary for 8-hour working. The lowest position of the oil tank should not be l m lower than the center of the fuel feed pump. The oil tank should not be near vent pipe or electric equipment.
(2) The use of engine oll must satisfy relevant requirements: for the unit with the engine rotating speed of 1,500rpm, the high-speed diesel engine oil must be used; for the unit with the engine rotating speed within 1,500rpm, the above-said engine is preferred; alternatively, domestically-produced 15w-40CD or #HC-14 diesel engine oil may be used instead. Use clean engine oil. Prevent diesel or water from getting in engine oil. Don't use different grade engine oil at the same time.
(3) The pure antirust and antifreeze coolant should be used. Don't use well water or underground water (hard water) because such water contains a lot of mineral substances which are easy to fur up in the diesel engine to affect cooling effects. Never use sea water or salty river water to avoid salt caking in the diesel engine under high temperature.
(4) When the diesel engine is working under the ambient temperature below 0oC, the coolant should be prevented from freezing up so as to protect some parts from cracking. Therefore, when the diesel engine without antifreeze liquid finishes running, the coolants of each part should be discharged; for the unit with the closed circulation cooling system, an appropriate antifreeze coolant may be selected for use according to the local lowest temperature.

3.4. Outdoor use of the unit

(1) When the unit works outdoors, a rain shed should be erected to protect the unit from sunshine or rain.
(2)The output cables must be tidy, safe and reliable, but cannot be dragged randomly so as to ensure the safety of operators.
(3)The insulation of the output cables of the unit-must be above 2MO (measured with 500VMO meter); otherwise, the unit is not allowed to work.
(4)1f outdoor use must sure 1 m around the generator should with fence protection and warning sign.

3.5. Indoor use of the unit

(1) The distance from the water tank of the closed-cooling unit to the air outlet in the wall should not be greater than 1 m, while the distance from any other edge to the wall should not be smaller than 1 m.
(2) When two or more units are installed in a room, the distance between two units should not be smaller than 2m.
(3) Good ventilating conditions should be provided indoors to ensure the convection of hot and cold air.
(4) The distance between the circulating water pool and the open-cooling unit depends on the unit's power. For the unit below 200kW, the distance should not exceed 5m and the water pool's capacity should not be smaller than 4m3; water surface must be higher than the water outlet of the engine; meanwhile, spraying cooling or cooling tank should be employed (see Attached Fig. 1).

3.6. Output Power

(1) When the ambient temperature is 40oC, the altitude is 1 000m and, the relative humidity is 60%, the unit may keep running continuously at the rated power.
(2) 1f the above ambient conditions in (1) are exceeded, the output power of the unit should be corrected. The output power of the diesel engine is corrected as specified in (4), and that of the generator is corrected according to GB755-8l "Basic Technical Requirements of Motor".
(3) When the unit works at the altitude of not higher than·1,500m and the ambient temperature of not higher than 38oC, it is allowed to run at 100% of the rated power.
(4) The diesel engine outputs the rated power at the ambient temperature of 38oC, and the fuel system needs not adjusting as long as the unit does not run overload. When the altitude exceeds 2,250m, the power should be reduced by 4% for every 300m higher; when the ambient temperature exceeds 38oC, the power should be reduced by 2% for every 11 °C higher; correspondingly, the fuel system should be adjusted to reduce fuel delivery, and the power of the unit will also decrease.

3.7. Eight electric performance targets of voltage and frequency of the unit are as follows:

Vpltage				Frequency			
Stable Regulating Rate (%)	Instantaneous Regulating Rate (%)	Recovery Time (Sec.)	Fluctuation Rate	Stable Regulating Rate(%)	Instantaneous Regulating Rate(%)	Recovery Time (Sec.)	-Fluctuation Rate
±2.5	20~15	6	1	0-5 Adjustable	±10	5	1

Note:

(1) When the unit is under 0-25% of the rated load, the fluctuation rates of its voltage and frequency are allowed to be 0.5 bigger than the figures listed in the table.
(2) In the calculation of stable voltage regulating rate, the voltage change from the cold to hot state; the hot state means the state that the unit runs continuously under the rated mode.

4. INSTALLATION GUIDE

The following circumstances should be taken into account for the installation of the unit. Refer to Attached Fig. 2, 3 and 4.

4.1. Above ground installation

The most ideal position of the machine room should be above ground, and far away from other buildings. This way, the influences caused by the unit's vibration and noise may be reduced, and also a good working environment may be provided for maintenance personnel.
If the unit is required to work in an open field and no cement or brick machine room can be built, a temporary shed may be built with iron sheet and asbestos shingle to shelter the unit from wind, rain and sunshine; the ground must be even and solid, and be covered with rubber cushions.

4.2.Underground installation

If the unit has to be installed in the basement, then the air change volume necessary for the unit's working and heat spreading should be ensured.

4.3. Machine room

In the machine room, there must be adequate space and passage for operators' convenience in inspection and maintenance. The distance between one end of the water tank of the unit and the wall should not be greater than 1 m to avoid blocking air exhaust because blocked air exhaust may heat the water tank and thus heat cooling water. If it is really difficult to make arrangement in the way as said in the above, an air scoop may be mounted to exhaust air outdoors directly. If two or more units are in talled in a room, the distance between two units should not be smaller than 2m. When noise control is required, the silent-type unit is available, or noise reduction measures may be taken in the machine room.

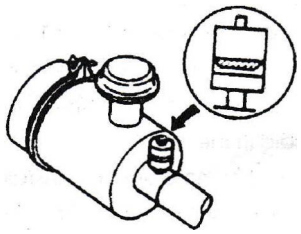
4.4. Gas exhaust system

When the unit is installed indoors, the waste gas discharged by the diesel engine should be exhausted to an appropriate outdoor place. The most ideal place is the downwind side of the house. Never exhaust waste gos toward the door/window or the air intake of the machine room. Gas exhaust pipe should be shorter and straighter, but should not include more than 3 elbows, which should be jointed in arc form. A flexible pipe should be attached to the joint of the external exhaust pipe and the exhaust outlet of the unit.

The external exhaust pipe should be supported by other brackets separately, but cannot press the flexible pipe. As the temperature of waste gas is high, and even up to 700oC in some diesel engines, combustible articles must be kept away from waste gas. When the exhaust pipe needs to pass through the wall, it is required that a bigger round pipe (whose inner diameter should be about 25mm bigger than the outer diameter of the exhaust pipe) should be fitted in the wall, and the big pipe should be filled with heat insulating materials. It not only supports the exhaust pipe, but also ensures heat installation.

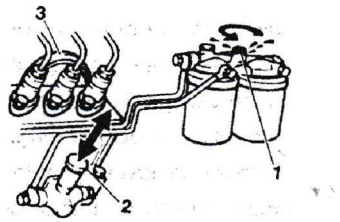
4.5. Air Intake

The air intake should be positioned near the tall end of the generator part of the unit, and be parallel and at the same elevation as the generator shaft. The area of the air intake should be above 50% bigger than that of the water tank. Too small air intake may cause pressure drop in the machine room and then power reduction of the diesel engine. To ensure constant temperature in the machine room and avoid the influences of wind and rain, louvers may be used. However, be cautious that the area of the air gap of the louver should be 25% bigger than that of the above-said air intake.



4.6. Fuel Tank Position & Fuel Line

The fuel tank is required to store the fuel necessary for working for 8 hours and above, It would be better to separate the fuel tank from the unit and to position the fuel tank higher than the fuelpump of the unit. When installed underground, the fuel tank's position. should not be 1m lower than t,e center of the fuel feed pump, and the inlet port of the sucker must be 50mm higher than the bottom of the fuel tank in order to avoid sucking sediment to block the fuel line. The refilling port of the fuel tank should be provided with a filter screen to prevent impurities from entering the oil tank. The bottom of the oil tank must be provided with a discharge valve: for the convenience of cleaning. The oil tank should be made of uncoated mild steel but not galvanized iron sheet because zinc film can react with fuel to form a kind of substance harmful to the fuel injection nozzle.



4.7 Electric

It would be better to use flexible three-phase, four-core copper cables as power cables. Cable end should be crimp-connected via copper wire lug and zinc cover. The section of power cable depends on the unit's capacity, the ambient temperature, the laying mode of cable and the distance from the load to the unit. See the details of the electric installation documents that can provide you with satisfactory solutions. The best solution is to place cables in an underground cable trench, and then cover the trench. The cable trench should be provided with a drainage system to protect cable from being immersed in water and oil. The depth of the cable trench depends on the size of cable, but must allows cable to be introduced into the trench vertically; the curvature radius of coble should not be smaller than 1 0 times of the outer diameter of cable. In most cases, the cable trench is 0.5m wide and 0.5m deep; but when the voltage exceeds 600kVA, the depth of the coble trench needs increasing to 1 m. If cable is laid along walls, it must be fixed to walls, and its lower end should pass through a protective sleeve not 1.5m lower than the ground level. In laying, cable cannot be too tight or loose, and adequate allowances should be left at both ends. During cable laying, the temperature should not lower than 0oC.

4.8 Installation of earth wire

According to the Design Specifications of Internal Combustion Power Station, the diesel generator employs the three-phase four-wire neutral point direct earthing mode; thus, the neutral point earthing of the generator is essential to the installation of the unit. If the neutral point were not earthed, the neutral wire (also known as zero wire), like phase wire, would form a great capacity pressure difference with the ground; additionally, people usually think that zero wire is not live, and probably touch it to cause electric shock; It would be extremely dangerous. The earthing resistance of the earth wire should not be greater than 4Ω.

4.9 Safety and fire prevention

If water vapor enters the motor, It will be fatally dangerous. Don't Install any water tap near the air intake. Keep water bucket away from the unit. In machine room design, fire safety should be taken Into consideration, and the machine room should be provided with fire-extinguishing facilities. The fire safety of the machine room should be accepted by the fire department. The control panel of the unit should be close to the entrance door. In case of any accident. it will be very convenient to shut down the unit. The above staements are for reference only can design a machine room for you, and also provide further detailed information.

5. OPERATION GUIDE

5.1. Preparations before the start-up of the unit

Check all parts of the diesel generator for normal working conditions, all accessories and fasteners for reliable fixing, and the control mechanism for flexible and reliable running. Any abnormal condition or impurity that obstructs the running of the unit should be eliminated and settled immediately.

(2) The electric wiring of the unit has been completed prior to delivery. In consideration of bump and shake in long-distance transport, the user needs to check the nut(s) of each joint of the line for firm fixing and good contact and check each circuit for correct wiring by referring to the electric schematic diagram and the electric wiring diagram prior to the start-up of the unit.

(3)If the unit is not used for a long term, check electric circuits for dampness and also check insulations. Use a 500V mega meter to measure the insulation resistance of main loop and control loop; the insulation resistance at cold state should not be smaller than 2MO. (Be cautious that silicon rectifying cell should be short-circuited in insulation measurement; the electric wires affected with damp should be dried with the resistance current method - ntil they satisfy relevant requirements. In the control box, trouble spots in insulation should be find out for settlement).

(4) Check the wiring of the electric start-up system for normality and the storage battery for sufficiency. The electrolyte's density should not be lower than 1.27g/CM (at 15oC); add distilled water when the liquid level is too low.

(5) Check the cooling system for normality. The open cooling system, should be connected with water supply, and its water level should be higher than the generator; for the closed cooling system, check whether cooling water is filled up, and add cooling water if water is not enough.

(6) Check the fuel system for normality and the fuel amount in the tank for adequateness, open the switch if the fuel system, and use a hand pump for refilling fuel when necessary. In refilling fuel, loosen the bleeding screw on the injection pump to release the air in the fuel system until there is no air bubble in the overflowing fuel, and then fasten the bleeding screw to pump fuel continuously until there is fuel in the return fuel pipe; fasten the hand pump.

(7) Check the level of engine oil to see whether it is within the scale range of the oil scale. If engine oil is not enough, use the same grade engine oil, and refill it to the scale range.

(8)Check the air intake system for normality and the air filter for good working conditions.

(9) Check the wiring of output circuits of the generator for normality and the meters and switches on the control panel for normality and reliability.

(10) The output switch is at the off position.

5.2 Start up of the unit

(1) Adjust the rotating speed to the position of 850rpm. For the low lower generator unit with the rated rotating speed of 1500rpm, it should be adjusted to the position of 1500rpm.

(2) When use the key to turn on the unit with protective device, check the low oil pressure alarm lamp of engine oil. If the lamp is on, it means it is at good working conditions. Start the unit 4-5 seconds later.

(3)1f the engine with air preheating device needs preheating. the preheating heater plug should be powered on for 1 0 seconds, and then the diesel engine may be started. If the diesel engine is not started in l 0 seconds, release the start button. and start it two minutes later. If startup operation falls for three times continuously, stop startup operation. Find out causes and remove troubles prior to the fourth-time startup.

(4) After the unit is started and runs, release the start button immediately, The finger of the charging ammeter points to the positive position, which means the charging set is working normally. Here, the low oil pressure alarm lamp of the unit with protective device should be off. If the emergency lamp is not off, it indicates that the engine oil pressure is too low; stop the unit immediately to check the. unit.

(5)After the unit is started, the rotating speed should be controlled within 850rpm usually for less than 30 minutes. The unit cannot run at such speed for a long time.

(6)After the unit is started, pay close attention to the readings of all meters. and check the running status of each part of the unit at once. Remove any abnormality immediately. When the unit runs normally, record the startup and running time.

5.3 Management during operation

(1) After the unit is started and runs normally, the rotating speed should be gradually increased from 850rpm to l 1500rpm. For the lower power unit with the rated rotating speed of 1500rpm, the diesel engine needs warming up first.

(2) Generally, the unit can be accelerated to the rated rotating speed (i.e. frequency 50HZ) when the discharge temperature in the warming up of the diesel engine reaches 45oC (except under emergencies).

(3) If the generator cannot generate voltage automatically, magnetize the generator, and then adjust voltage setting and resistance. Adjust the no-load voltage to 400V.

(4) Close the air output switch, and switch on the load to supply power to the load.

(5) If the unit is in parallel operation, usually adopt the lighting method or use a synchronous meter for manual parallel operation. Operators are required to close the switch of the unit (to be put in parallel operation) skillfully and rapidly to avoid asynchronous impact.

(6) If parallel operation fails for several times, remove the load and cancel parallel operation, and adjust the stable regulating rate of single unit.

(7) After the unit is in normal power supply operation, check the working condition of each part of the unit from time to time, and observe various meters and alarm lamps frequently to see whether they are at normal working conditions. Record the readings of the meters every hour.

5.3 Management during operation (cont.)

(8) Check the volumes of diesel and engine oil regularly. Refill fuel immediately when the fuel level is lower than the 1/3 position of the fuel tank.

(9) Load increase and decrease should take place evenly; except under emergencies, sudden load increase or removal is not allowed. When the discharge temperature of the diesel engine reaches 55oC, and the engine oil temperature reaches 45oC, it is allowed to increase to the full load.

(10) When the diesel generator unit is used for a long time, it can run under 90% of rated load. The unit can run under rated load for 12 hours continuously at most.

(11) During the normal operation of the silent-type generator, open the door regularly to see whether the unit is running normally, and record the readings of the meters. Remove any abnormality in time.

(12) The new or heavy-repaired diesel engine need go through 60h trial running prior to formal use, and then can be put in full-load use. Throughout the trial running stage, the load should be 50%-80% of the rated power of the unit. Never allow the unit to run Idle for a long time. During the use of the unit, check and replace "three filters (air filter, diesel filter and engine filter) regularly and check the unit for ·three leakages· (air leakage, oil leakage and water leakage) from time to time. In case of three leakages, conduct repair in time.

5.4 Unit shutdown

(1) Gradually remove the load of the generator, and cut off the air output switch.

(2) Gradually reduce the rotating speed, and shut down the unit after it runs for 3-5 minutes. Try to avoid stop the unit under full load suddenly in order to prevent overheat accident. Set the electric key to the off position and take the key out.

(3) Bring the fuel system to the state prior to startup, and cut off the delivery valve of the fuel tank.

(4) For the open cooling system, cut off the water supply and the water valve. When the ambient temperature is lower than 0oC in winter, to protect the unit's parts from frostbite, the water in the cooling system should be discharged after shutdown (unless the antifreeze liquid is added).

(5) The diesel generator unit not in use for a long time should be provided with an oil seal. Every week, the unit without oil seal must be started and run for 5-10 minutes to prevent the unit's parts from getting rust, especially internal parts.

(6) Emergency stop of the diesel generator unit. Under emergency or special circumstances, the unit must be stopped to avoid serious accidents. Cut off the air output switch quickly, remove the unit's load, and push the emergency stop button or move the emergency stop throttle control handle to the position of stopping feeding fuel; then, the unit stops running immediately.

(7) After the unit, stops running, check and clean the outside of the unit, and wipe off oil stain and dust on the unit to keep the unit ready for use at any time. Record the shutdown time.

6. MAINTENANCE GUIDE

To ensure the normal running of the diesel generator unit and prolong the service life of the unit, you must check, adjust and clean the unit periodically to create good conditions necessary for the unit to run and prevent early wearing and failure. The operator must follow the instructions below:

1. Routine maintenance
2. 1st-level technical maintenance
3. 2nd-level technical maintenance
4. 3rd-level technical maintenance

6.1 Routine maintenance after every shift

(1) Check coupling bolts of rotating members for fastening, and fasten any loose bolt in time.

(2) Check the engine oil level in the oil sump (oil scale).

(3) Check the volume of fuel in the fuel tank.

(4) Check the water level of the water tank.

(5) Check the joints of fuel and water pipelines.

(6) Check the gaskets of air intake pipe, exhaust pipe, and cylinder for tightness.

(7) Clean oil stains and dust on the surface.

6.2 1st-level technical maintenance (50 hours)

In addition to the contents of routine maintenance, the following items are added:

(1) Check the filter element of the air filter.

(2) Replace the fuel filter and the filter screen in front of the hand pump.

(3) Check the tensioning of the rubber strip.

(4) Replace cooling water and engine oil.

(5) Apply butter to the bearing of the water pump.

6.3 2nd-level technical maintenance (200 hours)

In addition to the items of the l st-level technical maintenance, the following contents are added:

(1) Replace the filter elements of the air filter, the engine oil filter and the fuel filter.

(2) Replace the engine oil in the oil sump.

(3) Check and adjust the valve clearance.

6.4 3rd-level technical maintenance (500 hours)

In addition to the contents of the 2nd-level technical maintenance, the following items should be added:

(1) Check and adjust the oil injection advance angle.

(2) Check the spraying of the nozzle:

a. Sprayed fuel should be fogging;
b. The nozzle orifice should not have oil drip.
c. If injection pressure is not enough, use a screwdriver to rotate the adjusting screw to adjust fuel injection pressure.

(3) Clean the fuel tank.

(4) Clean the oil sump.

(5) Replace the engine oil in the injection pump.

(6) Check the fastening moments of connecting rod bolt, main bearing bolt and cylinder cover bolt.

6.5 Routine maintenance of generator

(1) Protect the generator from damp, and cover it with a cloth to when it is not in use.

(2) Metal chips, water drops, dust, water vapor and other hazardous gas should be prevented from entering the generator.

(3) When the generator is running, good ventilation should be ensured. There should not be any cover on the external surface of the generator so as to facilitate ventilation and heat emission.

(4) Check the temperature of the bearing every four hours in each shift, and observe the sound of the bearing for any abnormality.

6.6 Routine maintenance of storage battery

(1) Ensure good ventilation for the storage battery, and protect it from water. oil, dust or heavy impact.

(2) Clean the terminals and surface of the storage battery every day. The electrolyte level is required to exceed the pole plate by 10-15mm; the density of the electrolyte should be within 1.28-1.30 at 25oC; otherwise, distilled water should be added.

6.7 Maintenance of the starting motor

(1) The starting motor is working under high current for a short time, and connections are required to be firm. Check terminal posts for any damage or color change.

(2) The storage battery and other power supply should be free of oil stain, etc.

6.8 Maintenance of the charging generator

For the sake of safety, never check the charging set when the unit is running, but check the external wiring of the motor and the voltage regulator for fastening and the driving belt for tightness. Besides, the disassembly check and maintenance of the charging set should be conducted together with the 3rd-level protection of the unit.

6.9 Maintenance of the control box

(1) Open the control box regularly (twice per shift) to see whether any terminal post gets loose, overheated or faded.

(2) Clean the control box regularly (once per shift) to keep meters clean, smooth, readable, complete and bright.

6.10 Maintenance of instruments and meters

(1) Often use a handle air blower to below off dust on current transformer, voltage transformer. etc. to keep them clean.

(2) Meters should be sent to the testing department for calibration every year (annual inspection).

7. REPAIR GUIDE

Diesel Generator is an advanced unit coming with various automatic control functions. To keep it under good technical conditions and prolong its service life, besides proper installation, use, operation and maintenance of the unit, proper repair should be also conducted for the unit's problems and troubles to resume its good technical status during use. The unit's repair involves such stages as disassembly, cleaning, repair, and reassembly.

7.1 Disassembly of the unit

(1) Preparation before disassembly:

a. Site requirements: the disassembly and repair site should be big enough, even, clean and bright, and be located indoors so as to facilitate the smooth proceeding of repair work.
b. Tool preparation: necessary tools should be prepared according to the scope and specific requirements of repair work. Common tools: various open end wrenches, box wrenches, socket wrenches, moment wrenches, screwdrivers, nippers, etc. Special tools: tools for dismounting valves and rolling bearings, etc. Measuring tools: micrometers, clock gouges, vernier calipers, clearance gauges, etc. Heavy tools and other apparatuses: pulleys, oil tanks, oil pans, etc.
c. Technical document preparation: instruction manuals, disassembly & assembly technical requirements, repair standards of necessary parts and accessories, etc.

(2) Main rules for disassembly:

a. According to the requirements of repair items and disassembly process, various parts should be dismounted correctly. Prepare and select disassembly tool and equipment. For some complicated parts, disassembly procedures should be carefully analyzed to prevent brutal disassembly and port damage. Use diesel for immerse or heating, and start disassembly ofter appropriate knocking.
b. Disassembled parts should be placed in order. Important parts should be affixed with proper marks and labels. Disassembled oil ducts and water ducts should be wrapped with cloth to prevent mud, sand and dirty substances from getting in.

c. For any port with certain assembly direction and position, pay attention to original marks. If original marks are not clear, new marks may be mode. Don't punch marks on any contact surface.

d. Disassembled bolts, nuts, gaskets and spacers should be mounted to original positions or placed according to their categories. Don't litter them everywhere.

e. Determine part and accessory disassembly scope according to repair needs; those that do not need disassembling should not be disassembled; otherwise, the working life, of parts and accessories may be affected.

f. Repair one replace any damaged or worn connecting or fastening piece founded in disassembly.

(3) General method for part disassembly

a. A suitable spanner should be selected to dismount screwed connections. Wrench screwed connections with appropriate force to avoid damaging edges· and corners with too big force. Use a special tool to remove studs.
b. A special detacher puller can be used for dismounting too-tight-connected parts.
c. For key joints, the same method can be adopted as the too-tight-connected parts.

(4) Crane operation rules

a. Strictly prohibit overweight hoisting.
b. At the contact place between wire ropes and parts, a wood block should be placed to prevent crushing parts.
c. Check ropes and fittings to see whether they are reliable and under even stress prior to hoisting. When weight is 5-10cm above the ground, vibrate or shake the rope to see whether it is reliable.
d. Prevent too fast rise or fall in hoisting. Never stand below hoisted weights. When a weight is hoisted to the required position, place it slowly and steadily.

7.2 Cleaning and check of parts

Part cleaning is also one of the repair methods. Disassembled parts must be cleaned. Typical cleaning methods include oil wash and mechanical cleaning.

(1) Greasy stains are usually removed with the oil wash method. Precision parts like the plunger, plunger sleeve, injection nozzle, and rolling bearing should be cleaned with gasoline; after cleaning, they should be dried with compressed air.

(2) Removal of carbon deposit: carbon deposits are often removed with the mechanical cleaning method; according to the material nature of parts and accessories, suitable tools like chisel, scraper and brush can be used. Be cautious not to damage the sur1ace of parts and accessories.

(3) Incrustation removal: the incrustation inside the cooling water tank can be chiseled off manually or removed by adding the cleaning liquid (l 5Og caustic soda In l kg water) in the closed cooling system, keeping it in the system for 8-12 hours and running the unit to 75oC.

4) Test and check cleaned parts and accessories according to repair criterions, and then decide to repair or replace them.

7.3 Assembly of the unit

The unit should be assembled in the reverse order of disassembly. The general principle is from internal to external, from main parts to auxiliary ones, and simultaneous assembly and adjustment. Main assembly procedures include:

(1) Parts should be cleaned; particularly, the lubrication system needs a thorough cleaning.

(2) Sliding contact surface should be free of burs or scratch. Clean lubricant should be applied prior to assembly.

(3) Select and use suitable tools. Bolt screwing procedures must comply with relevant technical requirements.

(4) For the rolling bearings with inner diameter greater than 35mm, the hot assembly method should be adopted. Place the bearing In the 90-1 00oC for heating, and put it in the journal. Those with inner diameter smaller than 35mm cannot be heated, but can be assembled through hammering; but hammering position must be at the inner ring.

(5) The parts and accessories with certain directions and marks should be assembled according to such directions and marks; never make mistake in assembly.

(6) Asbestos, paper and cork gaskets should be replaced to keep original thickness; if remaining intact, metal gaskets may be used again but need to go through annealing treatment.

(7) Any worn or deformed bolt should be replaced. Double-ended bolt should be fastened to the end. For the screws with certain installation subsequence and tightening force, nuts should be fastened according to such subsequence and moment.

(8) AII required locking parts including cotter pin, lock washer, spring shim and relief spring should be installed according to the technical requirements.

(9) The joints of oil and water lines and intake and outlet pipes should be tight; washers, gaskets, gum rings and gum covers should be used according to the technical requirements and be tight.

(10) When mounting the parts, rotate the parts to see whether it is jammed. After assembly is completed, run the crankshaft to conduct an overall check, and eliminate any trouble in time.

7.4 Repair of the generator

(1) Take the core out of the generator for repair once every year, and check and test the insulations of each circuit.

(2) When dismounting the generator, there are two opening boltholes beside the flange on either of front and rear end caps. To dismount end caps, remove the bolts of the front end cap firstly, and then screw the removed bolts into the boltholes on the rear end cap to eject the end cap gradually. This way, end caps are under even stress, and are not easy to deform or crack.

(3) Generally, lubricating grease should be replaced when the unit runs for 2,000 hours. Clean up the old grease in the bearing chamber prior to replacing lubricating grease. Use kerosene to wash the chamber, and different grade bearing greases cannot be mixed for use. The volume of bearing grease to be added should be 1/3-1/2 of the capacity of the bearing chamber. Too much bearing grease may cause overheat of the bearing.

(4) When dismounting bearing cap and bearing, take care to protect them from dust.

(5) The rust or stain on the surface of the collector ring may be wiped off with a roving cloth dripped with little alcohol or other solution, or gently ground with #00 sand paper. In case of any serious sear, it should be processed on the lathe. In processing, it should be concentric with two bearing guards in order to prevent the collector ring from jumping in rotation.

(6) The electric brush's pressure is 200-250g/cm2. if the motor is installed at a place with violent vibration, the brush's pressure should be 300-350g/cm2. The fixing of the brush and the brush holder frame should be appropriately tight. Serious worn brush should be replaced. Use a fine sand paper to grind the face of the new brush in contact with the collector ring into an arc (this paragraph is not applicable to brush-less motor).

(7) Open the motor, check the inside and use dry compressed air to blow and clean dust buildup on conductive surface to prevent electric discharge on surface. The surface of each circuit and the inside of the fan should also be cleaned thoroughly to ensure effected ventilation and heat emission. When dismounting the connector lugs of the generator and the excitation device, pay attention to the labels. if any label goes missing or becomes unclear, check and rearrange labels. In assembly, wires should be connected to their original positions, and never make mistake in wiring. Use a puller to pull off the bearing, and cover the dismounted parts with clean paper.

8. A.T.S AUTOMATIC TRANSFER SWITCHES SYSTEM

8.1 Description of switch connection

(1) The wiring copper bars of channel I and II of the switch are connected from the left to the right to A, B, C and N phases respectively of the commonly used power supply (front) and the standby power supply (rear).

(2) The control power supply comes from the C and N phases of the commonly used power supply and the standby power supply.

(3) The control power supply AC 220 V of the Channel I and II are connected respectively to the terminals l 02-103 and 104-105 the 1 02 and the 104 of which are live wires of the commonly used power supply and the standby power supply.

(4) The terminals 101 and 106 ere used only for the control power supply of the signal lights.

Be sure not to connect 101 and 106 with any other lines!

(5) For the incoming wires from above (below), copper bars or conductors are used to connect the A, B, C and N phases of the channel I and II of the upper (lower) side respectively for output.

8.2 Description of switch commissioning

(1) Connect the commonly used power supply (I) and the standby power supply (ll) to the wiring copper bars accordingly. Fully automatic commissioning:

Commonly used power supply is powered up. Standby power supply is powered up. The channel I of the switch is put through.

Commonly used power supply suffers loss of power. Standby power supply is powered up. The channel II of the switch is put through.

Commonly-used power supply Is powered up. The channel I of the switch is put through.

(See the white Indication arrow on the switch panel)

Turn the function selection switch to the remote control (manual) position: The switch should be actuated as required in article.

8.2 Description of switch commissioning (cont.)

(2) When the switch is In the channel I or II putting-through state, the signal light on the panel should be lit up accordingly.

(3) With the commissioning completed, first turn off the power supply and then turn the handle to the "0" position (the central position, see th white Indication arrow on the switch panel for reference)

8.3 Maintenance items

This switch is an intelligent integral product, which, if the driving mechanism and the electric control ,area are not altered presumptuously, is free of any maintenance basically.

This switch should be kept from any moisture, dust or vibration. The ambient temperature in the surroundings should riot be more than +40oC for the upper limit and -5oC for the lower limit arid the average value within 24 hours should not be more than +3oC.

The height above sea level where the switch is installed should not be more than 2000 m.

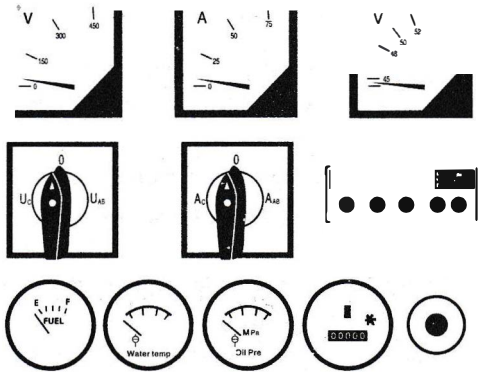
The relative humidity in the atmosphere should not be more than 50% when the temperature in the surroundings is +40'C. There may be a higher humidity in lower temperatures. The max relative humidity may be 90% on an average, when the minimum temperature is +25oC on an average in the wettest month and dewing produced on the surface of the product as a result of the change of the humidity should be taken into consideration.

The pollution is Grade 111.o

The place where this switch is used should be free of strong vibration and impact, harmful gases leading to corrosion against metals and damage, to insulation, thick dust, electric conduction particles, explosive and dangerous substances or strong electromagnetic field interferences.

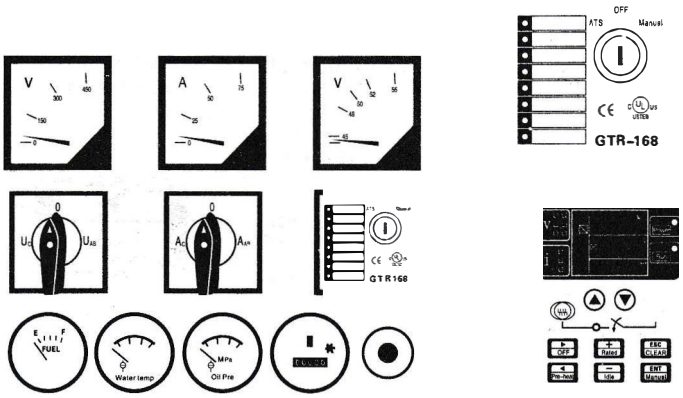
9. CONTROL PANEL AND OPERATION

(1) 4 Protect function panel:



This Panel with Low oil , High water temp,High oil temp and Over speed protect functions. This Panel just for key start type. If over speed ,high water temp etc .. the generator will stop auto. Start generator Just turn the key to on positibn after check oil and water and fuel.

(2) AMF and ATS type Panel



This panel is for AMF and ATS type generator use.

9.1 The module GTR 168 is a low cost Generator controller...

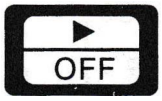
...equipped with Auto Start/Stop functions, protections, alarm and annunciation etc .. Monitoring and protections include: Running, Over Speed, High Water Temperature, Low Oil Pressure, Over Crank, Emergency Stop, and Low Battery. All outputs function executed by a set of traditional relays which make it possible to support heavy power handling capability, It designed to control engine by a key switch. User only needs to switch the key to the Manual position then the system will carry out whole functions according your settings. Besides, the GTR-168 applied with a high security continental terminal connector that provides easy plug-in and removal.

9.2 GTR-2 is a, full digital Gen-set controller equipped with all basic functions and LCD panel that Include error message...

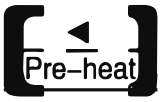
...display; fault input detection, analog signal measurement and generator status. When the error occurred, GTR-22 shuts down the engine; real-time diagnosis can be known easily by reading LCD panel information. Furthermore, parameters can be adjusted from front panel in accordance with any special requirement. Operating DC power range is from 8 to 38 volts, and low power consumption in standby mode.

Suitable for small battery charger. The function of all button list in below:

a. Under password input mode, this keypad is used for code #1 input.
b. Under running status, this keypad is used for stopping generator.
c. Under configure mode, this keypad is used for changing parameter page.

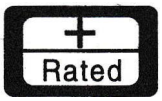


a. Under password input mode, this keypad is used for code #2 input.
b. Under auto or manual mode, th:s keypad is used for pre-heat command input.
c. Under configure mode, this keypad is used for changing parameter page.

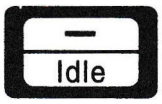


9.2 (cont.)

a. Under password input mode, this keypad is used for code # 3 input.
b. Under idle status, this keypad is used for recover rated speed command input.
c. Under configure mode, this keypad is used for increasing a unit of the setting.



a. Under password input mode, this keypad is used for code #4 input.
b. Under running status, this keypad is used for idle speed command input.
c. Under configure mode, this keypad is used for decreasing a unit of the setting.



a. Under standby status, this keypad is used for changing mode input. (Lock mode Password mode Auto mode Manual mode)
b. Under failure stopping status, this keypad is used for clearing error signal input.
c. Under configure mode, this keypad is used for escaping from configure mode, and the setting will cancel.



a. Under password input mode, this keypad is used for confirming input.
b. Under standby status, this keypad is used for manual start command input.



USE AND CARE

Unauthorized modification may impair the function and/or safety of this device and could affect the life of the equipment. Always check for damaged or worn out parts before using the device. Store it in a secure place out of the reach of children when not in use. Inspect for good working condition prior to storage and before re-use.

REPLACEMENT PARTS

The DPG-20KW-1P-120.240 is designed to provide years of reliable performance. Should the need for replacement parts arise, please contact Larson Electronics.

THESE INSTRUCTIONS MAY NOT COVER ALL DETAILS OR VARIATIONS OF THIS PRODUCT FOR YOUR EQUIPMENT OR INSTALLATION REQUIREMENTS. SHOULD FURTHER INFORMATION NOT COVERED BY THESE INSTRUCTIONS BE REQUIRED, PLEASE CONTACT LARSON ELECTRONICS BY EMAIL AT SALES@LARSONELECTRONICS.COM OR BY PHONE AT 1-877-348-9680 FOR FURTHER ASSISTANCE.

PLEASE VISIT LARSONELECTRONICS.COM FOR **WARRANTY** AND **RETURN** INFORMATION.