

ISO 9001

CERTIFIED

shindaiwa

OWNER'S MANUAL

GENERATOR / WELDER

DGW310DMC

DGW310MC

Sound Proof

Vertical, Water-Cooled

4-Cycle Diesel Engine



Caution

Do not operate the generator/
welder, or any other appliance,
before you have read and
understand the instructions for use
and keep near for readily use

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Shindaiwa Corporation

Introduction

Thank you for purchasing Shindaiwa Sound Proof Diesel Engine Generator.

- This user manual was prepared 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 attach this manual, if the equipment will be sub-leased.
- Please store this manual near the equipment for easy reference.
- Following conversion will be used throughout the manual to indicate the degree of cautions.



Danger: Can cause serious injuries or death



Caution: Can cause minor injuries or damage to the equipment or other properties.

<Caution>: Other types of caution

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

1. Safety Guidelines



Danger: Suffocation from exhaust fume

- Exhaust fume from the engine contains many elements harmful to human. Do not operate this equipment in poorly ventilated areas, such as inside a room or in a tunnel.



Danger: Electric Shock

- Do not touch the output terminals during operation
- Do not insert metal objects (such as pin or wire) into receptacle
- Do not touch wires or electric parts inside the equipment during operation.
- Before connecting or disconnecting a load cable from output terminals, always turn the circuit breaker to OFF position.
- Before connecting or disconnecting a load cable from output terminals, always turn the circuit breaker to OFF position.
- Before connection or disconnection a welding cable from DC output terminal, stop the engine and remove the engine key.
- Before performing any equipment check or maintenance, stop the engine and remove the engine key. A maintenance person should always keep the key.



Danger: Burns

- Do not open the radiator cap while operating this equipment or immediately after stopping the equipment, to avoid sustaining burns from hot vapor.



Danger: Injuries

- Close all doors and place locks during operating this equipment, to avoid injuries by unintentional touching a cooling fan and fan belt.



Caution: Suffocation from exhaust fume

- Do not point the exhaust fume toward pedestrians or building.



Caution: Suffocation from exhaust fume

- Be sure to wear a fume proof mask in operation, because welding fume contains poisonous gas and dust. Pay attention to the airflow direction and ventilation also in order to prevent from inhaling the fume.

 **Caution: Injuries to eye and skin**

- Be sure to wear spark protection glass (es), long-sleeve shirts, gloves, etc. in order to protect eyes and skin from harmful spark in welding.
- Battery fluid contains diluted sulfuric acid. Avoid contact with eyes skin or on clothing.
If the acid comes in contact, especially with eyes, flush water with a lot of water and contact a physician immediately.

 **Caution: Electric Shock**

- Do not flush water onto the equipment nor operate it in the rain.

 **Caution: Explosion**

- Do not use the equipment or charge the battery, in the case the battery fluid level is lower than the LOWER level.
- Battery may emit some combustible gas, so keep it away from fire and sparks.

 **Caution: Fire**

- The equipment run on Diesel Oil. When refueling, always stop the engine and keep away from fire. Moreover, always wait until the engine cools down before refueling.
- Always wire any drip of Diesel fuel or lubrication oil. Do not use this equipment when any leak is found. Repair it before use.
- Temperature around muffler and exhaust can get extremely high. Keep any inflammable items (such as fuel, gas, paint, etc.) away from the equipment.
- Always operate this equipment on flat surface, at least 1 meter away from any objects (wall, box, etc.)
- Always operate this equipment on flat surface and at least 1 meter away from any objects (wall, box, etc.)
- Do not connect AC output to any indoor wiring.
- Always wait until the equipment cools down, before placing any covering material for storage.



Caution: Burns

- Do not touch the engine and muffler during operation and immediately after stopping the equipment, for the temperature can reach extremely high.
- When checking engine oil or changing oil, always stop the engine, and wait until the engine cools down. If you open either the oil gauge or the oil plug during operation, hot oil may cause some injuries.
- Be sure to wear leather gloves, apron, shoe covers, eye protection glass (es) (mask), safety shoes, and safety cap and long sleeve shirts, because welding splashes spatters.



Caution: Injuries

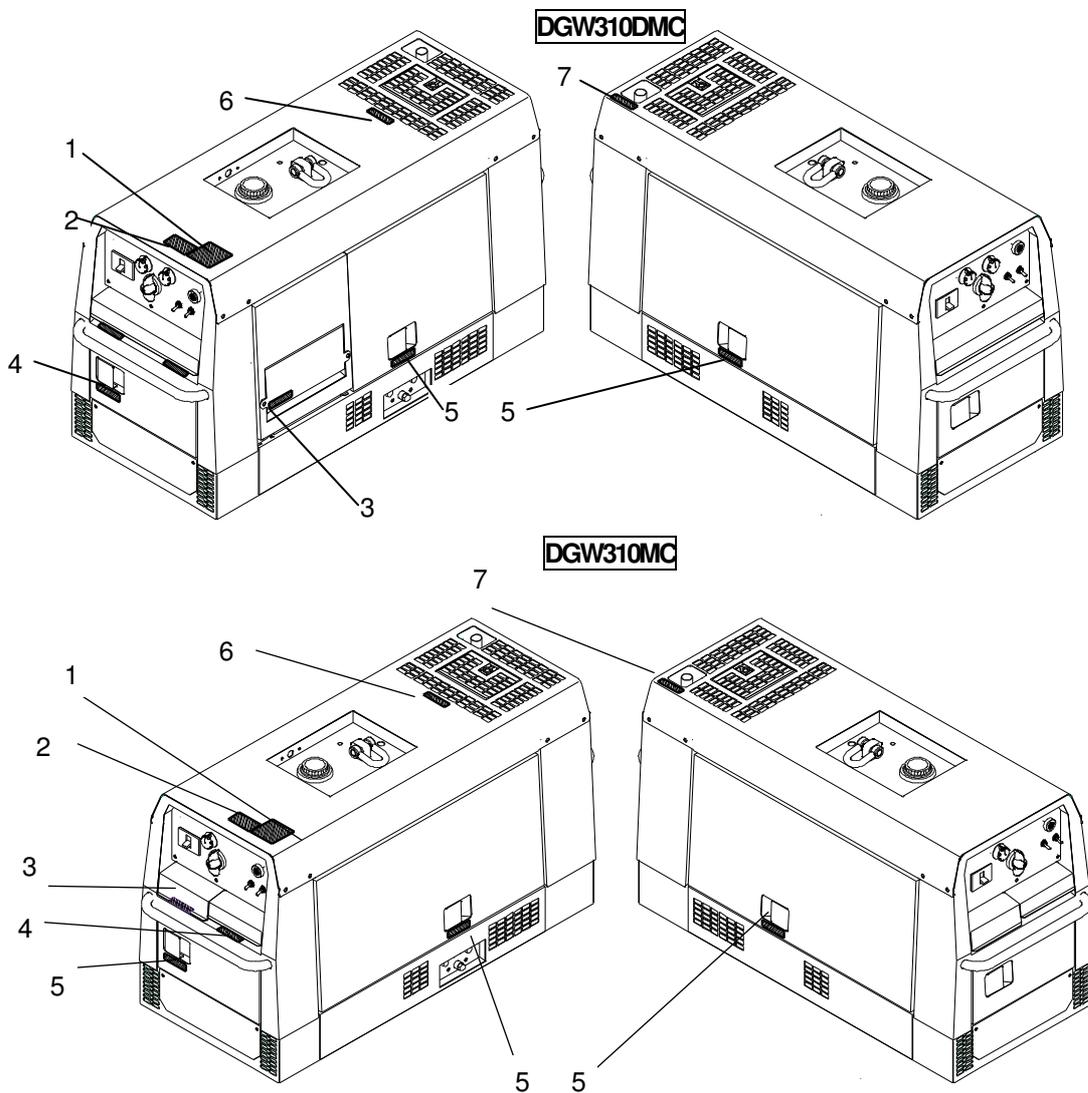
- When lifting the equipment, always use a lift hook. Do not lift the handle, for it may cause the equipment to drop due to handle breaking off.
- When carrying the equipment by truck, fix it strongly to keep the equipment from sliding as roping two points of handle.
- Always place the equipment on a flat and stable surface, to keep it from sliding. Be sure to lock the wheels for with wheel type.
- When starting the engine, turn off the connected equipment
- And set the circuit breaker to 『OFF』 position.
- Do not move the equipment during operation.
- When performing equipment check and maintenance, always stop the engine.
- Do not operate the equipment if the equipment are modified or parts are removed

■Location of warning labels

When any warning label becomes unreadable or damaged, place a new label on the appropriate location.

When ordering a new label, use the following part number.

- | | |
|----------------------------------|------------------|
| 1. Suffocation from exhaust fume | (No.19402-00106) |
| 2. Suffocation from welding fume | (No.19402-00107) |
| 3. Electric Shock | (No.19402-00102) |
| 4. Electric Shock | (No.19402-00103) |
| 5. Injuries | (No.19402-00109) |
| 6. Burns | (No.19402-00108) |
| 7. Burns | (No.19402-00112) |



2. Specifications

Model		DGW310DMC		DGW310MC		
Generating Method		Rotating Field				
Welding generator	Rated Current (A)	260/280				
	Rated Load Voltage (V)	30.4/31.2				
	Rated Duty Cycle (%)	100				
	Rated Speed (min ⁻¹)	3000/3600				
	No Load Voltage (V)	MAX 85				
	Output change	Adjustable Range (A)	Eco	30~160	Eco	30~160
				Welding Rod (φ)		2.0~4.0
		Adjustable Range (A)	Single	70~280/85~310	Normal	35~280/45~310
				Welding Rod (φ)		2.6~6.0
		Adjustable Range (A)	Dual	35~150/45~160		
Welding Rod (φ)				2.0~4.0		
AC Generator	Rated Frequency (Hz)	50/60				
	Rated Speed (min ⁻¹)	3000/3600				
	Phase	1-Phase		3-Phase		
	Rated Voltage (V)	100/110	200/220	200/220		
	Power Factor	1.0		0.8		
	Rated Output (kVA)	6 Receptacle 1.5kVA×2 and output terminal	8 (Output Total)	9.9		
	Rate	Continuous				
	Model	Kubota D722				
Method	Vertical In-lined Water Cooled 3 Cylinders Diesel Engine					
Displacement (L)	0.719					
Rated Output (kW{PS}/ min ⁻¹)	11.7{15.9}/3000 14.0{19.0}/3600					
Fuel	Diesel Fuel No.JIS2					
Lubricant	API Class CD or better					
Lubricant Volume (L)	3.8(effective1.4)					
Coolant Volume (L)	3.0(including sub tank 0.6)					
Starting Method	Starter Motor					
Battery		46B24L				
Fuel Tank Capacity (L)		37				
Dimension	Length (mm)	1410 (1280 Canopy Length)				
	Width (mm)	566				
	Height (mm)	760 (870 with wheel)				
Dry Weight (kg)	338 (348 w/wheel)		333 (343 w/wheel)			
Full Weight (kg)	382 (392 w/wheel)		377 (387 w/wheel)			

3. Use

- Arc Welding
- Electric Tools and Home Appliances
- Power Supply to lights

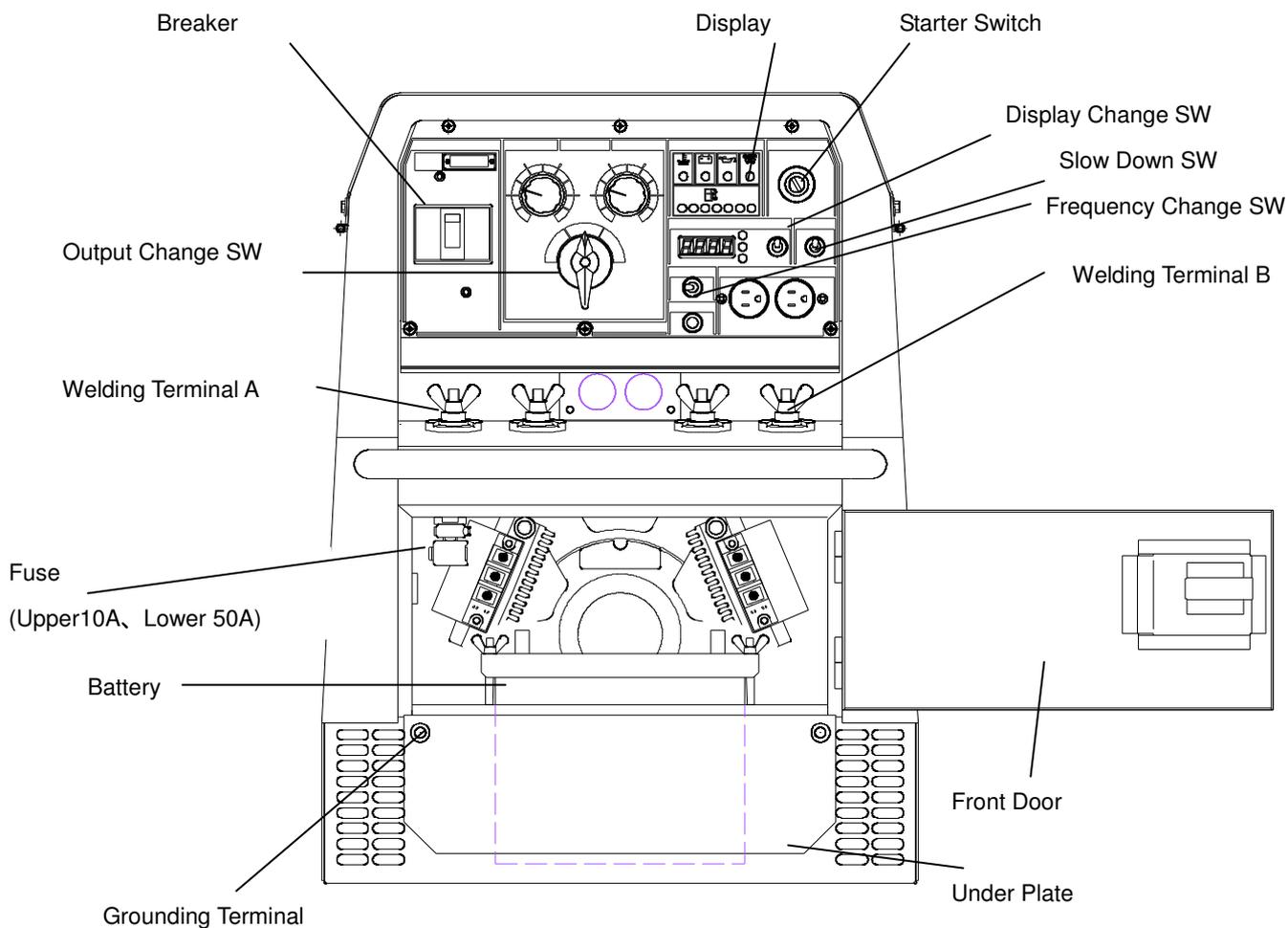


Caution : Damage to the property and secondary damage

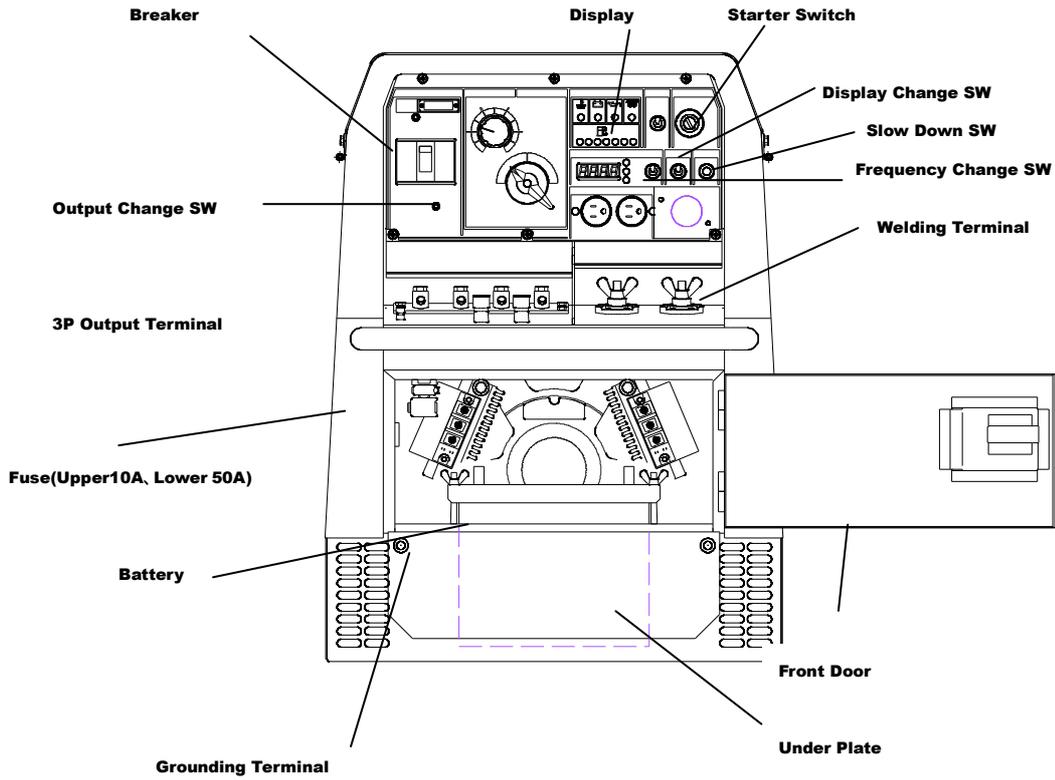
- Do not use other than the above purposes
- Never use it without consulting with medical equipment manufacturer, doctor, hospital and obtaining confirmation in Hospital.

4. Parts

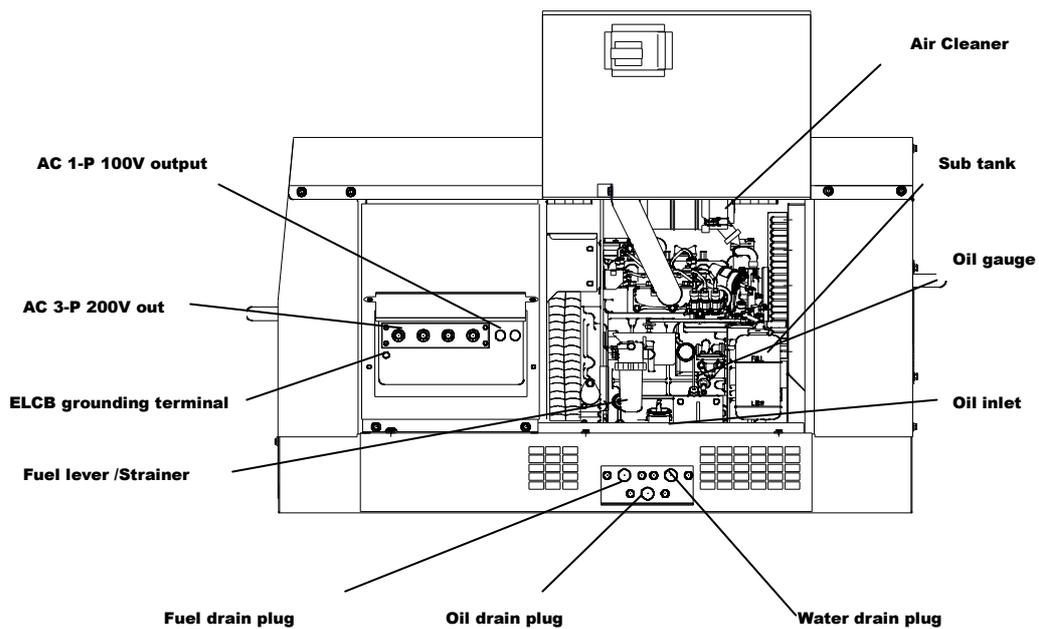
DGW310DMC



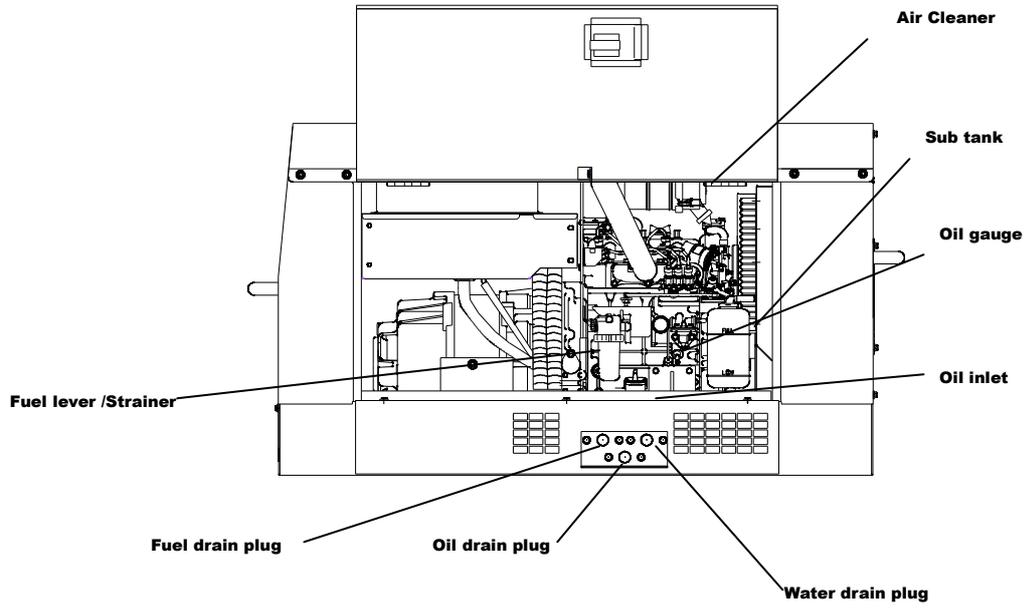
DGW310MC



DGW310DMC

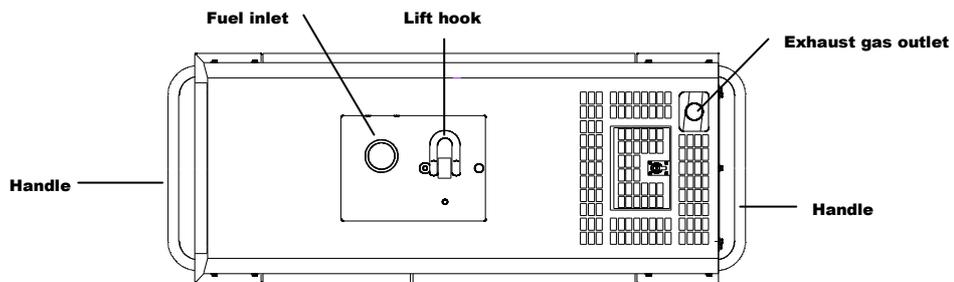
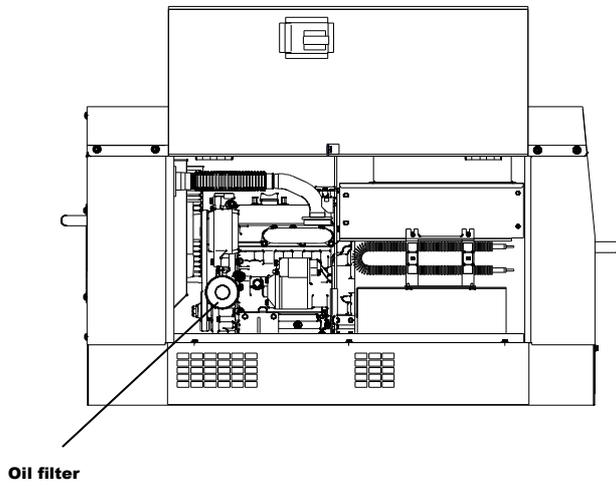


DGW310MC



DGW310MC

DGW310DMC



5. Incorporated

5-1. Eco Welding

The equipment is incorporated in Eco Welding Feature that is aiming at performing

The low noise, the lower fuel consumption and the low gas emission than those of conventional models.

When you turn the selector switch to Eco, you will be able to weld with Max 4.0mmφ rod at the slow down speed.

<Caution>

- When welding is performed, do not turn the output selector switch which causes the burnout of the switch
- Eco is designed for welding only. The breaker activates to TRIP, in case it is used for AC Output

5-2. Display

The equipment is incorporated in Digital Display. It displays 『Voltage』 , 『Hour』 , 『Speed』 successively, by changing the display selector switch.

<Caution>

- During operation, voltage meter always displays the voltage in 200/220V, 3-Phase both at the breaker position 『ON』 and 『OFF』 .

5-3. Frequency Selection

Selector either 50 or 60Hz by the selector switch on the front panel, in accordance with the load frequency.

5-4. Monitor Lamp

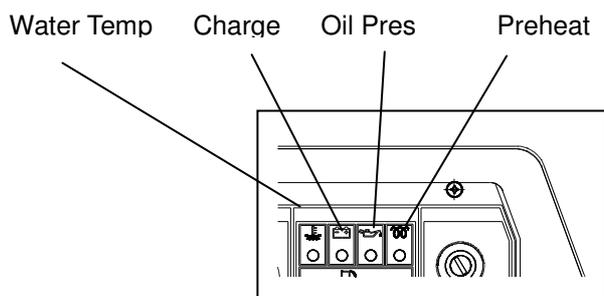
The equipment incorporates monitor lamps as 『Water Temperature』 , 『Battery Charging』 and 『Oil Pressure』 .

Under normal condition, when the starter switch is turned from 『STOP』to 『REN』, the lamps of, 『BATTERY CHARGING』 and 『OIL Pressure』 turned To ON and all the lamps turn to OFF after the Engine starts.

When abnormality happens in running, monitor lamps flicker

And the engine stops automatically.

In the case the automatic shutdown is engaged, turn the starter switch to STOP once, and then restart the engine. When the automatic shutdown is engaged again, check which lamp turns ON or OFF and point out where the abnormality is.



(1) Water Temperature Monitor Lamp



Danger: Injuries

- Close all the doors and place lock during operation, to avoid injuries by unintentional touch of cooling fan or fan belt.



Danger: Burns



Caution: Burns

- Do not touch the engine and muffler during operation and immediately after stopping it, for

When the water temperature rises abnormally, the water temperature lamp flashes and the automatic shutdown will be engaged.

When this happens, check water tank and replenish if needed. (Refer to 『6-2. Check the water temperature』)

If the water level is normal, there may be possibility of overload. Always use the equipment within the rated duty cycle and output power.

(2) Battery Charge Monitor Lamp

When the battery charge becomes unable during operation, the monitor lamp flashes and the automatic shutdown is engaged.

Please consult with our authorized distributor or service section.

<Caution>

- The monitor cannot detect battery degradation or insufficient battery liquid.

Be sure to check battery liquid level periodically.

(Refer to 『6-5. Battery Check 』)

(3) Oil Pressure Monitor Lamp



Danger: Injuries

- Close all the doors and place lock during operation, to avoid injuries by unintentional touch of cooling fan or fan belt.



Caution: Burns

- Do not touch the engine and muffler during operation and immediately after stopping it, for the temperature can reach extremely high
- When checking engine oil or changing oil, always stop the engine, and wait until the engine cools down. If you open either the oil gauge or the oil plug during operation, hot oil may cause some injuries.

When the oil pressure drops during operation, the monitor lamp flashes and the automatic shutdown is engaged. When this occurs, check the engine oil level and replenish the maximum level if needed.

<Caution>

- The monitor cannot detect the degradation of engine oil. Please check engine oil periodically and replenish if needed.
(Refer to 『11. Checking and Maintenance』)
- Check fuse next, when the abnormality other than 『Water Temp』 , 『Charge』 or 『Oil Pressure』 is detected. If a fuse is burned, consult with our authorized distributor or our service section, because there may be an abnormality of electric/electronic parts or wiring and repairing may be required.
(Refer to 『4. Parts』)

5-5. Remote Control Box (Option)

You can make remote control by connecting our remote control box

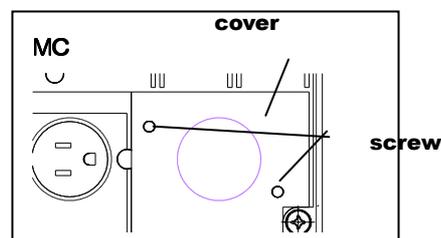
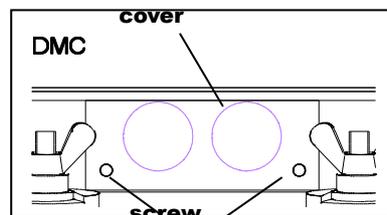
■How to connect remote control box

1. Remove the remote control

Receptacle cover.

(DMC: M5 Screw x 2 pcs)

(MC: M4 Screw x 2 pcs)



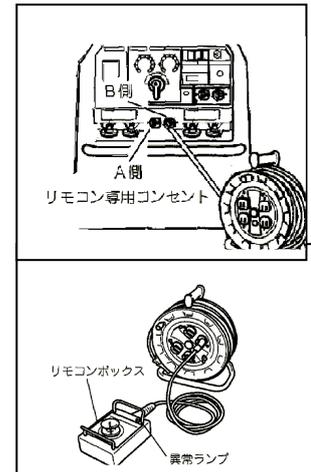
2 Insert the extension cord plug into

The receptacle.

In case of DGW310DMC, insert either A or B to be remote controlled.

3 Insert the plug into the receptacle of extension cord reel.

You can use 3 reels in series (30mx3)



<Caution>

- Never connect a remote control box plug to a receptacle of extension reel connected to AC100/110 Output receptacle in the equipment. The abnormality lamp in the box turns ON to show abnormality when it is connected by mistake.
- Never connect any device to a receptacle in the extension reel other than a remote controller.
- In case of using the cord reel incorporating ELCB set the ELCB ON and use.

5-6. ELCB and Grounding



Danger: Electric Shock

- Ground every grounding terminal to the earth as set in the manual. If even one of all is unconnected by mistake or accident, it will make much more dangerous for human than the NO RELAY case, because leaking current inevitably goes through the body.
- Even though all the terminals of the loads have been grounded to the earth, the bonnet grounding terminal should be grounded to the earth.
- Grounding should be made after the engine stopped.
- Whenever the ELCB relay has activated, you should repair the leaking part always first of all.

<Caution>

- The ELCB activates only for AC output.
- ELCB activates when AC output is used with the output selector switch at 『ECO』 position for protection load damage.

The circuit breaker is incorporated with ELCB to protect electric shock

The breaker trips when current leakage is detected due to insufficient insulation of loads

The specifications of ELCB are as follows.

- Rated Sensitive Current less than 30mA (Grounding Resistance less than 500Ω)
- Activation Time less than 0.1 second

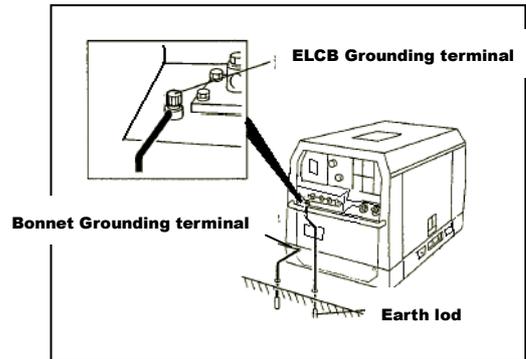
(1) Grounding

A qualified electrician should perform the grounding work for the following 3 points. (Ground Resistance less than 500Ω)

- The ELCB grounding terminal
- The bonnet grounding terminal
- The load bonnet terminal

<Caution>

- In the event you cannot ground, consult with our authorized distributor or our service section.



(2) Operation Check

1. Turn a tarter switch from 『STOP』 to 『RUN』 .
2. Set the breaker lever to 『ON』 .
3. Push a test button in the breaker.

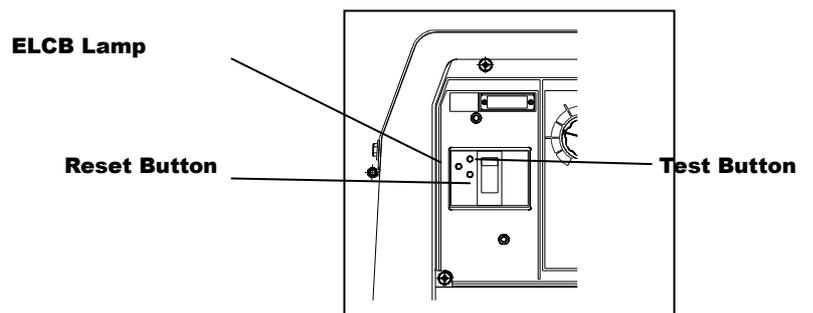
(The device is normal when ELCB Lamp (Red) turns ON and the lever positions at the middle of 『ON』 and 『OFF』).

4. Push the reset button.

(The ELCB lamp (red) turns OFF)

5. Push down the breaker lever 『OFF』 .
6. Proceed with engine start procedure once returning a starter switch to 『STOP』 .

In the event you cannot complete all steps as above, the device is out of order. Consult with our authorized distributor or our service section.



(3) The ELCB has activated



Caution: Electric Shock/Injuries

- Be sure to disconnect all the loads to the equipment when turning the breaker ON again after ELCB has activated.

ELCB lamp (Red) turns ON and the breaker lever positions at the middle of 『ON』 and 『OFF』 .
In that case, reset the ELCB per the following procedure after having finished the leaked points.

1. Push the reset button.
2. Push the breaker lever down to 『OFF』 .

The above procedure brings restoration of the breaker lever to 『ON』 .

<Caution>

- In the case ELCB monitor lamps keep OFF on using, it means that AC Output over supply or AC output Supply under output selector switch positions at ECO. Refer to 『9-3. Operation』 to recover.

5-7. Slow-down Feature

The Slow-down feature is to set the engine speed low automatically (in about 8seconds) for the purpose of reducing noise and fuel consumption, whenever no welding operation or electric supply is performed.
In the case of using the Slow-Down feature, turn the slow-down switch to ON. By the condition, the engine automatically moves to high speed, whenever welding operation or electric supply starts.



Caution: Damage to properties

- When using the load with magnet switch, turn the slow-down switch 『OFF』 .

<Caution>

- When the load less than 0.5A are connected to use, the slow-down feature does not function sometimes. So, turn the switch 『OFF』 .
- When welding and AC supply are used alternately or intermittently, turn the switch 『OFF』 .
- When the output selector switch is at 『ECO』 ,the engine does not turn to high speed.

6. Initialization and Pre-check

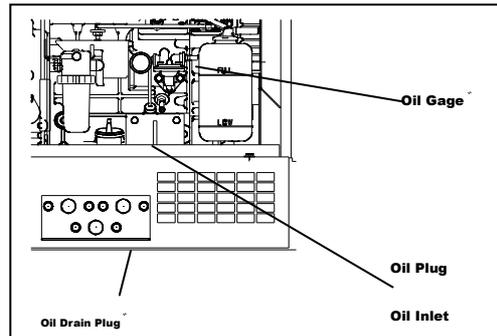


Caution: Fire/Burns/Injuries

- When checking engine, always stop the engine and keep away from fire.
Wait until the engine cools down before performing any check.

6-1. Engine Oil

When checking engine oil, be sure to
Keep the equipment leveled and insert
The oil gauge all the way in.
Before starting the equipment, make
Sure to fill the engine oil to the UPPER
Line through the oil inlet.



<Caution>

- If the equipment is not levels, you cannot obtain accurate oil level. Do not overfill (over UPPER line) the engine oil. The excessive oil may damage the engine (inside cylinder).

■ Selection of proper engine oil

Select the proper viscosity engine oil in compliance with ambient temperature. (Refer to the chart below)

<Caution>

- Use the API class CD or higher.

Viscosity and temperature

Temperature	Over+20°C	+10~+20°C	-10~+40°C
Viscosity	SAE30	SAE20	SAE10W/30

6-2. Coolant and Water



Danger: Injuries

- Close all doors and locks during operating equipment to avoid injuries by accidental touch cooling fan or fan belt.



Danger: Burns

- Do not open the radiator cap while operating the equipment or immediately after stopping the equipment to avoid sustaining burn from hot vapor.



Caution: Burns

- Do not touch the engine or muffler during operation or immediately after stopping the equipment for the temperature can reach extremely high.

Check to see if the coolant/water level is between 『FULL』 and 『LOW』 in the sub tank.

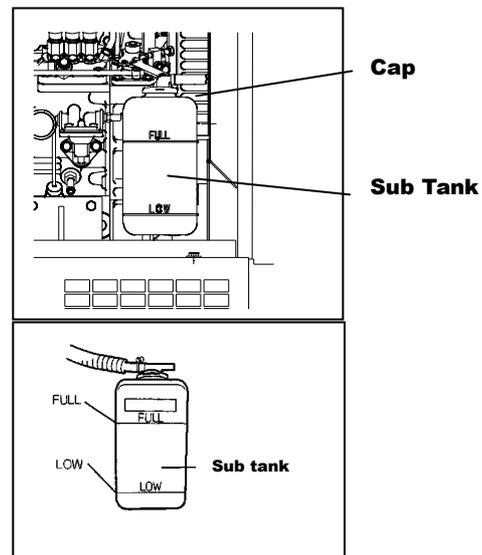
If it is below 『LOW』 level, fill the tank and the radiator accordingly.

(1) Filling the sub tank

1. Remove the sub tank cap.
2. Fill up the sub tank to 『FULL』 level.
3. Install the cap again.

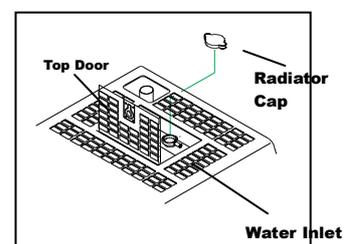
(2) Filling the radiator

1. Open the top plate.
2. Remove the radiator cap.
3. Fill the radiator up to the top/
4. Install the cap again and tighten.
5. Close the top plate.



<Caution>

- Use Long Life Coolant to prevent from freeze and rust.
(30% mixture LLC is filled when shipped out from factory)



- Mixture ratio of the coolant should be 30%-45% depending on the ambient temperature.
- Replace LLC at every year or 2000 hours.

Recommended LLC concentration (for reference only)

Lowest Temp.	-15°C	-20°C	-30°C
Mixture Ratio	30%	35%	45%

6-3 Fuel



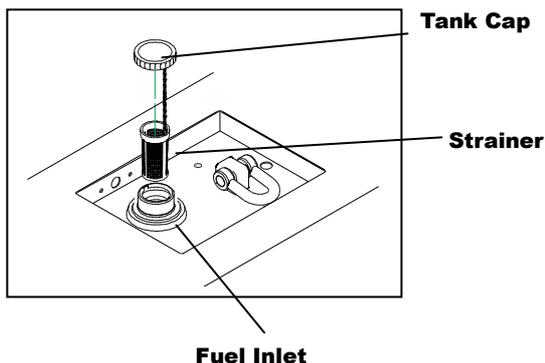
Caution: Fire

- Always wipe any drip of fuel. Do not use the equipment when any leak is found. Repair the equipment before use.

Check the fuel level and add the fuel if it is necessary.

<Caution>

- Use Diesel Fuel JIS No.2 in the event ambient temperature down to -5°C
- In colder area, use JIS No.3 (down To -15°C.) or JIS No. Special 3 (down to -25°C)
- Always use fuel strainer in the fuel inlet.
- Fill the fuel tank slightly less than the FULL tank.



6-4. Fuel, Engine Oil and Water Leakage



Caution: Fire

- Do not use the equipment when any leak is found. Repair the equipment before use.

Be sure to check any leakage for fuel, oil and coolant/water at the hose connections by opening the side doors. Whenever checking leakage, turn the fuel lever OPEN and be sure to close the fuel lever after checking.

6-5 Battery



Caution: Injuries to eye and skin

- Battery Fluid contains diluted sulfuric acid. Avoid contact with eyes, skin or clothing.
- If the acid comes to contact, especially with eyes, flush with a lot of water and contact to a doctor immediately.

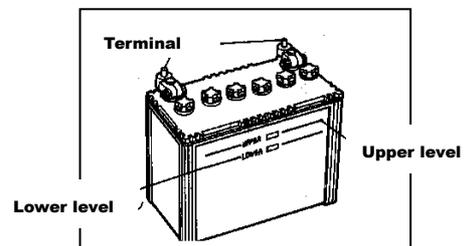
□ Caution: Explosion

- Do not use the equipment or charge the battery in the case battery Fluid level is lower than the LOWER level.

- Battery emits some combustible gas, so keep it away from fire and spark.

1. Check the fluid level. If the level is near or lower than the LOWER level, add distilled water until the fluid level reaches UPPER.
- 2 Make sure that the battery cables are firmly secured to the posts.

Tighten the clamps if it is necessary.

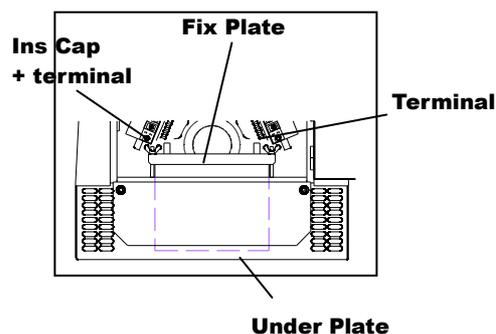


<Caution>

- Check the hydrometer of the battery fluid. If it falls below 1.23, the battery requires recharging. Consult with our authorized distributor or our service department.

■ Replacing battery

1. Remove the under plate.
(M6 bolt x 2)
2. Remove the cable on [-] side.
(Always on [+] side first)
3. Remove the battery fixing plate.
4. Remove the cable on [+] side.
5. Remove the battery.



- Reinstall a new battery in the reverse order.

(Install always the cable to the [+] positive post first in a new battery.)

<Caution>

- Use the following battery. <46B24L>
- When replacing a battery, remove the under plate firstly. Otherwise the battery slanted and the fluid may leak and contact to eye or skin.

7. Operation



Danger: Suffocation from exhaust fume

- Exhaust fume from engine contains many elements harmful to human. Do not operate this equipment in poorly ventilated area such as inside room or in tunnel



Caution: Suffocation from exhaust fume

- Do not point the exhaust fume toward pedestrians or building.



Caution: Fire

- Temperature around muffler and exhaust can get extremely high. Keep any inflammable items (such as fuel, gas, paint, etc.) away from the equipment.
- Always operate this equipment on flat surface and at least 1 meter away from any objects (wall, box, etc.)



Caution: Injuries

- Always place the equipment on flat and stable surface to keep the equipment from sliding and lock wheels if they have.
- Before starting, turn the load switch OFF and set the Equipment breaker 『OFF』 .

7-1. Starting

1. Turn the breakers to 『OFF』 .
2. Turn the fuel lever to 『OPEN』 .
3. Turn the Slow-Down Switch to 『ON』 .
4. When the temperature is below 5□ turn and keep the starter Switch at 『PREHEAT』 until the preheat lamp turns OFF (about 5 seconds).
5. Turn the starter switch to 『START』 . And then the engine starts by the starter motor.

<CAUTION>

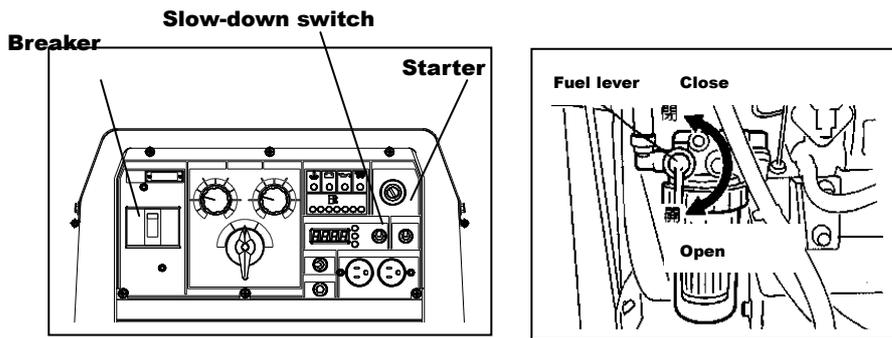
- Do not drive the starter motor for more than 15 seconds successively.
- If you need to restart, wait for 30 seconds or more before retry.

6. Once the engine has started, release hand offs the starter switch.

<Caution>

- Once the engine has started, never turn the switch to 『START』 .

7. Keep the engine idle for about 5 minutes.



■Restarting after stopping due to fuel shortage

This equipment is incorporated in automatic vacuuming air feature. Therefore, even though the engine stops due to fuel run out, you can restart the engine easily by the following steps.

1. Turn the breakers to 『OFF』
2. Turn the starter switch to 『STOP』 .
3. Fill the fuel.
4. Turn the slow-down switch to 『ON』 .
5. Turn the starter switch to 『START』 and drive the starter motor for about 10 seconds.
6. Release the starter switch, promptly as the engine started.
7. Wait for about 1 minute to vacuum the air out. The engine peed becomes stable when the air is extracted.

<Caution>

- Never turn the engine NORMAL speed or connected the loads until the air is extracted completely (until the engine becomes stable).

7-2 Stopping

1. Turn the breaker to 『OFF』 .
2. Turn the slow-down switch to 『ON』 .
3. Keep the engine (cool down) for about 5 minutes.
4. Turn the starter switch to 『STOP』 .
5. After the engine stops, turn the fuel lever to 『CLOSE』 .

<Caution>

- When the engine will not stop in spite of turning the starter switch to STOP, turn the fuel lever to CLOSE, then the engine will stop in a few minutes. In this case, be sure to consult with our authorized distributor or our service section and ask to repair.

8. Welding Operation

8-1. Selection – Welding Cable

Select the cable in proper gauge, based on the allowable amperage and the length, per the table shown below.

The welding capacity is to reduce if the small gauge or long cable is used.

<Caution>

- Welding cables should be used unstrained. When the welding cable are used in swirl, the welding capacity is to reduce

Size of Cable (Unit : mm²)

Return Length Current	20m	30m	40m	60m	80m	100m
	300A	30	38	50	80	100
250A	22	30	38	60	80	100
200A	22	30	30	50	60	80
150A	22	22	22	38	50	60
100A	22	22	22	30	30	38

8-2. Polarity

There are 2 welding output terminals 『+』 and 『-』 .

Select the polarity according to the operation, referring to the table below.

<Caution>

●Welding Rods

	Application	Connection
Normal	General Welding such as construction	- to Holder (Rod) + to Earth (Material)
Reverse	Thin Plate, Build-UP Welding Stainless Steel	- to Earth (Material) + to Holder (Rod)

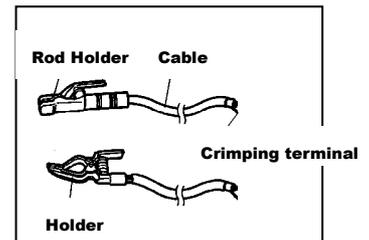
8-3. Connection – Welding Cable



Danger: Electric Shock

- Before connecting or disconnecting welding cable to terminal, stop the engine and Remove the engine key. A person performing should always keep the key.

1. Stop the engine
2. Connect a cable to a crimping terminal, a rod holder and a material holder.
3. As to DGW310DMC, connect the cable referring the chart below.



ECO (Single)	Single	Dual
Rod Φ2.0~Φ4.0	Rod Φ2.6~Φ6.0	Rod Φ2.0~Φ4.0
Welding Output Terminal A	Welding Output Terminal A	Welding Output Terminal A & Welding Output Terminal B

<Caution>

- Be sure to crimp a crimping terminal to a cable and connect the cable to welding cable to welding output terminal. Otherwise the terminal may burn out by the heat due to insufficient connections.
- Use a cable with a crimping terminal. To weld binding bare wires to an output terminal, the terminal may burn out by the heat caused by insufficient connections and also bare wires may touch the bonnet to bring short-circuit.

8-4. Welding

Caution: Suffocation from welding fume

- Be sure to wear a welding mask in operation, because welding fume contains poisonous gas and dust. Pay full attention to the airflow and direction and sufficient ventilation also in order to prevent from inhaling fume.

Caution: Injuries to eyes and skin

- Be sure to wear spark protection glass (refer to the table below), long-sleeve shirts, gloves, etc. in order to protect eyes and skin from harmful spark in welding.

Standard for Spark Protection Glass (Japan Industrial Standard)

No.	7	8	8	10	11	12	13
Current (A)	30~75		76~200			201~400	

Caution: Fire

- Keep any inflammables and easily burning item away from the place in welding, because welding splashes spatter.

Caution: Burn

- Be sure to wear leather gloves, apron, shoe covers, eye protection glass, safety shoes, safety cap and long-sleeve shirts, because welding splashes spatter.

<Caution>

- Never turn the output selector switch during welding, because it must cause the burnout of the switch.

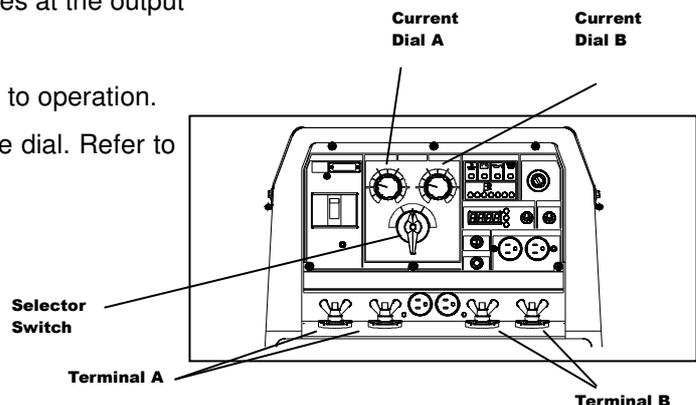
(1) DGW310DMC

The equipment can be operated 2 persons simultaneously.

Each person can adjust the welding current individually.

The current adjustable range by the dial changes at the output selector switch position.

- 1 Turn the selector switch properly according to operation.
- 2 Adjust the voltage by the current adjustable dial. Refer to the following chart next.



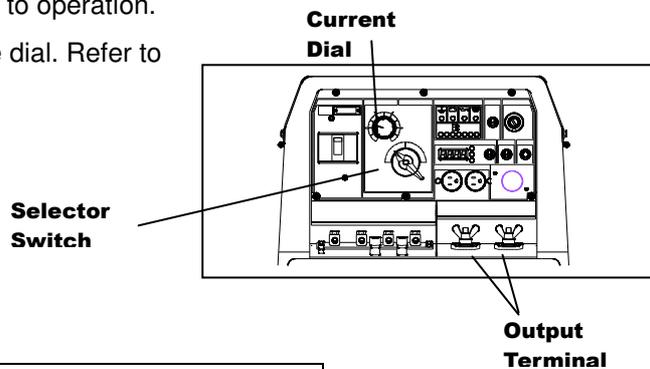
	Position	Freq	Welding Current at the dial position (A)						
			MIN	1	2	3	4	5	MAX
1 Person	ECO		30	45	70	95	120	145	160
	Single	50Hz	70	90	135	175	215	260	280
		60Hz	85	110	155	200	245	290	310
2 Persons	Dual	50Hz	35	45	70	95	115	140	150
		60Hz	45	55	80	105	125	150	160

- The values are for reference only. The length or the ambient temperature each affects the value.
- When the remote control box is used, the value may change to some degree.

(2) DGW310MC

The current adjustable range by the dial changes at the output selector switch position.

- 1 Turn the selector switch properly according to operation.
- 2 Adjust the voltage by the current adjustable dial. Refer to the following chart next.



Position	Freq	Welding Current at the dial position (A)						
		MIN	1	2	3	4	5	MAX
ECO		30	45	70	95	120	145	160
Regular	50Hz	35	60	110	160	205	255	280
	60Hz	45	70	125	180	230	285	310

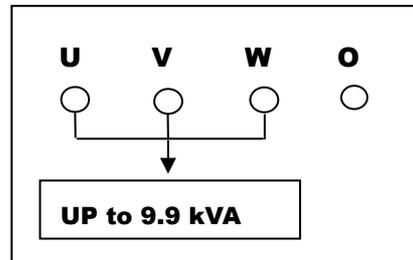
The values are for reference only. The length or the ambient temperature each affects the value.
 When the remote control box is used, the value may change to some degree.

9. Genrating Operation

9-1. Output Range

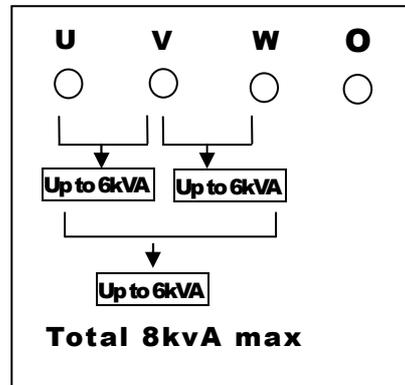
(1) 3-P 200/220V (3-P 4-Wires)

Maximum output from the terminals at 200/220
9.9kVA



(2) 1-P 200/220V

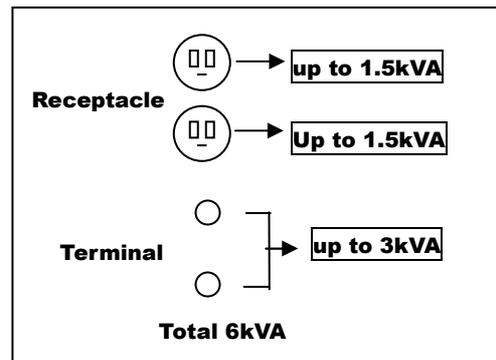
1-P 200/220V is supplied by 1 pair out of 3 terminals.
Max. output by 1 pair is 6kVA and the maximum
output for 3 pairs total is 8kVA, which please note.
You should connect the load for 3 pairs evenly as
possible to terminals.



(3) 1-P 100/110V

1-P 100/110V is supplied by 2 receptacles and 1-P
terminal set. Max 1.5kVA is supplied through 1
receptacle and max 3kVA is supplied from 1-P
terminal set.

Max output by 2 receptacles and
1 terminal set is 6kVA.



9-2. Output Limitation

Please refer to the table below, because electric tools and home appliances cannot be judged only by the rated.

The rated output or the power consumption due to the efficiency and character of components.

Applicable Load (For reference only)

Loads	Capacity(kW)					
	1-P 100/110V			1-P 200/220V		3-P 200/ 220V
	Receptacle 1pce	Terminal 1 set	Terminal & receptacle total	Terminal 1 set	Total 3 terminal set	Terminal
Electric Bulb, Heater, etc.	1.5	3.0	6.0	6.0	8.0	—
Electric Tools, etc. (Series motor)	0.7	1.5	3.0	3.0	4.0	—
Mercury Lamp (high power factor type)	0.6	1.2	2.4	2.4	3.2	—
Submersible Pump, Compressor, etc. (induction motor)	0.6	1.2	2.4	2.4	3.2	4.0

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Series Motor : Motor with brush

Induction Motor : Brushless Motor

The value described is 『OUTPUT』 for induction motor load and 『POWER CONSUMPTION』 for the other equipment.

<Caution>

- Be sure to use the frequency designated in the equipment incorporated in mercury bulb or induction motor.
- The load incorporated in motor may require bigger power than the rated power consumption.
So, consult with our authorized distributor or our engineering section to clarify.
- When connection to use 2 or more sets, start the load one by one, not to start them simultaneously.
- When starting a mercury bulb ON again, wait for about 15 minutes until it cools down.

9-3. Operation



Danger: Electric Shock

- Before connection or disconnecting a load cable from the receptacle, always turn the circuit breakers (3-P and 1-P) to OFF. And stop engine and remove the engine key. A person to perform it should always keep the key.
- Ground every grounding terminal to the earth as set in the manual.
If even one of all is unconnected, by mistake or accident, it must be much more dangerous for human body than NO CONNECTION, because a leaking current inevitably goes through the body.
- Even though all the current leakage relays in the loads have been grounded to the earth, the grounding terminal and the bonnet (canopy) should be grounded to the earth.
- Grounding should be made after the engine is stopped.
- Whenever the current leakage breaker activates, you should repair the leaking point first of all.



Caution: Injuries

- Be sure to connect to the output terminals or insert a plug to a receptacle, after confirming that all the switches in the loads are positioned at OFF.
- Be sure to select the correct frequency, designated in the loads.



Caution: Damage to the property – Aftermath

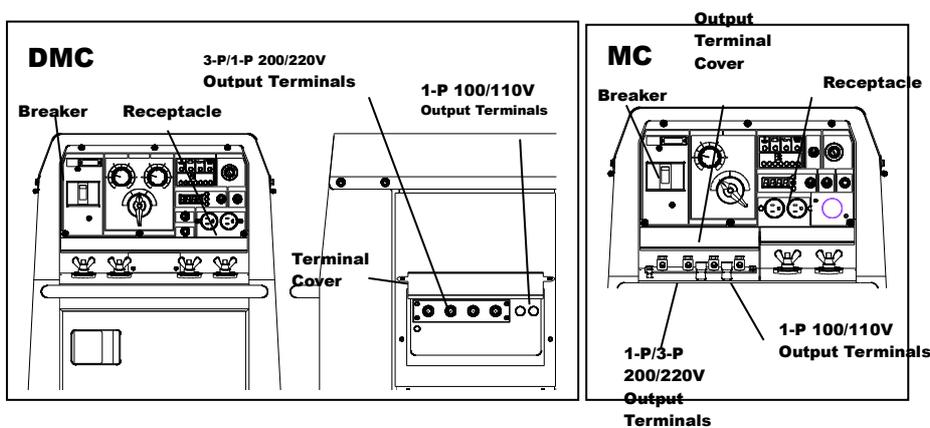
- Whenever connecting to use medical equipment or appliances, be sure to consult with the medical equipment company, doctor or hospital personnel.
- Be sure to select the correct frequency, designated in the loads.
Otherwise the loads may be damaged.

<Caution>

- The AC volt meter reads 3-P 200/200V apart from the circuit breakers position at 『ON』 or 『OFF』 when the engine driving.

After the engine starts (Refer to 『7-1.Starting』), operate as per the following procedures.

- 1 Turn the power switch off on the load.
- 2 Check and confirm the breakers position at 『OFF』.
- 3 Select the correct frequency, designated in the loads.
- 4 Connect the loads to receptacle or terminals.
- 5 Close the terminal cover and fix it with the bolts.
- 6 Turn the breakers to 『ON』.



- Return -The circuit breaker has activated due to overload



Caution: Injuries

- Be sure to turn the power switch to OFF on the load when returning the circuit breaker to ON again, when the circuit breaker has activated.

When the electric supply exceeds the rated output, the breaker activates to trip in order to shut down the circuit. Check the breakers when the load stops operation.

ELCB lamp is to turn OFF in the case of overload shutdown. When the lamp keeps ON, refer to 『5-6. ELCB and Grounding』.

When any breaker has activated, return the circuit breaker per the followings procedure.

- 1 Turn OFF all the power switches on the loads.
- 2 Once push down the breaker lever to 『OFF』, push up the lever to 『ON』.

<Caution>

- Take care for overload, referring to 『9-2 Output Limitation』
- The breaker activates when having used AC output in the selector switch at 『ECO』position. In the case stop using AC supply and return the breaker as above.

10. Simultaneous use of Generating and Welding

The circuit breakers react on the AC power supply circuit only. In the simultaneous use of welding and generating, there may be happen overload to the engine. Refer to the following table and limit AC power use.

Limitation of AC Power Supply in the simultaneous use of welding and generating (60Hz)

DGW310DMC

Welding Output		AC Power Output	
Rod/Current	Select	3-P Output (PF 0.8)	1-P Output
φ2.0mm/60A	Dual	9.3kVA	7.4kVA
φ2.6mm/120A	Dual	7.2kVA	5.7kVA
φ3.2mm/140A	Dual	6.4kVA	5.1kVA
φ4.0mm/170A	Dual	5.2kVA	4.1kVA
φ5.0mm/240A	Single	2.0kVA	1.6kVA
φ6.0mm/300A	Single	0kVA	0kVA

□ The 1-P figure shown is the total output of 1-P 100/110V and 200/220V.

DGW310MC

Welding Output		AC Power Output	
Rod/Current	Select	3-P Output	1-P Output
φ2.0mm/60A	Regular	9.3kVA	7.4kVA
φ2.6mm/120A	Regular	7.2kVA	5.7kVA
φ3.2mm/140A	Regular	6.4kVA	5.1kVA
φ4.0mm/170A	Regular	5.2kVA	4.1kVA
φ5.0mm/240A	Regular	2.0kVA	1.6kVA
φ6.0mm/300A	Regular	0kVA	0kVA

□ The 1-P figure shown is the total output of 1-P 100/110V and 200/220V.

<Caution>

- Simultaneous use of Welding and AC Power is NOT available.
- Avoid simultaneous use in the case high welding quality is required.

11. Check and Maintenance



Danger: Electric Shock/Injuries

- Before checking, stop the engine and remove the engine key which to be kept by the person to do.
- Do not open the doors during operation or just after, because the cooling fan or driving belts can enwind the body.

Danger: Burns

- Never open a radiator cap during operation or just after operation, because of avoid burns from hot vapor.



Caution: Fire/Burns

- Keep the equipment far away from fire.
- Do not touch the engine and muffler during operation or immediately after stopping the equipment, for the temperature reaches extremely high.



Caution: Injuries to eyes and skin

- Battery fluid contains diluted sulfuric acid. Avoid contact with eyes, skin or on clothing.
- If the fluid comes in contact, especially with eyes, flush with a lot of Water and contact to a physician immediately.



Caution: Explosion

- Do not use the equipment or charge the battery, in the case the battery fluid level is lower than LOWER level.
- Battery may emit some combustible gas, so keep it away from fire and sparks.

<Caution>

- Besides pre-check before operation, qualified person only should do check and maintenance.
- Our authorized distributor or our service section only should do the job marked • in the table.
- Use the genuine parts only for replacement.
- Use the tray to receive when draining the waste fluids.
- Be sure to comply with the regulations when discarding hazardous substances such as oil, fuel, coolant (LLC), filter, battery, etc.
- To protect the environment, never discard the waste fluid to the grounds, the rivers, lakes, the oceans, etc.

To optimize the use of the equipment, be sure to perform the check and maintenance based on the following table. Use the hour meter on it as rough standard for operation time

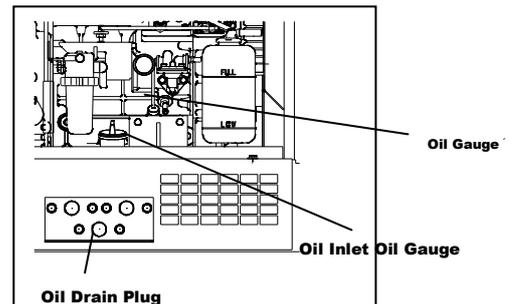
Check Items	Startup	Check Time					
		At 50 hrs	Every 100 hrs	Every 200 hrs	Every 400 hrs	Every 1000 hrs	Every 2000 hrs
1 Check and supply fuel	○						
2 Check and supply engine oil	○						
3 Change engine oil		1st ○	2 nd or after ○				
4 Change oil filter		1st ○		2 nd or after ○			
5 Check/Add water/coolant	○						
6 Change Water/Coolant							○ Or 2 yrs
7 Clean Fuel Strainer		1st ○	2 nd or after ○				
8 Change Fuel Filter Element					○		
9 Drain Water/Clean Fuel Tank				○			
10 Check Leakage Fuel, Oil, Water	○						
11 Check Battery Fluid/Add Fluid	○						
12 Clean Air Element		1st ○	2 nd or after ○				
13 Change Air Filter Element					○		
14 Adjust V Belt Tension		1st ●	2 nd or after ●				
15 Change V Belt					● Or 2 yrs		

Check Items	Startup	Check Time					
		At 50 hrs	Every 100 hrs	Every 200 hrs	Every 400 hrs	Every 1000 hrs	Every 2000 hrs
16 Clean Radiator Fin (Outer)					●		
17 Clean Radiator (Inner)					●		
18 Change Fuel Hose, Coolant Hose, Oil Hose, Anti-Vibration Rubber							● Or 2 yrs
19 Adjust/Plane Engine Valve Clearance						● Adjust	● Plane
20 Check/Adjust Injection Nozzle					●		
21 Check/Adjust Injection Nozzle							●

(1) Change Engine Oil

1 st	At 50 hrs
2 nd or after	Every 100 hrs

- 1 Remove the oil plug.
- 2 Remove the oil drain plug and drain the oil completely.
- 3 Reinstall the oil drain plug tightly.
- 4 Checking the oil level by the oil level gauge, replenish oil up to the UPPER level through the oil inlet.
(About 38 Liter)
- 5 Reinstall the oil plug tightly.



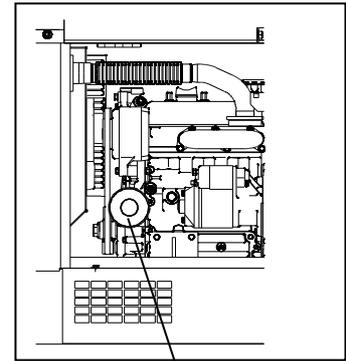
<Caution>

- Refer to 『6-1. Check Engine Oil』 to decide Engine Oil.
- Change the packing to the new one in the oil drain plug whenever changing engine oil.
- Packing No.: 6C090—58961 (Kubota)
- After reinstalling the oil drain plug tightly, keep the engine drive for a while to check no engine oil leakage and then stop the engine.

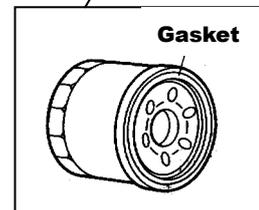
2) Change Oil Filter

1st	At 50 hrs
2 nd or after	Every 200 hrs

- 1 Drain the oil as described in
『(1)Change Engine Oil』 .
- 2 Remove the oil filter using an oil filter wrench.
- 3 Smear a little engine oil on the rubber gasket of a new filter.
- 4 Screw the new filter into place and tighten it by
Hand until the gasket contact seat. Then give it
additional 1.1/4 turns using an oil filter wrench.
- 5 Supply engine oil.



Oil filter



Gasket

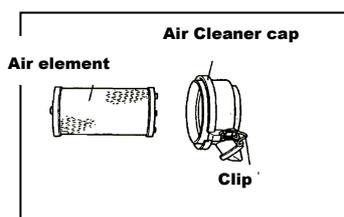
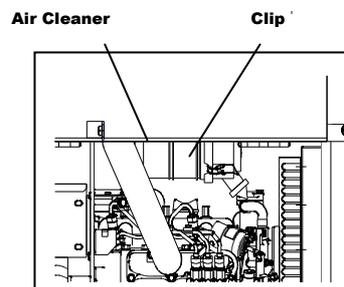
<Caution>

- If an oil filter wrench is not available to get, contact our authorized distributor or our service section to change.
- Oil Filter Part No.:15853-32433 (Kubota)
- After supplying engine oil, keep the engine drive for a while to check no engine oil leakage and then stop the engine

(3) Clean/Change Air Element

Clean	1 st at 50 hrs 2 nd or after 100 hrs
Change	Every 400 hrs

- 1 Loosen the wing bolts in the cleaner and remove the air element.
- 2 Clean or replace the air element.
<Dried contaminants adhere>
Blow up compressed air from inside the element.
<Carbon or oil adhere>
Replace to a new one.
- 3 Reinstall it in reverse order.



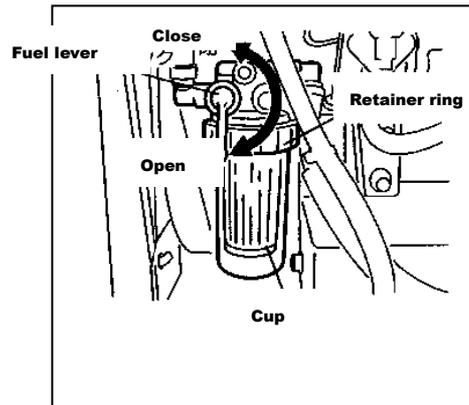
<Caution>

- Clean more frequently when it is used in dusty environment.
- Air Element Part No.: 1G347-11181 (Kubota)

(4) Clean/Change Fuel Strainer

Clean	1 st at 50 hrs 2 nd or after 200 hrs
Change	Every 400 hrs

- 1 Turn the fuel lever to 『CLOSE』 .
- 2 Unscrew the retainer ring counterclockwise
And remove the cup and filter element.
- 3 Discard any dust or water inside the cup
and clean the filter by blowing compressed
air. (or replace element)
- 4 Reassemble it back.



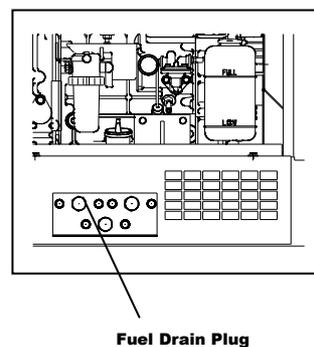
<Caution>

- Be sure to check for any contaminants on the packing whenever reinstalling the cup.
- Be sure to confirm no fuel leakage by opening the fuel lever to 『OPEN』 . Turn the lever to 『CLOSE』 finally after confirmation.
- Fuel Element Part No.: 16271-43561 (Kubota)

(5) Drain water in fuel tank

Drain	At every 200 hrs
-------	------------------

- 1 Unscrew the fuel drain plug.
- 2 Reinstall the drain plug after draining
water completely.



<Caution>

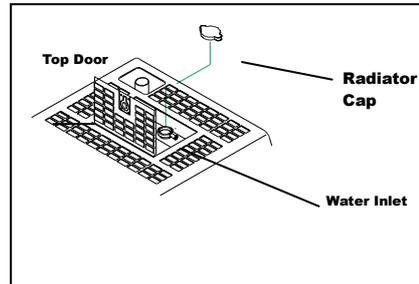
- Change the packing whenever draining water.
- Packing Part No.: 6C090—58961 (Kubota)
- Confirm no fuel leakage after reinstalling the fuel drain plug.

(6) Change Coolant/Water

Change	At 2000 hrs or 2 yrs
--------	----------------------

<Total capacity: 3L (including Sub Tank: 0.6L) >

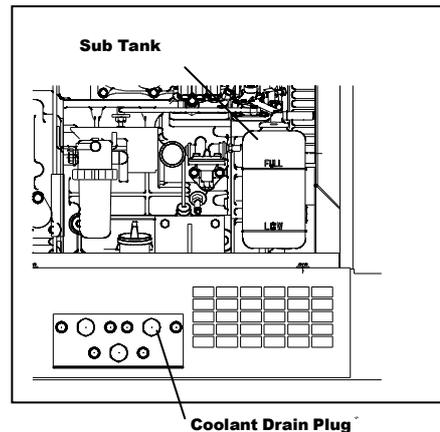
- 1 Open the top door.
- 2 Remove the radiator cap.
- 3 Remove the water drain plug.
- 4 After draining all the water, reinstall the water drain plug.



<Caution>

- Change the packing whenever changing coolant/water.
- Packing Part No.: 6C090—58961 (Kubota)

- 5 Replace all the water in the sub tank.
- 6 Fill water to Max Level (to the water inlet)
- 7 Reinstall the radiator cap.
- 8 Close the top door.



<Caution>

- After supplying water, keep the engine drive for a while to check no water leakage and then stop the engine

12. Long-Term Storage



Danger: Electric Shock

- When performing check and maintenance, always stop the engine



Caution: Injuries

- When performing check and maintenance always stop the engine



Caution: Fire/Burns

- Keep the equipment far away from fire.
- Do not touch the engine and muffler during operation or immediately after stopping the equipment for the temperature reaches extremely high.

If the equipment will not be used for more than 2 months, perform the following maintenance and storage procedure.

- 1 Remove the battery. (Refer to 『6-5. Check Battery』)
- 2 Change the engine oil. (Refer to 『11. Check & Maintenance』)
- 3 Drain the fuel from the fuel tank and the strainer. Refer to 『11. Check & Maintenance』
- 4 Clean all the parts, cover the equipment and keep in the clean and dry place.

<Caution>

- Recharge the removed battery once a month.

13. Troubleshooting



Danger: Electric Shock

- Do not operate the equipment if the equipment or you are wet.
- Before performing any equipment check or maintenance, stop the engine.



Caution: Injuries

- Before performing any equipment check or maintenance, stop the engine.



Caution: Fire/Burns

- Keep the equipment far away from fire.
- Do not touch the engine and muffler during operation or immediately after stopping the equipment for the temperature reaches extremely high.

Follow the guideline below when performing any troubleshooting. If you can not resolve the problem by the troubleshooting guide, contact our authorized distributor or our service section to request the repair.

Symptoms	Presumable Causes	Actions
Starter motor will not start	<ol style="list-style-type: none"> 1. Battery Weak 2. Battery Dead 	<ol style="list-style-type: none"> 1. Recharge the Battery 2. Replace the battery
The engine will not start	<ol style="list-style-type: none"> 1. Fuel Lever at 『CLOSE』 2. Insufficient Fuel 3. Water or contaminants in the fuel 4. Fuse burnt 	<ol style="list-style-type: none"> 1. Fuel Lever to 『CLOSE』 2. Replenish fuel 3. Drain water or Clean Fuel Tank & Strainer 4. Repair

Symptoms	Presumable Causes	Actions
The engine starts but stalls immediately	<ol style="list-style-type: none"> 1. Insufficient Oil 2. High Water Temperature, Insufficient Coolant/Water 3. Unable to charge 	<ol style="list-style-type: none"> 1. Replenish Oil 2. Keep the rated Replenish coolant/water 3. Repair
Black or white smoke exhaust from the muffler successively	<ol style="list-style-type: none"> 1. Overload 	<ol style="list-style-type: none"> 1. Keep the rated output
The engine wont stop	<ol style="list-style-type: none"> 1. Stop Solenoid Disorder 	<ol style="list-style-type: none"> 1. Turn the lever to 『CLOSE』 to stop and repair
Welding Arc is weak	<ol style="list-style-type: none"> 1. Output Selector Switch at 『ECO』 or 『DUAL』 2. Freq. Switch at 50Hz』 3. Current Dial Position 4. Poor Contact on Cables 5. Improper Diameter or Length of Cable 6. Poor Contact to material 7. Simultaneous use 	<ol style="list-style-type: none"> 1. Change to 『SINGLE』 or 『REGULAR』 2. Change to 『60Hz』 3. Turn it clockwise more 4. Connect sufficiently 5. Change the cable as per 『SELECTION – WELD CABLES』 6. Connect securely 7. Stop using AC Output
Welding Arc is too strong	<ol style="list-style-type: none"> 1. Output Selector Switch at 『SINGLE』 or 『REGULAR』 2. Current Dial Position 	<ol style="list-style-type: none"> 1. Change to 『ECO』 or 『DUAL』 2. Turn it counterclockwise more
NO AC Output	<ol style="list-style-type: none"> 1. Breaker at 『ON』 2. Selector Switch at 『ECO』 	<ol style="list-style-type: none"> 1. Change to 『ON』 2. Change to 『SINGLE』 , 『DUAL』 o 『REGULAR』
Weak AC Output	<ol style="list-style-type: none"> 1. Wrong Frequency 2. The rated current of load exceeds the rated output of the equipment 3. Simultaneous use 	<ol style="list-style-type: none"> 1. Change to the load frequency 2. Refer to 『OUTPUT LIMITATION』 <p>Stop welding</p>
Slow-down does not activate	<ol style="list-style-type: none"> 1. Welding Cable short-circuit 2. The power consumption Of the load is 0.5A or below 	<ol style="list-style-type: none"> 1. Repair the short-circuit 2. Chang the slow-down switch to 『OFF』
Remote Control does not work	<ol style="list-style-type: none"> 1. Connected to AC100/110V receptacle by mistake 2. Connected AC100V load to remote control receptacle 3. The switch (breaker) on the cord reel at 『OFF』 	<ol style="list-style-type: none"> 1. Connect to the remote control receptacle 2. Disconnect the AC100V plug 3. Change the switch to 『ON』

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