

shindaiwa®

OWNER'S AND OPERATOR'S MANUAL

Diesel Engine Generator

DG15BMK/UKV

Vertical, Water-Cooled 4-Cycle Diesel Engine

**CAUTION**

Do not operate the Generator, or any other appliance, before you have read and understood the instructions for use and keep near for ready use.

DG15BMK/UKV
X753-008 72 0
X753801-590 0

Introduction

Thank you for purchasing a Shindaiwa Sound Proof Diesel Engine Generator.

This operation manual has been created to ensure the safe operation of this equipment. Therefore, the manufacturer of this equipment strongly recommends that the user follow the instructions herein, to avoid unnecessary accidents and repairs.

Please operate this equipment after thoroughly reviewing and understanding the contents of this manual.

Please supply this manual with the equipment.

If disposing of this generator and other equipment, do so in a manner that is in compliance with laws related to industrial waste. Contact the authorized distributor which the generator was purchased if you have any inquiries regarding proper disposal.

■ The following conventions will be used throughout the manual to indicate the degree of caution.

 Danger	<i>Will cause serious injuries or death.</i>
 Warning	<i>Can cause serious injuries or death.</i>
 Caution	<i>Can cause minor injuries or damage to the equipment or other properties.</i>
<Note>	<i>Other types of caution and indications.</i>

Even some of the items noted in 『  **Caution** 』 may lead to serious injuries. Please read all items and follow all the safety guidelines.

■ The following explanatory symbols will be used throughout the manual and on the product itself. Please make sure to understand fully what each symbols stands for.

<i>Symbol form / shape</i>	<i>Symbol description / application</i>
	<i>Safety / Alert</i>
	<i>Beware of exhaust fumes.</i>
	<i>Beware of fire hazard.</i>
	<i>Beware of electric shock.</i>

	<p>Beware of extremely hot components. Always be sure to stop the engine and leave the engine to cool down before performing any inspection/maintenance.</p>
	<p>Beware of injury. Always lock the doors and never open during operation to avoid injury by moving parts.</p>
	<p>Beware of injury. When lifting the unit, use the built-in lifting hook only.</p>
	<p>Beware of injury to eyes and skin. Battery acid, Diesel fuel and/or Engine oil can be very harmful if contact is made with eyes, skin or clothing.</p>
	<p>Guaranteed sound power level</p>

- Some of the items noted in [ **Caution**] may also causing serious injuries.
- Please read all items and follow all the safety guidelines.
- This product is for professional use. Please follow international regulations (if any) for the education /training in relation to the engine driven machine/fuel handling qualification, first aid, etc.
- The following statement refers to the noise level data contained in the EC Declaration of Conformity contained on the next page of this manual.

“The figures quoted are emission levels and are not necessarily safe working levels. Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factors that influence the actual level of exposure of work-force include the characteristics of the work place, the other sources of noise, etc. i.e. the number of machines and other adjacent processes, and the length of time for which an operator is exposed to the noise. This information, however, will enable the user of the machine to make a better evaluation of the hazard and risk”.

Declaration of Conformity

The undersigned manufacturer: **YAMABIKO CORPORATION**
1-7-2 Suehirocho
Ohme, Tokyo 198-8760
JAPAN

declares, under the sole responsibility thereof, that the hereunder specified new unit:

DIESEL POWERED AC GENERATOR
[GENERATING SET]

Brand: Shindaiwa
Type: DG15BMK/UKV

Serial Number D20101000049 to D20101999999

complies with:

- the requirements of Directive 2006/42/EC (use of harmonized standard EN ISO 8528-13:2016)
- the requirements of Directive 2014/30/EU (use of harmonized standard EN 55012:2007/A1:2009
EN 61000-6-2:2005)
- the requirements of Directive 2011/65/EU (use of harmonized standard EN IEC 63000:2018)
- the requirements of Directive 2000/14/EC

Noise measurements have been made in accordance with 2000/14/EC
annex 3 part B(45) with supervision by Notified Body No.0036
(TUV SUD Industrie Service GmbH Westendstrasse 199 80686 Munchen)
The declared noise values are as follows:

Measured sound power level	Guaranteed sound power level
89dB LwA	91dB LwA

Tokyo, Sep 1th, 2021

YAMABIKO CORPORATION



Hisashi Kobayashi

General Manager
Quality Assurance Dept.

the person in Europe who is authorized to compile the technical file.

Company: Shindaiwa Limited

Address: 6 The Dell, Enterprise Drive, Four Ashes, Wolverhampton WV 10 7DF United Kingdom

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1. Safety Instructions

Danger: Using a generator indoors can kill you in minutes

- Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.
- NEVER use inside an enclosed area, even if doors and windows are open.
- Only use outside and far away from windows, doors, and vents.

Warning: Suffocation from Exhaust Fumes

- Do not operate the equipment in a poorly-ventilated area such as indoor, private home and/or similar location or within a tunnel because the engine exhaust fume includes components that are harmful to humans.
- Do not direct exhaust fumes toward bystanders or buildings.

Warning: Electric Shock

- Do not operate the equipment with any doors or covers open, and always lock them.
- Do not touch wirings or any electric parts inside the equipment during operation.
- Do not touch the equipment during operation if the equipment or your body is wet.
- Be sure to stop the engine whenever touching output terminals such as when installing or removing cables.
- Do not connect cables to any part other than output terminals.
- Do not insert any metallic objects, such as pins or wires, into AC output receptacles or terminals.
- Always be sure to turn off all circuit breakers before installing or removing devices using AC output receptacles.
- Do not operate the equipment with an incorrectly adjusted Earth Leakage relay, to avoid electrical shock when the relay is not properly set. (Check on-site regulation for correct setting.)
- Always be sure to repair the fault when the earth leakage circuit breaker operates.
- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.

Warning: Fire

- Always locate a fire extinguisher near the working space.
- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire or other open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.
- Spilled fuel and oil accumulates in the spill containment. Do not operate the equipment with liquid accumulated in the spill containment.
- Absolutely never use the equipment if there is a fuel, oil or coolant leak. Be sure to repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire, other open flames or sparks.
- Keep any ignitable items (such as fuel, gas and paint, etc.) or inflammable items away from the equipment because the muffler, exhaust fume and other parts attain high temperatures.

- Provide at least 1 meter (3 feet) of distance between the equipment and walls and other obstacles, and operate the equipment on a flat surface.
- Allow the equipment to cool before covering with protective covers and similar items.
- Do not ground wiring of earth leakage circuit breakers of the equipment to piping that contains flammable material.

⚠ Warning: Injuries

- Do not operate the equipment with any doors or covers open, and always lock them. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.
- Do not modify the equipment and do not operate with parts removed.
- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.
- Do not lift up by positioning handle. Doing so could cause the generator to fall.
- No persons should ever be under a lifted generator.

⚠ Warning: Explosion

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire or other open flames near the equipment because the battery generates ignitable gas.

⚠ Warning: Electromagnetic Interference

- Persons using a heart pacemaker are not allowed near the Generator work area while the Generator is in operation without the permission of a doctor. The welder generates a magnetic field while energized that can negatively affect pacemaker operation.

⚠ Caution: Electric Shock

- Do not come in contact with the output terminals while this equipment is in operation.
- Turn the main circuit breaker to off and stop the engine before servicing.
- Do not connect the AC output to indoor wiring.
- Do not splash water onto the equipment or operate it in the rain.
- If wearing gloves, be sure to always wear gloves with dry insulation properties.
- Do not wear gloves that are damaged or wet.

⚠ Caution: Burns

- The engine, muffler and similar parts and surrounding components are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot coolant and steam will spurt out.
- Always be sure to stop the engine and leave the engine to cool down before performing any inspection/maintenance such as inspection of engine oil or fuel filter. Opening the oil level gauge or oil filler during operation will result in hot oil spurting out.

⚠ Caution: Injuries to Eyes and Skin

- Use protective gear, such as rubber gloves, when inspecting or replacing the Battery acid, Diesel fuel and/or Engine oil. Be sure that fluid does not contact eyes, or on skin or clothing.

- Battery acid, Diesel fuel and/or Engine oil can be very harmful if contact with eyes, skin or clothing is made. If contact occurs, flush immediately with large amount of water and contact physician.

Caution: Injuries

- Use this equipment with it situated on a stable level surface so that it is prevented from moving.
- Do not move the generator during operation.
- Always be sure to turn off the switches of all devices using the equipment and turn off the generator circuit breakers before starting the engine.
- Always be sure to turn off the power switches of all devices using the equipment when turning on the generator circuit breakers. Leaving on the power switch of a device using the generator when the generator circuit breakers are turned on could result in the sudden operation of the corresponding device.
- Do not leave on the power switch of a device using the generator.
- The lifting lug is designed to be used only for lifting the generator. Do not lift the equipment with any heavy items (such as a trailer and additional fuel tank) added to the equipment.
- Always be sure to use the top-mounted lifting lug when lifting up the generator, and raise it slowly at a completely vertical angle.
- Wear a helmet, safety shoes, gloves and similar protective gear when performing lifting work. Do not stand or get under the equipment while it is suspended.
- Securely fix the equipment with rope or similar item so that it cannot move when transporting by truck or other vehicle.

Caution: Physical and Secondary Damage

- Do not use the equipment for any improper applications. Improper usage can result in an accident or malfunction.
- If using the equipment as a power source for medical equipment, you must check with the medical equipment manufacturer, doctor and hospital before using the equipment.

Caution: Fire

- Starting this product in an explosive atmosphere location may cause an explosion even with the weak sparks generated by the switch of the equipment. Do not take this equipment into an explosive atmosphere location as well as not start.

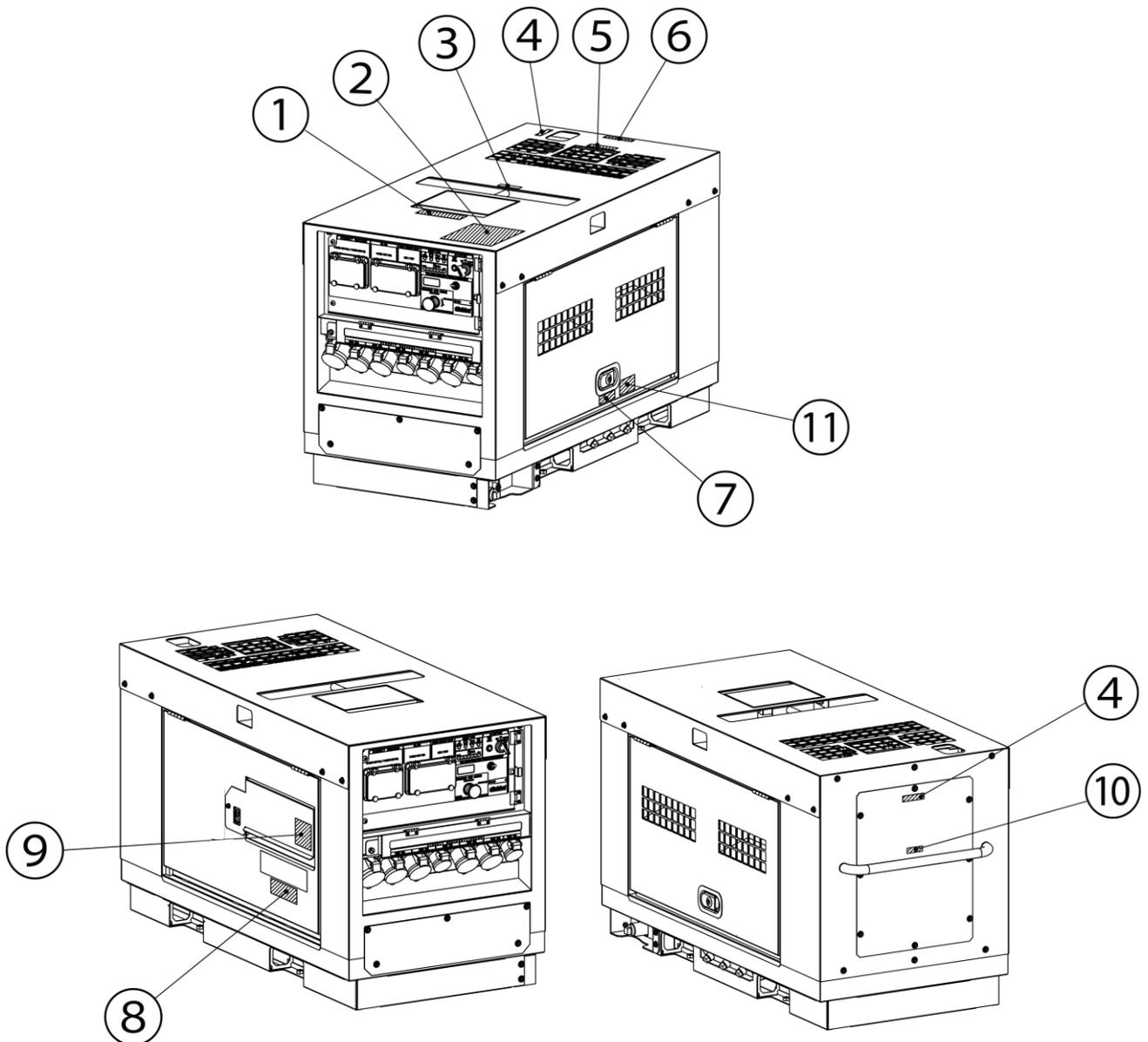
Caution: Damage to the equipment or other properties

- Do not use anything other than the specified optional device because they may cause malfunctions.

■ Location of Warning Labels

Replace warning labels when they become difficult to see or damaged by affixing new labels in the specified locations. Order the necessary labels by numbers in parentheses.

①	Warning: Fire	Part no. :X564-000640
②	Suffocation from exhaust fume	Part no. :X564-000620
③	Lifting eye	Part no. :X505-000240
④	Caution: Hot surface	Part no. X505-006420:
⑤	Caution: Burns	Part no. :X505-006410
⑥	Keep 1 meter	Part no. :M707-000260
⑦	Warning: Injuries	Part no. :X564-000630
⑧	Warning: Electric shock	Part no. :X564-000610
⑨	Earth leakage relay	Part no. :X505-004890
⑩	Positioning handle	Part no. :X505-006430
⑪	Caution: Burns	Part no. :X564-000650

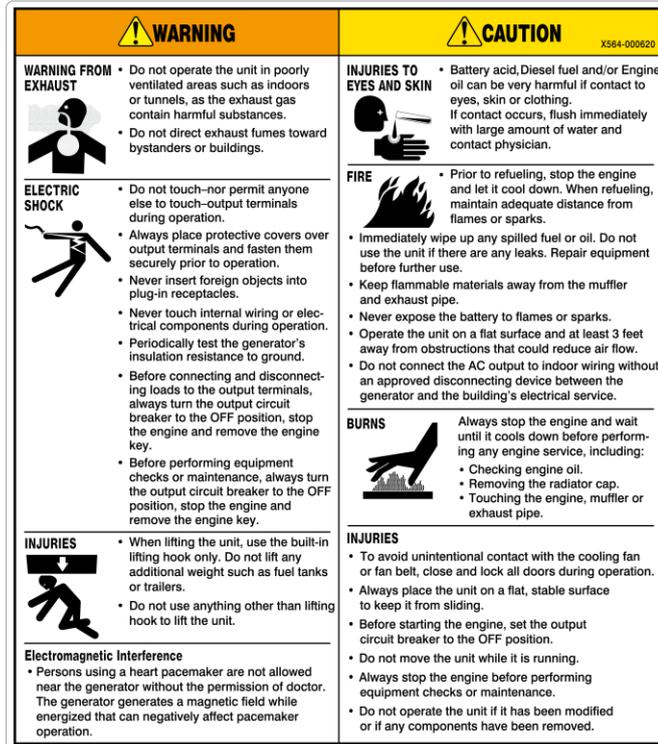


LABEL REPRODUCTION

① X564-000640



② X564-000620



③ X505-000240



④ X505-006420



⑤ X505-006410



⑥M707-000260



⑦X564-000630



⑧X564-000610



⑨X505-004890



⑩X505-006430

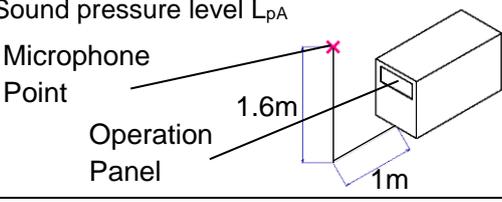


⑪X564-000650



2. Specifications

2-1. Specifications

Model		DG15BMK/UKV			
Generating Method		Revolving Field Brushless			
AC Generator	Rated Frequency	(Hz)	50		
	Rated Speed	(min ⁻¹)	3000		
	Phase		3-Phase	1-Phase	
	Rated Voltage	(V)	415	240 110	
	Rated Current	(A)	18.1	43.3 94.5	
	Power Factor		0.8	1.0	
	Rated Output	(kVA)	13	10.4	
		(kW)	10.4	10.4	
Rating		Continuous			
Engine	Model	Kubota D902			
	Type	Vertical, Water-Cooled 4-Cycle Diesel Engine			
	Displacement	(L)	0.898		
	Rated Output	(kW/min ⁻¹)	13.1/3000		
	Fuel	EN standard or ASTM standard (sulfur content < 15ppm)			
	Lubricant Oil	API Class CF or Higher			
	Lubrication Oil Volume	(L)	3.6 (Effective 1.7)		
	Coolant Volume	(L)	4.0 (Sub Tank Capacity 0.6 L included)		
	Starting Method	Starter Motor			
	CO ₂ Emission data Non-road steady-state test cycle	(g/kWh)	1047.4		
Battery	46B24L (Japanese Industrial Standard)				
Fuel Tank Capacity	(L)	37			
Dimension	Length	(mm)	1344		
	Width	(mm)	640		
	Height	(mm)	778		
Dry Weight	(kg)	400			
Noise (dB(A))	Sound pressure level L _{pA}			74(2006/42/EC, d=1m, h=1.6m)	
	Uncertainty K _{pA}			2	
	Measured sound power level L _{WA}			89(2000/14/EC, r=4m)	
	Uncertainty K _{WA}			1	
	Guaranteed sound power level L _{WA}			90(2000/14/EC, r=4m) 91(declared)(2000/14/EC, r=4m)	

<Note>

- This CO₂ measurement results from testing over a fixed test cycle under laboratory conditions a parent engine representative of the engine family and shall not imply or express any guarantee of the performance of a particular engine.

CE YEAR OF MANUFACTURE : 2020 IDENTIFICATION		AC GENERATOR			DIESEL ENGINE		
		PHASE	3	1	MODEL	KUBOTA D902	
TYPE:DG15BMK/UKV DRY WEIGHT:400kg		RATED OUTPUT(kVA)	13kVA	10.4kVA	PATED OUTPUT	13.1kW	
PERFORMANCE CLASS:G2 NET WEIGHT:440kg		RATED OUTPUT(kW)	PRP10.4kW	PRP10.4kW	PATED SPEED	3000min ⁻¹	
MANUFACTURER: YAMABIKO CORPORATION		RATED VOLTAGE	415V	240V 110V	DISPLACEMENT	0.898L	
1-7-2 Suehirocho Ohme Tokyo 198-8760 Japan		RATED CURRENET	18.1A	43.3A 94.5A	FUEL TANK CAP.	37L	
		FREQUENCY	50Hz			DIESEL FUEL	EN standard or ASTM standard (sulfur content <15ppm)
		POWER FACTOR	0.8 1.0				
		RATING	CONTINUOUS				Made in Japan

2-2. Ambient Conditions

- Temperature : -15 to 40 °C (5 to 104 °F)
- Humidity : 85% or less
- Elevation : 300 m (984 ft.) or less

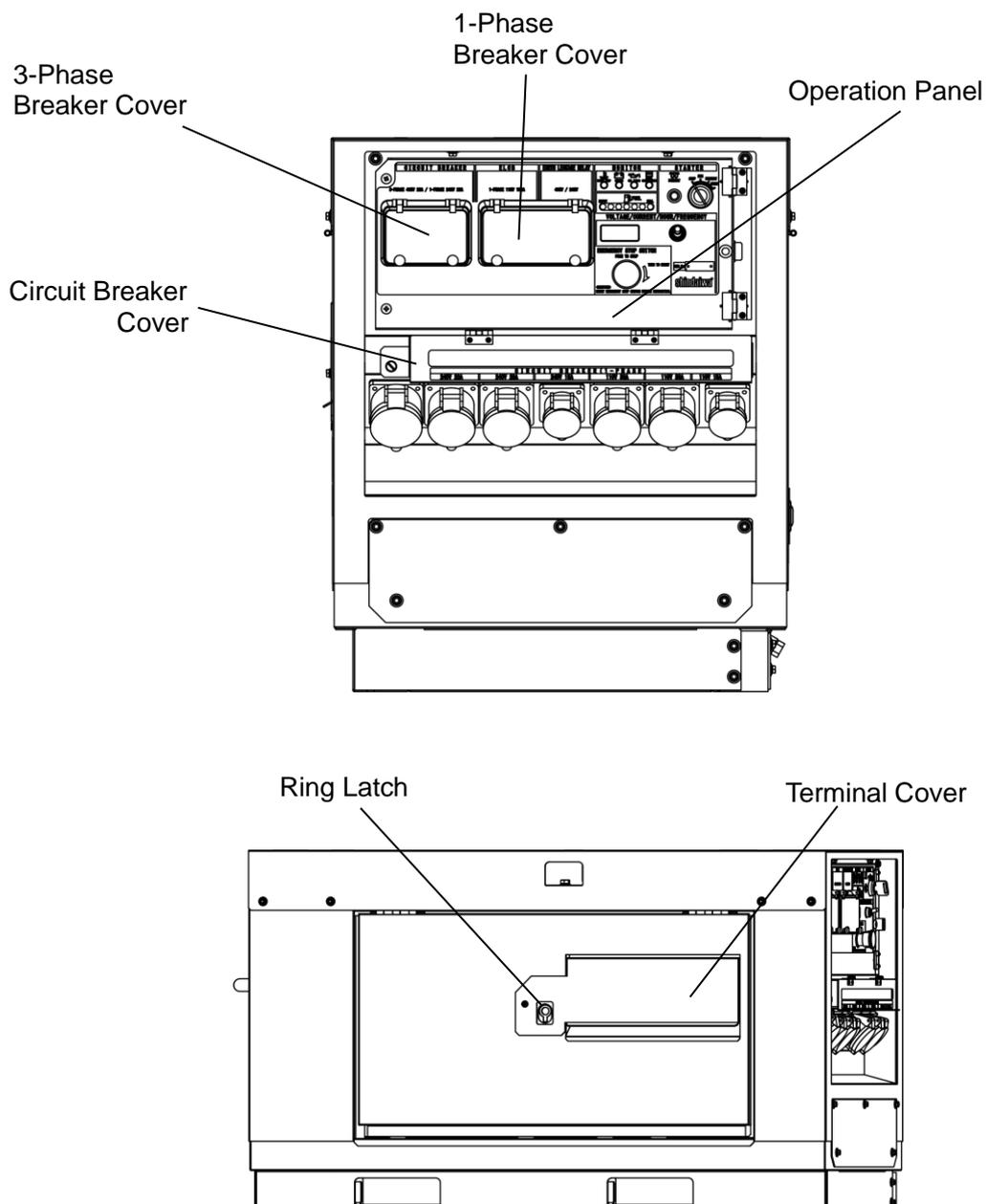
3. Applications

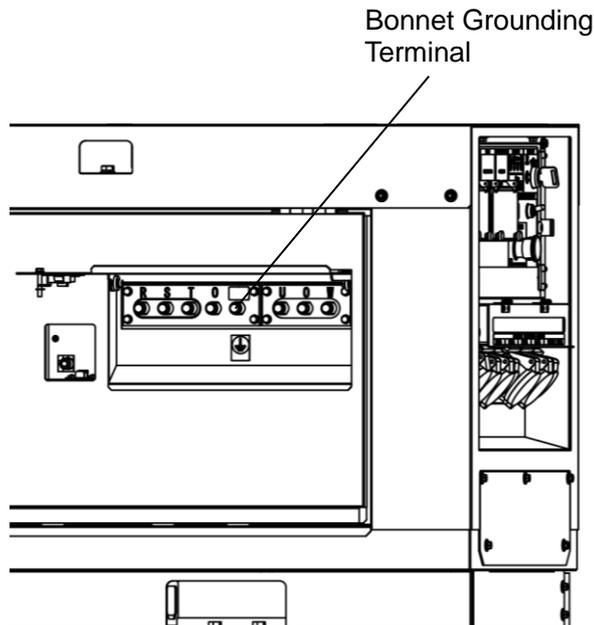
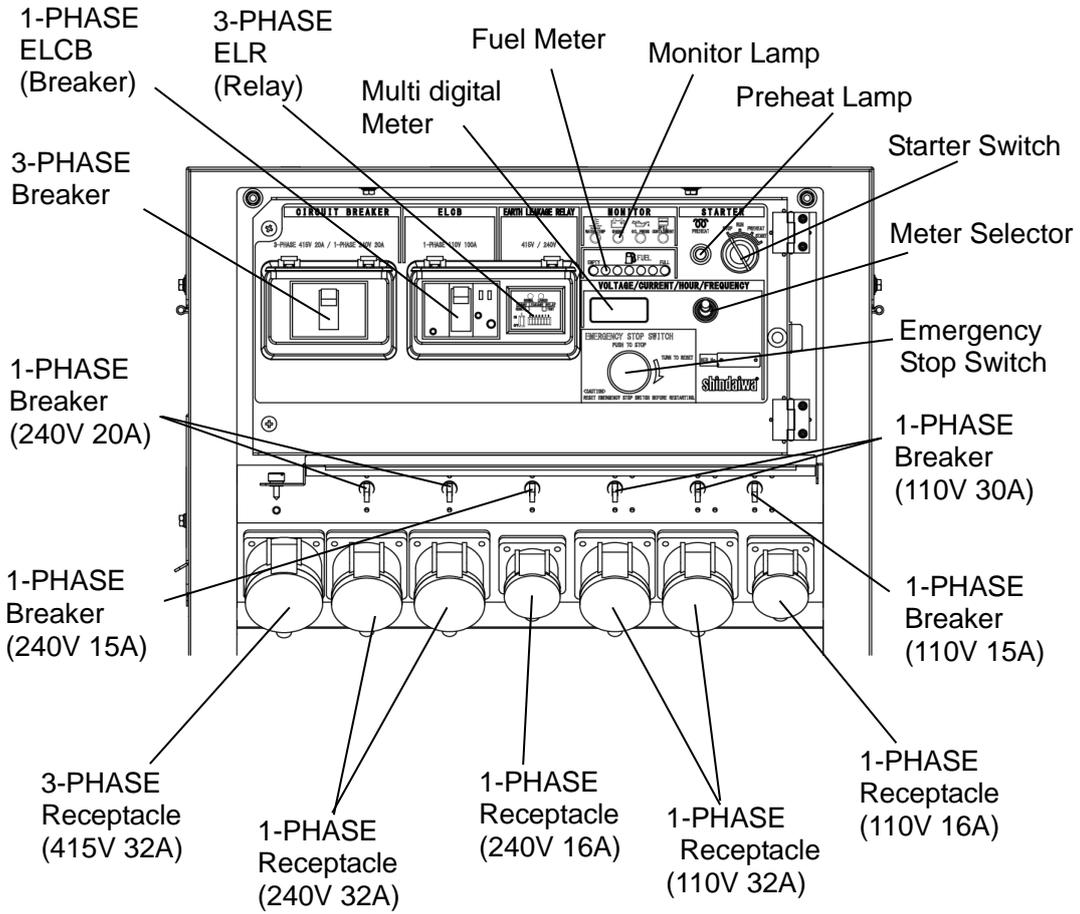
- Power Source for Light, Electric Tools and Appliances

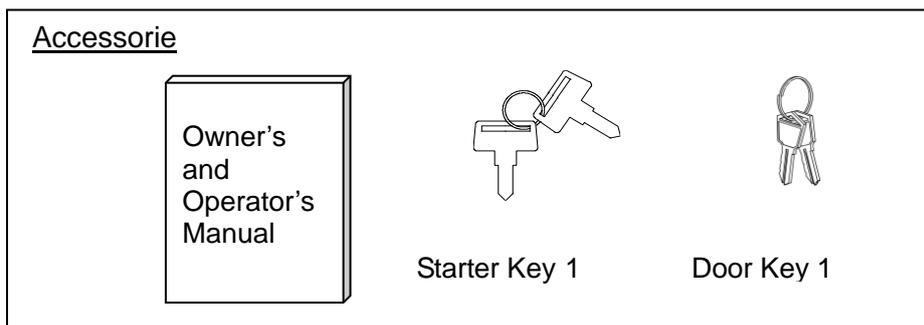
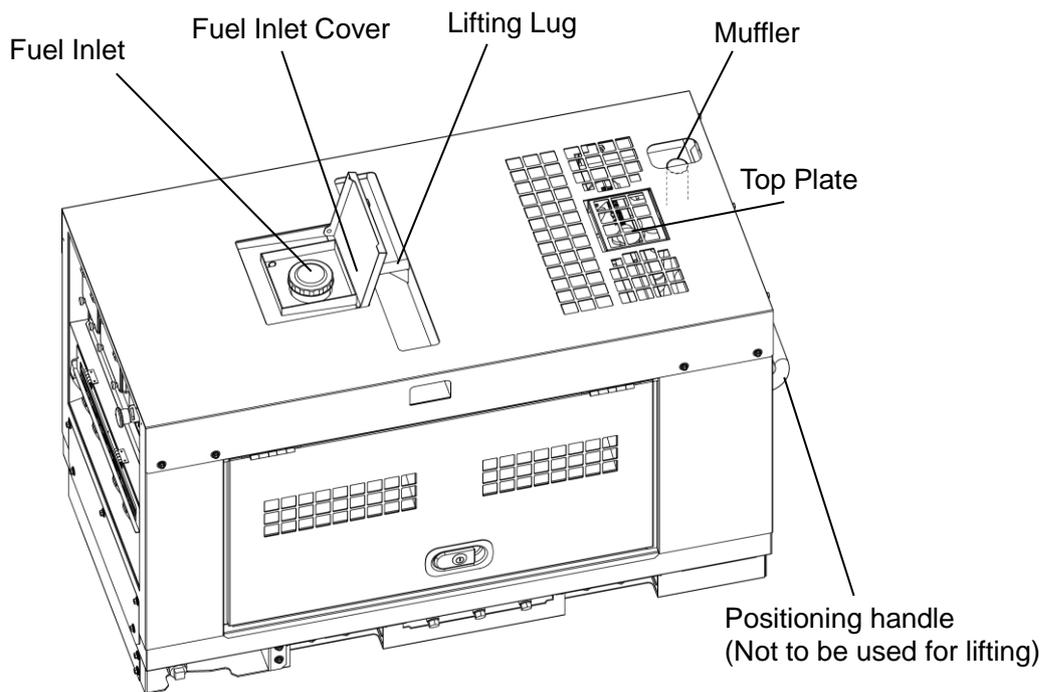
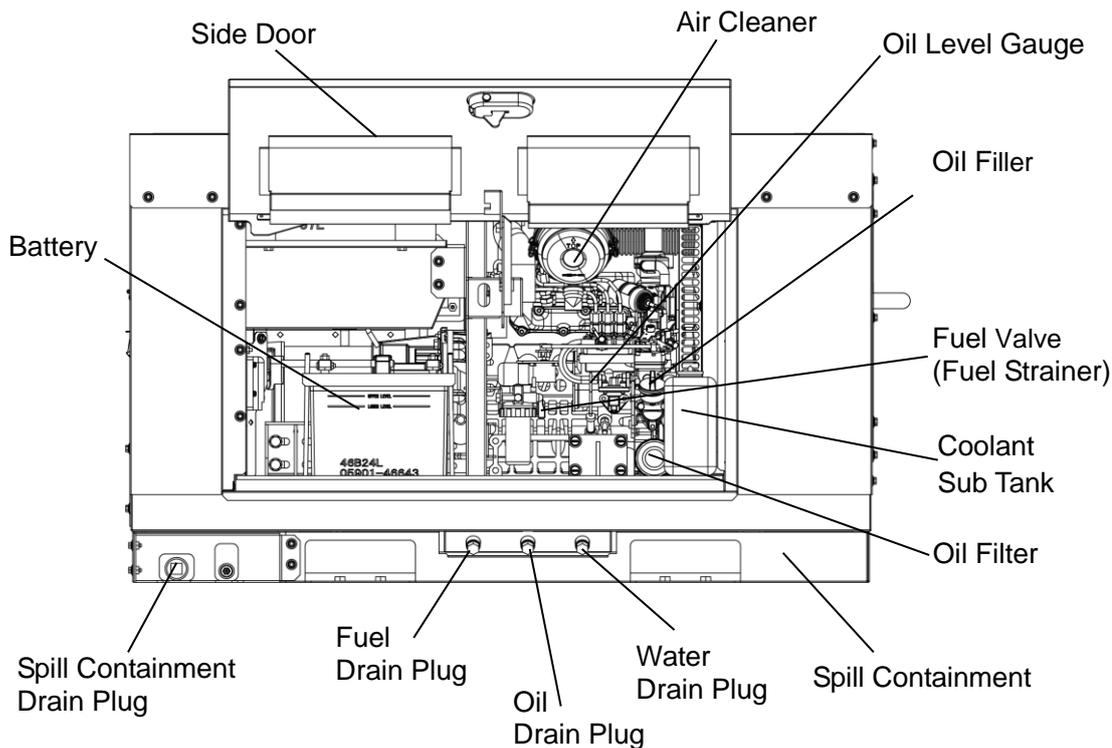
⚠ Caution: Physical and Secondary Damage

- Do not use the equipment for any applications not listed above. Improper usage can result in an accident or malfunction.
- If using the equipment as a power source for medical equipment, you must check with the medical equipment manufacturer, doctor and hospital before using the equipment.

4. Part Names







5. Equipment

5-1. Spill Containment

⚠ Warning: Fire

- Always be sure to wipe away any spilled fuel or oil.
- Spilled fuel and oil accumulates in the spill containment. Do not operate the equipment with fluids accumulated in the spill containment.
- Do not use the equipment if there is a fuel, oil or coolant leak, and be sure to always repair the leak before using.

The equipment includes a spill containment (a structure that collects leaking fluids) in order to prevent leaking fluid from getting outside of the equipment if oil, fuel or other fluids should leak.

Before starting operation, check if there is any fluid accumulated in the spill containment and drain any accumulated fluids. (Refer to section "10. (7) Drain fluid from the Spill Containment" .)

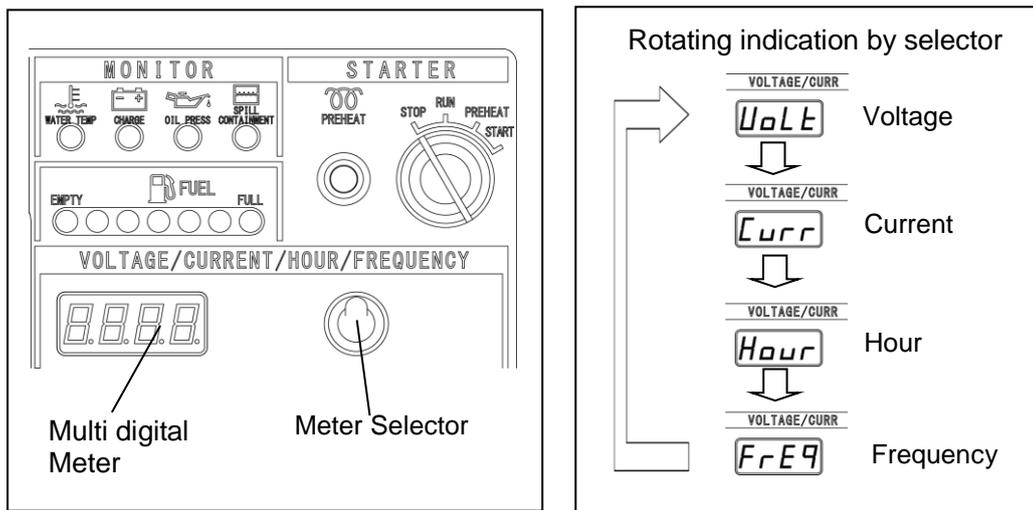
<Note>

- It is necessary to periodically drain the fluid from the spill containment because any rainwater induced into the equipment accumulates in the spill containment.
- Although the fluids consist of oil, fuel and coolant, the spill containment does not have a function that can separate rainwater leaked into the equipment from these internally leaked fluids. Properly dispose of fluids from the spill containment according to the applicable federal laws and regulations.

5-2. Multi digital meter

The equipment includes a meter that provides digital display of voltage, current, operating time and frequency.

The meter is equipped with meter selector that can be switched to display voltage, current, operating time or frequency.

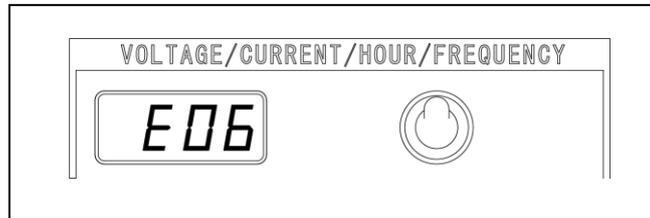


<Note>

- During operation, the 3-phase output voltage of the AC power source is constantly displayed regardless of whether the 3-phase circuit breaker is set to "ON" or "OFF".

5-3. Error Code Display

The equipment includes an error code display [E06] function that notifies the operator of Engine over speed after the engine shuts off automatically. Consult your authorized dealer when the error code [E06] is displayed on the meter.



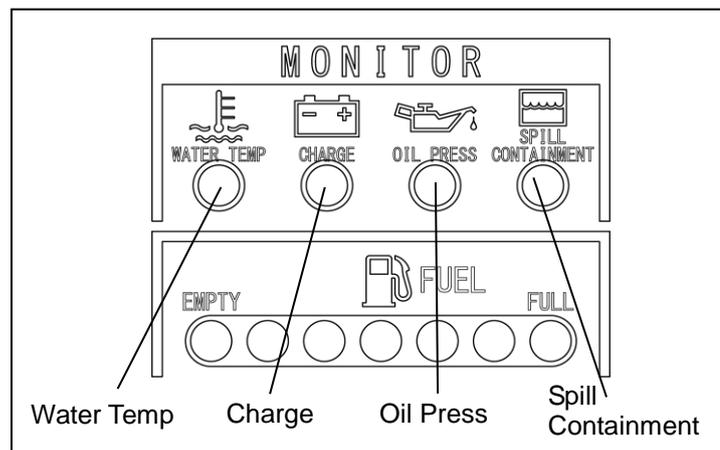
5-4. Monitor Lamp

⚠ Warning: Injuries/Electric Shock

- Do not operate the equipment with any doors or covers open, and always lock them. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.

⚠ Caution: Burns

- The engine, muffler and similar parts and surrounding components are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot coolant and steam will spurt out.
- Always be sure to stop the engine and leave the engine to cool down before performing any inspection/maintenance such as engine oil checking or fuel filter checking. Opening the oil level gauge or oil filler during operation will result in hot oil spurting out.



The equipment includes monitor lamps for "WATER TEMP", "CHARGE", "OIL PRESS" and "SPILL CONTAINMENT".

If the equipment is normal, the "CHARGE" and "OIL PRESS" monitor lamps light up when the starter switch is switched from "STOP" to "RUN", and all monitor lamps turn off when the engine is started. If any error besides that of spill containment occurs during operation, the corresponding monitor lamp illuminates and the engine is automatically stopped.

If the engine is automatically stopped, return the starter switch to "STOP" and restart the engine. Watch the lit/unlit status of the monitor lamps the next time an automatic stop occurs and check the error contents.

(1) Water Temperature Monitor Lamp

The water temperature monitor lamp ("WATER TEMP") illuminates and the engine is automatically stopped if the coolant temperature becomes irregularly high during operation. If this occurs, inspect the water level of the sub tank and add coolant if the water level is insufficient. (Refer to section "8-2. Checking Coolant" .)

If the coolant in the sub tank is at the specified level, it is probable that overloading is the cause. Use within the rated output.

(2) Battery Charge Monitor Lamp

The battery charge monitor lamp ("CHARGE") illuminates and the engine is automatically stopped if battery charge fails during operation. If this occurs, it is probable that there is fan belt damage or a wiring fault. Request repair at the retail outlet where the equipment was purchased.

(3) Oil Pressure Monitor Lamp

The oil pressure monitor lamp ("OIL PRESS") illuminates and the engine is automatically stopped if the engine oil pressure drops during operation. If this occurs, inspect the engine oil level and fill with engine oil until it reaches the maximum level.

<Note>

- The oil pressure monitor cannot detect oil deterioration. Change the engine oil periodically. (Refer to section "10. (1) Engine Oil Replacement" .)
- The charge monitor cannot detect battery deterioration or insufficient battery fluid. Inspect the battery fluid level periodically. (Refer to section "8-6. Checking the Battery" .)
- If the engine is automatically stopped and none of the monitor lamps ("WATER TEMP", "CHARGE" and "OIL PRESS") illuminates, this may be due to a blown fuse. To check the fuse, lower the control panel.
- If a fuse has blown, it is probable that there is a fault in an electric part or the wiring. Request repair at the retail outlet where the equipment was purchased.

(4) Spill Containment Monitor Lamp

The spill containment monitor lamp ("SPILL CONTAINMENT") illuminates if the level of fluid in the spill containment is approximately 70% full (approx. 36 L) in order to ensure that fluid accumulated in the spill containment does not spill out of the equipment. If this occurs, drain the accumulated fluid from the equipment. (Refer to section "10. (7) Drain Fluid from the Spill Containment" .)

<Note>

- The engine is not stopped if the spill containment monitor lamp illuminates during operation.
- When the spill containment monitor lamp illuminates during operation, stop the engine, check for fuel, oil and coolant leakage, and repair as necessary.
- Do not use the equipment with fluid accumulated in the spill containment. Drain the spill containment before using. (Refer to section "10. (7) Drain Fluid from the Spill Containment" .)

5-5. Earth Leakage Circuit Breaker and Grounding

⚠ Warning: Electric Shock

- Do not operate the equipment with wrong adjustment of Earth Leakage relay, to avoid electrical shock when the relay is not properly set.
- Always be sure to stop the engine and repair the corresponding earth leakage fault when earth leakage circuit breakers operate.

⚠ Warning: Fire

- Do not ground wiring of earth leakage circuit breakers of the equipment to piping that contains flammable material.

The equipment includes earth leakage circuit breakers (solidly grounded type) in order to prevent electric shock. Immediately isolate the electrical circuit if earth leakage occurs due to insulation failure in devices using the equipment or similar reason.

(1) Three phase 415V / Single phase 240V Earth Leakage Circuit Breaker (ELCB)

The equipment is provided with an earth leakage relay in the Circuit Breaker to detect any leakage arisen due to faults such as insulation failure of the load while the generator is running and cutting off the circuit for protection against any accident such as electrical shock.

The sensitivity current of the earth leakage relay can be adjusted from 30mA to 1,000mA with duration of 0.04sec to 2.00sec by selecting slide switch located on the front panel of the leakage relay.

For multiple load connections, set the leakage relay setting to be larger than each Individual leakage current of each load.

■ Selection of Sensitivity Current and activation duration

Unscrew the leakage relay cover, and adjust the leakage relay to the required current and duration. (Refer to the following selection table.)

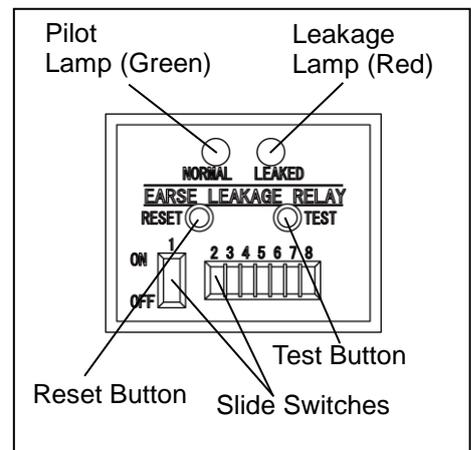
Default setting is below from factory

Sensitivity current: 30mA

Activation duration: 0.04sec

■ Operation Check

- 1) Start the engine (Refer to 9-1).
- 2) Turn the 3-phase ELCB (lever) to [ON] position.
- 3) Push the test button on leakage relay. The device is found to be normal when the circuit breaker leakage indication button protrudes and the lever positions in between [ON] and [OFF].
- 4) Press reset button to turn off the leakage warning indicator.
- 5) Push down the lever to [OFF] on 3-phase ELCB, then lift to [ON] position to reset the circuit breaker. The leakage relay will continue to shut off the circuit breaker once it is activated, until reset button is pressed or engine is stopped.



Selection of Rated Sensitivity Current

Current setting	Slide switch position				
	Switch	1	2	3	4
30mA (Operating time:0.04 sec. or less)	ON	<input type="checkbox"/>	※1		
	OFF	<input type="checkbox"/>			
100mA	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
300mA	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
500mA	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1000mA	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Selection of Operating Time
(not applicable to 30mA)

Time setting	Slide switch position				
	Switch	5	6	7	8
0.04sec. or less	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.3sec. (0.2-0.36 sec.)	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.5sec. (0.4-0.6 sec.)	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1sec. (0.8-1.2 sec.)	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2sec. (1.3-2sec.)	ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<Note>

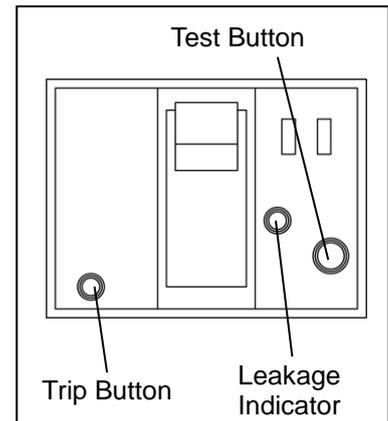
※1: Whenever Switch1 is set to 「ON」 position, the setting is back to default as 30mA/0.04sec, regardless of Switch2~8 position.

(2) Single phase 110V Earth Leakage Circuit Breaker (ELCB)

Rated Sensitivity current: 30mA (Duration 0.10sec).

■ Operation Check

- 1) Start the engine (Refer to 9-1).
- 2) Turn the 1-phase ELCB to [ON] position.
- 3) Push the test button on 1-phase ELCB. The device is found to be normal when the leakage indication button protrudes and the lever positions in between [ON] and [OFF].
- 4) Push down the lever to [OFF] on 1-phase ELCB, then lift to [ON] position to reset the circuit breaker.



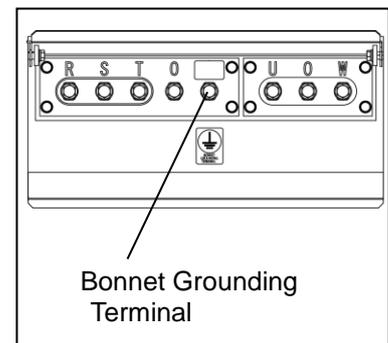
(3) Bonnet Grounding Terminal

The equipment includes a bonnet grounding terminal in order to connect bonnet grounding wire.

A neutral point of the AC power source is connected to the bonnet grounding terminal.

<Note>

- Connect using a plug with a grounding pole.
- If using a plug without a grounding pole, or output terminals, Connect load grounding earth on to the terminal directly as shown right.
- Securely ground the bonnet grounding terminal to the metal frame of the vehicle if transporting the equipment by truck or trailer.



(4) If an Earth Leakage Circuit Breaker Operates

⚠ Caution: Electric Shock/Injuries

- Always be sure to turn off the power switches of all devices using the generator when turning on the generator breakers after an earth leakage circuit breaker operates. Leaving on the power switch of a device using the generator when the generator breaker is turned on could result in the sudden operation of the corresponding device.

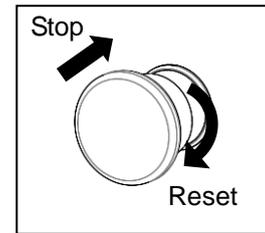
When the ELCB relay has activated, the leakage warning lamp is turned on, or the leakage indication button protrudes and the lever positions in between [ON] and [OFF]. Stop the engine promptly and find the faulty leakage point to repair.

In case 3-phase ELCB leakage indication button does not protrude or the leakage warning lamp is not turned on, the AC output is over supply.

5-6. Emergency Stop Switch

Press the emergency stop switch to stop the engine immediately.

After pressing the emergency stop switch, return the starter switch to the "STOP" position and turn the emergency stop switch clockwise to reset.

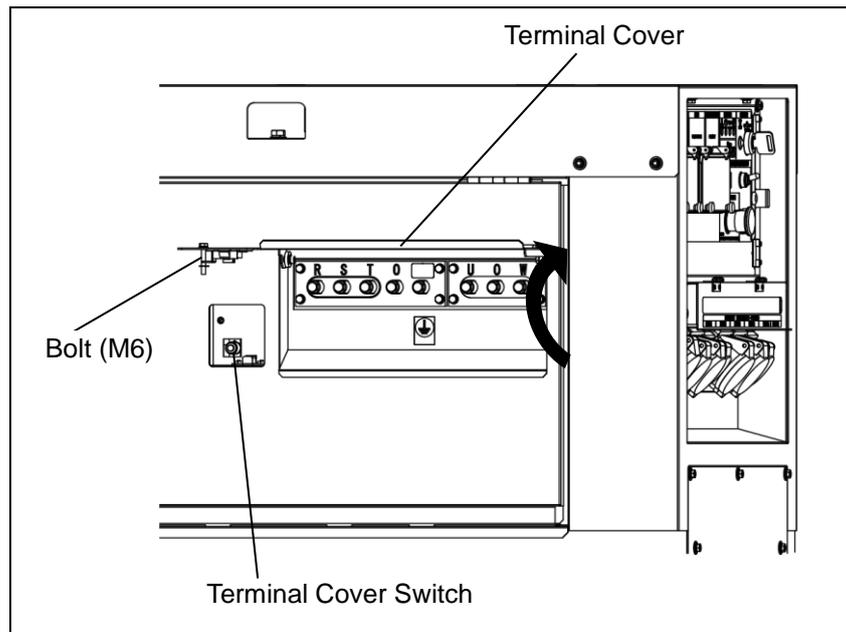


5-7. Terminal Cover Switch

An automatic engine stop feature is incorporated in the equipment, if the left side terminal cover is opened.

Before starting engine, be sure to close the terminal cover and tighten the bolt.

If the terminal cover remains open, the engine will not start or be restarted.



6. Transport/Installation

6-1. Transport Procedures

Warning : Injuries

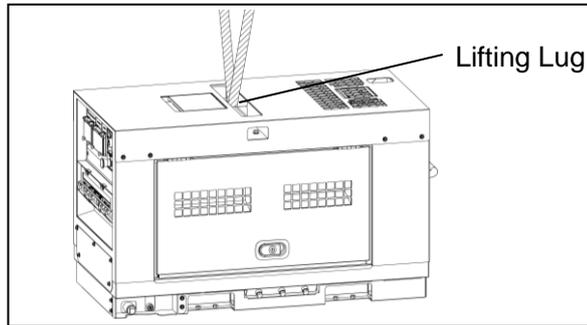
- Do not lift up by positioning handle. Doing so could cause the generator to fall.
- No persons should ever be under a lifted generator.

Caution : Injuries

- Always be sure to use the top-mounted lifting lug when lifting up the generator, and raise it slowly at a completely vertical angle.
- Wear a helmet, safety shoes, gloves and similar protective gear when performing lifting work. Do not stand or get under the equipment while it is suspended.
- Do not move the generator during operation.

(1) Lifting Procedures

Always be sure to use the top-mounted lifting lug when lifting up the generator, and raise it slowly at a completely vertical angle.

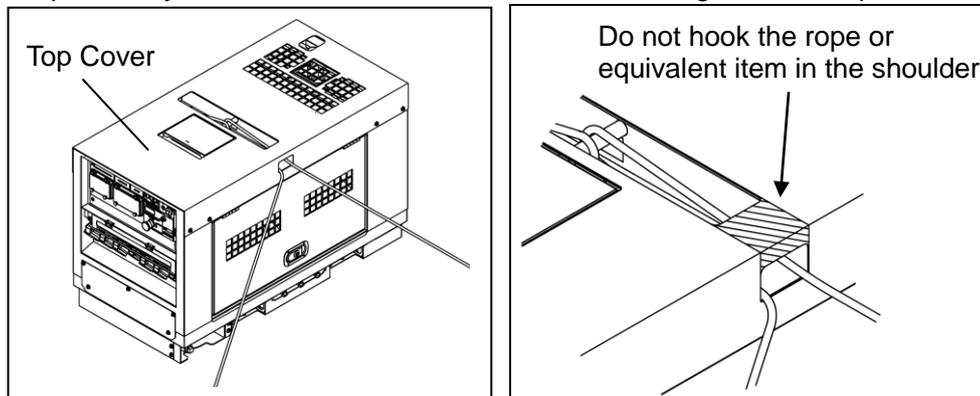


(2) Transport

When transporting this generator, securely fix it with rope or equivalent item so that it cannot move.

< Note >

- Handle this generator with great care when raising, lowering and transporting. Rough handling of generator can result in damage or malfunction.
- Do not hook the rope or equivalent item in the shoulder area on the top cover as the metal plate may become distorted if it is bent when this generator is placed.



6-2. Installation Procedures

⚠ Warning: Fire

- Always locate a fire extinguisher near working space.

⚠ Warning: Exhaust Gas Poisoning

- Do not operate the equipment in a poorly-ventilated area such as indoor, private home and/or similar location or within a tunnel because the engine exhaust fume includes components that are harmful to humans.
- Do not direct exhaust fumes at bystanders or buildings.

⚠ Caution: Fire

- Starting this product in an explosive atmosphere location may cause an explosion even with the weak sparks generated by the switch of the equipment. Do not take this equipment into an explosive atmosphere location.

⚠ Caution: Electric Shock

- Do not splash water onto the equipment or operate it in the rain.
- Do not connect the AC output to any indoor wiring.

⚠ Caution: Damage to the equipment or other properties

- Do not use anything other than the specified optional device because they may cause malfunctions.

- If installing this generator, set up barriers or fencing completely around the boundary line of the construction area and take measures to prevent persons not involved in the construction from entering the area.
- Position this generator on a hard, flat and leveled surface.
- Position this generator 1 m (3 ft.) or more from walls or other hindrances so that the operation panel door and side/check doors are accessible for internal inspection/maintenance.

< Note >

- This generator is manufactured to be installed on a flat, hard and leveled surface. Accordingly, care must be taken that using under any other installation conditions can result in a fault or malfunction.
- Do not place any objects where they will interfere with the radiator or muffler exhaust ports. Objects interfering with these ports will result in reduced engine output, overheating, and electrical component fault/malfunction.
- Operating the equipment in dusty or excessively salty location can result in a clogged radiator or overheating resulting in malfunction/fault or reduced insulation of electrical components.

7. Load Connections

7-1. Load Cable Selection

⚠ Caution: Property Damage

- Cable burnout can occur due to generated heat if the load current exceeds the allowable current of the cable.
- The voltage drop between cables is large if the cable is excessively long or the cross sectional area is too small resulting in decreased input voltage to load using the generator, causing decreased performance, faulty operation and malfunction.

Select cable for use that has proper size and an allowable current for use, giving consideration to the distance from the generator to the load using the generator.

< NOTE >

- Select proper size of cables that ensures that the voltage drop across the cable will be within 5% of the rated voltage.

■ Load Cable Selection Tables

(Ex.) If used voltage is required 415 V (±5%)

Minimum Three-phase Cabtyre (Armoured) cables

(Unit: mm²)

Length Current	50 m or less	75 m	100 m	125 m	150 m	200 m
10 A	0.75	1.25	2	2	3.5	3.5
15 A	1.25	2	3.5	3.5	3.5	5.5
20 A	2	3.5	3.5	5.5	5.5	8

(Ex.) If used voltage is required 110 V ($\pm 5\%$)

Minimum Single-phase Cabtyre (Armoured) cables

(Unit: mm²)

Current \ Length	50 m or less	75 m	100 m
10 A	3.5	5.5	8
20 A	8	14	14
30 A	14	14	22
50 A	22	22	30
70 A	22	30	50
100 A	30	50	60

7-2. Connecting Load Cables

⚠ Warning: Electric Shock

- Do not touch the equipment during operation if the equipment or your body is wet.
- Be sure to stop the engine whenever touching output terminals such as when installing or removing cables.
- Do not connect cable to any part other than output terminals.
- Do not insert any metal objects, such as pins or wires, into AC output terminal or receptacles
- Always be sure to turn off all breakers before installing or removing devices using AC output receptacles.
- Close the output terminal cover before operating.
- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.

⚠ Caution: Fire

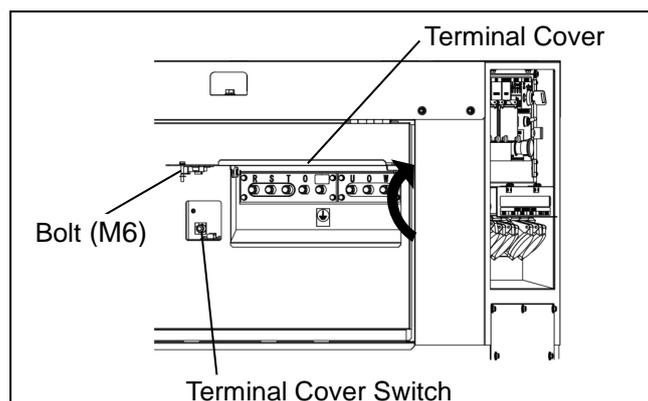
- Never directly connect the generator output to commercial power supply.

⚠ Caution: Electric Shock

- Do not splash water onto the equipment or operate it in the rain.
- Do not connect the AC output to any indoor wiring.

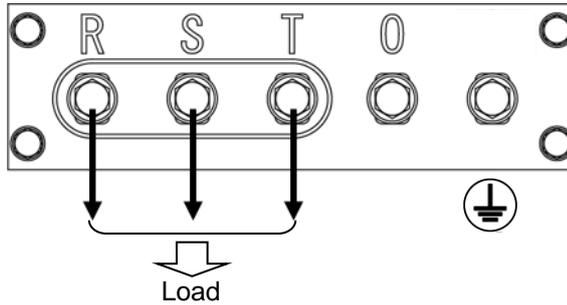
< NOTE >

- When connecting a load, check that the generator output terminal or receptacles connection position are matching.
- Use proper tools when connecting a load to sufficiently tighten the connection. Failure to sufficiently tighten will result in cable burnout.
- Before connecting a load and starting engine, be sure to close the terminal cover and tighten the bolt. If the terminal cover remains open, the engine will not start or be restarted.

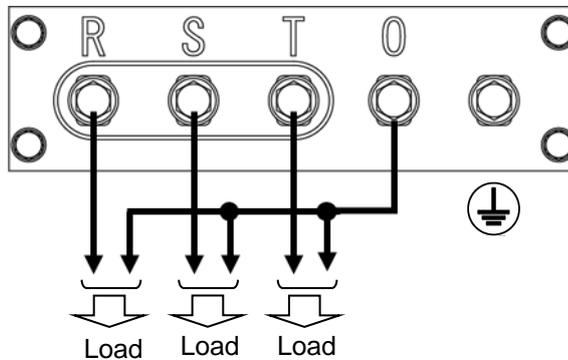


(1) Three-Phase Output Terminal

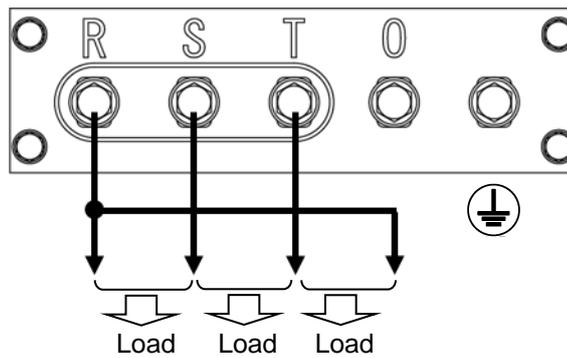
- For three-phase load:
 - Terminal voltage is 415 V.



- For single-phase load:
 - Terminal voltage is 240 V.

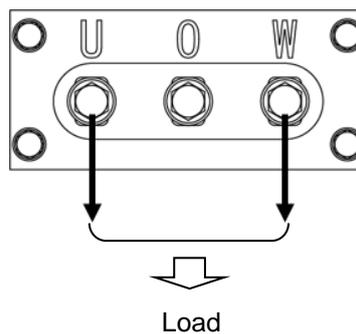


- For single-phase load:
 - Terminal voltage is 415 V.

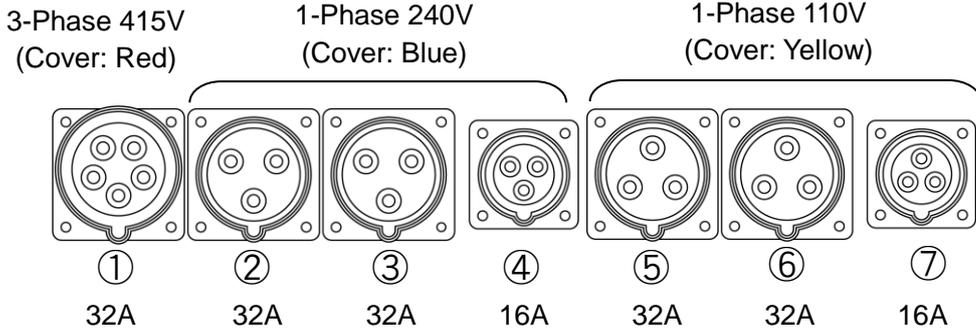


(2) Single-Phase Output Terminal and Receptacle

- For single-phase 110 V load:

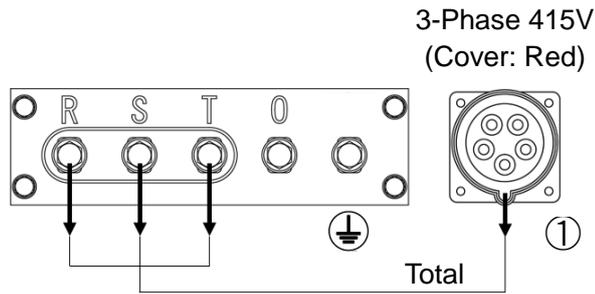


(3) Receptacle spec



(4) Allowable maximum current for each output

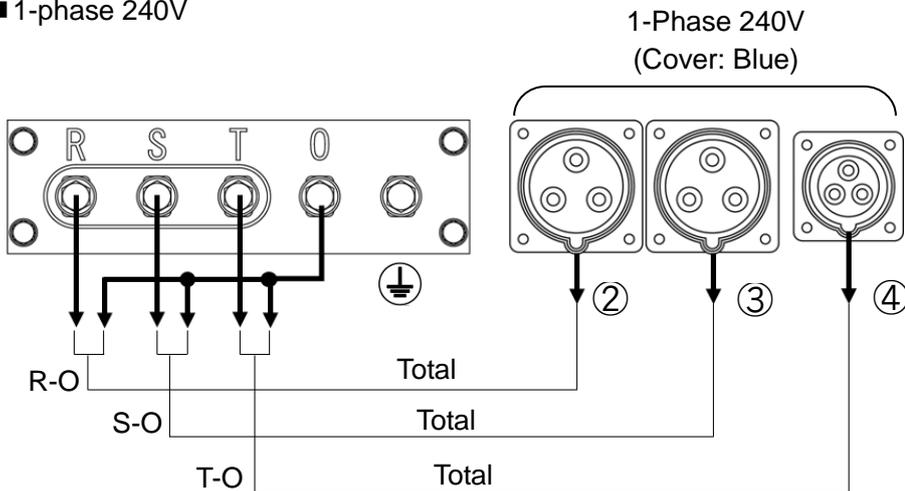
■ 3-Phase 415V



Use is possible up to the kVA as shown below.

3-Phase 415V Output Terminal	Receptacle	Total
13kVA	13kVA	13kVA

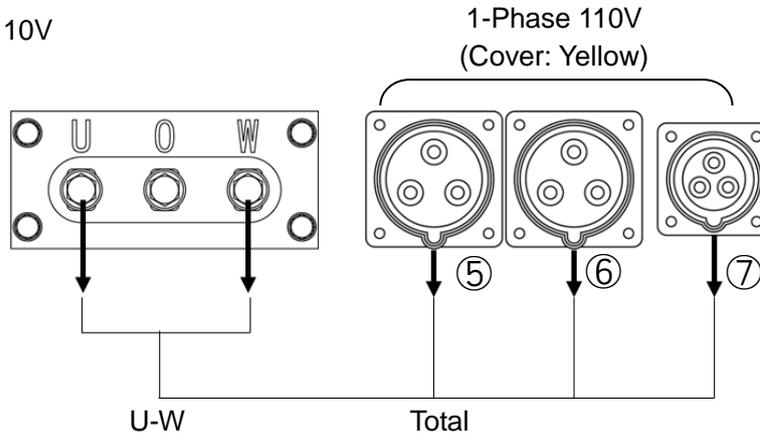
■ 1-phase 240V



Use is possible up to the kVA as shown below.

1-phase 240V Output Terminal			Receptacle			Total	
R - O	S - O	T - O	②	③	④		
4.8kVA	-	-	4.8kVA	-	-	4.8kVA	10.4kVA
-	4.8kVA	-	-	-	3.6kVA	4.8kVA	
-	-	4.8kVA	-	4.8kVA	-	4.8kVA	

■ 1-phase 110V



Use is possible up to the kVA as shown below.

1-phase 110V Output Terminal	Receptacle			Total
	⑤	⑥	⑦	
U - W	⑤	⑥	⑦	
10.4kVA	3.3kVA	3.3kVA	1.65kVA	10.4kVA

8. Pre-Operation Inspection

⚠ Warning: Injuries/Electric Shock

- Do not operate the equipment with any doors or covers open, and always lock them. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.
- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.

⚠ Warning: Fire

- Always be sure to wipe away any spilled fuel or oil.
- Spilled fuel and oil accumulates in the spill containment. Do not operate the equipment with fluid accumulated in the spill containment.
- Absolutely never use the equipment if there is a fuel, oil or coolant leak, and be sure to always repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire, open flames or sparks.
- Always locate a fire extinguisher near working space.

⚠ Caution: Burns

- The engine, muffler and similar parts and surrounding components are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Always be sure to stop the engine and leave the engine to cool down before performing any inspection/maintenance such as engine oil checking or fuel filter checking. Opening the oil level gauge or oil filler during operation will result in hot oil spurting out.

⚠ Caution: Electric Shock

- Do not splash water onto the equipment or operate it in the rain.
- Do not connect the AC output to any indoor wiring.

⚠ Caution: Damage to the equipment or other properties

- Do not use anything other than the specified optional device because they may cause malfunctions.

8-1. Checking Engine Oil

⚠ Caution: Fire

- Starting this product in an explosive atmosphere location may cause an explosion even with the weak sparks generated by the switch of the equipment. Do not take this equipment into an explosive atmosphere location.

⚠ Caution: Injuries to Eyes and Skin

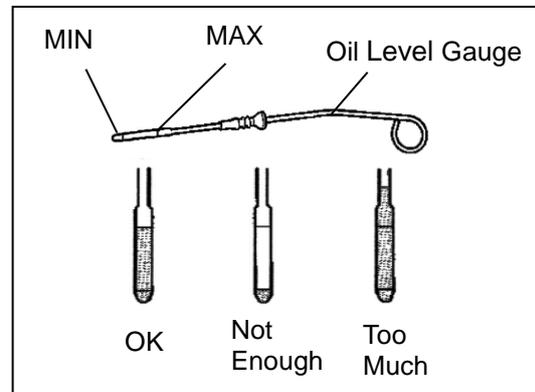
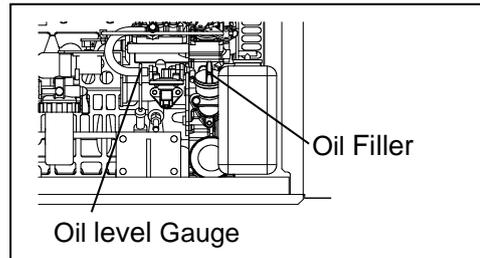
- Use protective gear, such as rubber gloves, when inspecting or replacing the Battery acid, Diesel fuel and/or Engine oil. Be sure that fluid does not contact eyes, or on skin or clothing.
- Battery acid, Diesel fuel and/or Engine oil can be very harmful. If contact to eyes, skin or clothing. If contact occurs, flush immediately with large amount of water and contact physician.

Situate the equipment on a level surface and completely insert the oil level gauge to inspect the oil level.

Inspect the oil level before starting operation and, if it has decreased, fill with oil until it reaches the maximum level.

<Note>

- The oil level cannot be accurately checked if the equipment is at an angle.
- Operating the equipment when the oil has been filled above the maximum level can result in engine cylinder internal damage.



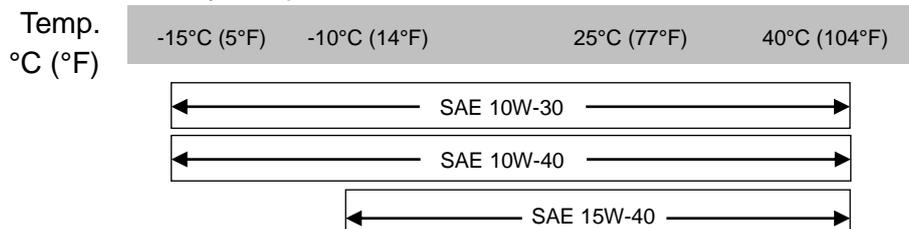
(1) Types of Engine Oil

Use only API service-type CF class or better.

(2) Engine Oil Viscosity Grades

Use a diesel engine oil with an appropriate viscosity corresponding to the ambient temperature (refer to the table).

○ Relation of Viscosity/Temperature



8-2. Checking Coolant

⚠ Caution: Burns

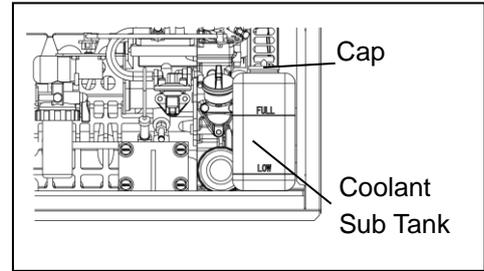
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot coolant and steam will spurt out.

Check that the sub tank coolant level is within the range of "FULL" and "LOW".

If the coolant level lower than "LOW", add water to both the sub tank and radiator.

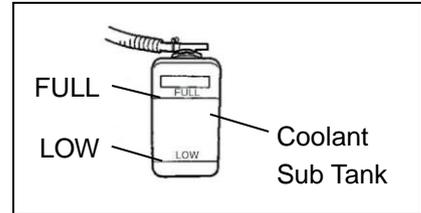
(1) Adding Water to the Coolant Sub Tank

- 1) Remove the sub tank cap.
- 2) Pour coolant into the sub tank until it reaches the "FULL" level.
- 3) Re-attach the cap.



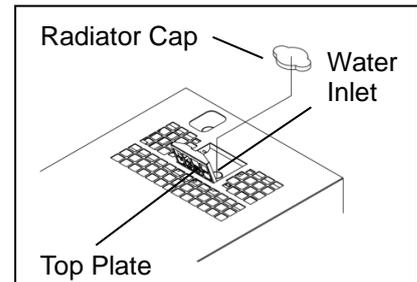
(2) Adding Water to the Radiator

- 1) Open the top plate.
- 2) Remove the radiator cap.
- 3) Pour coolant into the radiator through the inlet port until it reaches the mouth of the port.
- 4) Re-attach and tighten the radiator cap.
- 5) Close the top plate.



<Note>

- Use GM SPEC 6277M or equivalent.
- Always use potable water when mixing the coolant.
- Use LLC with the same mixture ratio in the coolant sub-tank.
- If adding LLC, be sure to use the same brand/type that is still in the generator.
- LLC is a toxic substance. Wear rubber gloves and other protective wear when handling.
- If someone mistakenly ingests LLC, induce vomiting immediately and seek medical care.
- If LLC gets on skin or clothing, wash with water immediately.
- LLC is flammable. Store in a location where flame is prohibited and it cannot be accessed by children.
- Engine coolant could leak if the radiator is not completely tightened or there is a gap in the seating face.
- Always be sure to securely tighten the radiator cap.
- Do not add engine coolant past the FULL level line of the coolant sub-tank.
- Do not mix different brands/types. Doing so could result in a chemical reaction and the creation of toxic substances.
- Use a long-life coolant (LLC) in order to prevent freezing and rust. (An LLC with a 30% mixing ratio is used when shipped from the factory.)
- Use an LLC mixing ratio in the range 30% to 45% in accordance with the outdoor air temperature.
- Change the LLC every 2,000 hours or every 2 years.



Mixing Ratio Guide

Min. Temp.	-15°C	-20°C	-30°C
Mixing Ratio	30%	35%	45%

8-3. Checking the Fuel

⚠ Warning: Fire

- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire, open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Absolutely never use the equipment if there is a fuel, oil or coolant leak, and be sure to always repair the leak before using.

⚠ Caution: Injuries to Eyes and Skin

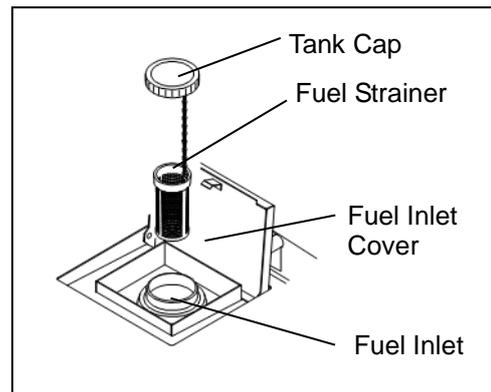
- Use protective gear, such as rubber gloves, when inspecting or replacing the Battery acid, Diesel fuel and/or Engine oil. Be sure that fluid does not contact eyes, or on skin or clothing.
- Battery acid, Diesel fuel and/or Engine oil can be very harmful If contact to eyes, skin or clothing. If contact occurs, flush immediately with large amount of water and contact physician.

Check that there is sufficient fuel and add fuel if insufficient.

After refueling, securely tighten the tank cap and close the fuel inlet cover.

<Note>

- Use Diesel fuel, EN Standard or ASTM standard (sulfur content < 15ppm). Engine is designed to operate on Ultra Low Sulfur Diesel Fuel only. Use of any other fuel may cause the engine not to operate in compliance with emissions requirements.
- The fuel supply 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.
- Carefully add fuel until tank is full.
- Always be sure to wipe away any spilled fuel.



8-4. Checking the Spill Containment

⚠ Warning: Fire

- Spilled fuel and oil accumulates in the spill containment. Do not operate the equipment with fluid accumulated in the spill containment.

Open the side door, check inside of the spill containment, and drain any fluid that has accumulated. (Refer to section "10. (7) Drain Fluid from the Spill Containment" .)

<Note>

- It is necessary to periodically drain the fluid from within the equipment because any rainwater that leaks into the equipment also accumulates in the spill containment.
- Although the fluids that can leak internally consist of oil, fuel and coolant, the spill containment does not have a function that can separate rainwater that has leaked into the equipment from these internally leaked fluids. Properly dispose of fluids drained from the spill containment in a manner according to the applicable laws and regulations.

8-5. Checking for Fuel/Oil/ Coolant Leak

⚠ Warning: Fire

- Absolutely never use the equipment if there is a fuel, oil or coolant leak, and be sure to always repair the leak before using.

Open the side door and check for fuel leakage from fuel line joints and similar components, and check for oil and coolant leakage. Open the fuel tap to perform inspection and close it after inspection has been completed.

8-6. Checking the Battery

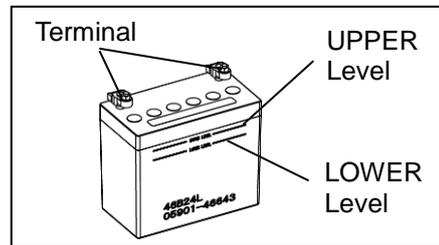
⚠ Warning: Explosion

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire, open flames and sparks near the equipment because the battery generates ignitable gas.

⚠ Caution: Injuries to Eyes and Skin

- Use protective gear, such as rubber gloves, when inspecting or replacing the Battery acid, Diesel fuel and/or Engine oil. Be sure that fluid does not contact eyes, or on skin or clothing.
- Battery acid, Diesel fuel and/or Engine oil can be very harmful If contact to eyes, skin or clothing. If contact occurs, flush immediately with large amount of water and contact physician.

- 1) Check the fluid level, and add distilled water until it reaches the upper level when the fluid level is near the lower level.
- 2) Check the terminals for looseness and tighten properly.

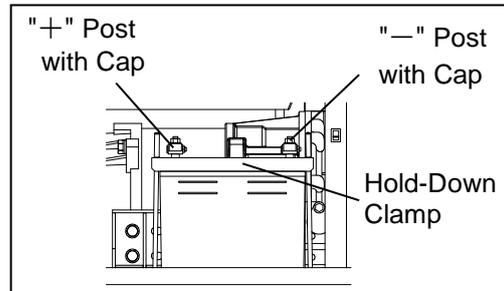


<Note>

- It is necessary to recharge the battery when the specific gravity of the battery fluid is 1.23 or less. Request the authorized distributor which the generator was purchased to recharge the battery.

■ Battery Replacement Procedures

- 1) Remove the battery negative (-) cable. (Always be sure to remove the negative (-) side first.)
- 2) Remove the battery hold-down clamp.
- 3) Remove the "+" (positive) cable.
- 4) Remove the battery.



**Reverse the procedure above for installing the battery.
(First, connect the positive (+) cable of the replaced battery.)

<Note>

- Use the specified battery. <46B24L> (Japanese Industrial Standard)

9. Operating Procedures

Warning: Injuries

- Do not operate the equipment with any doors or covers open, and always lock them. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.

Warning: Suffocation from Exhaust Fumes

- Do not operate the equipment in a poorly-ventilated area such as indoor, private home and/or similar location or within a tunnel because the engine exhaust fume includes components that are harmful to humans.

Warning: Fire

- Always locate a fire extinguisher near working space.
- Keep any ignitable items (such as fuel, gas and paint, etc.) or inflammable items away from the equipment because the muffler, exhaust fume and other parts attain high temperatures.
- Provide at least 1 meter (3 feet) of distance between the equipment and walls and other obstacles, and operate the equipment on a flat surface.

Warning: Electric Shock • Injuries

- Always be sure to turn off all circuit breakers before installing or removing devices using output receptacles or terminal.
- Always be sure to repair the corresponding earth leakage fault when earth leakage circuit breakers operate.
- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.

Warning: Electromagnetic Interference

- Persons using a heart pacemaker are not allowed near the generator without the permission of doctor. The generator generates a magnetic field while energized that can negatively affect pacemaker operation.

Caution: Burns

- The engine, muffler and similar parts and surrounding components are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.

Caution: Injuries

- Use this equipment with it situated on a stable level surface so that it is prevented from moving.
- Do not move the generator during operation.
- Always be sure to turn off the switches of all devices using the generator and turn off the generator circuit breakers before starting the engine.
- Always be sure to turn off the power switches of all devices using the generator when turning on the generator circuit breakers. Leaving on the power switch of a device using the generator when the generator circuit breakers are turned on could result in the sudden operation of the corresponding device.
- Do not leave on the power switch of a device using the generator and do not connect a device to an output receptacle or terminal.

Caution: Damage to the equipment or other properties

- Do not use anything other than the specified optional device because they may cause malfunctions.

⚠ Caution: Physical and Secondary Damage

- If using the equipment as a power source for medical equipment, you must check with the medical equipment manufacturer, doctor and hospital before using the equipment.

⚠ Caution: Fire

- Starting this product in an explosive atmosphere location may cause an explosion even with the weak sparks generated by the switch of the equipment. Do not take this equipment into an explosive atmosphere location.

⚠ Caution: Electric shock

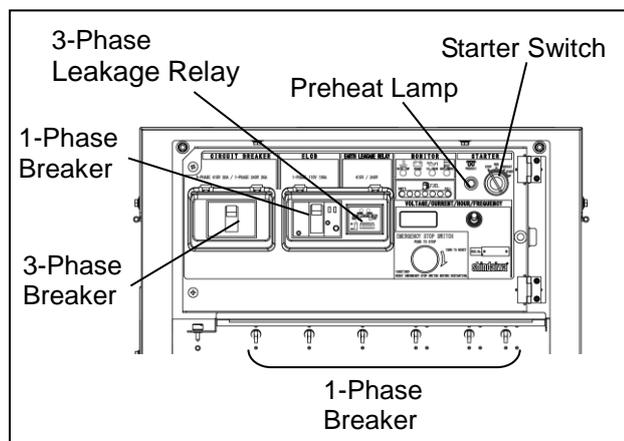
- Do not splash water onto the equipment or operate it in the rain.
- Do not connect the AC output to any indoor wiring.

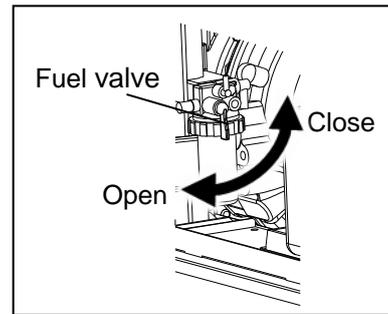
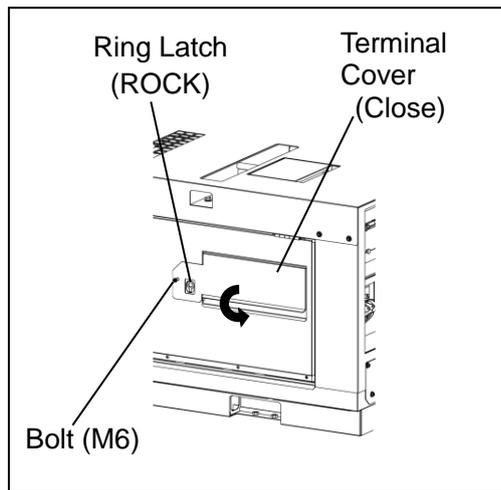
<Note>

- Check that the surrounding area is safe before starting the engine.
- When there are multiple workers who are working together, they must mutually signal each other before starting the engine.
- Do not use in an area with high temperature or humidity, or an area with a large amount of dust.
- Do not open any doors during operation. Operating with a door open can negatively affect cooling effect, resulting in an equipment malfunction.
- Use ear protection if the level of noise is high. Failure to do so could result in hearing damage.

9-1. Initial startup / Pre-check

- 1) Turn all connected equipment's switches to "OFF"
- 2) Turn all circuit breakers (3-P, 1-P and circuit protector) to "OFF".
- 3) Turn the fuel valve (on the fuel strainer) to "OPEN".
- 4) Check the emergency stop switch is released and terminal covers are closed by tighten bolt.
- 5) If the temperature is 5°C or less, turn the starter switch to the "PREHEAT" position and wait until the preheat lamp turns off. (Approx. 5 seconds)
- 6) Turn the starter switch to the "START" position to start the starter motor, which then starts the engine.
- 7) After the engine starts, remove your hand from the starter switch.
- 8) Allow the engine to warm up for approximately 5 minutes.
- 9) Turn the circuit breakers to "ON" to start power transmission.





<Note>

- Do not crank the starter motor for 15 seconds or more continuously.
- If repeating starter switch operation, wait 30 seconds or more between operations.
- After the engine starts, do not turn the starter switch to "START" during operation.
- During operation, the 3-phase output voltage of the power source is constantly displayed by the meter voltage display regardless of whether the circuit breaker is set to "ON" or "OFF".

■ Restarting after Stopping due to Running Out of Fuel

The equipment includes an automatic air-bleeding device. You can easily restart the engine according to the following procedures even if the engine stops due to running out of fuel.

- 1) Turn all circuit breakers (3-P, 1-P and circuit protector) to "OFF".
- 2) Turn the starter switch to the "STOP" position.
- 3) Add fuel to the fuel tank.
- 4) Turn the starter switch to the "START" position and crank the starter motor for approximately 10 seconds.
- 5) After the engine starts, remove your hand from the starter switch.
- 6) Wait for air to be completely bled from the fuel pipes and engine speed to stabilize (approx. 1-minute). (Engine speed is not stable until all air is bled from the fuel pipes.)

<Note>

- Do not apply any loads until all the air has been bled from the fuel pipes (until speed is stable). Doing so can cause a malfunction.

■ Recovery from Overcurrent Breaker Operation

⚠ Caution: Injuries

- Always be sure to turn off the power switches of all devices using the generator when turning on the generator circuit breakers. Leaving on the power switch of a device using the generator when the generator circuit breakers are turned on could result in the sudden operation of the corresponding device.

Circuit breakers operate when there is excessive current to isolate the corresponding circuit. Inspect the circuit breakers if a device being used stops during equipment operation. Follow the following procedures to recover operation when breakers operate due to overcurrent.

- 1) Turn off all switches of devices using the generator as an AC power source.
- 2) Push up the circuit breaker lever that has operated to the "ON" position.

9-2. Stopping the Engine

- 1) Turn all circuit breakers (main, 3-P and 1-P and circuit protector) to "OFF".
- 2) Allow the engine to cool down for approximately 5 minutes.
- 3) Set the starter switch to "STOP".
- 4) After the engine stops, turn the fuel valve to "CLOSE".

<Note>

- Do not stop the engine while using as an AC power source. Doing so can cause a malfunction.
- If the engine does not stop when the starter switch is set to "STOP", turn the fuel valve to "CLOSE". The engine will stop a few minutes afterwards. If the engine does not stop by starter switch operation, stop using the equipment and request repair at the retail outlet where the equipment was purchased.

9-3. Emergency Stop

The equipment includes an emergency stop device.

Press the emergency stop switch if you want to immediately stop the engine when an emergency occurs in the work area, the equipment suffers an operating fault, and similar circumstances.

<Note>

- After stopping the engine using the emergency stop device, turn the starter switch to "STOP".
- Do not strike the emergency stop switch with a hammer or similar tool.
- Only use the emergency stop switch for emergency stop purposes.
- If the engine does not stop when the emergency stop switch is pressed, turn the fuel valve to "CLOSE". The engine will stop a few minutes afterwards.

9-4. Protective Functions

Warning: Injuries

- Do not open the check door during operation. Be careful of pinching or catching of moving parts such as the cooling fan and fan belt.
- Always be sure to stop the engine and remove the starter key when performing inspection or maintenance.

Caution : Burns

- Do not touch the engine and surrounding components immediately after stopping the engine as they are still hot.
- Hot steam gushes out from the coolant sub-tank if the generator overheats. Do not touch the coolant sub-tank.

This generator is equipped with functions to automatically stop operation when there is a fault/malfunction during operation, and one to warn the operator of the fault location by use of indicator lamps. Check the fault location when the engine is automatically stopped or an indicator lamp lights up to stop the engine.

Protection Feature List

No.	Abnormality	Action	Breaker Trip	Engine Automatic Shutdown	Warning	Cause
1	Monitor Lamp	High Water Temperature	–	○	○※1	Activates due to high water temperature in the engine Default 115°C
2		Low Oil Pressure	–	○	○※1	Activate due to low oil pressure in the engine Default 98 kappa
3		Battery Charge Insufficient	–	○	○※1	Activates by insufficient charging system.
4		Spill Containment Fluid Level	–	–	○※1	Spill containment accumulated fluid has exceeded the specified level making it necessary to flush the fluid.
5		Engine Overspend	–	○	○※2	Engine speed is exceeded 4140 min-1 or more
6		Short Circuit	○	–	○※3	Activates in short circuit
7		Overload	○	–	–	Activates in overload
8		Terminal cover open	–	○	–	Activates when terminal cover is opened.

○ Indicates the automatic activation.

※1: Warning lamp is turned on (Refer to 5-4)

※2: Indicates 「E06」 on the multi meter. (Refer to 5-3)

※3: Leakage warning lamp is turned on, or the leakage indication button protrude. (Refer to 5-5)

10. Inspection/Maintenance

Warning: Electric Shock • Injuries

- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.
- Do not touch the equipment during operation if the equipment or your body is wet.
- Do not operate the equipment with any doors or covers open, and always lock them. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.
- Do not modify the equipment and do not operate with parts removed.

Warning: Fire

- Always locate a fire extinguisher near working space.
- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire, open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.
- Spilled fuel and oil accumulates in the spill containment. Do not operate the equipment with fluid accumulated in the spill containment.
- Absolutely never use the equipment if there is a fuel, oil or coolant leak, and be sure to always repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire, open flames or sparks.

Warning: Explosion

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire or other open flame near the equipment because the battery generates ignitable gas.

Caution: Burns

- The engine, muffler and similar parts and surrounding components are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot coolant and steam will spurt out.
- Always be sure to stop the engine and leave the engine to cool down before performing any inspection/maintenance such as engine oil checking or fuel filter checking. Opening the oil level gauge or oil filler during operation will result in hot oil spurting out.

Caution: Injuries to Eyes and Skin

- Use protective gear, such as rubber gloves, when inspecting or replacing the Battery acid, Diesel fuel and/or Engine oil. Be sure that fluid does not contact eyes, or on skin or clothing.
- Battery acid, Diesel fuel and/or Engine oil can be very harmful. If contact to eyes, skin or clothing. If contact occurs, flush immediately with large amount of water and contact physician.

<Note>

- Procedures except for pre-operation inspection must be performed by specialized technicians.

- Request the authorized distributor which the generator was purchased to perform the procedures in the table with a “●”.
- Always be sure to use genuine parts when replacing parts.
- When removing waste fluid from the equipment, place a container to collect the fluid and prevent it from spilling on the ground. Dispose of such oil, fuel, coolant (LLC), filters, batteries and other harmful substances as industrial waste in accordance with applicable laws and regulations. Consult with the retail outlet where the equipment was purchased if you have any inquiries regarding proper disposal.
- When performing maintenance with doors or covers open, be sure that no other persons can accidentally come close to the equipment. Close all doors and covers if momentarily leaving the equipment unattended.
- Be sure to request the authorized distributor which the generator was purchased to perform the removal of a door or panel fixed by bolts when it is necessary to do so except the side door.
- Please be careful about a strong wind and the opening and shutting of the door. When a door is opened or closed suddenly, a finger might be sandwiched.

Perform periodic inspection and maintenance as indicated by the table below in order to ensure that this equipment can be operated in optimal condition.
Use the hour meter as a general indicator for the operating time.

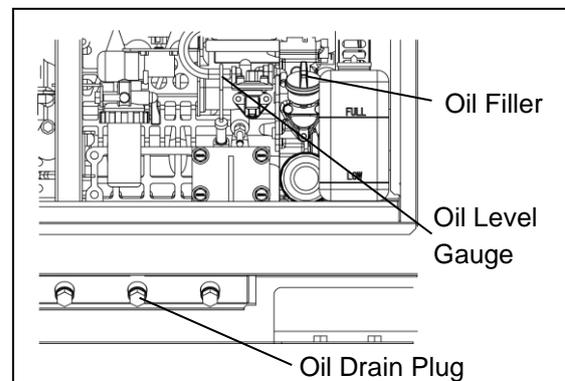
Description		Daily	Every 100 hours	Every 200 hours	Every 400 hours	Every 500 hours	Every 800 hours	Every 1,000 hours	Every 1500 hours	Every 2,000 hours	Every 3,000 hours	Remarks
1	Inspect/Add Fuel	○										
2	Inspect/Add Engine Oil	○										
3	Change Engine Oil		1st time at 50hrs ○									
4	Change Oil Filter			1st time at 50hrs ○								
5	Inspect/Add coolant	○										
6	Change Coolant									Or 2years ○		
7	Clean Fuel Strainer		1st time at 50hrs ○									
8	Replace Fuel Element				○							
9	Drain Water from/Clean Fuel Tank			○								
10	Inspect for Fuel/Oil/coolant Leakage	○										
11	Inspect/Add Battery Fluid	○										
12	Clean Air Element		○									
13	Replace Air Element	once in 6 times cleaning or 1 year										
14	Drain Liquid from Spill Containment	○										

Description	Daily	Every 100 hours	Every 200 hours	Every 400 hours	Every 500 hours	Every 800 hours	Every 1,000 hours	Every 1500 hours	Every 2,000 hours	Every 3,000 hours	Remarks
15 Adjust V-belt Tension		1st time at 50hrs ●									
16 Replace V-belt					Or 2years ●						
17 Clean Radiator Fin (External)					●						
18 Clean Radiator (Internal)					●						
19 Replace Fuel/Coolant/Oil Hoses and Anti-Vibration Rubber											Every 2years ●
20 Check of valve clearance						●					
21 Check of fuel injection nozzle injection pressure								●			
22 Check of injection pump										●	
23 Clean/Inspect Spill Containment				Or 1years ●							

(1) Engine Oil Replacement

1st time	50 hours
2nd time and after	Every 100 hours

- 1) Set a container to catch spilled engine oil.
- 2) Remove the oil filler.
- 3) Remove the oil drain plug and drain the engine oil.
- 4) After the oil has been drained, close and tighten the oil drain plug.
- 5) Add oil through the oil filler until it is at the maximum level on the oil level gauge. (Fill with approx. 3.6 L.)
- 6) Attach the oil filler cap.



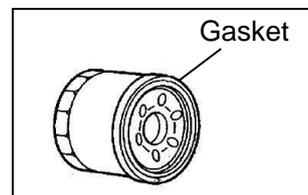
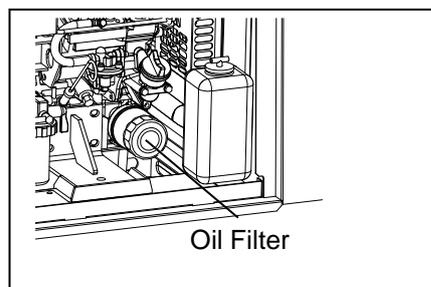
<Note>

- Refer to section "8-1. Checking Engine Oil" for the types and amounts of engine oil.
- Replace the packing of the oil drain plug with a new part each time the oil is changed.
- Packing part no.: 6C090-58961 (Kubota part no.)
- After tightening the oil drain plug, operate the engine for a short period and check that there is no oil leakage. Stop the engine when completed.
- Always be sure to wipe away any spilled engine oil.

(2) Replacing the Oil Filter

1st time	50 hours
2nd time and after	Every 200 hours

- 1) Drain the engine oil according to the procedures of " (1) Engine Oil Replacement".
- 2) Remove the oil filter using a filter wrench.
- 3) Apply a thin layer of oil to the gasket of a new oil filter.
- 4) Screw in the oil filter by hand and securely tighten by hand (do not use a filter wrench) after the gasket contacts the seal surface.
- 5) Add engine oil.
- 6) Shortly after starting the engine, always be sure to check that there is no oil leakage from the seal surface.



<Note>

- Request the authorized distributor where the generator was purchased to perform this procedure if you do not have a filter wrench.
- Oil filter part no.: 1J090-32431 (Kubota part no.)
- After adding engine oil, operate the engine for a short period and check that there is no oil leakage. Stop the engine when completed.

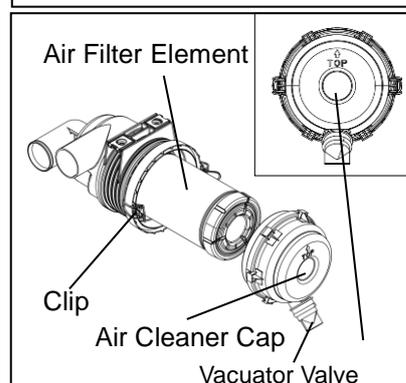
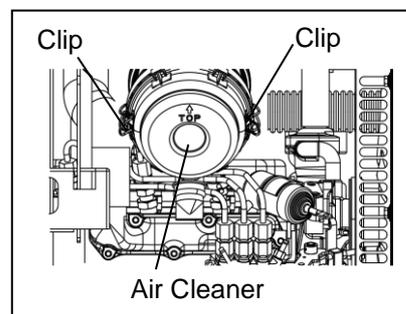
(3) Air Filter Element Cleaning/Replacement

Cleaning	Every 100 hours
Replacement	Once in 6 times cleaning or 1 year

- 1) Remove the air cleaner clips and cleaner cap.
- 2) Remove the element.
- 3) Clean or replace the element. Reverse the procedure above for re-assembly.

<Note>

- Replace the elements earlier if using in an excessively dusty location.
- Element part no.: 1G319-11211 (Kubota part no.)
- Make sure "↑TOP" marks is at the top when assembling the air cleaner cap.
- Do not add oil as this generator uses a dry element.
- Clear foreign material by pinching the vacuator valve once a week in normal operating conditions or daily if operating in a location that is excessively dirty or dusty. Wipe away any dirt or moisture that has adhered to the parts.
- Never touch the elements for any reason except cleaning.



■ Cleaning the air filter element

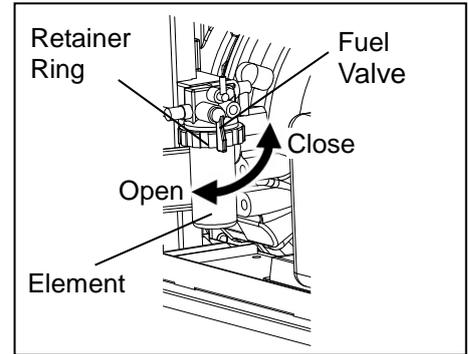
If dry dust is adhering: Blow compressed air from inside the element.

If carbon or oil is adhering : Replace with new parts.

(4) Fuel Strainer Cleaning/Replacement

Cleaning	1st time: 50 hours 2nd time and after: Every 100 hours
Replacement	Every 400 hours

- 1) Place a container under Fuel Filter to catch fuel spilling out of the filter.
- 2) Turn the fuel valve to "CLOSE".
- 3) Turn the retainer ring counter clockwise and remove the cup and element.
- 4) Remove any water or foreign material from the cup and clean the element using compressed air. (Or replace the element.)
- 5) Install in the reverse order of removal.



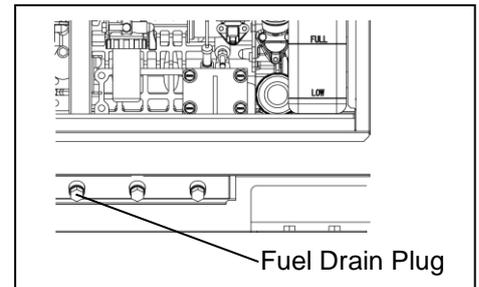
<Note>

- Check that no foreign material is adhering to the packing then install the cup.
- After installation, turn the fuel valve to "OPEN" and check that there is no fuel leakage. After checking, turn the fuel valve to "CLOSE".
- Element part no.: 16271-43561 (Kubota part no.)
- Always be sure to wipe away any spilled fuel.
- If water gathers in the cup, drain water from the fuel tank. (Refer to section "10, Inspection/Maintenance (5) Draining Water from the Fuel Tank")

(5) Draining Water from the Fuel Tank

Draining Water	Every 200 hours
----------------	-----------------

- 1) Set a container to catch spilled water.
- 2) Remove the fuel drain plug and packing.
- 3) Drain the water and tighten the fuel drain plug.



<Note>

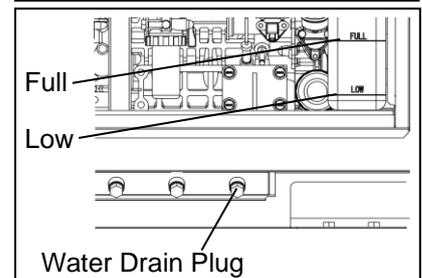
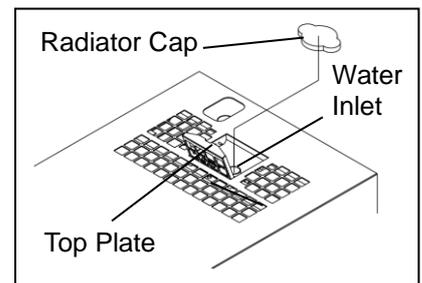
- Replace the packing with a new part each time you drain the water.
- Packing part no.: 6C090-58961 (Kubota part no.)
- Always be sure to check that there is no fuel leakage after tightening the fuel drain plug.

(6) Coolant Replacement

Change	Every 2,000 hours or 2 years
--------	------------------------------

Coolant Total Capacity: Approximately 4 L
(Including the sub tank capacity of approx. 0.6 L)

- 1) Set a container to catch spilled coolant.
- 2) Open the top plate.
- 3) Remove the radiator cap.
- 4) Remove the water drain plug and packing.
- 5) After the coolant has been drained, reinsert the coolant drain plug with new packing.
- 6) Remove the sub-tank and empty the coolant from the sub tank.
- 7) Reattach the sub-tank to its original position and fill with coolant until it reaches the FULL level.
- 8) Fill the radiator with coolant until it reaches the filler neck.
- 9) Re-attach and tighten the radiator cap.
- 10) Close the top plate.



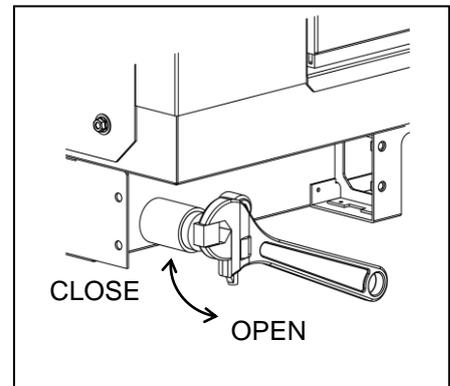
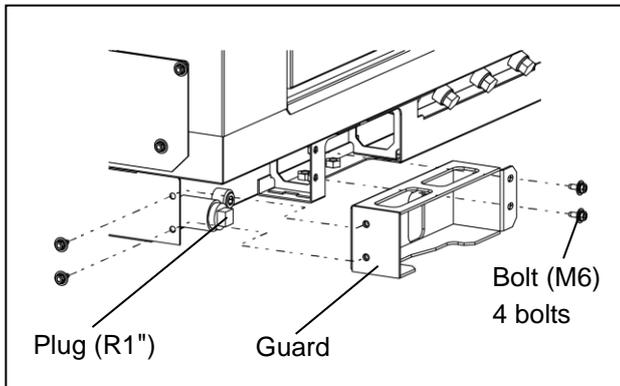
<Note>

- Replace the packing with a new part each time you change the coolant.
- Packing part no.: 6C090-58961 (Kubota part no.)
- Operate the engine for a short period and check that there is no coolant leakage. Stop the engine when completed.
- Refer to section "8-2. Checking Coolant" for coolant information.

(7) Drain Fluid from the Spill Containment

Drain	Pre-operation
-------	---------------

- 1) Set a large pans or bucket under the drain port of the spill containment to catch the fluid.
- 2) Remove the guard by loosening bolts.
- 3) Remove the plug (R 1") of the spill containment drain valve by turning the plug counter clock wise.
- 4) Tighten the (R 1") plug with thread seal tape to 19.6N-m. (By adjustable wrench)
- 5) Reinstall the guard.



<Note>

- It is possible that there is a fuel or oil leak if the drained fluid contains oily components. If this occurs, check for leakage locations.
- Although the fluids that can leak internally consist of oil, fuel, coolant and battery fluid, the spill containment does not have a function that can separate rainwater that has leaked into the equipment from these internally leaked fluids. Properly dispose of fluids drained from the spill containment in a manner according to the applicable laws and regulations.

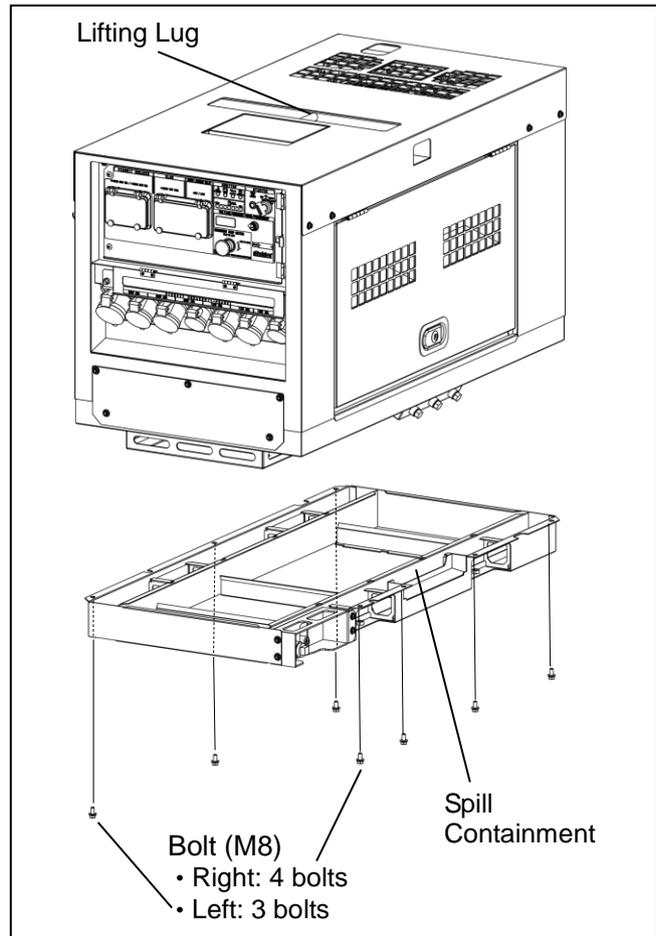
(8) Spill Containment Cleaning/Inspection

Clean / Inspect	Every 400 hours or 1 year
-----------------	---------------------------

⚠ Caution: Injuries

- Always be sure to use the top-mounted lifting lug when lifting up the generator, and raise it slowly at a completely vertical angle.
- Wear a helmet, safety shoes, gloves and similar protective gear when performing lifting work. Do not stand or get under the equipment while it is suspended.
- For spill containment cleaning/inspection, set this equipment with it situated on a stable level surface so that it is prevented from moving.

- 1) Drain the spill from the containment.
- 2) Remove the seven installation bolts (M8) of the spill containment.
- 3) Lift up the equipment body to separate the spill containment and set the equipment on a level surface.
- 4) Clean the inside of the spill containment using a high-pressure washer or similar equipment.
- 5) Drain the cleaning fluid from the spill containment.
- 6) Remove any rust that has formed in the spill containment and paint it again.
- 7) Pour water into the spill containment and check that there is no leakage. (After checking, drain the water you have used.)
- 8) Install the spill containment to the equipment in the reverse order of removal.



<Note>

- Do not operate the equipment with the spill containment separated.
- If fluid drained from the spill containment during cleaning contains oily components, dispose of it in a manner according to the applicable laws and regulations.
- If the spill containment has a leak, request repair at the retail outlet where the equipment was purchased.

11. Long-Term Storage

⚠ Warning: Electric Shock/Injuries

- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.
- Do not operate the equipment with any doors or covers open, and always lock them. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.
- Do not modify the equipment and do not operate with parts removed.

⚠ Warning: Fire

- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire, open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.
- Spilled fuel and oil accumulates in the spill containment. Do not operate the equipment with fluids accumulated in the spill containment.

⚠ Caution: Burns

- The engine, muffler and similar parts and surrounding components are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot coolant and steam will spurt out.
- Always be sure to stop the engine and leave the engine to cool down before performing any inspection/maintenance such as engine oil checking or fuel filter checking. Opening the oil level gauge or oil filler during operation will result in hot oil spurting out.

Perform the following maintenance procedures if not using the equipment for two months or more.

- 1) Remove the battery. (Refer to section "8-6. Checking the Battery".)
- 2) Change the engine oil. (Refer to section "10. (1) Engine Oil Replacement".)
- 3) Drain the fuel from the fuel tank and strainer.
(Refer to section "10. (4) Fuel Strainer Cleaning/Replacement " .)
- 4) Clean and inspect the spill containment.
(Refer to section "10. (8) Spill Containment Cleaning/Inspection" .)
- 5) Remove the starter key and store in a secure location.
- 6) Clean all parts and store the equipment in an area with low humidity and little dust with a cover or similar protection covering it.

<Note>

- Recharge a removed battery approximately once every month.

12. Troubleshooting

⚠ Warning: Electric Shock/Injuries

- Do not touch the equipment during operation if the equipment or your body is wet.
- Always be sure to stop the engine and remove the starter key before performing any equipment check or maintenance. The person performing the maintenance must always keep the key.
- Do not operate the equipment with any doors or covers open, and always lock them. There is a danger of hair, body parts and other items being caught up in moving parts such as cooling fans and belts.

⚠ Warning: Fire

- Always locate a fire extinguisher near working space.
- Always be sure to stop the engine when inspecting fuel or refueling, and absolutely never perform such tasks near fire, open flames or sparks. Wait until the engine has completely cooled before inspecting fuel or refueling.
- Always be sure to wipe away any spilled fuel or oil.
- Spilled fuel and oil accumulates in the spill containment. Do not operate the equipment with fluid accumulated in the spill containment.
- Absolutely never use the equipment if there is a fuel, oil or coolant leak, and be sure to always repair the leak before using.
- Absolutely never inspect or perform maintenance to the equipment near fire, open flames or sparks.

⚠ Caution: Injuries to Eyes and Skin

- Use protective gear, such as rubber gloves, when inspecting or replacing the Battery acid, Diesel fuel and/or Engine oil. Be sure that fluid does not contact eyes, or on skin or clothing.
- Battery acid, Diesel fuel and/or Engine oil can be very harmful If contact to eyes, skin or clothing. If contact occurs, flush immediately with large amount of water and contact physician.

⚠ Caution: Explosion

- Do not operate the equipment or recharge the battery when the battery fluid level is below the lower level.
- Do not generate any sparks near the battery and do not allow any fire or other open flames near the equipment because the battery generates ignitable gas.

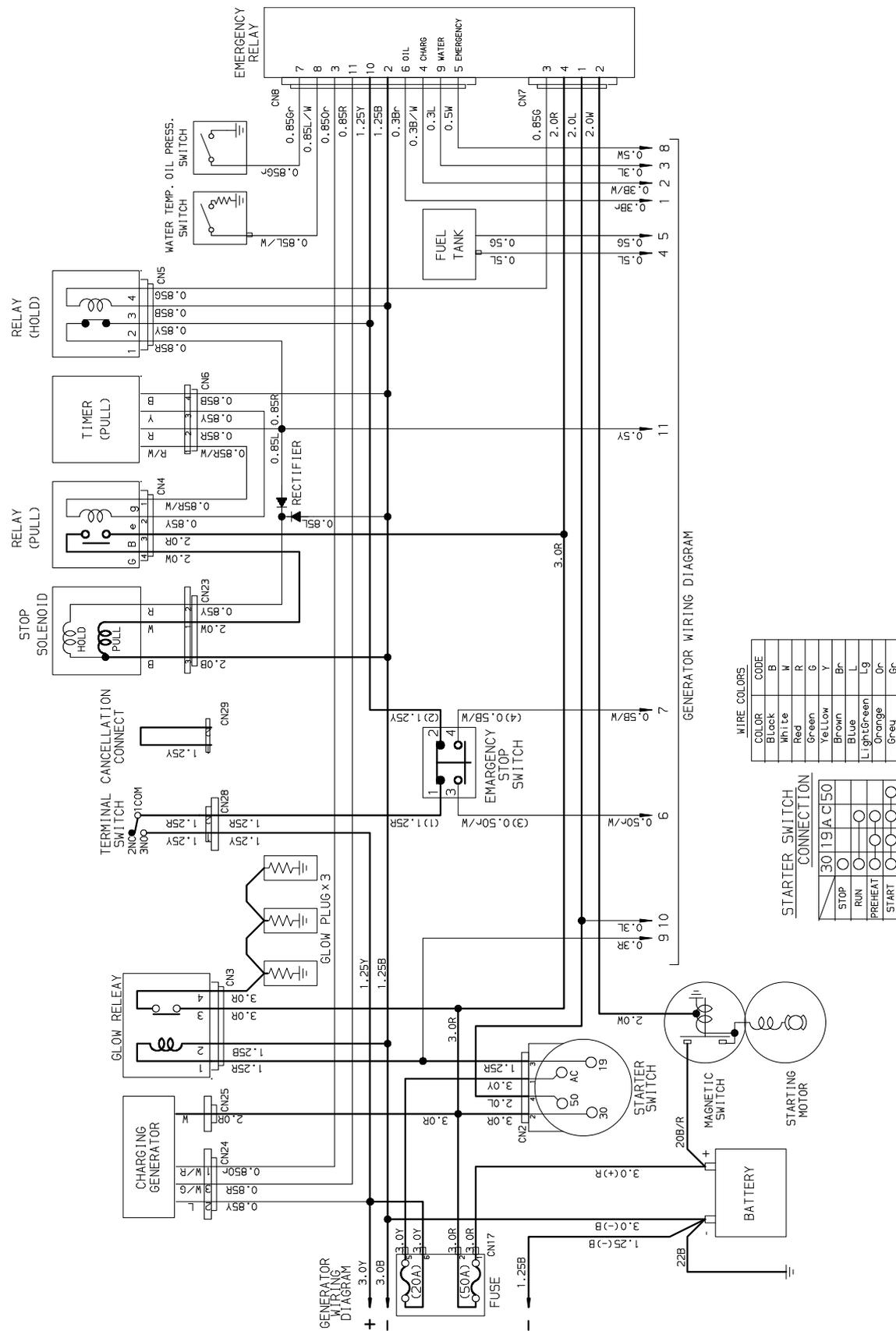
⚠ Caution: Burns

- The engine, muffler and similar parts and around them are extremely hot during operation and immediately after stopping the equipment. Never touch hot parts.
- Never open the radiator cap during operation or immediately after stopping the equipment. Hot coolant and steam will spurt out.
- Always be sure to stop the engine and leave the engine to cool down before performing any inspection/maintenance such as engine oil checking or fuel filter checking. Opening the oil level gauge or oil filler during operation will result in hot oil spurting out.

Refer to the table below to perform inspection when the equipment is operating poorly. If you cannot resolve a problem after inspecting the equipment, request repair at the retail outlet where the equipment was purchased.

Symptom	Possible Causes	Remedy
Starter motor does not start.	1. Battery has a low charge. 2. Battery is deteriorated.	1. Recharge the battery. 2. Replace the battery.
Engine does not start.	1. Fuel valve is "CLOSE". 2. No fuel 3. Emergency stop SW is "ON". 4. Terminal covers are opened. 5. Water or foreign material is mixed in with the fuel. 6. Blown fuse	1. Turn the fuel valve to "OPEN". 2. Add fuel. 3. Release Emergency stop SW. 4. Close the Terminal covers. 5. Drain water from and clean the fuel tank and fuel strainer. 6. Replace the fuse.
Engine starts but quickly stops.	1. Insufficient oil 2. Overheating of water temperature 3. Battery recharging fault	1. Add oil. 2. Comply with rated outputs/Add coolant. 3. Repair.
Black or white smoke is continuously exhausted from the muffler.	1. Overloaded	1. Comply with the rated output.
Engine does not stop.	1. Stop solenoid fault	1. Turn the fuel valve to "CLOSE" to stop the engine and repair.
No AC power output	1. Breaker is "OFF".	1. Turn the breaker to "ON".
AC power output is weak.	1. The current of devices using the equipment exceed the rated current.	1. Refer to "Usable Device Capacities".

13. Engine Wiring Diagram



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