



# DGK25E Owners Manual

## Sound Attenuated Diesel Generator Sets

**WARNING!**

**CALIFORNIA - Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

**shindaiwa**  
*Construction Products*



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# 1. INTRODUCTION

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Thank you for purchasing a Shindaiwa KWiet Power Sound Attenuated Diesel Generator.

This manual contains important information for maintenance and safe operation of the Shindaiwa diesel generator DGK25E.

- Please read and understand this manual before operating to avoid accidents or unnecessary repairs.
- This manual should always be kept on or near the generator at all times
- Always keep the generator properly maintained.

For periodic maintenance and repair of the engine, please contact KWiet Power dealer or authorized ISUZU service center.

<p><b>ENGINE MODEL : BV-4LE1 (ISUZU)</b> <b>US EPA Interim Tier 4 Compliant</b></p>
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## 2. SAFETY INSTRUCTIONS

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### WARNING SYMBOLS USED IN THE MANUAL

In this manual, safety and caution items are classified as **[WARNING]** and **[CAUTION]**.



#### **WARNING**

Indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.



#### **CAUTION**

Indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury and property damage.

Note that  **CAUTION** item can also lead to major accidents under some circumstances if not correctly followed.

All items listed in this manual are important for safe operation of the generator unit. Be sure to observe them closely.

# SAFETY INSTRUCTIONS

---

## **WARNING**

### **DANGER OF ELECTRIC SHOCK**

#### **DO NOT TOUCH OUTPUT TERMINALS DURING EQUIPMENT OPERATION!**

Do not touch the output terminal while the generator unit is operating since it can cause an electric shock. When it is necessary to touch the output terminals such as for load connections, make sure that the engine is not operating.

### **DANGER OF EXHAUST GAS POISONING**

#### **DO NOT OPERATE GENERATOR UNIT IN AN ENCLOSED AREA!**

The exhaust gas of the engine contains substances that are harmful to human health. Operate the unit in a well ventilated area. Using the generator unit indoor or in enclosed place can cause exhaust gas poisoning.

### **DANGER OF INJURY CAUSED BY ROTATING PARTS**

#### **DO NOT TOUCH ROTATING PARTS DURING EQUIPMENT OPERATION!**

Stay clear of rotating parts such as the belt, pulleys and the fan while the generator unit is running. Your hands or other parts of your body can be caught by rotating parts, or strike your body with great force, thus causing injury. Turn off the engine before inspecting the unit or conducting maintenance work.

### **DANGER OF ELECTRIC SHOCK, INJURIES AND BURNS**

#### **PRECAUTIONS FOR MAINTENANCE AND INSPECTIONS!**

Before conducting an inspection or maintenance work, remove the key from the starter switch, and place a [DO NOT OPERATE EQUIPMENT] sign or similar warning over the starter switch. An accidental operation of the engine during an inspection or maintenance work can cause a serious accident.

# SAFETY INSTRUCTIONS

---



## CAUTION

### [TRANSPORTATION]



## DANGER OF EQUIPMENT DROPPING



### HANDLE SUSPENDING EQUIPMENTS CAREFULLY!

- (1) Do not use twisted or frayed wire cable to lift up the unit, as it can be break easily.
- (2) Do not twist chains, since twisted chains can break easily.



### HANDLING EQUIPMENT AT DESIGNATED LOCATION!

The generator unit is designed with a single lifting hook on the top section. Do not lift the unit at any other sections. If wire cables are attached to the other parts, the unit can become unbalanced or drop when it is lifted.

### [INSTALLATION]



## DANGER OF INJURIES



### DO NOT OPERATE EQUIPMENT IN SLOPED/UNEVEN LOCATION!

Do not operate the generator on unlevelled or soft ground surfaces, the generator unit can move or tilt and could cause personal injuries.

### [OPERATION]



## DANGER OF FIRE



### USE EXTRA CAUTION WHEN ADDING FUEL OR OIL!

Before adding fuel or oil, stop the engine and make sure there is no open flame in the area. If fuel is spilled or leaks onto hot parts or electric components, a fire could occur. If fuel or oil is spilt, clean the area immediately. Close the cap securely after supplying fuel or oil.

# SAFETY INSTRUCTIONS

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## [MAINTENANCE AND INSPECTION]

### DANGER OF BURNS AND FIRE

#### **DISCONNECT THE BATTERY BEFORE INSPECTION AND MAINTENANCE!**

Before inspecting electrical parts, disconnect the negative (-) cable from the terminal of the battery. If the maintenance is conducted with the battery cables connected, the electric current flowing from the positive (+) terminal of the battery can cause a short-circuit resulting in burns or fire.

#### **DO NOT SPLASH WATER ON ELECTRICAL PARTS WHEN CLEANING!**

When cleaning the generator unit with water, close all doors of the generator unit. If water is splashed on the control panel, it could cause a malfunctions and a short-circuit, and result in a fire. If water is accidentally splashed on electrical components or the control panel, use compressed air to dry out completely.



## PRECAUTIONS IN HANDLING BATTERY

#### **HANDLING BATTERY CAREFULLY!**

The battery generates hydrogen gas and oxygen, which are flammable. A flame when brought near the battery can cause an explosion. Handle the battery with extra caution.

- (1) Wear protective glasses and rubber gloves when conducting maintenance work or inspecting the battery.
- (2) Do not smoke or generate a spark near the battery.
- (3) Stop the engine before conducting an inspection or maintenance of the battery.
- (4) Do not touch both terminals of the battery with a tool or metal object.
- (5) When removing the battery cables, disconnect the cable at the negative (-) terminal first.  
When connecting the cables, install the positive (+) terminal first.
- (6) Change the battery in a well-ventilated area only.
- (7) Connect the cables securely to each terminal posts. Loose cables could be causing faulty contact, which can generate a spark and causing an explosion.
- (8) Before conducting maintenance work on the electrical system or conducting electric welding, remove the negative (-) cable from the battery to cut-off the electric current flow to the circuits.

# SAFETY INSTRUCTIONS

---



## **BE CAREFULL OF ELECTROLYTE!**

Electrolyte contains dilute sulfuric acid. Careless handling of the battery can cause the electrolyte to spill resulting in loss of sight or burns.

- (1) Any work that requires the handling of electrolyte must be conducted under the supervision of a battery expert or a person experienced in handling batteries.
- (2) Do not use the battery with the electrolyte surface below the minimum level, as it can cause an explosion.
- (3) If electrolyte spills on the skin or clothing, wash immediately with plenty of water, then clean thoroughly with soap.
- (4) If electrolyte accidentally enters the eye, wash immediately with plenty of clean water and consult a doctor immediately. Electrolyte can cause the loss of eye sight.
- (5) If electrolyte is accidentally swallowed, rinse mouth repeatedly with plenty of water, drink large amounts of water, and consult a doctor immediately.



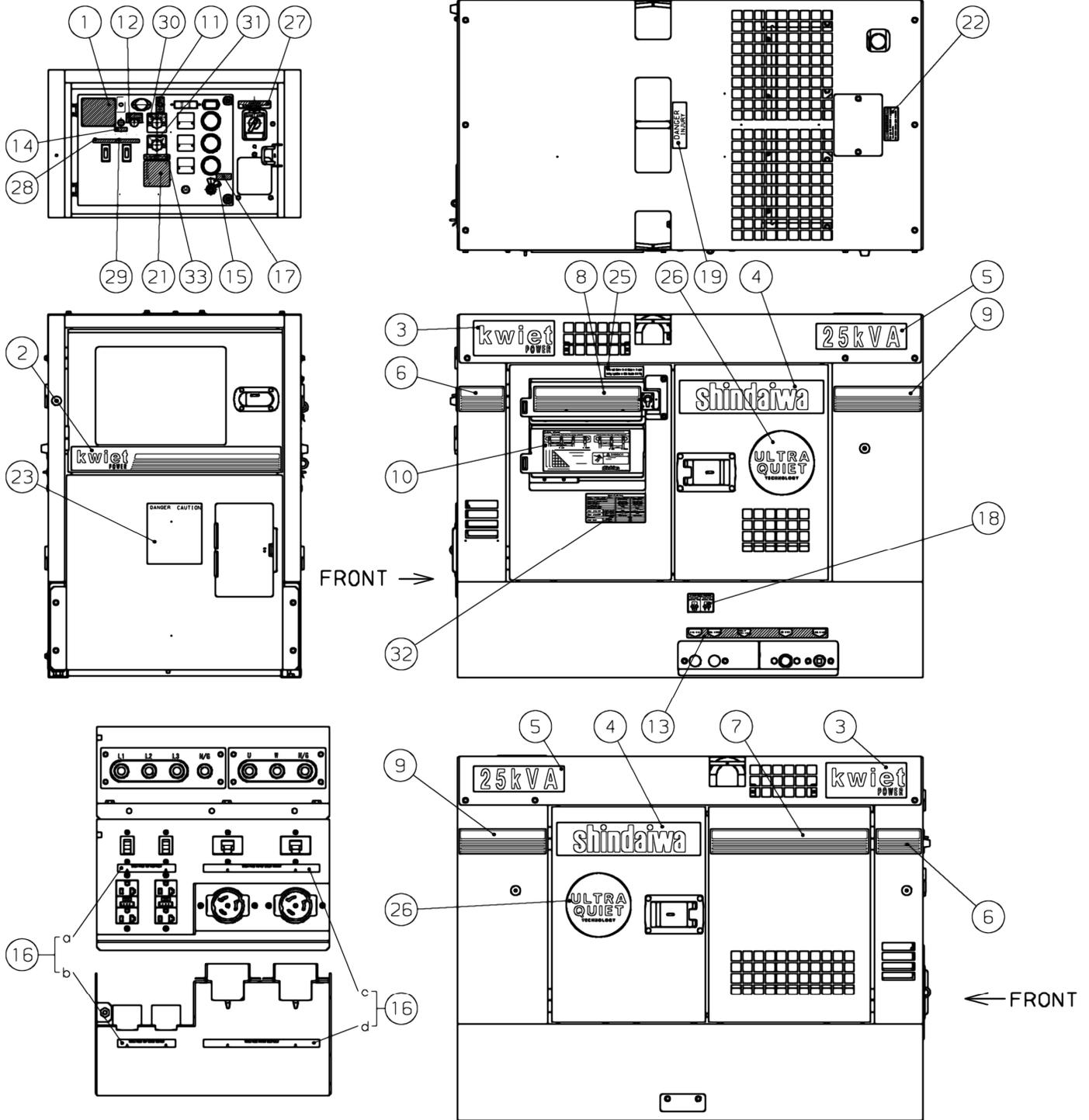
## **WARNING**

### **KEEP TERMINAL BLOCK FREE OF DUST AND MOISTURE AT ALL TIMES!!**

Always keep environmental contaminants such as dust and moisture from building up on the terminal block and generator control box or arcing from the terminals to the generator control box or terminal block mounting screws may result.

# 3. LABELS

## 3.1 Locations



**Note:** Make sure all information labels are undamaged and readable. Immediately replace any damaged or missing label. New labels are available from your local Shindaiwa distributor or dealer

# LABEL

## 3.2 Part Numbers

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Reference #	Part Number	Part Name	Qty
1	N/A	serial # plate	1
2	19406-00115	kwiet power	1
3	19406-00089	kwiet power name plate	2
4	19420-00057	shindaiwa	2
5	19404-00025	25kVA	2
6	19407-00078	side line	2
7	19407-00079	side line	1
8	19407-00080	side line	1
9	19407-00081	side line	2
10	19422-00048	Simul-Phase	1
11	19401-00212	panel light switch	1
12	19401-00214	voltage regulation	1
13	19401-00405	fuel and oil drain	1
14	19401-00211	pilot lamp	1
15	19401-00216	stop-run-start	1
16	19401-00466	circuit breaker and receptacle	1
17	19401-00401	internal fuel tank	1
18	19401-00372	3 way valve	1
19	19402-00210	injury	1
21	19407-00055	auto start cover	1
22	19402-00295	caution: gm spec LLC	1
23	19402-00306	danger caution	1
25	19401-00431	terminal cover instructions	1
26	19406-00111	ultra quiet technology	2
27	19402-00288	caution: do not change	1
28	19401-00412	3-phase breaker	1
29	19401-00411	1-phase breaker	1
30	19401-00409	off L1-L2,L2-L3,L3-L1 off	1
31	19401-00410	off L1(U), L2, L3(W) off	1
32	19406-00118	continous output	1
33	19402-00215	ampmeter indicates	1

# 4. SPECIFICATION

## GENERAL SPECIFICATION

DGK25E Specifications					
Alternator	Generator Type		Revolving Field Brushless Ac Simultaneous 3 Phase-120/240V 1 Phase		
	Rated Output	kVA	25		
		kW	20		
	Voltage-Three phase		V	208,240,480	
	Voltage-Single phase		V	120,139,240,277	
	Amps	Single phase-120V		A	62.5 x 2
		Single phase-240V		A	62.5
		Three phase-208V		A	69
		Three phase-240V		A	60
		Three phase-480V		A	30
	Frequency-regulation		Hz	60/50 ± less than 5%	
	Rated speed		rpm	1800/1500	
	Winding			Star with Neutral	
	Power factor			.8	
	Insulation class			F	
	Excitation			Self excitation (brushless)	
No. of poles			4		
Engine	Type		Vertical Water-cooled 4-cycle Diesel		
	Model (Manufacturer)		4LE1 (ISUZU)		
	No. of Cylinders (bore x stroke)		(in./mm)	4 (3.35 x 3.78/85 x 96)	
	Continuous rated output		hp	31	
	Rated speed,60/50Hz		rpm	1800/1500	
	Displacement		Cu.in./liters	133/2.179	
	Combustion system			Swirl Chambered	
	Cooling method			Radiator	
	Lubricating method			Forced lubrication	
	Starting method			Electric	
	Fuel			ASTEM No. 2 Diesel	
	Fuel Consumption		gal./liters	1.76/6.68 per hour @ full load	
	Lubricating oil			CD class or higher	
	Fuel tank capacity		gal./liters	20.6/78	
	Lubricant volume		gal./liters	2.2/8.5	
	Cooling water volume		gal./liters	2.2/8.2	
	Starting motor capacity		V-kW	12V-2.0kW	
	Charging alternator capacity		V-A	12V-20A	
Battery capacity		V-AH	12V-80AH		
Meters	Voltage/Frequency/Amperage/Hour				
Voltage Regulation	Automatic Voltage Regulator		3 Phase ± 1.0%		
			1 Phase ± 5.0%		
Shutdowns	Oil pressure, Water temperature		Lamp indication with shutdown		
Warning	Battery charge		Lamp indication		
Unit	Dimensions (L x W x H)		in./mm	57 x 31 x 45/1440 x 780 x 1140	
	Dry weight		lbs./kg	1543/700	
Sound Level	No Load		dB(A)	53	
	Full Load		dB(A)	56	

\*US emission certified at 1800 rpm only\*

Specifications are subject to change without notice.

Shindaiwa Construction Products 11975 SW Herman Road Tualatin, OR 97062

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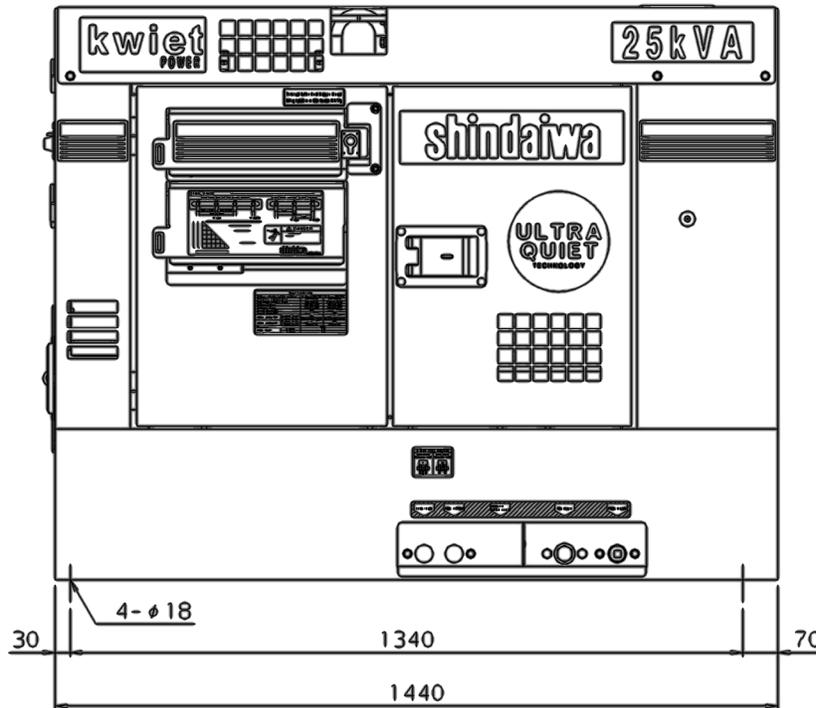
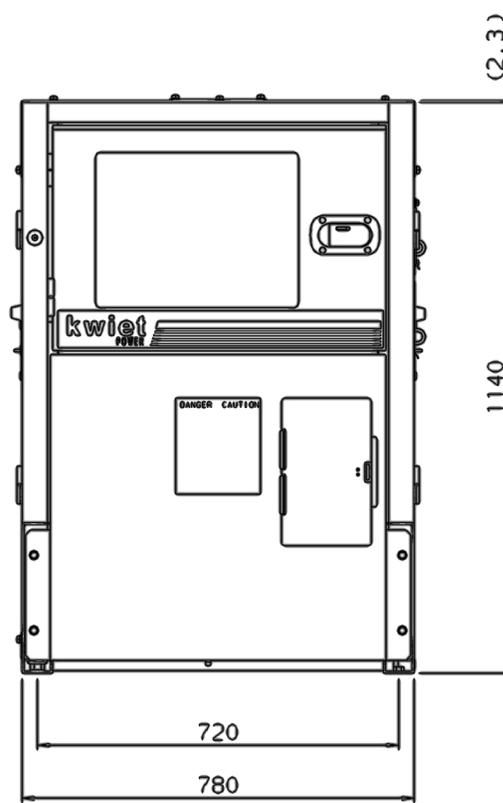
### Standard Specification condition:

Altitude: 3280 ft (1000m) or lower, Temperature: 5 to 104° F (-15 to +40°C),

Humidity: 85% or lower (no condensation) \*Reference data only\*

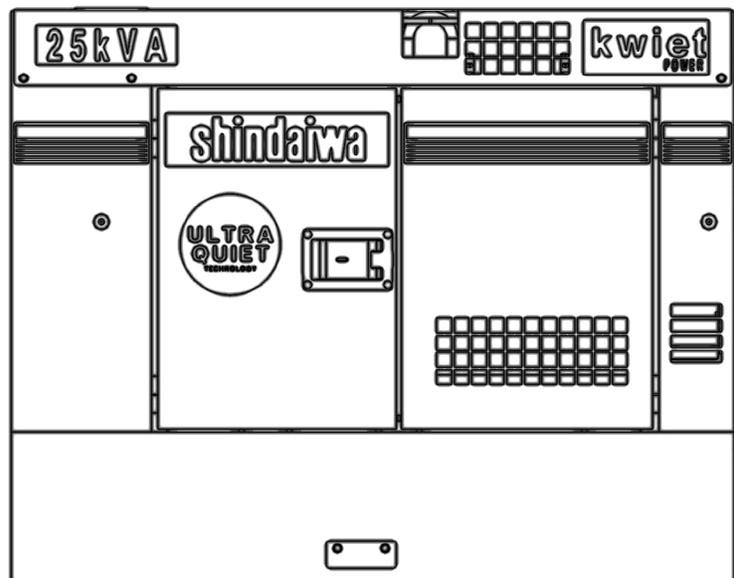
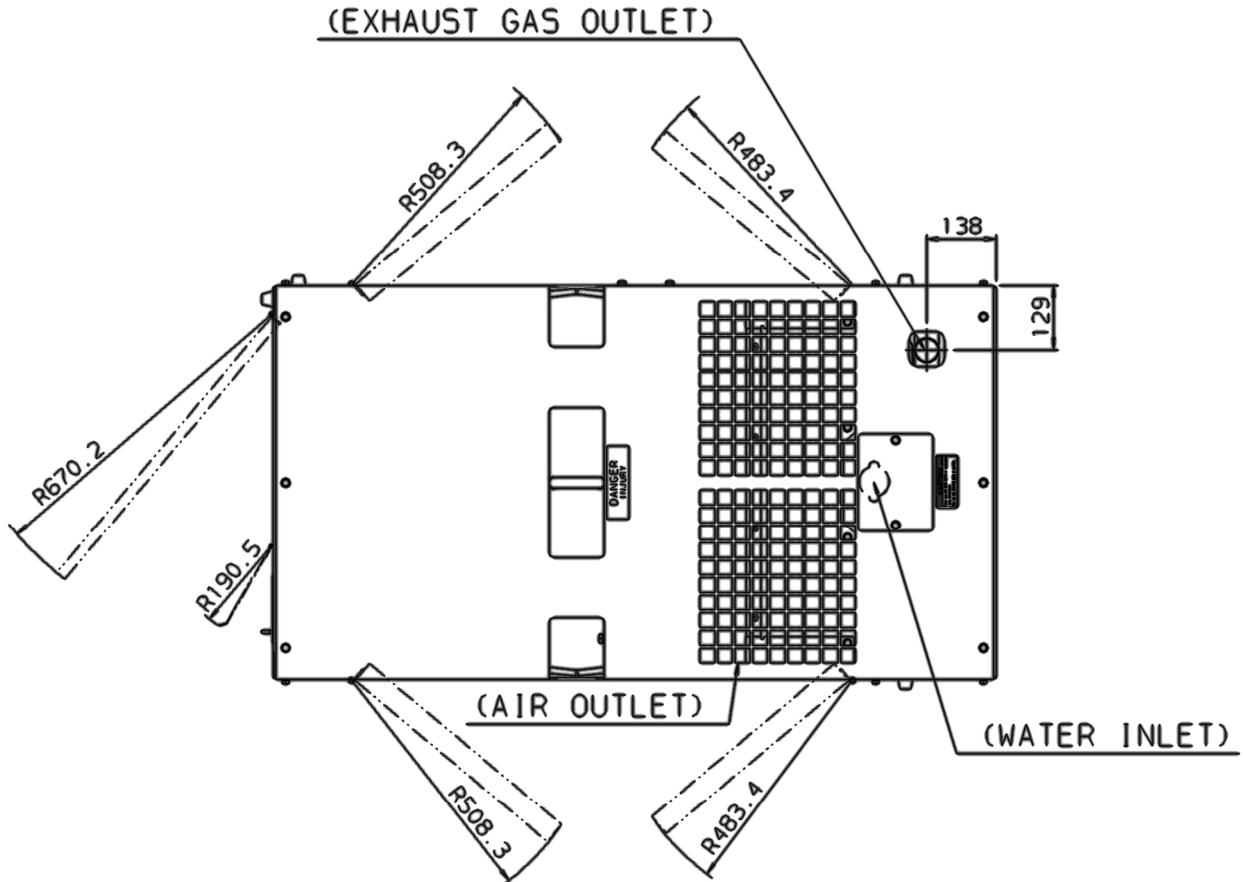
# DESCRIPTION

## 5.1 Outside View



Units (mm)

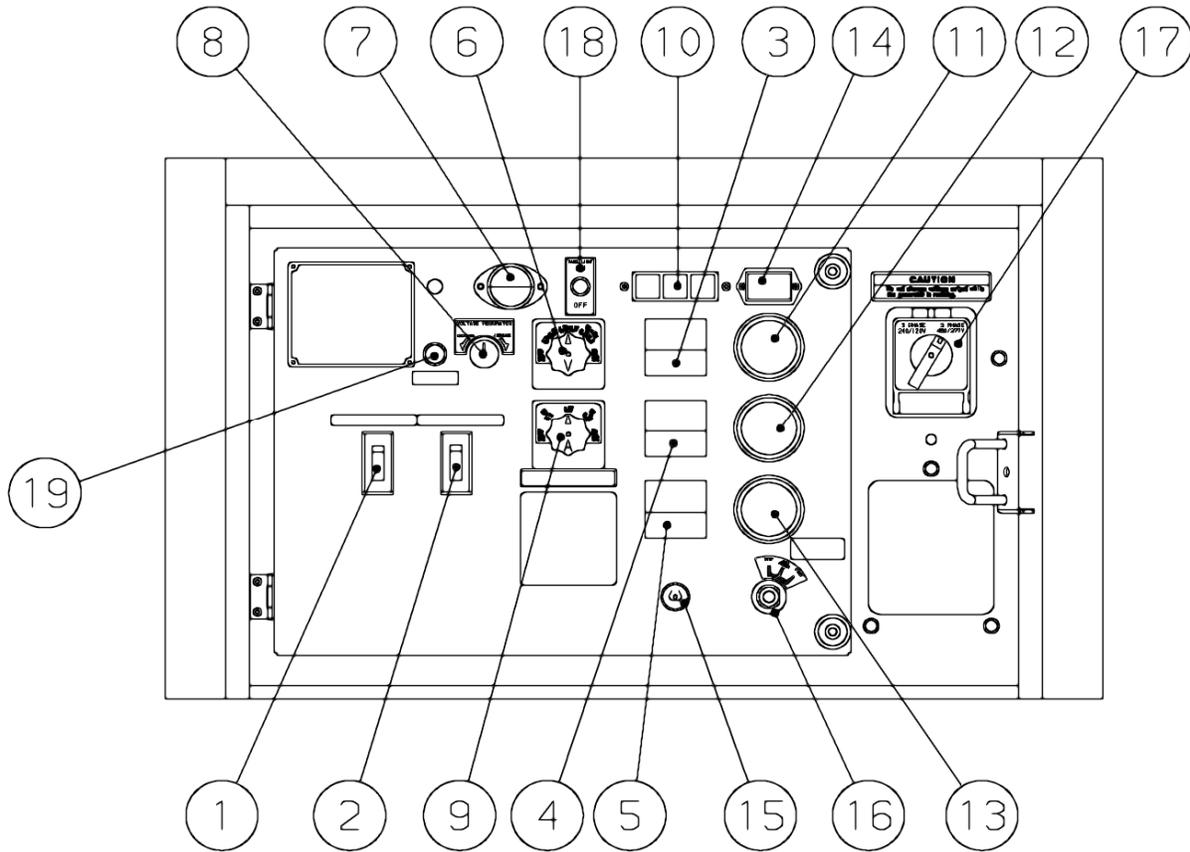
# DESCRIPTION



Units (mm)

# DESCRIPTION

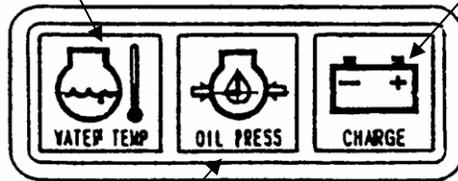
## 5.2 CONTROL PANEL



**Detail drawing of warning indicator**

High water temperature

Battery charge fault



Low oil pressure

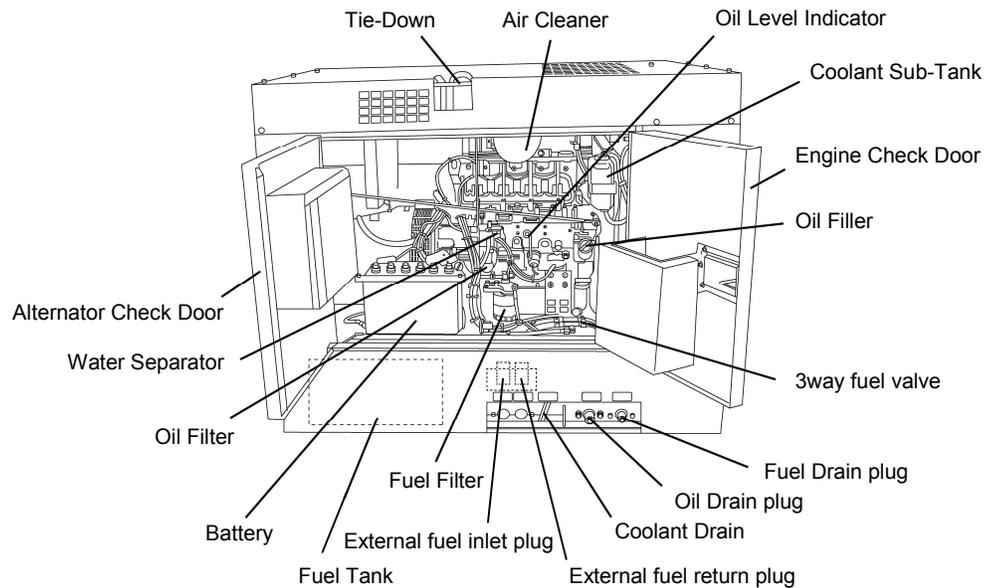
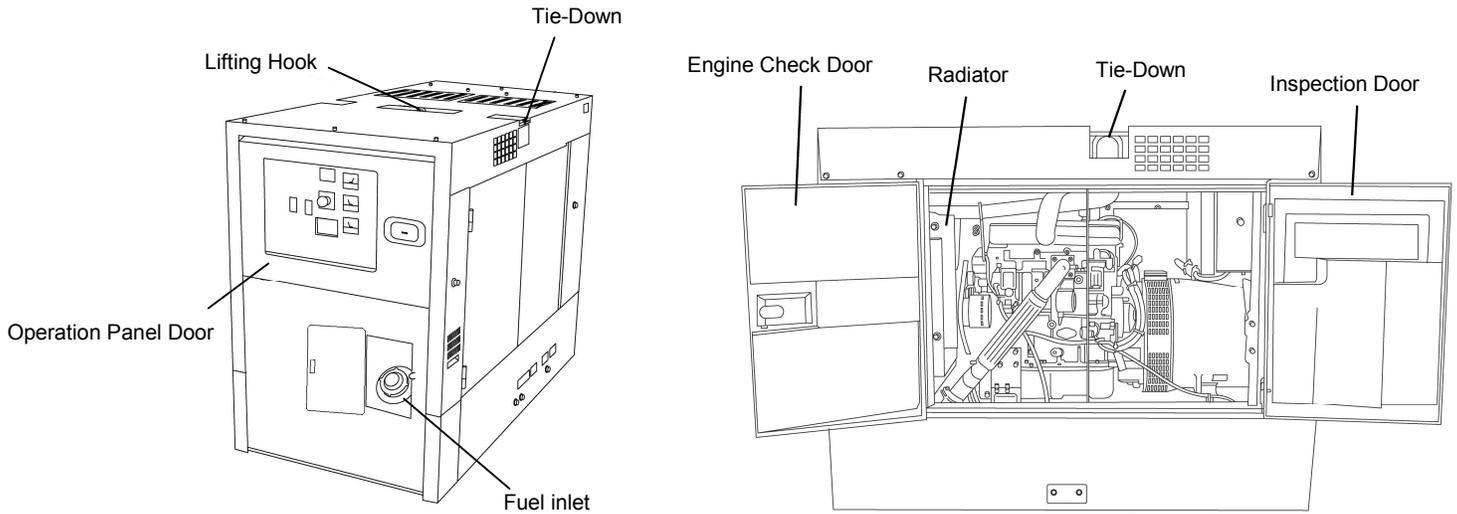
# DESCRIPTION

## Control Panel (Continued)

NO.	Name	Description of function
1	3-phases circuit breaker	Connects (On) or disconnects (Off) the load from the output of the generator
2	1-Phase circuit breaker	Connects (On) or disconnects (Off) the load from the output of the generator
3	Voltmeter	Indicates voltage
4	Ammeter	Indicates phase current
5	Frequency meter	Indicates electrical frequency
6	Voltmeter Selector Switch	Selects the phase voltage the voltmeter is displaying
7	Panel light	Illuminates control panel
8	Voltage adjust potentiometer	Used to adjust voltage
9	Ammeter selector switch	Selects the phase current the ammeter is displaying
10	Warning indicators	Lights when an equipment malfunction occurs
11	Coolant temperature gauge	Indicates temperature of the engine coolant
12	Oil pressure gauge	Indicates lubricating oil pressure
13	Fuel gauge	Indicates the fuel level in the internal tank
14	Hour meter	Indicates total operating hours of the generator unit
15	Pre-heating indicator	The indicator lights when the key switch is set to the [ON] position, and starts pre-heating. Turns off when pre-heating is completed.
16	Ignition switch	OFF: Stops engine operation. ON: Supplies electricity for control operation and starts pre-heating START: Starts the engine
17	Voltage selector switch	Selects voltage output at terminals
18	Panel light switch	Turns on the control panel light
19	Pilot Lamp	Indicates when the generator is running

# 5. DESCRIPTION

## 5.3 Layout

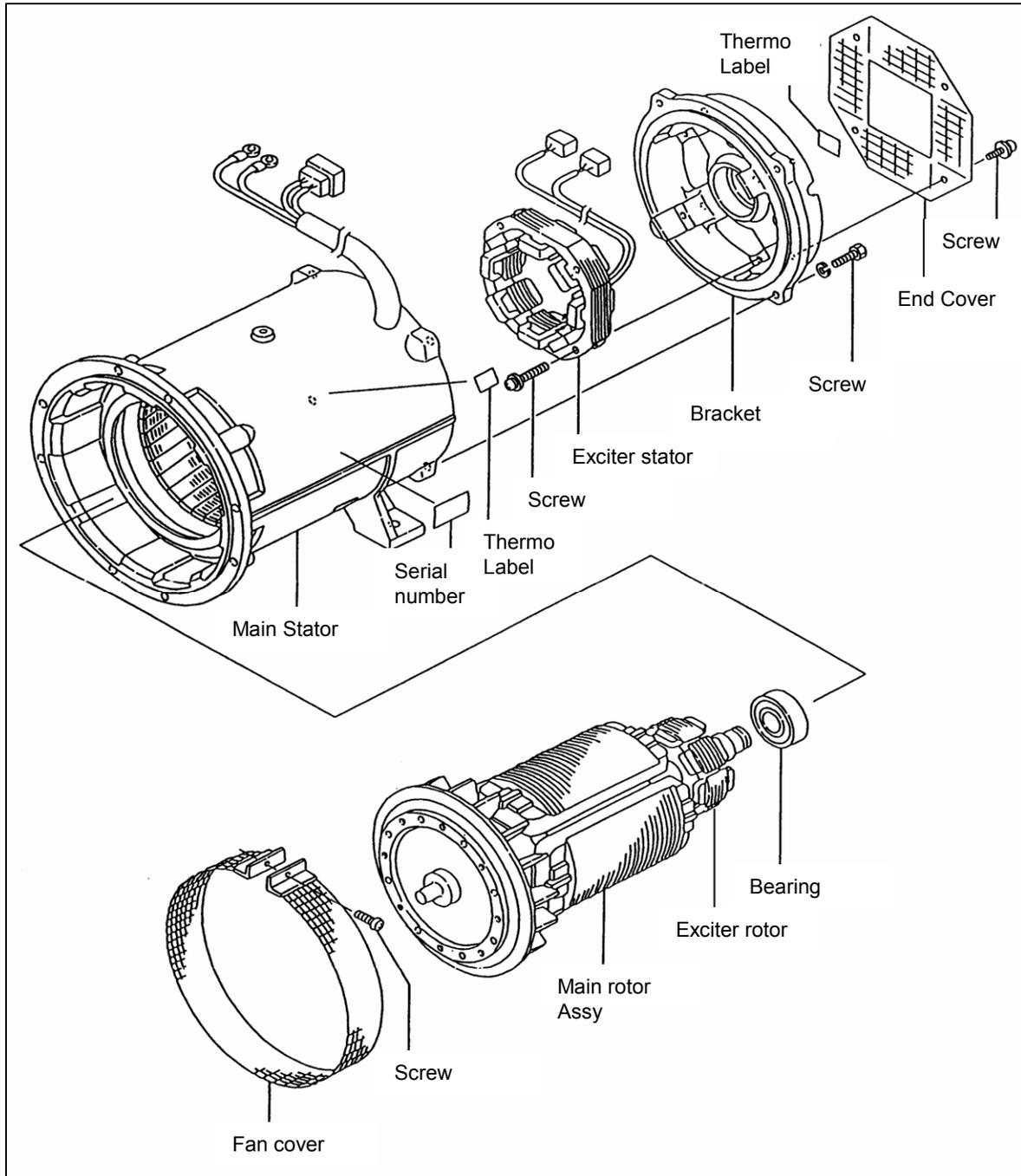


# DESCRIPTION

## 5.4 GENERATOR

The main parts of the generator consist of rigid casting, and it has superior quality and durability with the features of a powerful damper winding to minimize wave distortion.

### Exploded View

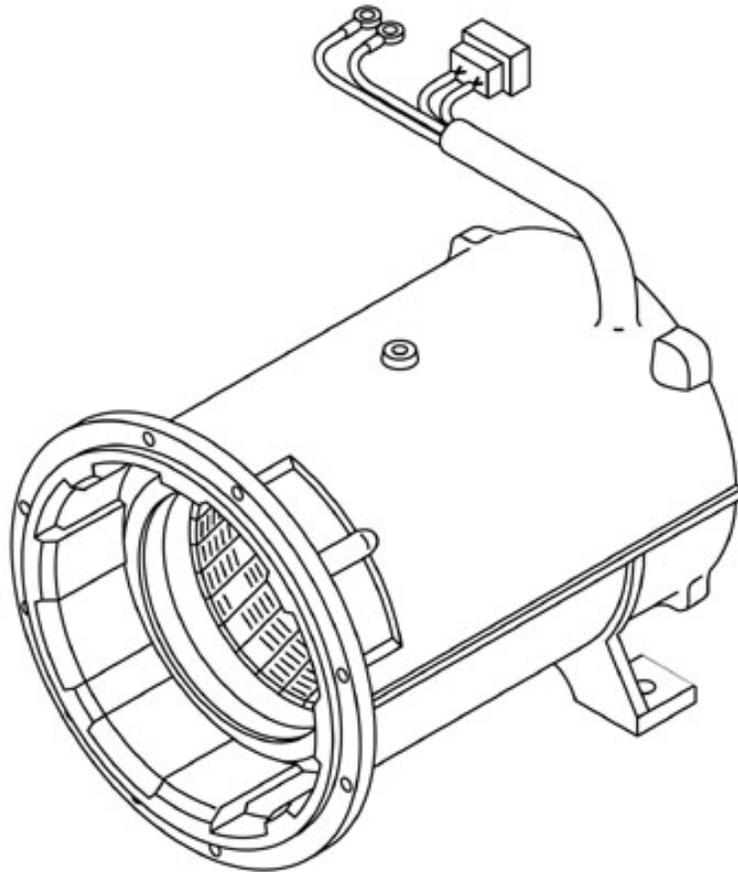


# DESCRIPTION

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## Stator

The stator is the external stationary portion of the generator that actually provides the electricity for distribution to the load(s). It is composed of several individual coils of copper wire distributed and wound such that the magnetic field associated with the rotor passes over and around the coils and in turn produces an electric potential (voltage) that is used as the supply voltage to the load(s). This stator also houses the stationary coils used as the exciter stator for the generator field exciter. The stator is bolted directly to the flywheel housing of the engine. The end bracket and end cover are bolted directly to the end of the stator opposite to where the stator is bolted to the flywheel housing.

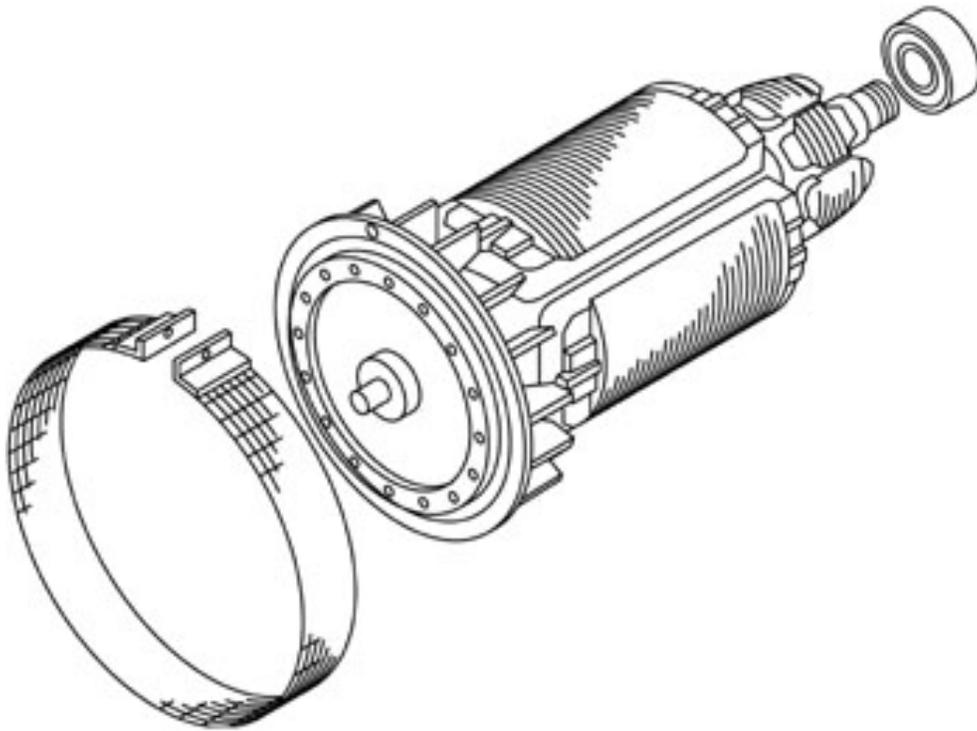


# DESCRIPTION

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## Rotor

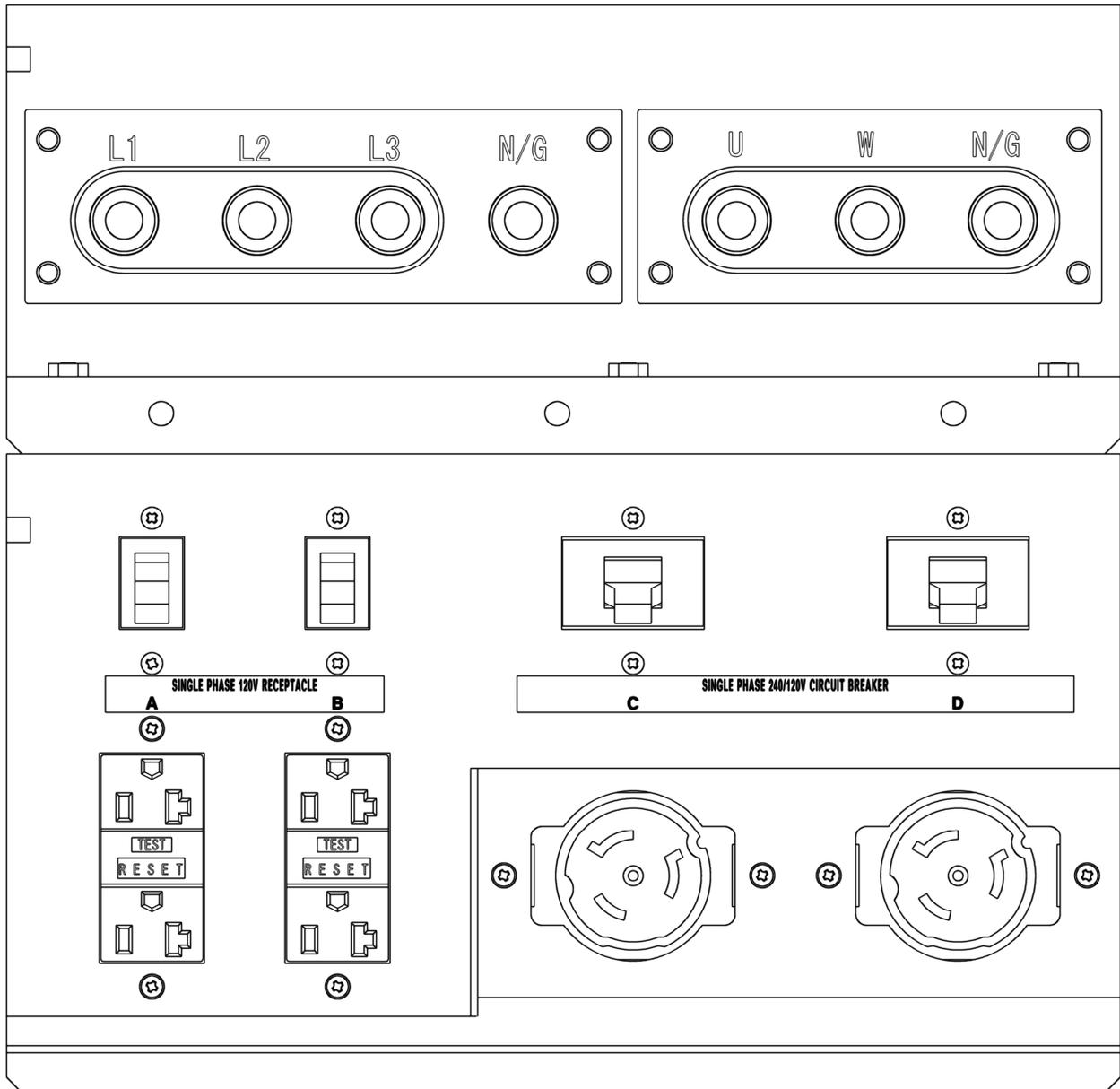
The rotor is the portion of the generator bolted directly to the crankshaft of the engine so that it rotates at the same speed that the engine crankshaft is rotating. The opposite end of the rotor is supported by the generator end bracket using a single ball bearing. The rotor has the field coils attached to it. The amount of current through the field coils determines the strength of the rotating magnetic field being used to generate a potential in the stator and therefore determines the output voltage of the generator. Field coil current is regulated by the exciter output, which is in turn regulated by the automatic voltage regulator. The rotating portion of the exciter is also mounted on the rotor.



# DESCRIPTION

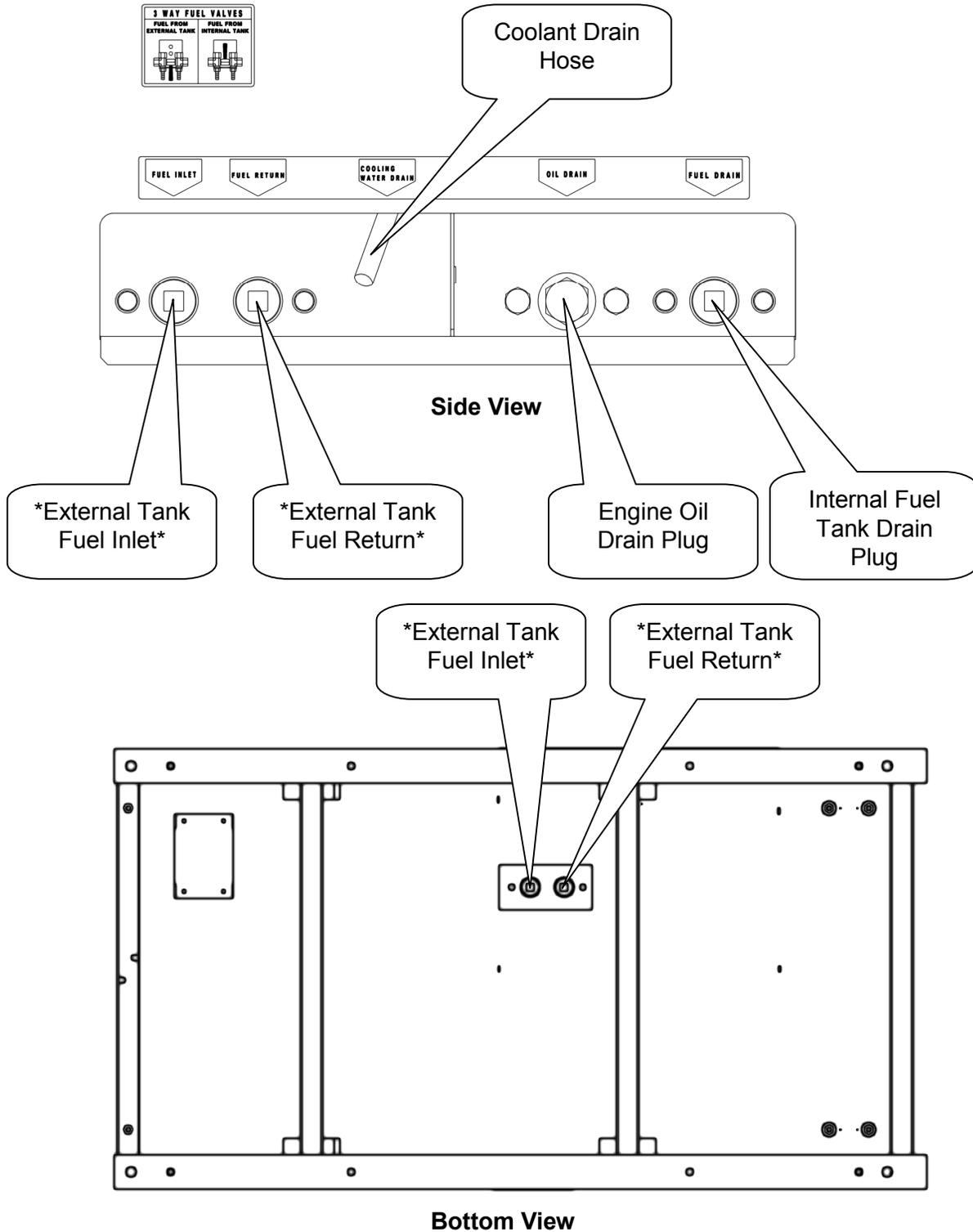
## 5.5 Receptacles and Main Terminals

**Note:** All duplex receptacles are GFCI protected and are rated at 20 amp. All twist loc receptacles are rated at 50 amps.



# DESCRIPTION

## 5.6 Drain Plugs and External Fuel Ports



**\*The inlet and outlet for external fuel tank are located on the bottom of the generator bed from the factory but can also be easily relocate to the side of the frame depending on the application.\***

# 6. EQUIPMENT

---

## 6.1 Engine Control Circuit

### Automatic pre-heating system

When the starter switch is set to [ON] position electricity flows to the glow plug and glow indicator. Pre-heating time is automatically based on coolant temperature. Glow timer [QOS] detects the coolant temperature and if the temperature is above 5° F the pre-heating time is approximately 5 seconds, and if the temperature is above 68° F the pre-heating time is approximately 2 seconds.

### Control power

When the starter switch is set to the [ON] position. Electricity for control power is supplied from the battery. Stop solenoid is energized and allows fuel to the injection pump.

### Starting

When the starter switch is set to the [START] position, the generator unit starts.

After the engine starts, release the switch, and it will return to the [ON] position automatically.

### Stopping

When the starter switch is set to the [STOP] position, the stop solenoid is de-energized and shuts the fuel off to the injection pump.

### Protection

#### (1)Over current

When output amperage becomes excessively high, the circuit breaker trips and the lever is positioned between [ON] and [OFF]. Move the lever to the [OFF] position first, and then set the lever to the [ON] position to reset.

#### (2)Low oil pressure

When lubricating oil pressure becomes excessively low, emergency timer shuts down the engine.

#### (3)High coolant temperature

When coolant temperature becomes excessively high, emergency timer shuts down the engine.

#### (4)Charging fault

When battery charging system malfunction occurs, the indicator light turns on.

# EQUIPMENT

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## 6.2 Monitors and Displays

The DGK25E diesel generator is equipped with monitoring functions for coolant temperature, oil pressure and battery charge condition.

Under normal operating conditions these monitoring lamps will illuminate momentarily when the engine is first started but will go out shortly thereafter.

If an abnormal condition is detected in the coolant temperature or oil pressure, the corresponding monitor lamp will flash and the automatic shutdown will be activated shutting down the engine. The battery charge light will cause only the light to flash.

If an automatic shutdown is activated, check for and correct the cause of the shutdown prior to trying to restart the generator set.

### Coolant Temperature Monitoring Lamp

#### **WARNING**

##### **Injuries**

- To Avoid injuries by unintentional contact with the fan and/or fan belts, close and lock all doors while operating this equipment.

##### **Burns**

- To avoid sustaining burns from hot vapor, do not open the radiator cap while operating or immediately after stopping the equipment.
- Due to extremely high temperatures, do not come in contact with the engine and/or muffler while operating or immediately after stopping this equipment.

If the coolant temperature reaches 230° Fahrenheit during operation, the coolant temperature monitoring lamp will flash and automatically shut down the engine.

If this occurs, check the coolant reservoir tank level, and if low, replenish the coolant in the reservoir as needed with a 50:50 mix of water and Long Life Coolant. **NEVER ADD COOLANT TO THE RADIATOR WHEN THE ENGINE IS HOT!!** After the engine cools down check for any coolant leaks and repair if needed.

#### **CAUTION**

- If the coolant level is too low the temperature sensor cannot detect the coolant temperature. Always check the coolant level in the radiator and coolant reservoir tank before operating this equipment.

# EQUIPMENT

---

## Engine Oil Monitoring Lamp

### WARNING

#### Injuries

- To avoid injuries by unintentional contact with the moving parts such as the cooling fan and/or belts, close and lock all doors while operating this equipment.

### WARNING

#### Burns

- Due to extremely high temperatures, do not come in contact with the engine and/or muffler while operating or immediately after stopping this equipment.
- When checking or changing the engine oil, always stop the engine and allow sufficient time for the engine to cool down. Opening the oil filler cap during operation can cause injury due to hot oil.

If the engine oil pressure drops below 10 psi during operation, the oil pressure monitoring lamp will flash, and the automatic shutdown will activate. If this occurs, check the engine oil level, and fill to the maximum level if needed.

### CAUTION

- The oil pressure sensor cannot detect engine oil degradation due to extended use. Oil change intervals listed under Periodic Maintenance Table must be strictly adhered to.

## Battery Charge Monitoring Lamp

Insufficient battery charging during operation will cause the battery charge light to flash. If this occurs, check the condition and tightness of the fan belt and replace or tighten if necessary. This light is an indicator that the charge system is not working properly and a possible battery charge alternator has little or no output to keep the battery charged. Further testing may be required by a skilled technician.

### CAUTION

- If the belt needs to be replaced refer to the engine Workshop Manual.
- The battery charge light cannot detect the degradation of battery life or the battery fluid level.

# EQUIPMENT

---

## 6.3 Meters and Gauges

### Hours Meter

The hour meter keeps track of the run time. The meter should be used to schedule preventative maintenance. **Note:** The hour meter will continue to operate as long as the ignition switch is in the on position regardless if the engine is running or not.

### Water Temperature Gauge

Water temperature gauge displays the temperature of the engine coolant. Normal operating temperature will vary between 176° to 220° F depending on load and ambient temperature.

### Oil Pressure Gauge

Oil pressure gauge indicates the pressure of the engine oil. Normal operating pressures may vary depending on conditions but should display between 40 and 60 PSI. In colder climates the oil pressure gauge may read higher at start up due to the viscosity of the engine oil. Allow engine to warm until a normal reading is obtained.

### Fuel Gauge

The fuel gauge indicates the level of fuel in the internal tank only. If an external fuel tank is being used the fuel gauge will not indicate the fuel level in the external tank.

### Volt Meter

The volt meter displays the phase to phase output voltage from the generator.

### Ammeter

The amp meter displays the electrical output current from the generator. The displayed current output will be dependant on the position of the amp meter selector switch.

### Frequency Meter

The frequency meter will display the frequency of the generated power.

# EQUIPMENT

---

## 6.4 Lamps and Lights

### Glow Lamp

When the starter switch is turned to the run/preheat position the glow lamp will illuminate. The glow lamp will stay lit until the preheat cycle is completed and the engine is now ready to start. The preheat cycle time will depend on the ambient and engine temperatures and may vary from 1- 5 seconds.

### Pilot Lamp

The pilot lamp indicates whether or not electricity is being generated when the engine is running. When the pilot light is illuminated the engine is running and there is electricity being generated. When the pilot lamp is not illuminated and the engine is running then there is no electricity being generated and indicates a problem with the generator system.

### Panel Light

The panel light is used to illuminate the generator control panel. The light can be turned on and off with the toggle switch located to the right of the panel light. The panel light will only operate when the ignition switch is in the run position.

## 6.5 Switches

### Ignition Switch

The starter switch is a three position switch used for starting, stopping and preheating the engine.

#### Positions:

#### Stop:

When the switch is set to this position all power will be turned off. The switch must be in this position to remove the key.

#### Run/Preheat:

The switch must be in this position during operation. This position also is used to begin the engine preheat cycle and to remove air from the fuel system. **Note:** Do not leave the switch in this position if the engine is not running or the battery will drain and the hour meter will still operate until the battery is discharged.

#### Start:

This position is to allow the operator to start the engine. The switch will automatically return to the run/preheat position when the key is released. **Note:** Do not hold the switch in this position after the engine starts or starter damage may occur.

# EQUIPMENT

---

## **Voltmeter Selector Switch**

The voltmeter selector switch is a 5 position switch located on the control panel to the left of the voltmeter. The voltmeter selector switch selects which phase voltage is displayed on the voltmeter.

### **Positions:**

#### **Off:**

There are two off positions on the voltmeter selector switch. One at the full clockwise position and one at the full counter-clockwise position of the switch. In either off position the voltmeter will not display any voltage.

#### **L1-L2:**

In the L1-L2 position the voltmeter will display the phase voltage between L1 and L2.

#### **L2-L3:**

In the L2-L3 position the voltmeter will display the phase voltage between L2 and L3.

#### **L3-L1 / U-W:**

In the L3-L1 / U-W position the voltmeter will display the phase voltage between L3 and L1 and U and W phase voltage.

## **Ammeter Selector Switch**

The ammeter selector switch is a 5 position switch located on the control panel to the left of the ammeter. The ammeter selector switch selects which phase current is displayed on the ammeter.

### **Positions:**

#### **Off:**

There are two off positions on the ammeter selector switch. One at the full clockwise position and one at the full counter-clockwise position of the switch. In either off position the ammeter will not display any amps.

#### **L1 - U:**

In the L1 - U position the ammeter indicates the combined 3-Phase L1 + 1-Phase U output amps

#### **L2:**

In the L2 position the ammeter indicated the 3-Phase amps for L2.

#### **L3 - W:**

In the L3 - W position the ammeter indicates the combined 3-Phase L3 + 1-Phase W output amps.

# EQUIPMENT

---

## Output Circuit Breakers

The DGK25E has two main output circuit breakers for the main terminals located on the left side of the control panel. The 3 phase circuit breaker is for connecting and disconnecting the load on terminals L1, L2 and L3. The single phase circuit breaker is for connecting and disconnecting the load on the U and W terminals. Turning the circuit breaker on will allow power to flow to the load. Turning the circuit breaker off will remove the power to the load. The breakers will also trip in the event of an overload condition on the generator or if the main terminal door is opened.

## Voltage Adjustment Knob

The voltage adjustment knob is used to adjust the generated output of the generator. Turning the voltage adjustment knob clockwise will increase the output voltage and turning the knob counter-clockwise will decrease the voltage. The adjust range available for the voltage adjustment knob is plus 5% and minus 15%.

## 3 Phase Voltage Selector Switch

The voltage selector switch is a 2 position switch located to the right of the control panel. The voltage selector switch makes a quick and convenient method of changing the generator output voltage and is lockable. **Note: This switch should NEVER be changed while the generator is running or serious damage may occur!**

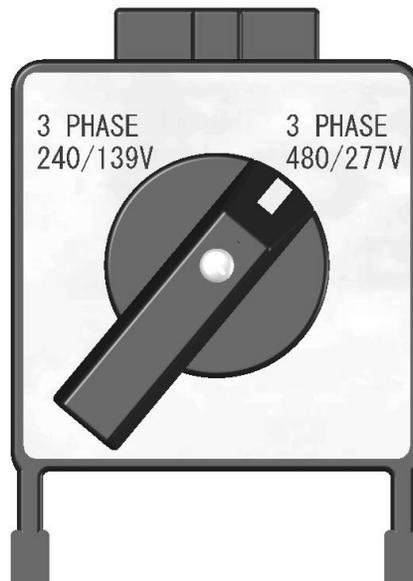
### Positions:

#### 480/277:

The 3 phase 480/277 position gives the output from the generator of 480 volts 3 phase and 277 volts single phase at the 3 phase terminal board and 240/120 volts at the single phase terminal board.

#### 240/139:

The 3 phase 240/139 position gives the output from the generator of 240 volts 3 phase and 139 volts single phase at the 3 phase terminal board and 240/120 volts at the single phase terminal board.



# EQUIPMENT

## 6.6 3 Way Fuel Valve

The 3 way fuel valve is located inside the enclosure on the right side of the engine. The 3 way fuel valve provides a quick and convenient method of attaching an external fuel tank for supplying fuel to the engine. The 3 way valve comes from the factory in the B position that uses the internal fuel tank for fuel supply.

### Positions:

#### A – Position:

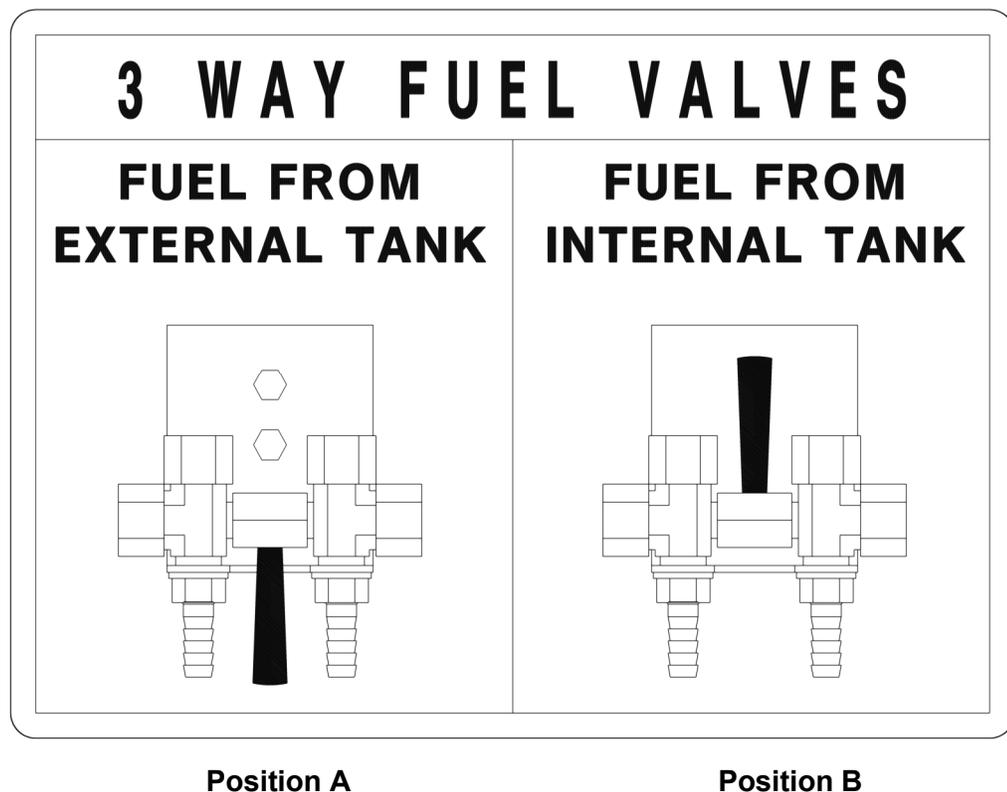
When using an external fuel tank for the fuel supply to the engine, remove the 1/2" pipe plugs, connect the fuel lines from the external tank to the appropriate inlet and return port fittings and then set the 3 way valve to position **A**. **Note:** The internal fuel tank will not supply fuel to the engine when in the **A** position.

#### B – Position:

When using the internal tank for the fuel supply to the engine, set the 3 way valve to position **B**. In the **B** position the fuel for the engine is supplied by the internal fuel tank. **Note:** Always ensure external fuel ports are plugged with the supplied 1/2" pipe plug fittings when the 3 way valve is in the B position.



- Always stop the engine prior to performing any work on the fuel system or lines.
- Immediately clean up any fuel leakage.



# 7. LIFTING, TRANSPORTING AND INSTALLING

## 7.1 Lifting

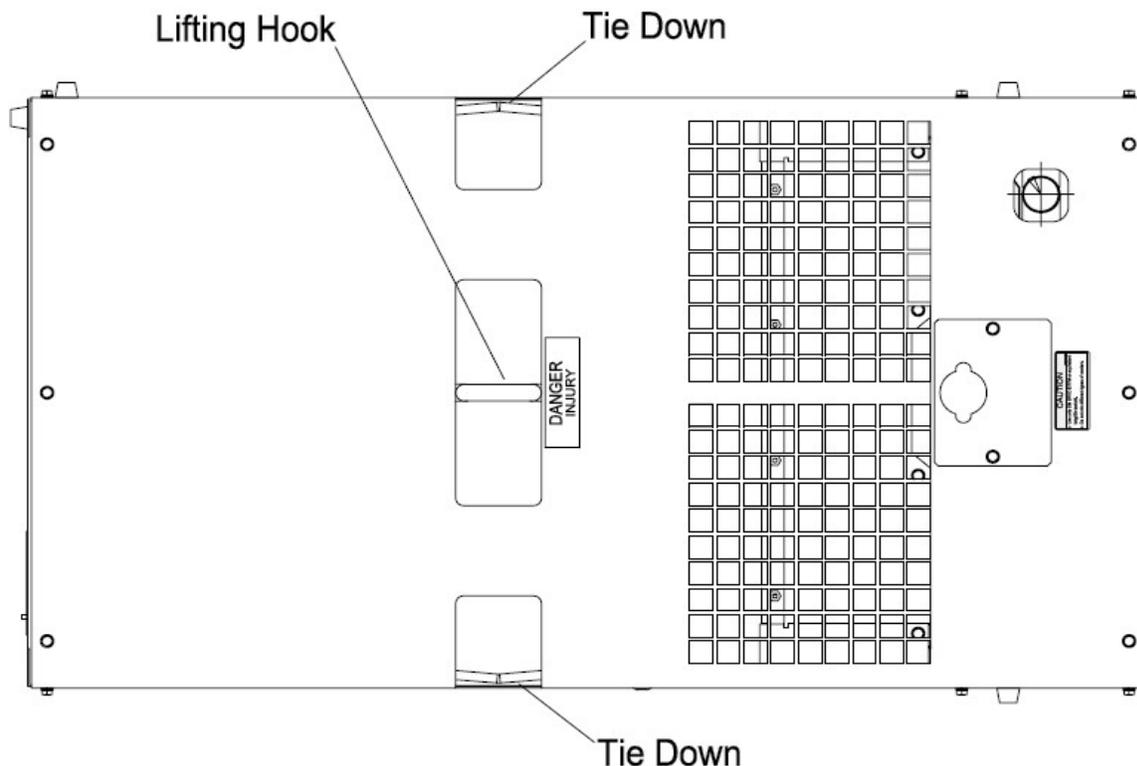
### WARNING

- The lifting hook is designed to lift only the weight of the generator. Do not lift any additional added weight such as fuel tanks and/or trailers with the lifting hook.

### CAUTION

- Use only the installed lifting hook for lifting the equipment.
- Do not use the tie down posts for lifting as they are not designed to hold the weight of the equipment.

Always use the installed lifting hook whenever the lifting of the equipment is necessary. **Note: The lifting hook is designed to lift only the weight of the generator. Do not lift any additional weight such as a fuel tank and/or trailer with the lifting hook. Do not lift with the tie downs.**



# LIFTING, TRANSPORTING AND INSTALLING

---

## 7.2 Transporting

### WARNING

- Always use extreme caution when loading, unloading or transporting this equipment. Failure to do so may result in personal injury or death and/or damage to the equipment resulting in a malfunction.

When transporting this equipment, ensure that the equipment is properly secured using the tie down posts.

## 7.3 Installing

### WARNING

#### **Suffocation from exhaust gases:**

- Exhaust fumes from the engine contains many elements that are proven to be harmful to humans. Do not operate this equipment in poorly ventilated areas such as inside a building or in tunnels.
- Do not direct the exhaust fumes towards pedestrians or buildings.

### CAUTION

#### **Fire:**

- Always operate this equipment on flat surfaces and at least 3 feet away from and objects, such as a wall, as overheating may occur due to lack of air flow.
- Temperatures around the muffler and exhaust system can get extremely hot. Keep any flammable items such as fuel, gas, paint, etc.) away from this equipment.

- Always place this equipment on a hard, flat and level surface.
- Keep the equipment at least 3 feet away from any obstruction that might obstruct the air flow to the exhaust or radiator cooling air. Failure to do so may result in a reduction in engine performance, overheating or damage to the equipment.
- Operating the equipment in dusty or other harsh environments may result in a clogged radiator or air filter element and may result in overheating. Be sure to check the radiator, air filter element, fuel filter, etc. on a daily basis and in some cases more often in this type of condition.



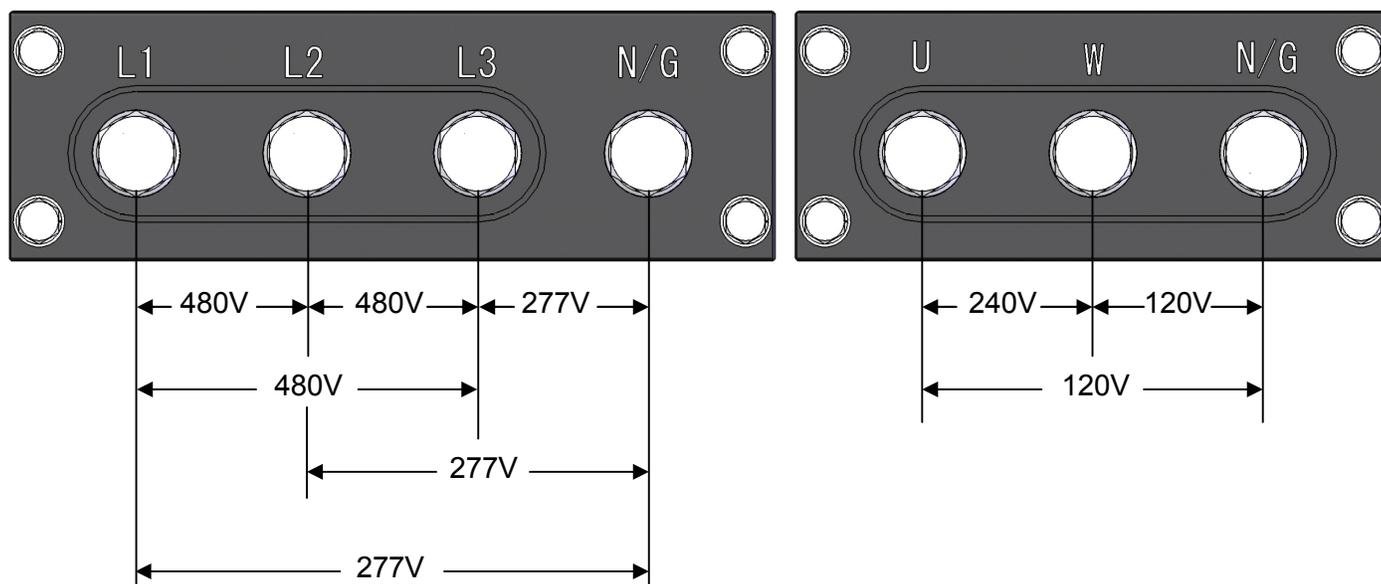
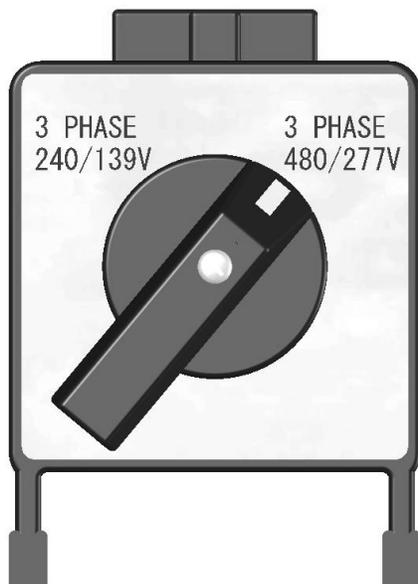
# 9. CONNECTING CABLES

## 9.1 Main Terminal Connections 480/277V Position



### Electric Shock:

- Before connecting or disconnecting the load cables from the output terminal, always turn the output circuit breakers to the OFF position, stop the engine, and remove the ignition key. The person performing the connection or disconnection should always have possession of the key.



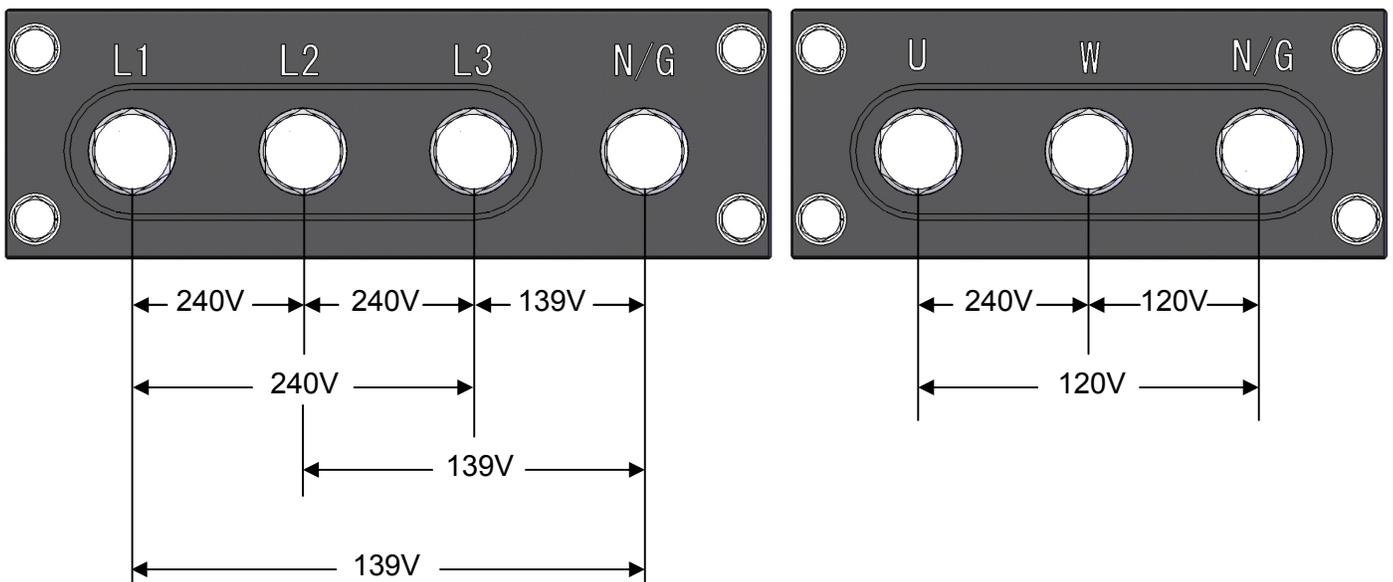
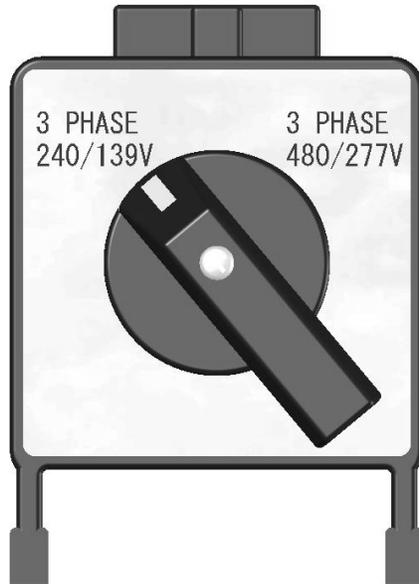
# CONNECTING CABLES

## 9.2 Main Terminal Connections 240/139V Position



### Electric Shock:

- Before connecting or disconnecting the load cables from the output terminal, always turn the output circuit breakers to the OFF position, stop the engine, and remove the ignition key. The person performing the connection or disconnection should always have possession of the key.



# 10. GENERATOR

## 10.1 Technical Specifications

Items		Reference value	Notes
Insulation	Armature winding	3MΩ or more	DC500V Mega ohm Tester
	Exciter field	3MΩ or more	
Pre-heating time		5 seconds (Coolant temp. is less than 5° F(-15°C) 2 seconds (Coolant temp. is less than 68° F(20°C)	Automatic pre- heating system
*High idling speed		50Hz:up to 1575 rpm 60Hz:up to 1890 rpm	Within 5%
Lubricating oil pressure		14.5 to 71 PSI (1~5kgf/cm <sup>2</sup> )	-
Coolant temperature		158 to 218° F ( 70 – 100°C )	-
Engine speed droop	Transient deviation	Within 10%	Full load to no load
	Steady-state deviation	Within 5%	
Voltage regulation	Transient deviation	Within 20%	Full load to no load
	Steady-state deviation	Within ±1.0%	
Protective device	Low oil press.	Working pressure	[Closed] when activated
		Part no. (ISUZU )	
	High water temp.	Working temperature	[Closed] when activated
		Part no. (ISUZU )	

**\*US EPA Interim Tier 4 Emission certified at 1800 rpm only\***

# 11. INITIAL STARTUP and PRE-CHECKS

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## Electrical Shock

- Before performing any equipment checks or maintenance, stop the engine, and remove the engine key. The person performing the equipment checks or maintenance should always have possession of the key.



## Burns

- To avoid sustaining burns from hot vapors, do not open the radiator cap while operating or immediately after stopping this equipment
- Due to extremely high temperatures, do not touch the engine or exhaust system while operating or immediately after stopping this equipment.
- When checking or changing the engine oil, always stop the engine, and wait until the engine cools down. Removing the engine oil level indicator or opening the oil fill cap during operation may cause injury due to hot oil.

## Fire

- Always immediately wipe up and diesel fuel or engine oil that is spilled. Do not use this equipment if there are any leaks. If leaks are found, repair the leak before further use.

# INITIAL STARTUP and PRE-CHECKS

## 11.1 Checking Engine Oil

(Also refer to the accompanying Engine Instruction Manual)

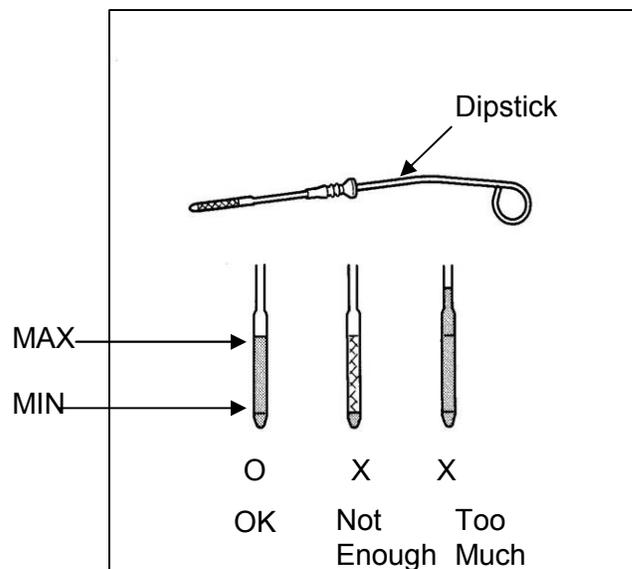
When checking the engine oil, be sure to keep the equipment level and insert the dipstick fully.

Prior to starting the engine, make sure to fill the engine oil to the MAX line through the oil filler opening

### CAUTION

- If the equipment is not level, you can't obtain an accurate oil level reading.
- Do not overfill the engine oil as this can damage the engine.

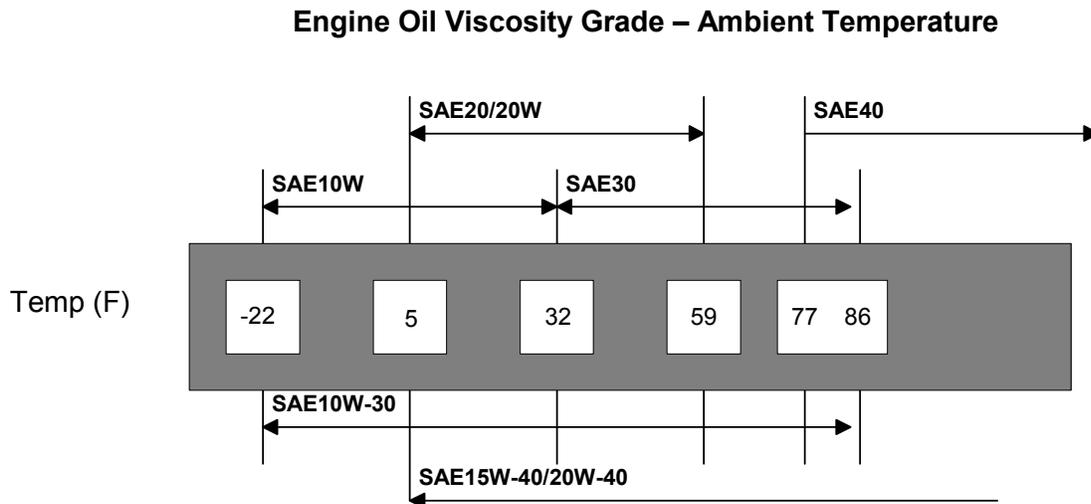
1. Remove the dipstick from the crankcase and wipe it clean with a clean cloth.
2. Reinsert the dipstick fully and gently remove it again
3. Check the oil level on the dipstick. The level must be between the Max level mark and the Min level mark.
4. If the level is above the Max mark, drain oil out until the level is between the Max and Min marks.
5. If the level is at or below the Min level mark, add oil until the level is at the Max mark.



# INITIAL STARTUP and PRE-CHECKS

## 11.2 Selecting the Proper Engine Oil

Use engine oil specifically designed for diesel engines. Use the chart below to determine the proper viscosity of oil to use for the anticipated ambient temperature the equipment will be operated in.



### CAUTION

- Use only API class CD grade or higher

## 11.3 Check for Leaks

Prior to starting the engine, make sure a complete and thorough inspection is performed to check for any leaks.

### CAUTION

- Do not use this equipment if a leak is detected. Repair the leak before further use.
- Always check around hoses and fitting for signs of leaks.

# INITIAL STARTUP and PRE-CHECKS

## 11.4 Checking Engine Coolant

(Also refer to the accompanying Engine Instruction Manual)

### WARNING

#### Injuries

- Before performing any equipment checks or maintenance, stop the engine, and remove the engine key. The person performing the equipment checks or maintenance should always have possession of the key.



### CAUTION

#### Burns

- To avoid sustaining burns from hot vapors, do not open the radiator cap while operating or immediately after stopping this equipment
- Due to extremely high temperatures, do not touch the engine or exhaust system while operating or immediately after stopping this equipment.
- When checking or changing the engine oil, always stop the engine, and wait until the engine cools down. Removing the engine oil level indicator or opening the oil fill cap during operation may cause injury due to hot oil.

#### Fire

- Always immediately wipe up any diesel fuel or engine oil that is spilled. Do not use this equipment if there are any leaks. If leaks are found, repair the leak before further use.

#### Procedure for Checking Radiator Coolant Level

1. Remove the radiator access plate on top of the enclosure.
2. Loosen the thumb screw for the radiator cap access door
3. Remove the radiator cap and check the level of the coolant. The coolant level should be up to the filler neck. If the level is low, add a 50:50 mix of Long Life Coolant (GM SPEC 6277M or equivalent) until the level is at the filler neck.
4. Reinstall the radiator cap, install the radiator access door and reinstall the radiator access plate.

#### Procedure for Checking the Coolant Reservoir Level

1. Open the enclosure door to gain access to the reservoir.
2. The coolant level should be between the Min and Max line. If the coolant level is low, add a 50:50 mix of Long Life Coolant (GM SPEC 6277M or equivalent) until the level is between the Min and Max line.

### CAUTION

- Always use potable water when mixing the coolant.
- Do not spill antifreeze on the exhaust or hot engine parts, as in some cases, coolant can combust.

# INITIAL STARTUP and PRE-CHECKS

---

## 11.5 Checking the Fan Belt

(Also refer to the accompanying Engine Instruction Manual)

### WARNING

#### Injuries

- Before performing any equipment checks or maintenance, stop the engine, and remove the engine key. The person performing the equipment checks or maintenance should always have possession of the key.
- To avoid injuries by unintentional contact with the cooling fan or fan belt, close and lock all doors while operating this equipment.

### CAUTION

#### Burns

- Due to extremely high temperatures, do not come in contact with the engine and/or muffler while operating or immediately after stopping this equipment.

### Procedure for Checking Fan Belt and Tension

1. Gain access to the alternator side of the engine.
2. The fan belt should have  $\frac{1}{4}$  to  $\frac{1}{2}$  inch of slack when applying finger pressure on the belt between the alternator and water pump pulley.
3. Check the condition of the belt. If the belt is cracked or damaged replace the fan belt before operating this equipment using the procedure in the Engine Instruction Manual.
4. If belt is loose refer to the Engine Instruction Manual for tightening procedure.

# INITIAL STARTUP and PRE-CHECKS

---

## 11.6 Checking the Fuel Level

Prior to starting the engine, check the fuel level in the tank that is supplying fuel to the engine. The fuel gauge on the control panel will only display the fuel level for the internal fuel tank. Always use the fuel strainer when refueling.



 **CAUTION**

### Fire

- Always immediately wipe up any diesel fuel or engine oil that is spilled. Do not use this equipment if there are any leaks. If leaks are found, repair the leak before further use.
- Fill the fuel tank slightly below the Full mark to allow for expansion of the fuel.

 **CAUTION**

- The fuel injector pump, injectors and other parts of the fuel system and engine can be damaged if any fuel or fuel additives are used other than those specifically recommended by the engine manufacturer.
- Refer to the Engine Instruction Manual for the recommended fuels.

## 11.7 Battery Check

### Procedure

1. Check the battery fluid level. If the level is near or at the Lower Level, add distilled water until the level reached the Upper Level.
2. Make sure the battery terminals are tight and free of corrosion.
3. Make sure the battery is securely mounted with the bracket.



 **CAUTION**

### Injury

- Battery fluid contains diluted sulfuric acid. Avoid contact with eyes, skin or clothing. If contact with the acid does occur, especially with the eyes, immediately flush with large volumes of water and contact a physician immediately.

# 12. OPERATION

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## 12.1 Starting

### WARNING

#### Suffocation from exhaust gases:

- Exhaust fumes from the engine contains many elements that are proven to be harmful to humans. Do not operate this equipment in poorly ventilated areas such as inside a building or in tunnels.
- Do not direct the exhaust fumes towards pedestrians or buildings.

### CAUTION

#### Injuries

- Always place the equipment on a flat, hard level surface and at least 3 feet way from obstructions.
- Due to extremely high temperatures, do not touch the engine or exhaust system while operating or immediately after stopping this equipment.
- Before starting this equipment, turn off the connected equipment and turn the output circuit breakers to the OFF position.

#### Fire

- Always immediately wipe up any diesel fuel or engine oil that is spilled. Do not use this equipment if there are any leaks. If leaks are found, repair the leak before further use.

#### Procedure

1. Turn the 3 Phase and 1 Phase generator output circuit breaker to the OFF position.
2. If this is the first time starting the engine, refer to After Long Term Storage Starting Procedure on Page 50.
3. Turn the ignition key to the Preheat/Run position until the Glow lamp turns off.
4. Turn the key to the Start position and release the ignition key as soon as the engine starts. **Note: Do not hold the key in the Start position for more than 10 seconds or damage to the starter system may occur.** If the engine does not start, wait at least 30 seconds before attempting to start again.
5. Once the engine starts, check to make sure all monitoring lamps remain off.
6. Allow the engine to run, with no load, for at least 10 minutes.

### WARNING

#### Electric Shock:

- Before connecting or disconnecting the load cables from the output terminal, always turn the output circuit breakers to the OFF position, stop the engine, and remove the ignition key. The person performing the connection or disconnection should always have possession of the key.

## 12.2 Loading the Generator

#### Procedure

1. Set the required voltage using the voltage adjustment knob.
2. Turn the generator output circuit breaker to the ON position to supply power to the load.

# OPERATION

---

## 12.3 Operating the Generator

1. Make sure all monitoring lights remain off.
2. Check and make sure all gauges and meters are working properly.
3. Check for any unusual vibrations or noises.
4. Check for any unusual color from the exhaust.
5. **NEVER change the voltage selector switch while the generator is running.**
6. In the event the output circuit breakers trip, make the necessary corrections or repairs (or decrease the load) prior to resetting the breaker.
7. If a red monitoring light turns on, stop operation immediately and correct the fault before resuming operation.

## 12.4 Resetting the Main Breaker after Overload

1. Reduce the load on the generator.
2. Wait approximately 1 minute before attempting to reset the main breaker to allow the over-current relay to automatically reset.
3. Turn the breakers to the "OFF" position.
4. Turn the breakers to the "ON" position

## 12.5 Stopping the Generator

1. Turn the load circuit breakers to the OFF position.
2. Turn the generator output circuit breakers to the OFF position.
3. Allow the engine to run for at least 3 minutes.
4. Turn the ignition key to the Stop position.

### CAUTION

- Fuel pump continues to operate with the key in the run position regardless whether or not the engine is running.

# 13. GENERAL MAINTENANCE

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## 13.1 Engine Maintenance



### Electrical Shock

- Before performing any equipment checks or maintenance, stop the engine, and remove the engine key. The person performing the equipment checks or maintenance should always have possession of the key.



### Burns

- To avoid sustaining burns from hot vapors, do not open the radiator cap while operating or immediately after stopping this equipment
- Due to extremely high temperatures, do not touch the engine or exhaust system while operating or immediately after stopping this equipment.
- When checking or changing the engine oil, always stop the engine, and wait until the engine cools down. Removing the engine oil level indicator or opening the oil fill cap during operation may cause injury due to hot oil.

### Fire

- Always immediately wipe up any diesel fuel or engine oil that is spilled. Do not use this equipment if there are any leaks. If leaks are found, repair the leak before further use.

To maximize the useful life of this generator, follow the recommended periodic maintenance schedule and maintenance checks according to the following table. The hour meter should be used as a guide to schedule the maintenance and checks.



- With the exception of pre-startup and operating checks, only qualified technicians should perform the equipment and maintenance checks.
- Maintenance items should be performed only by an authorized dealer or distributor.
- This chart covers only basic checks and maintenance for the engine. For more detailed maintenance information for the engine, refer to the engine Instruction Manual.
- For maximum performance and useful life, always use genuine replacement parts.

# PERIODIC MAINTENANCE TABLE

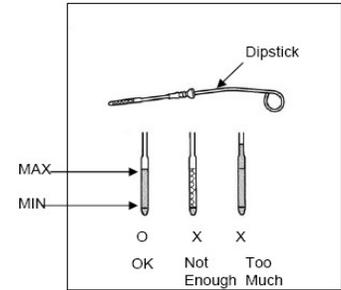
Description	Daily	First 50 hrs	Every 200 hrs	Every 400 hrs	Every 500 hrs	Every 1000 hrs
<b>Engine</b>						
Engine oil (Check/Add)	○					
Engine oil (Replace) <b>(1<sup>st</sup> time at 50hrs)</b>		○	○			
Oil filter (Replace) <b>(1<sup>st</sup> time at 50hrs)</b>		○		○		
Coolant (Check/Add)	○					
Coolant (Change/ Radiator Flush)						○
Pre-filter bowl (Clean/drain water)	○					
Main & Pre-Fuel filter (Replace)					○	
Fuel tank (Drain water)			○			
Fuel tank (Clean)						○
Fuel hose (Replace)						○
Check for leaks (Fuel/Oil/Coolant)	○					
Air cleaner element (Inspect)	○					
Air cleaner element (Clean)			○			
Air cleaner element (Replace)					○	
Battery fluid (Level/Gravity check)	○					
Fan belt tension (Check)	○					
Wiring and connection (Check)	○					
Radiator and fins (Clean)					○	
Fuel injector nozzle tip (Check)					○	
Exhaust color (Check)	○					
Valve clearance (Check/Adjust)						○
Compression (Check)						○
Fuel injection nozzle pressure (Check)						○
Fuel injection timing (Check)						○
<b>Generator</b>						
Indicators, Gauges, Alarms (Check)	○					

# MAINTENANCE

## 13.2 Oil Change

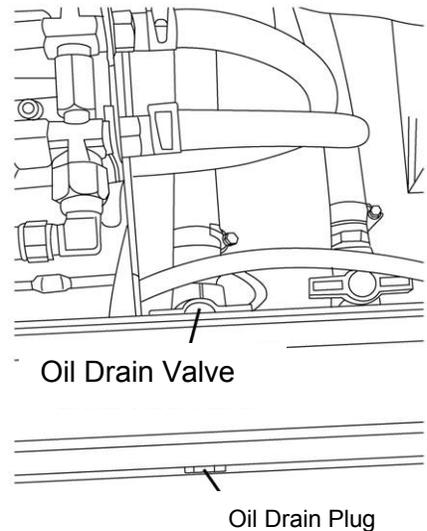
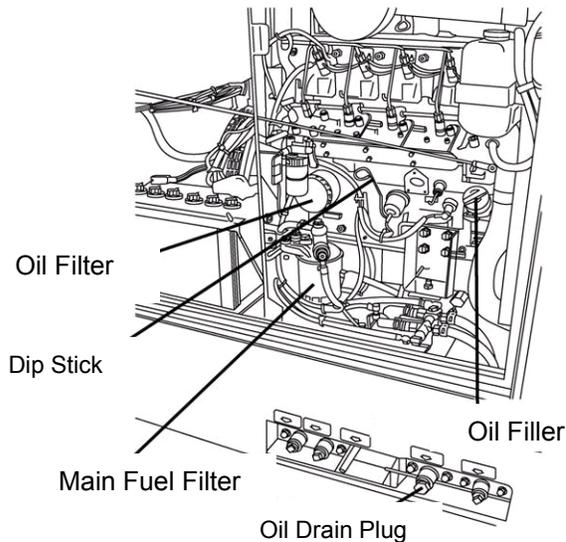
### Frequency

First Time	50 Hours
Thereafter	Every 200 hours



### Procedure

1. Wipe clean the area around the oil filler cap to prevent entry of foreign material.
2. Remove the oil filler cap.
3. Remove the engine oil drain plug and turn the ball valve inside the enclosure counterclockwise and allow the oil to drain completely.
4. Turn the oil drain valve clockwise and reinstall the oil drain plug and tighten.
5. Fill with new oil, through the oil filler opening, until the oil level is at the max line on the dipstick (approximately 2 gallons).
6. Reinstall the oil filler cap and tighten by hand.
7. Start the engine and check for any leaks.
8. Stop the engine for 20 minutes and then recheck the engine oil level, on the dipstick. Replenish the engine oil, if necessary, to the specified level.



### CAUTION

Use only engine oil designated API, CD grade or higher  
Refer to Engine Instruction Manual for recommended oil viscosity

# MAINTENANCE

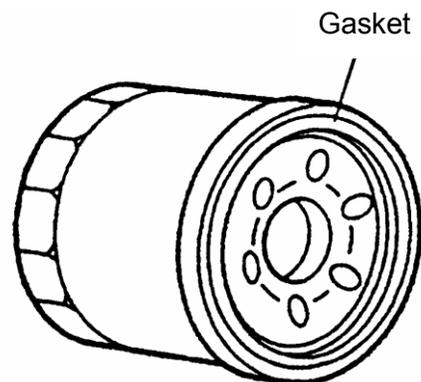
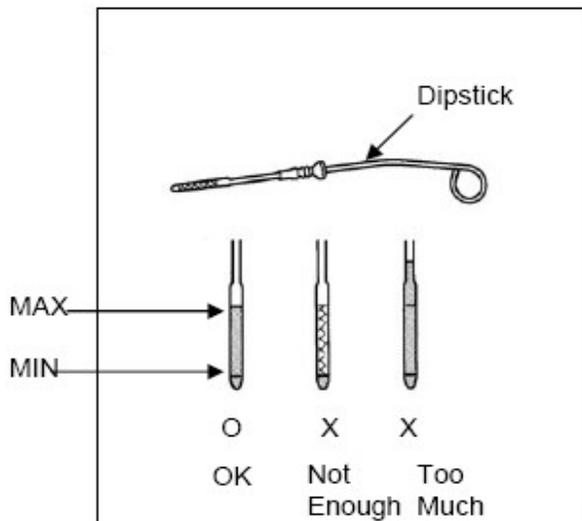
## 13.3 Oil Filter Replacing

### Frequency

First Time	50 Hours
Thereafter	Every 400 hours

### Procedure

1. Wipe clean the area around the oil filter and oil filler cap to prevent entry of foreign material.
2. Remove oil filler cap.
3. Remove the engine oil drain plug, turn the ball valve inside enclosure counterclockwise and allow the oil to drain completely.
4. Turn the ball valve clockwise and reinstall the oil drain plug and tighten.
5. Using an oil filter wrench, loosen and remove the oil filter.
6. Lightly coat the rubber gasket on the new oil filter with new engine oil.
7. Install the new oil filter until the rubber gasket makes contact with the sealing face.
8. Using an oil filter wrench tighten the oil filter an additional  $\frac{1}{4}$  turn.
9. Fill with new oil, through the oil filler opening, until the oil level is at the max line on the dipstick (approximately 2 gallons).
10. Reinstall the oil filler cap and tighten by hand.



### CAUTION

Use only engine oil designated API, CD grade or higher  
Refer to Engine Instruction Manual for recommended oil viscosity

# MAINTENANCE

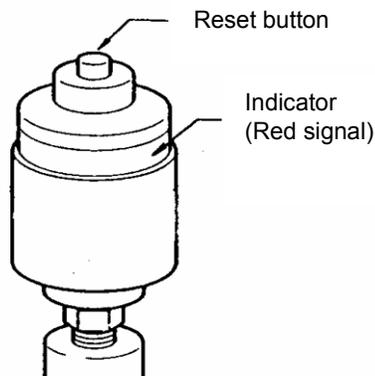
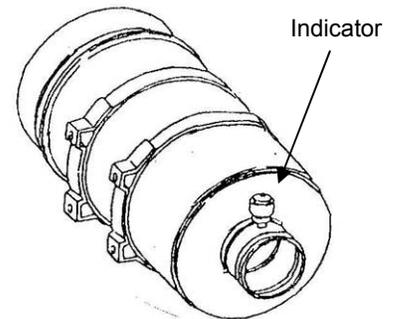
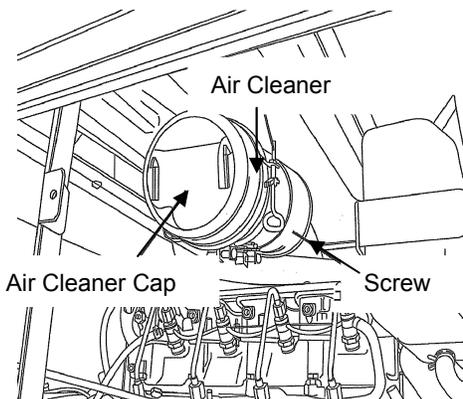
## 13.4 Cleaning/Replacing the Air Cleaner Element

### Frequency

Inspect/Clean	Daily / 200hours
Replace	Every 500 hours

### Procedure

1. Unscrew the retaining ring wing nut for the air filter housing end.
2. Remove the air filter housing end.
3. Remove the wing nut.
4. Remove air filter element and clean or replace the element.
5. Reinstall the air filter element and wing nut.
6. Install the air filter housing end retaining ring.
7. Tighten the retaining ring wing nut.
8. Push the reset button on the indicator upon replacing or cleaning the air filter.



### CAUTION

- In dusty or other harsh environments, increase the frequency of cleaning or replacing of filters

# MAINTENANCE

## 13.5 Cleaning/Replacing the Fuel Filters

### Frequency

Pre-Fuel Filter/Clean	Daily
Pre-Fuel Filter (Drain Water)	Every 200 hours
Main Fuel Filter	Replace Every 500 hours

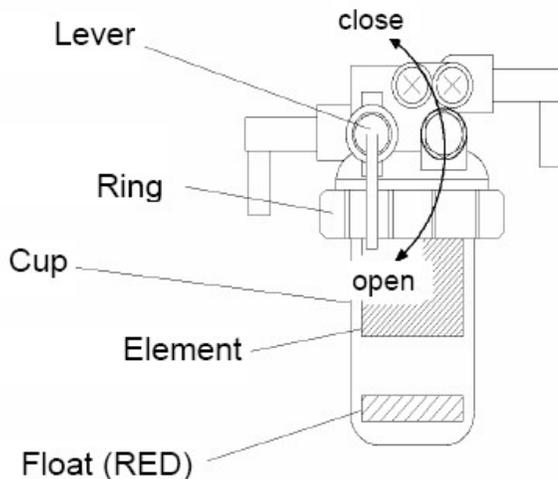
### Procedure for Pre-Fuel Filter

1. Turn the fuel shut off valve on the top of the fuel filter to the CLOSED position.
2. Unscrew the ring nut by turning counterclockwise, and then remove the retaining cup and pre-fuel filter element.
3. Remove any debris and/or water from inside the bowl, and then clean the pre-filter element using compressed air (or replace if necessary). **Note:** If replacing the pre-filter element, be sure to replace the o-ring as well.
4. Reassemble and turn the butterfly valve to the OPEN position.
5. To bleed the air from the fuel system, turn the ignition switch to the on position but do not start the engine for at least 30 seconds.

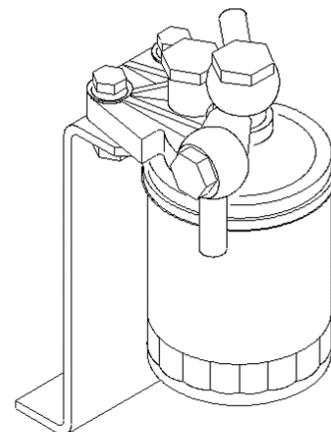
### Procedure for Replacing the Main Fuel Filter

1. Using a filter wrench, unscrew the main fuel filter by turning it counterclockwise.
2. Clean the sealing surface on the upper cover.
3. Apply a light film of new oil on the fuel filter seal and thread the new fuel filter on until the seal makes contact with the sealing surface. Using a filter wrench turn an additional 2/3 of a turn to seat the filter.

**Pre Fuel Filter**



**Main Fuel Filter**



# MAINTENANCE

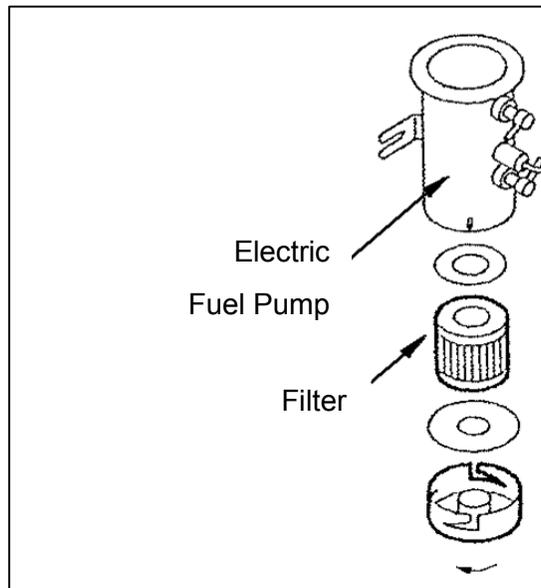
## 13.6 Replacing Electric Fuel Pump Filter

### Frequency

Replace	Every 1000 hours
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### Procedure

1. Turn the bottom cover of the pump counterclockwise to remove the end.
2. Remove the electric fuel pump filter and seals
3. Install the new filter and seals in the reverse order.
4. To bleed the air from the fuel system, turn the key to the run position, but do not start the engine, for 30 seconds.



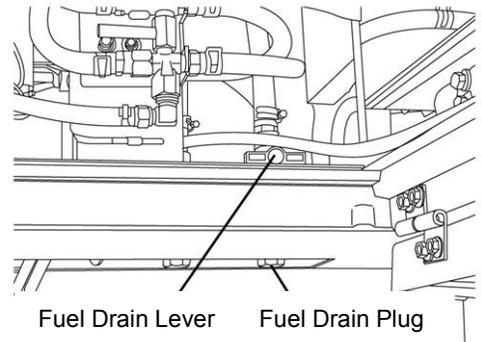
## 13.7 Draining Water from the Internal Fuel Tank

### Frequency

Drain Water	Every 200 hours
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### Procedure

1. Remove the fuel drain plug.
2. Turn the fuel drain valve located inside the enclosure counterclockwise.
3. After completely draining any water, turn the ball valve clockwise and reinstall the plug.



# MAINTENANCE

## 13.8 Replacing LLC Antifreeze (Long Life Coolant)

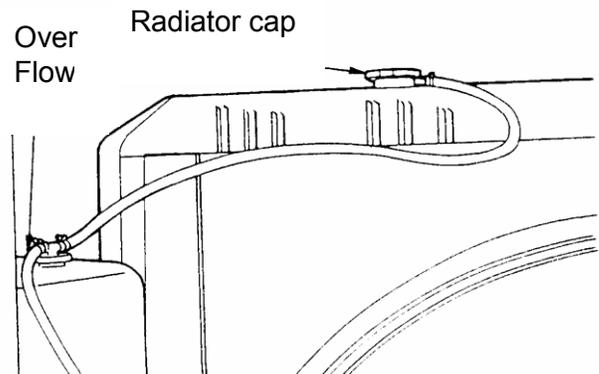
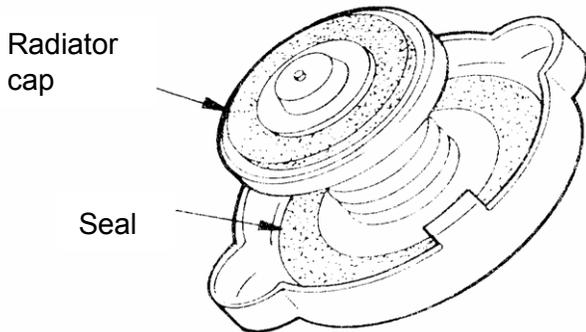
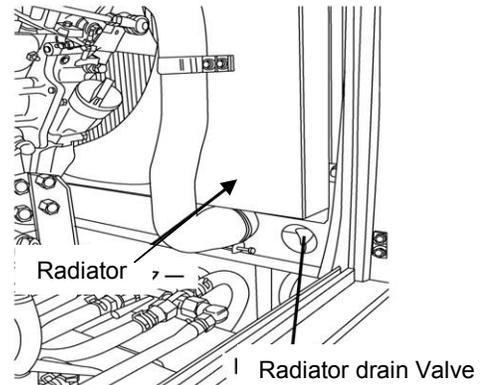
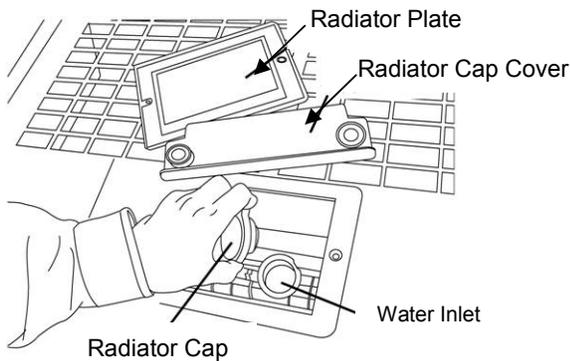
### Frequency

Replace Antifreeze (LLC)	Every 1000 hours
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### Procedure

1. Remove the radiator plate located on the top of the enclosure.
2. Remove the radiator cap cover.
3. Remove the radiator cap and check seal (replace if seal is damaged).
4. Loosen the radiator drain valve and drain plug on engine side and drain coolant completely.
5. Tighten the radiator drain valve.
6. Drain the coolant reservoir.
7. Install a mixture of 50:50 LLC and potable water into the reservoir to the full mark.
8. Fill the radiator slowly to avoid trapping any air, with a mixture of 50:50 LLC and potable water.
9. Reinstall the radiator cap tightly.
10. Close the radiator cap cover and install the radiator top plate.
11. Check for leaks, and if none, start the engine and let warm up.
12. Turn off the engine and let cool.
13. Check and replenish the coolant reservoir if needed.

**Note:** Use GM SPEC 6277M or equivalent long life coolant. Do Not mix different brands of coolant.



# 14. TROUBLE SHOOTING

## Problem and corrective measure

### 14.1 GENERATOR

Problem	Suspected cause	Inspection	Corrective measure
No output voltage	<ol style="list-style-type: none"> <li>1. Faulty voltmeter.</li> <li>2. Faulty generator.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the voltage at the volt meter.</li> <li>2. Verify the exciting amperage and the value of resistance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the volt meter.</li> <li>2. Replace the generator.</li> </ol>
No voltage increase	<ol style="list-style-type: none"> <li>1. Faulty voltmeter.</li> <li>2. Faulty generator.</li> <li>3. Faulty AVR or voltage adjuster.</li> <li>4. Slow rotation.</li> <li>5. Faulty initial excitation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the voltage of the volt meter</li> <li>2. Verify the exciting amperage and the value of resistance.</li> <li>3. Broken wire, loose or disconnected cable.</li> <li>4. Check the rotation speed of the engine.</li> <li>5. Broken or loose wiring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the volt meter.</li> <li>2. Replace the generator.</li> <li>3. Repair or replace the parts.</li> <li>4. Adjust the rotation speed of the engine properly.</li> <li>5. Repair.</li> </ol>
High output voltage	<ol style="list-style-type: none"> <li>1. Faulty volt meter.</li> <li>2. Faulty adjusting AVR.</li> <li>3. Broken wire, loose or disconnected cable of the voltage adjuster circuit</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the voltage at the volt meter</li> <li>2. Check the dial gauge [VR1] on the AVR.</li> <li>3. Check wiring of voltage adjuster.</li> <li>4. Check for broken or loose wiring</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the volt meter.</li> <li>2. Adjust the voltage properly.</li> <li>3. Inspect and repair the cable.</li> </ol>
Abnormal frequency or voltage drop when load is increased	<ol style="list-style-type: none"> <li>1. Unbalanced load.</li> <li>2. Low engine RPM</li> <li>3. Over load.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the amperage of each phase.</li> <li>2. Check the engine RPM.</li> <li>3. Check the amperage of each phase.</li> </ol>	<ol style="list-style-type: none"> <li>1. Balance the current.</li> <li>2. Adjust to appropriate engine RPM.</li> <li>3. Decrease the load.</li> </ol>
Can't turn ON the Main Circuit Breaker	<ol style="list-style-type: none"> <li>1. The lever of the breaker is positioned between [ON] and [OFF] position.</li> <li>2. Over load.</li> <li>3. Terminal cover opened.</li> <li>4. Over current (overload).</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the position of the handle.</li> <li>2. Check the load.</li> <li>3. Check terminal cover is closed completely .</li> <li>4. Check thermal relay.</li> </ol>	<ol style="list-style-type: none"> <li>1. Press the lever to the [OFF] position first, then set the lever to the [ON] position to reset.</li> <li>2. Decrease the load.</li> <li>3. Close terminal cover.</li> <li>4. Wait approximately 1 minute before attempting to reset the main breaker to allow the over-current relay to automatically reset.</li> </ol>

# TROUBLE SHOOTING

## 14.2 ENGINE

Problem	Suspected cause	Inspection	Corrective measure
Unable to start the engine.	1. Starter does not engage.	<ol style="list-style-type: none"> <li>1. Check voltage, electrolyte level, specific gravity of the battery.</li> <li>2. Check the starter relay. Confirm battery voltage at the starter relay when the starter switch is turned to [ON] position.</li> <li>3. Check the starter. Confirm battery voltage at the starter when the starter switch is set to [Start] position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check battery fluid level and add if necessary then charge battery.</li> <li>2. Replace the starter relay.</li> <li>3. Repair the starter. Refer to the engine manual.</li> </ol>
	2. Starter turns normally.	<ol style="list-style-type: none"> <li>1. Check the stop solenoid. Confirm that the stop solenoid is energized while the starter switch is set to [ON] position.</li> <li>2. Check pre-heating. Confirm battery voltage at the glow plug and glow indicator when the starter switch is set to [ON] position.</li> <li>3. Check the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the solenoid or the solenoid fuse.</li> <li>2. Repair wiring, replace the glow timer.</li> <li>3. Refer to the engine manual and the product manual.</li> </ol>
Sudden stopping of the engine.	1. Activation of protective devices. Low oil pressure and/or high water temperature.	<ol style="list-style-type: none"> <li>1. Check oil level. Check overload, ventilation, coolant level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add oil as needed. Decrease load, improve ventilation, add coolant.</li> </ol>
	2. Air or water is entering into fuel system, clogged fuel filter.	<ol style="list-style-type: none"> <li>2. Check fuel system. Refer to the engine service manual.</li> </ol>	<ol style="list-style-type: none"> <li>2. Repair the fuel /intake system.</li> </ol>

# LONG TERM STORAGE

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## 15.1 Long Term Storage

If the generator will not be used for more than 2 months perform the following procedure.

### Procedure for Long Term Storage

1. Remove the battery.
2. Change the engine oil.
3. Drain the fuel from the fuel tank and filters.
4. Clean all parts, cover the generator and store in an area free from dust or humidity.

**Note:** The “After Long Term Storage Starting Procedure” should also be performed before initial starting of a new generator.

### After Long Term Storage Starting Procedure

1. Install the battery, check the electrolyte level and charge the battery if necessary.
2. Check all fluid levels as described in “Initial Start Up and Pre-Checks” beginning at page 34 of this manual and add if necessary.
3. Disconnect the Shut Down Solenoid connector to keep the engine from starting.
4. Crank the engine for 10 seconds then wait 30 seconds and crank for an additional 10 seconds. **Note:** This is to help prime the engine oil system.
5. Reconnect the Shut Down Solenoid connector.
6. Start the engine. **Note:** If the engine does not start within 10 seconds wait 30 seconds before reattempting to start the engine.
7. Allow the engine run, with no load, for at least 10 minutes.

