HAHN & SOHN

OPERATION MANUAL

PLEASE READ THIS MANUAL CAREFULLY.
IT CONTAINS IMPORTANT SAFETY INFORMATION.

ULTRA-SILENT GENSET

Single-phase: ***HDE20SS***
HDE26SS
HDE35SS

Three-phase: ***HDE20SS3***
HDE30SS3
HDE40SS3
HDE55SS3
HDE60E3
HDE60SS3
HDE70SS3
HDE80SS3

Preface

Thank you for purchasing a diesel generator.

This manual will tell you how to install, operate and maintain the gensets correctly.

Please read this manual carefully before using this genset and ensure you understand all procedures regarding handling, operation, servicing and maintenance prior to use.

Failure to follow these instructions may cause serious personal injury and equipment damage and shorten its working life.

If you have any comments or problems, please contact us or your local distributor.

Please pay more attention to the warnings and cautions throughout the manual.

Failure to observe the warning notices throughout this manual may lead to severe personal injury or death due to incorrect operation.

Safety information contained in this introduction is extremely important. Read this manual carefully before using it.

- ☒ Only qualified technicians are allowed to operate this genset.
- ☒ Please read this manual carefully and keep it available at all times.
- ☒ Please contact the factory or your distributor if this manual is lost or damaged.
- ☒ Please transfer this manual if you lend or sell this genset to others.

Contents

1. Safety Instructions 1
   1.1 Safety Alerts 1
   1.2 Safety Information and Specific Hazards 2
2. General Instructions 6
   2.1 Application and Llaws 6
   2.2 Exterior Parts 7
   2.3 Inner Structure 7
   2.4 Control Panel 8
   2.5 Component Name and Function 8
3 Installation 11
   3.1 Standard Installation 11
   3.2 Special Precautions 12
4. Load Connection 14
   4.1 Genset Sizing 14
   4.2 Grounding Protection 15
   4.3 Grounding Method 15
   4.4 Load Wiring 17
   4.5 Selection of Power Cables 19
5. Fluids & Battery 20
   5.1 Fuel 20
   5.2 Lube oil 21
   5.3 Coolant 21
   5.4 Battery 22
6. Operating the Generator 24
   6.1 Preparation before Startup 24
   6.2 Check before Running 25
   6.3 Starting the nset 26
   6.4 Initial Running 26
   6.5 Running 26
   6.6 Stopping the Genset 30
7. Service and Maintenance 32
   7.1 Routine and Periodic Service Chart 33
   7.2 Service Intervals 35
8. Troubleshooting 40
9. Long Term Storage 43
   9.1 Storage Precautions 43
   9.2 Stacking 44
10. Technical Specifications 45
   10.1 Power Derating 45
   10.2 Technical Parameters 46
   10.3 Wiring diagrams 52
11. Warranty 55

1. Safety Instructions

Please read all safety instructions carefully. It may cause severe personal injury if you fail to comply with these instructions.

1.1Safety Alerts

Please pay special attention to the material in this manual when preceded with the following symbols:

Indicates a strong possibility of severe personal injury or death if instructions are not followed.

Indicates a possibility of personal injury or equipment damage if instructions are not followed.

Indicates a minor to moderate possibility of personal injury or equipment damage if instructions are not followed.

Indicates a possibility of equipment damage if instructions are not followed or provides helpful information.

Any modification without authorization from the factory is strictly prohibited. The generator may be damaged or the service life shortened. Also, the possibility of severe personal injury exists. The warranty may also be invalidated.

Always use genuine service and replacement parts to insure proper operation of the genset.

If you encounter any difficulty in the operation of your genset that can′ t be resolved by the information in this manual, contact the factory or your local distributor immediately.

1.2. Safety Information and Specific Hazards

⚠CAUTION

- ☒ Don′ t use this genset when you are tired, ill or physically impaired
- ☒ Please wear protective clothing and personal protective equipment
- ☒ Keep children and pets away from the genset.
- ☒ Only qualified technicians are allowed to operate this genset.
- ☒ If the genset seems abnormal during operation such as strange sounds, vibrations, exhaust leaks, fluid leaks or system alarms, stop the genset immediately and determine the cause of the malfunction. Don′ t use the genset until is it back in a normal state of operation.

⚠WARNING

- ☒ There are many warning labels on the genset. Read the labels carefully.
- ☒ Keep all labels clean and don′ t remove them for any reason
- ☒ Contact your distributor to obtain replacement labels if necessary.

⚠DANGER

Exhaust gas is toxic

Exhaust gas contains poisonous carbon monoxide that will kill you.

Always run the genset in a will ventilated area.

Any operation indoors must be done in a specially designed room with provisions for proper ventilation and exhaust.

The exhaust may not be directed toward any residential areas or offices.

⚠DANGER

Rotating parts

Don't touch any moving parts to avoid severe personal injury

Close and lock all cabinet doors while the genset is in operation

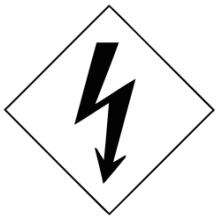
If you have to open a door, keep your hands head and clothing away from moving parts

Please stop the genset before any checks or service.

Some electric cooling fans will continue to run after the generator is stopped. Ensure it has stopped rotating before working in the area of the radiator and fan.

⚠DANGER

Electric shock



Touching the output terminal during operation can cause a severe electric shock injury or death. Never touch the genset with wet hands.

Turn off the circuit breaker and stop the genset before connecting terminals.

Close the output terminal cover and tighten all screws before running this genset.

Output voltage will hurt you even at idle speed. Stop the genset before checks or service.

Never touch electrical circuits in the control panel when the genset is running.

Turn off the main circuit breaker, stop the genset and pull out the start key before working in the control box.

If the circuit breaker is defective replace it with a supplied part of the exact same rating.

Ground the genset correctly.

⚠DANGER

Grounding protection

The terminals, generator frame, enclosures and loads must be properly grounded. If the genset is improperly grounded, the genset or operator is not fully protected from electric shock leading to injury or death. Refer to section 4.2 for proper grounding instructions.

⚠CAUTION

Fire hazard

Fuel, oil, antifreeze and battery gasses are extremely flammable and can lead to fire or explosion. Observe the following cautions:

- Stop the genset and allow it to cool before refueling in a well-ventilated area. Keep cigarettes, sparks and any other source of combustion away from genset.

- Don't place any flammable and explosive materials in the vicinity of the generator
- Wipe up spilled fuel, oil, or coolant immediately.
- **Don′t store rags inside or around the generator.**

- Special precautions shall be taken while using the genset in an area with potential fire risks.

⚠CAUTION

Hot parts

The muffler is very hot during operation and remains hot for some time after stopping the engine. Be careful not to touch the muffler while it is still hot.

Please wait until the engine has cooled completely before storing it indoors.

Lock the cabinet doors and keep your hands away from the muffler, exhaust elbow and pipes, cylinder heads, engine block, radiator and hoses, generator frame and any other hot parts.

Stop the engine and wait until it′ s cool before checks or service.

Some parts remains hot for a long time even after the genset has stopped.

⚠CAUTION

Radiator

Don′ t remove the radiator cap while the engine is hot. Hot water or steam may bu you seriously.

Please stop the genset and wait until the coolant is cool (coolant temperature should be lower than 50ºC) before check or service.

⚠CAUTION

Battery

The battery may produce flammable gas. Be careful to avoid any injuries from an explosion.

Charge the battery in a well-ventilated area to prevent a fire or explosion. Charging produces gaseous vapors.

Never connect a positive terminal with a negative terminal. Connect connect positive to positive, negative to negative.

Please disconnect grounds before service.

If your skin or clothing comes into contact with electrolyte, flush with lots of water. If it enters your eyes, flush your eyes with large amounts of water and seek immediate medical attention.

Always stop the genset before checking the battery.

⚠CAUTION

Noise

Close the doors while running to prevent abnormal generator noise. When working in close

proximity to the generator with the doors open, wear ear plugs or other protective hearing protection.

CAUTION

Storage

Use extreme caution when stacking generators to prevent falling. Do not stack more than two high.

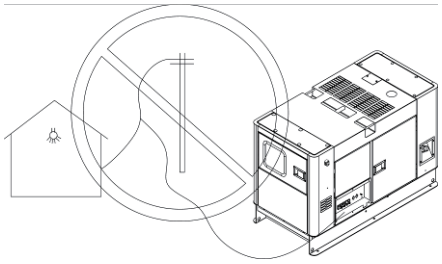
Put the heavier of two generators on the bottom.

Make sure that the genset enclosure is not broken and all fasteners are intact.

The genset should be put on level ground which is hard enough to support its weight.

Never run two gensets when they are stacked together. The vibration may cause one generator to shift and fall.

CAUTION



Cable Connections

Use an isolating switch or a double-throw switch and cut off utility power before connecting cables to a factory or other buildings.

Only qualified electricians are allowed to make cable connections.

Comply with all local rules and regulations before using the genset.

WARNING

Maintenance practices

Severe personal injury can result if someone else starts the genset during a check or service.

Place an appropriate warning label such as "DANGER! DO NOT RUN" in a clearly visible position near the starting switch in order to prevent others from starting the genset unexpectedly. Disable any remote start capability.

Never check or service the genset when it is still running unless stated in the engine or generator service manuals.

If you have to run the genset for troubleshooting, two people should be involved- one for performing the maintenance and the other ready to stop the genset in an emergency.

Keep your body or clothing away from moving parts.

CAUTION

Dispose of used liquids properly

Waste fuel, oil, coolant and dead batteries will pollute the environment seriously. Dispose of properly in accordance with local regulations. Never pour liquids directly into any body of water or on the ground.

Use a proper container while draining fuel, oil or coolant.

CAUTION

Transportation

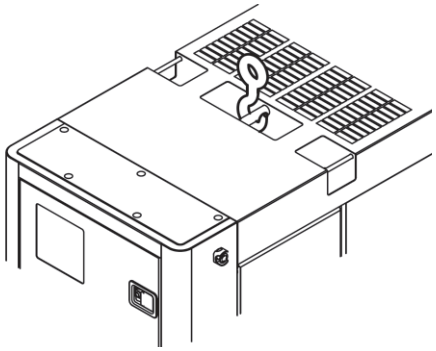
Don't use ropes to lift the genset to prevent the generator from falling. Use steel cables or adequate straps that can bear the weight of the genset safely.

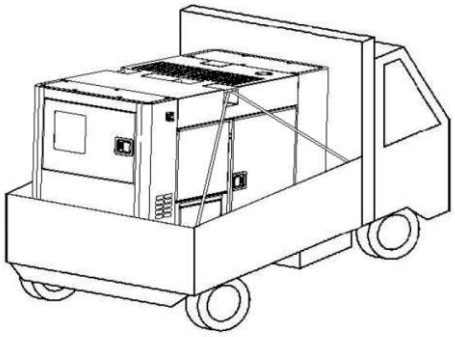
Lift the genset at the lifting rod at the center of the canopy or use the forklift slots. The outer lifting rods can be used to stabilize the genset while lifting.

Don’ t stand under the genset while lifting.

Don't lift the genset while the engine is still running to prevent a serious accident.

Bind the genset securely when transporting in a truck or trailer.





2. General Instructions

2.1 Application and Laws

This genset is to be used as prime or standby power for outdoor work.

In some countries it is illegal to connect to indoor distribution terminals. Comply fully with local regulations and laws.

This genset is categorized as a mobile power set. Please make relevant declarations as local laws require.

Only qualified technicians are allowed to operate this genset.

⚠DANGER

Connecting the genset to other power supplies such as utility power is strictly forbidden.

Only a qualified technician is allowed to connect this genset to loads.

⚠CAUTION

Lock the control panel door and maintenance door securely when it is not in use.

Keep the door keys by the operator for safekeeping.

Keep children and any other personnel who are unaware of the dangers away from the genset.

2.1.1 General instructions

No.	Item	Descriptions
1	Application	Outdoor standby power
2	Environmental conditions	Ambient temperature: 5~25° C Relative humidity: 30% Altitude: 0~1000 meters above sea level
3	Installation	On hard level ground

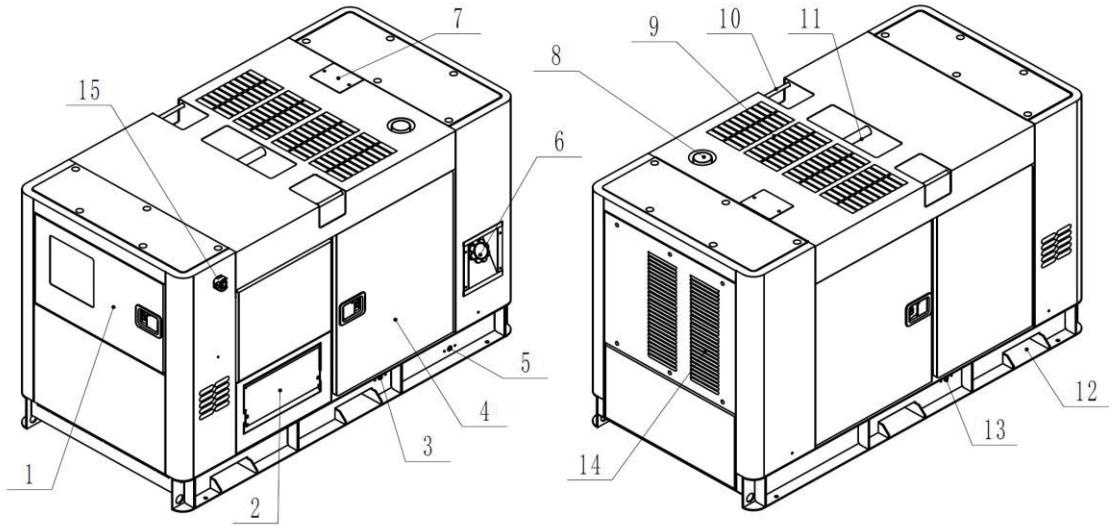
Please refer to the technical specifications for the overall dimensions of the genset.

⚠ NOTE

Please refer to Controller Manual for more information on the control system.

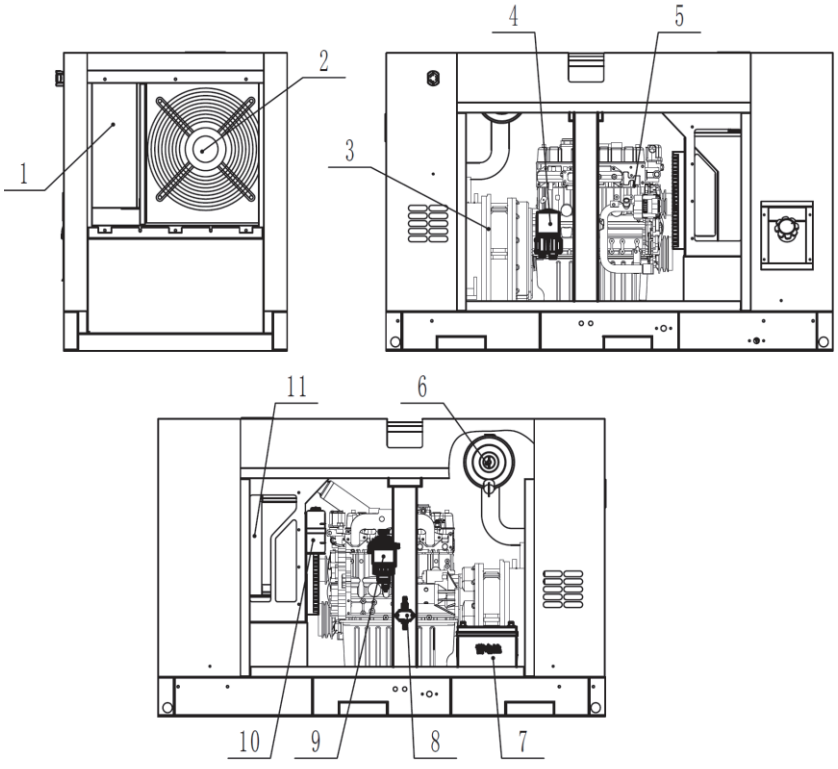
All genset pictures refer to the KDE35SS3. It may differ slightly from other models.

2.2 Exterior Part Identification



No.	Name	No.	Name	No.	Name
1	Control panel plate	6	Fuel inlet	11	Lifting rod
2	Terminal box	7	Coolant inlet	12	Forklift slot
3	Oil outlet	8	Exhaust outlet	13	Coolant outlet
4	Door	9	Air outlet	14	Air inlet
5	Fuel outlet	10	Auxiliary lifting rods	15	Emergency stop button

2.3 Inner Structure

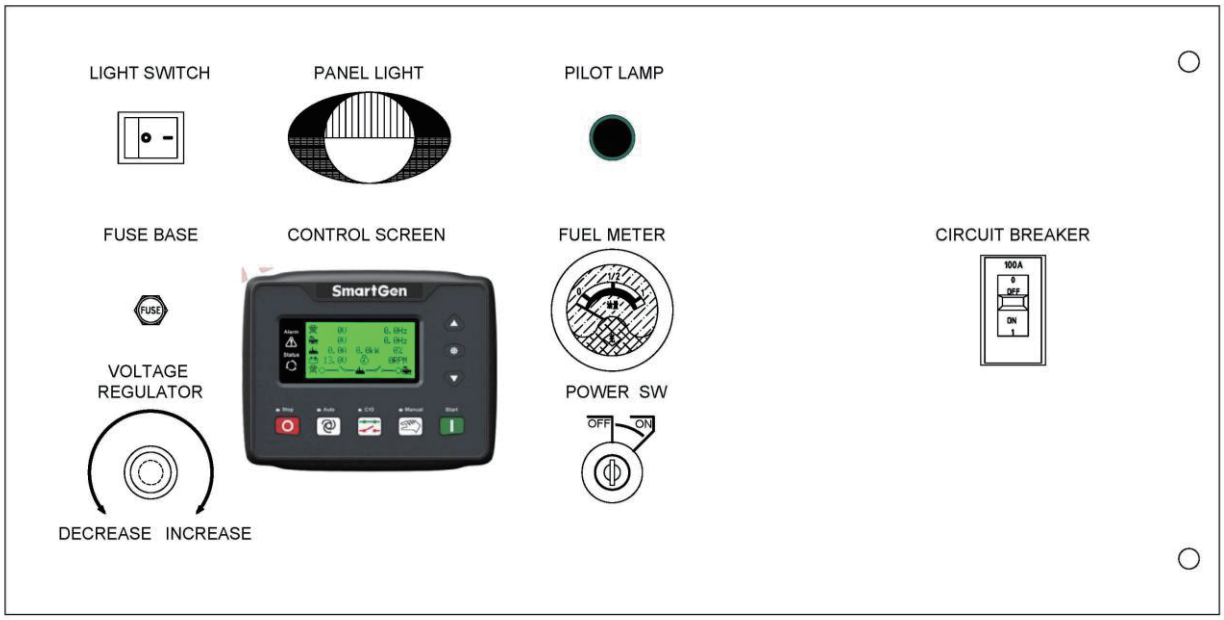


No.	Name
1	Muffler
2	Electric fan
3	Alternator
4	Oil filter
5	Diesel engine
6	Air filter
7	Battery
8	Fuel delivery pump
9	Oil water separator
10	Expansion tank
11	Radiator

2.4 Control Panel

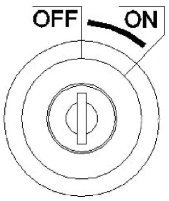
(1) Single phase: HDE20SS, HDE26SS, HDE35SS

Three-phase: HDE25SS3,HDE32SS3,HDE43SS3,HDE60SS3,HDE75SS3,HDE95SS3



2.5 Component Name and Function

POWER SW



(1) Starter switch and key

It's used to start, run or stop engine. Insert the key and turn to "ON". It will close the control circuit and the digital control panel will operate. Engine is ready to start.

☒ ON

When the key is released from the "START" position, the engine will stay running.

☒ OFF

Turn the key to "OFF" and the engine will stop immediately.

⚠CAUTION

Pull out the key and secure it when the generator is not in use to prevent an unauthorized operation

(2) Main circuit breaker

The main circuit breaker is a device that can be used to automatically interrupt power of the genset output when current exceeds the trip rating of the breaker.

In case of an overload, short circuit or a genset fault, it will automatically interrupt power to protect

the genset and the loads.

- ☒ Please turn to "OFF" before starting the generator and turn to "ON" when the genset is ready to provide power.
- ☒ In case of an emergency, stop the genset with the emergency stop button and turn the main breaker to "OFF".

⚠CAUTION

Don't use main circuit breaker to control loads. Control loads with other breakers such as a load switch.

If the main circuit breaker stops between "ON" & "OFF" for an over current or other fault, find the trouble and eliminate it and then turn the breaker to "OFF" before turning to "ON".

The main circuit breaker will automatically interrupt power if the genset is in trouble. Don't turn the breaker to "ON" before finding and eliminating the trouble.

When you stop the genset with the emergency stop button, identify and eliminate any fault. The main circuit breaker will be unable to turn to "ON" if the emergency stop button is not reset.

(3) AVR (Automatic Voltage Regulator)

The AVR is used to adjust output voltage. It will increase voltage when the knob is turned to the right and decrease voltage when the knob is turned to the left. Adjusting range: ± 10%.

(4) Emergency stop button

Press the "EMERGENCY STOP" button in an emergency to stop the engine immediately.

Reset the button by pressing and rotating it clockwise after the fault is corrected.

(5) Panel light & light switch

Illuminates the panel when necessary.

⚠CAUTION

The panel light is powered by the batteries and will turn on when the genset isn't running. Turn off when not in use or the batteries will discharge.

(6) Fuel gauge

Indicates fuel level in the tank and alerts you when refueling is necessary.

(7) Safety fuses

a. Preheat circuit: 50A

b. Charging circuit: 20A

c. Control circuit: 10A

(8) Digital controller

Please refer to Controller Manual for detailed information.

3. Installation

3.1 Standard Installation

Comply with the following instructions when installing the generator.

(1) Place the genset in a well-ventilated area with adequate air for combustion and cooling. Prevent exhaust air from entering the air inlet.

(2) Place the genset in an area that is protected from rain, snow, ice, water and excessive heat.

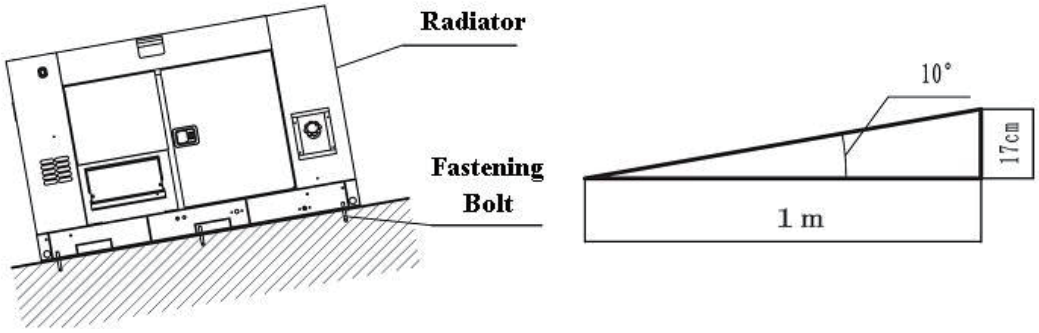
(3) **Don′t place the genset in an area with unclean air such as abrasive dust, metal dust, fibers** smoke, oil fumes and exhaust air. The engine needs clean air to operate efficiently and so does the operator.

(4) If you want to install the genset outdoors, it should be equipped with a canopy or enclosure designed for an outdoor application. Observe the surroundings and try to keep the generator away from trees or power lines that could fall and cause damage.

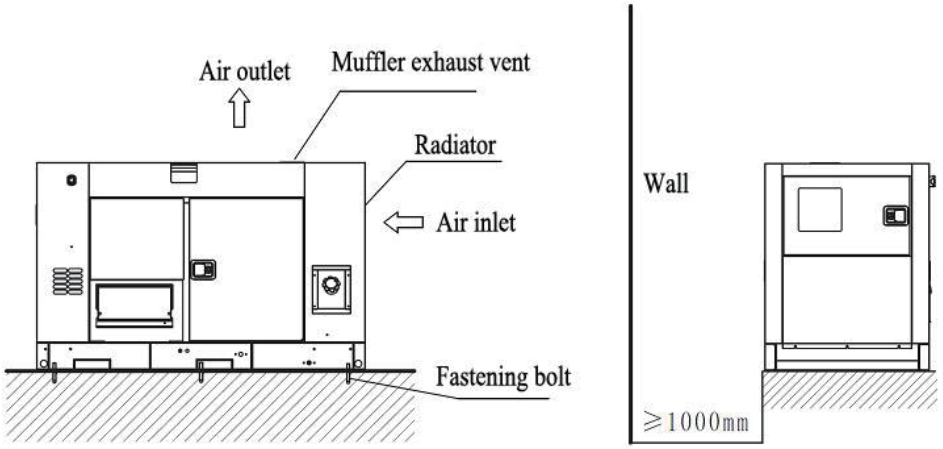
(5) Install the genset on a solid and level ground. Make sure the bottom of the genset contacts the ground evenly to prevent excessive vibration.

(6) If you have to install the genset on a slope, make sure the side with the radiator faces upwards and the inclination angle is less than 10°.

The engine may overheat if the coolant level sensor is not close to level.



(7) There must be enough room around the genset for cooling and maintenance. Keep the genset at least 1 meter away from walls and 2 meters away from the ceiling. Keep the air outlet and exhaust vented upwards and prevent any blockage. This will help prevent overheating and poor engine performance due to excessive back pressure.



(8) Place the genset as close to the loads if possible. If the power cable is too long there will be a voltage drop due to increased resistance.

(9) If the genset is placed in a room, make sure the room is accessible for installation, maintenance and movement of the genset.

3.2 Special Precautions

⚠DANGER

Toxic exhaust

Poor ventilation may cause severe injury or death due to carbon monoxide poisoning.

■ Do not operate the genset in the room or poorly ventilated area.

■ Do not operate the genset indoors unless it is installed in a specially designed room.

■ The exhaust vent must not open out to offices or residences

⚠CAUTION

Vibration

Pay attention to vibrations during the installation:

■ The genset should be put on a hard ground level; uneven ground may cause abnormal vibrations.

■ Vibrations should not disturb others working or living around the genset.

⚠CAUTION

Noise

■ Close and lock the doors when running the genset.

■ If the noise is excessive, use additional sound attenuating methods such as adding insulation to the genset room. Contact the factory for assistance with special mufflers or resonators.

⚠CAUTION

Placement

■ The genset should be put on a hard ground level.

■ Install the generator at least one meter from the wall at the side of the refuel inlet.

■ Keep fuel lines and connection cables at least 1.2 meters from the control panel.

■ Allow adequate space to service the generator.

■ Pay special attention to the condition of the generator when operating in dusty conditions or salty air. These cause the genset to deteriorate quickly.

⚠CAUTION

Indoor Installation

■ The exhaust gas must be vented to the outside by an exhaust pipe.

■ The intake vent should be large enough to provide air for cooling and combustion and avoid the induction of hot air.

■The temperature in the genset room will increase rapidly when ventilation is poor and shorten the service life.

4. Load Connection

4.1 Genset Sizing

Loads are the most important factor in sizing the genset. Different load types such as motors and uninterruptible power supplies (UPS) have considerable and varying influences on the genset sizing.

The power required by many loads is considerably higher when starting the load than what is required for continuous steady state running (most motor driven loads). Some loads (non-linear loads like UPS, computers) cause excessive generator distortion unless the generator is sized larger than what is required to power the load. The genset must be able to supply all operating power requirements to the loads.

If the genset sizing is not proper, it may cause load failure or genset damage.

Consider the following when sizing the generator.

The starting current of an electric motor is typically 5-8 times rated current. The abrupt increase in current may cause an overload and output voltage will drop suddenly. The motor may fail to start properly.

●You can calculate the genset size with the following formulas:

(1) The genset size of a squirrel cage asynchronous motor (kVA)

$$\text{The genset size (kVA)} \approx \frac{\text{Rated power of motor (kW)}}{\text{Motor efficiency x Power factor}}$$

Motor efficiency: 0.8

Power factor: 0.8

The genset size (kVA) = 1.56 × Rated power of motor (kW)

(2) Direct starting squirrel cage asynchronous motor (with knife switch)

The genset size (kVA) = 2 × Rated power of motor (kW)

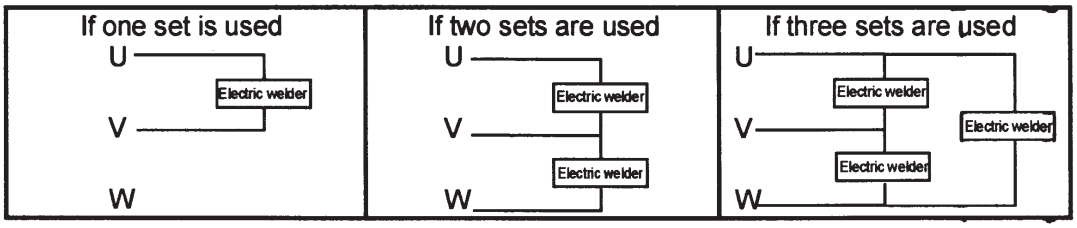
(3) Direct starting squirrel cage motor (with contactor)

The genset size (kVA) = 3 × Rated power of motor (kW)

(4) Y/△ starting squirrel-cage motor

The genset capacity = 1.2~1.5 × Rated power of motor (kW)

●It is better to balance the load if more than one AC electric welder is used. Balance each phase as follows:



CAUTION

When starting the appliance, it should be started without load. Load can be applied after the motor is started. If there are several motor loads in the circuit, the motor with the high power consumption should be started first then the others in turn.

4.2 Grounding Protection

DANGER

Electric Shock

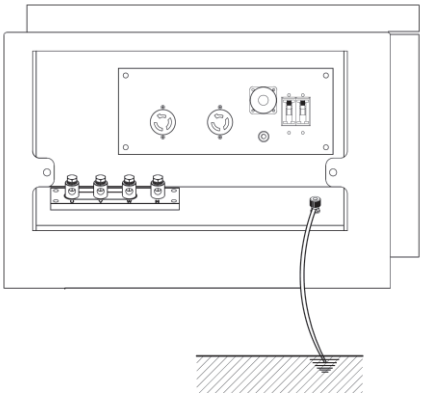
(1) Touching the output terminals with your hands may cause electric shock leading to death.

■ **Open the main circuit breaker and stop the genset before connecting any load.**

■ **Turn the main circuit breaker to "OFF" and stop the genset before service.**

(2) Don't use damaged cables to prevent an electric shock accident. If the cables are not secure, the connection may overheat and cause a fire or accident.

4.3 Grounding Method



(1) The grounding of gensets

The terminal box should be connected according to the picture at left.

The diameter of the grounding cable should be sized according to the genset capacity and relevant electrical standards. Use a grounding rod with the following resistance:

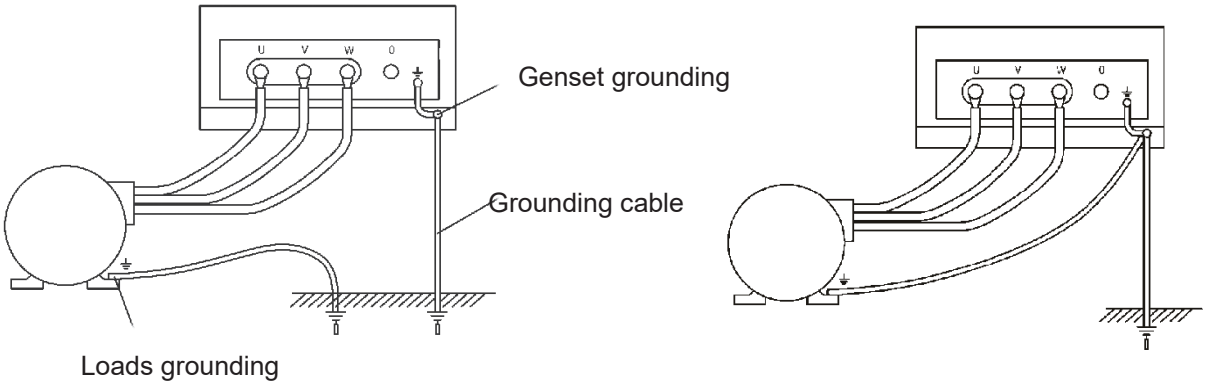
If it is D grounding (No.3 grounding), the grounding resistance should be lower than 100 Ω. When the voltage is over 300V, it is C class grounding and the grounding resistance must be lower than 10Ω.

(2) Grounding of loads

CAUTION

Loads must be grounded even if the genset is equipped with an electrical leakage protector.

The housing of the loads must be grounded. The section of grounding cable depends on the load capacity and relevant electrical standards. If it is D class (No.3 grounding) the grounding resistance should be **lower than 500Ω.**



(3) Common grounding

It is preferable to ground the genset canopy and loads separately. However common grounding is allowed in some situations.

a. Calculate grounding cable sections separately then select the larger one.

b. Calculate the grounding cable resistance separately then select the smaller one.

c. Tighten all grounding cables securely.

(4) Grounding precautions

☒ The grounding rod should be placed in a shady area. If the soil has high moisture content, bury the upper part completely in the soil.

☒ Clamp the cable securely to avoid tripping people who walk around it.

☒ Connect the extended cable as following:

- Weld the extended cable or use a sleeve to tighten. Cover the connection part with insulation tape. The connection should be above ground for periodic checks.
- Keep the grounding rod at least two meters away from any lighting rod.

☒ **Don't use the same grounding cable with the telephone ground or any other grounds.**

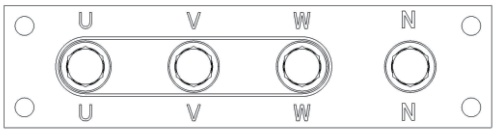
CAUTION

Screw on the bolts securely with a wrench when connecting the loads. Otherwise it may cause overheating and a fire.

4.4 Wiring Loads

(1) 3-phase, 4-line wirings

Connect the load cable with the three phase terminals of the genset.

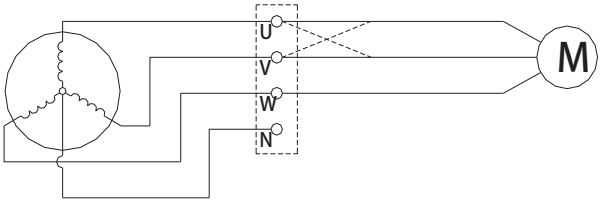


CAUTION

Check the phase and voltage of the loads before connection.

CAUTION

If a 3-phase motor rotates in a reverse direction, please exchange any two phases of three terminals.



(2) Single phase (230/240V)

There are two connection methods: single-phase receptacle and three-phase joint as indicated in the drawing below. Choose the correct one.

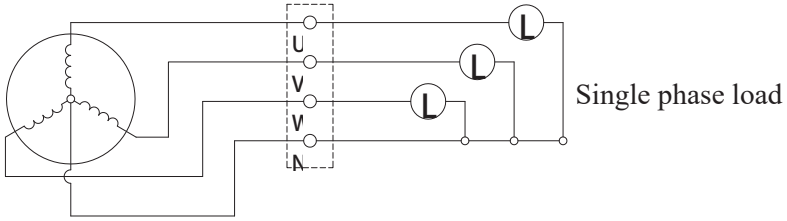
Receptacle and breaker are two 15A circuits (W phase); three phase joint combines N-phase with U, V, W phases,

Regulate voltage with AVR.

a) Three-phase joint

Make sure the maximum value of the controller ampere meter is larger than rated current.

☒ The maximum current of the genset is the total current of single-phase and three-phase loads. When the AC voltage meter is 400/416 V (50/60Hz), the single-phase output voltage is 230/240V (50/60Hz).



☒ If it is a single-phase output, output power of each single phase is only 1/3 of the rated power of the genset (KW). If you use single-phase and three-phase loads at the same time, not that the **load′ s power of each phase cannot exceed 1/3 of rated power (KW).**

Maximum load power of a single phase is $(P_N/3) \times 0.8$.

P_N indicates the rated power of the genset, 0.8 is the power factor.

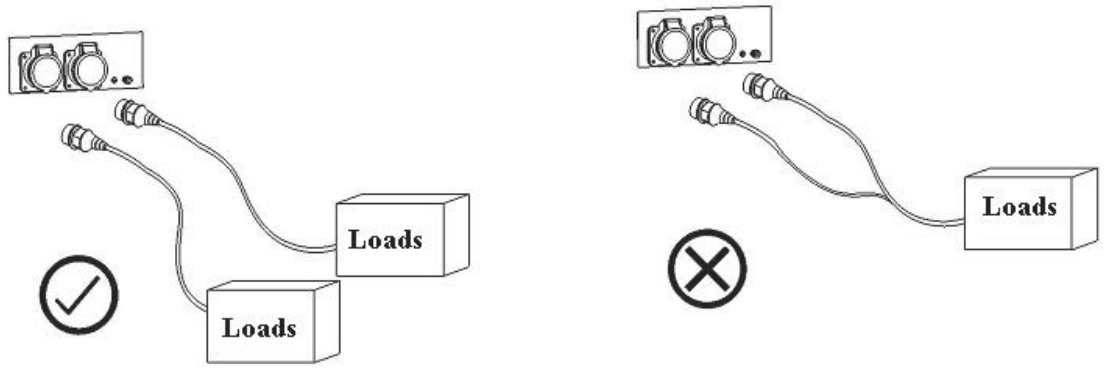
☒ Prevent overloading. If an unbalanced load is necessary, the difference between three phases shall be within 20%.

b) Single phase receptacle

Turn the single phase breaker to "ON" to energize the receptacle.

●There are two single-phase receptacles on the panel which are separate circuits.

● Overloading is not allowed.



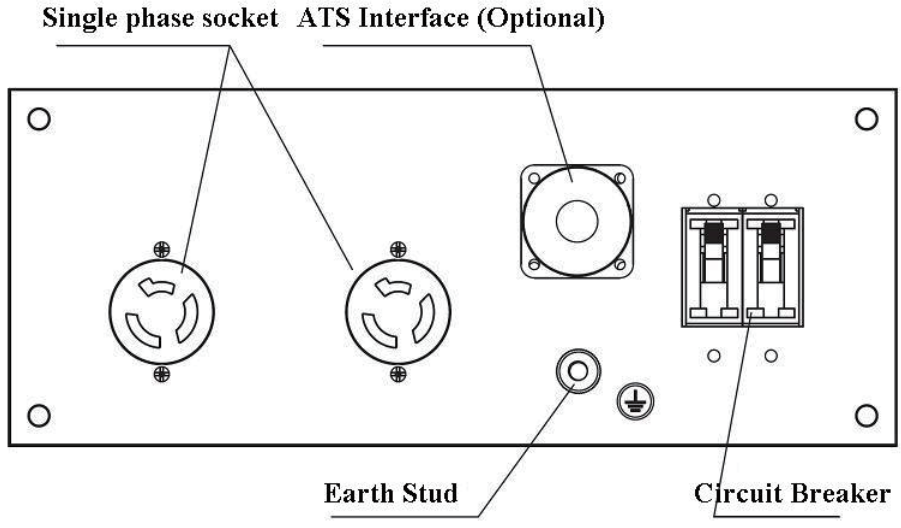
c) Comply with the following instructions when making connections.

☒ Install a circuit breaker between the genset output terminals and loads. Don't use the main circuit breaker to control loads; it may cause genset damage and/or personal injury.

☒ Turn the main circuit breaker to "OFF" and stop the genset before connecting cables.

☒ Don't connect cables of different phases together.

☒ After connecting loads, close the terminal box and tighten the fastening screw securely.



4.5 Selection of Power Cables

If the power cable diameter is too small, it may be overheat under high current and burn the cables. If the power cable is too long, the resistance will be large and cause a voltage drop which may stop the load from working.

Use the following formula to calculate cable length and diameter (section area).

$$\text{Voltage drop (V)} = \frac{1}{58} \text{ X } \frac{\text{Length}}{\text{Section area}} \text{ X Current (A) X } \sqrt{3}$$

The selection chart for single core and multi-core cables is as follows:

(It's applicable for 220V voltage with a voltage drop of less than 10V).

Ambient temperature：25℃

No	Copper wire type	Single core current capacity(A)		Voltage drop mv/M	3-core current capacity(A)		Voltage drop mv/M	4-core current capacity (A)		Voltage drop mv/M
		VV22	YJV22		VV22	YJV22		VV22	YJV22	
1	1.5mm^2	20	25	30.86	13	18	30.86	13	13	30.86
2	2.5mm^2	28	35	18.9	18	22	18.9	18	30	18.9
3	4mm^2	38	50	11.76	24	32	11.76	25	32	11.76
4	6mm^2	48	60	7.86	32	41	7.86	33	42	7.86
5	10mm^2	65	85	4.67	45	55	4.67	47	56	4.67
6	16mm^2	88	110	2.95	61	75	2.6	65	80	2.6
7	25mm^2	113	157	1.87	85	105	1.6	86	108	1.6
8	35mm^2	142	192	1.35	105	130	1.2	108	130	1.2
9	50mm^2	171	232	1.01	124	155	0.87	137	165	0.87
10	70mm^2	218	294	0.71	160	205	0.61	176	220	0.61
11	95mm^2	265	355	0.52	201	248	0.45	217	265	0.45
12	120mm^2	305	410	0.43	235	292	0.36	253	310	0.36
13	150mm^2	355	478	0.36	275	343	0.3	290	360	0.3
14	185mm^2	410	550	0.3	323	400	0.25	333	415	0.25
15	240mm^2	490	660	0.25	381	480	0.21	400	495	0.21

⚠CAUTION

Both ambient temperature and the method of laying cable will affect the current capacity of the copper wire.

The table is provided for your base reference.

5. Fluids& Battery

5.1 Fuel

Low grade or improper fuels may damage the engine and shorten its service life. Therefore please choose the GB/T252-1994 fuel or equivalent standard.

GB/T252-1994 light diesel 0# in summer, -10# , -20#, -35# in winter

(1) Fuel type

Fuel type is classified by the condensation point. Select the proper fuel for the ambient temperature.

Ambient temperature °C	Light fuel (GB/T252-1994)
＞4°C	0#
＞-5°C	-10#
-5～-14℃	-20#
-14～-29℃	-35#
-29～-44℃	-50#

(2) How to use fuel

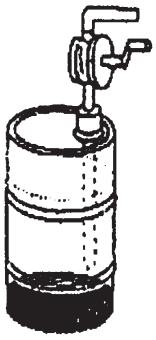
a. Fuel with water or foreign matter may damage the engine.

b. Store the fuel in a clean container.

c. The container shall be protected against rainwater or other foreign matter.

d. Do not move the fuel container and keep it static for several hours. This lets water and foreign matter in the fuel deposit at the bottom.

Only pump fuel from the clean section of the tank.



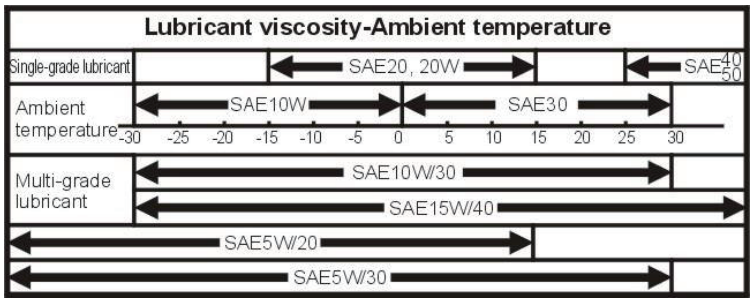
Use fuel in the top and middle of the tank to avoid pumping water and other matter that has settled in the bottom of the tank.

⚠CAUTION

(1) Never use heavy oil, kerosene, or mixed fuel. Use light fuel only.

(2) Choose the proper fuel in winter or summer.

Using the wrong fuel in the winter may make the engine hard to start. Additionally, the fuel may freeze.



5.2 Lubricating Oil

Use only designated lubricating oil to avoid engine damage and a reduced service life.

(1) Oil selection

●Use SAE 10W-30 and 15W-40 high-grade diesel lube oil (CD grade) for most environments.

●Use a grade of CD or CF (API classification).

(2) Oil viscosity

Choose the correct viscosity for the prevailing ambient temperature.

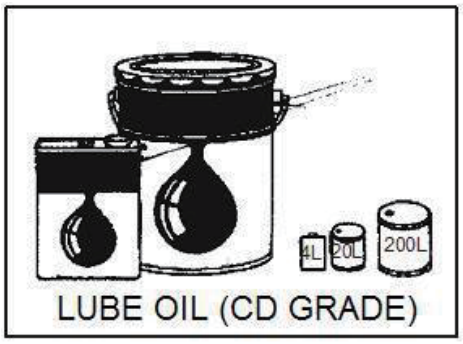
NOTE: Replace oil after the initial 50 hours then every 250 running hours or three months thereafter.

(3) How to use lube oil

●Avoid foreign matter or dust falling into the oil during storage and filling.

● Check for foreign material around the oil inlet when refilling.

●Do not combine different brands or grades of oil.



5.3 Coolant

Proper coolant is a mixture of either ethylene glycol or propylene glycol with clean water. For cooling, freeze and boil protection, the ratio of ethylene-glycol or propylene-glycol to water is 30% to 50%.

If the ratio is too low, the coolant will provide lower rust resistance. If the ratio is too high, the coolant will provide less protection from freezing.

The relationship between the mixture ratio and ambient temperature is as follows:

30%: -10°C

40%: -20°C

50%: -30°C

Use the same mixture when adding coolant.

⚠CAUTION

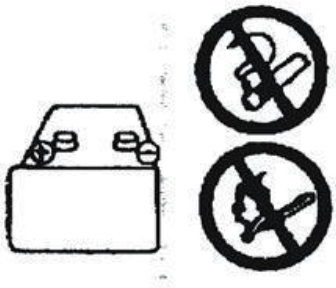
Use a coolant with an anti-rust agent.

Replace the coolant at least once a year regardless of how many hours the genset has run.

5.4 Battery

⚠DANGER

The battery produces highly flammable gas during charging.



5.4.1 Special precautions

- ☒ Charge the battery in a well-ventilated area to prevent fire or explosion from the highly flammable gas.
- ☒ Never connect the positive terminal with the negative terminal directly. Sparks can be generated that will ignite the battery gasses.
- ☒ Disconnect the negative terminal first while servicing the battery.
- ☒ Most electrolytes are diluted sulfuric acid.
- ☒ If the electrolyte contacts your clothing or skin, flush with large amounts of water.

  If electrolyte gets into your eyes, flush them with large amounts of water and seek immediate medical attention,.

Do not run the starting motor frequently or the battery will discharge.

Do not disconnect the battery while the genset is still running to prevent damage to the starting motor.

5.4.2 Checking the battery

(1) Check the electrolyte level

Check the battery indicator lamp on a maintenance free battery. A blue lamp indicates sufficient power while a red lamp indicates insufficient power.

(2) Check the electrolyte specific gravity.

If the starter rotation speed is slower than the rated value, it will lead to start failure so keep the battery charged. If the genset cannot start after charging, replace the battery.

Measure the specific gravity of the electrolyte level with a hydrometer if the battery lacks an adequate charge. If the residual voltage is below 75%, charge the battery.

Check the battery voltage first before starting the genset if it hasn′ t been used for more than 3 months. Charge the battery if the voltage is lower than 12V. Starting a genset with low voltage may damage the starting motor.

Calculate the charging ratio on the basis of measured specific gravity according to the table below:

Temperature °C / Charging ratio %	20	-10	0
100	1.28	1.30	1.29
90	1.26	1.28	1.27
80	1.24	1.26	1.25
75	1.23	1.25	1.24

A tolerance of ± 0.01 is permissible.

Charge the battery immediately when the charging ratio is lower than 75%.

(3) Charging information

☒ The battery can be charged automatically if the charging generator or float charger is working. Otherwise disconnect the cables to the starting motor before charging the battery.

☒ Charge the battery in a well-ventilated area.

☒ Disconnect the negative cable first when disconnecting cables.
(If you disconnect the positive cable first, it may cause an electrical spark the cable is touches the genset housing).

☒ When reconnecting the cables, connect the positive cable first and then connect negative wire.

☒ Keep fire, sparks or any other source of combustion away from the highly inflammable gas.

☒ If the battery is extremely hot, i.e. electrolyte temperature is above 45°C, stop charging until it cools down.

☒ Stop charging when the battery is completely charged. Continued charging will lead to:

- Battery overheating
- Loss of electrolyte
- Battery failure

⚠CAUTION

Incorrect wiring can damage the engine.

6. Operating the Generator

6.1 Preparation before Startup

6.1.1 Adding fuel

Recommended fuel: GB/T252-1994 light diesel: 0# in summer, -10#, -20#, -35# in winter

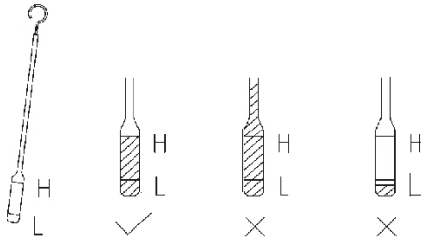
⚠DANGER

●Use the proper fuel. Improper fuel may be a fire risk and damage the engine. Please confirm the fuel type before filling.

●**Clean up any fuel that spills. Don′t start the engine before cleanup.**

● In order to prevent any overflow when the genset is running, the volume of fuel should be approximately 90% of total tank volume.

6.1.2 Checking and adding oil



a. Keep the engine on ground level when checking and adding oil.

b. Take off the cover off the lube oil inlet. Add recommended oil up to the upper mark (H) on the dipstick.

c. Measure the oil level with the dipstick. In order to get correct level, please clean the dipstick completely before reinserting it into the dipstick tube.

⚠CAUTION

Keep the oil level between the upper and lower scale marks. The oil level shall not exceed the upper mark (H). Too much oil puts a strain on the engine and can accumulate in the breather tube causing performance problems.

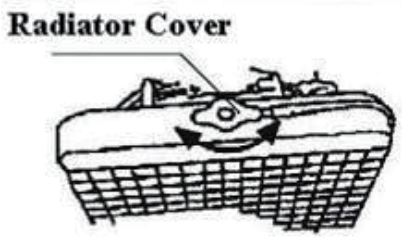
6.1.3 Checking and adding coolant

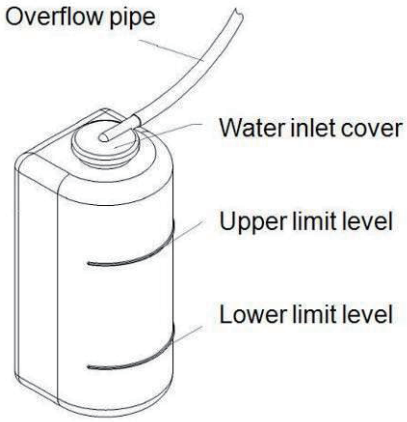
Use the proper coolant mixture. See section 5.3.

a. Turn the radiator cover anticlockwise and remove it.

b. Add coolant until it overflows from the radiator water inlet. Slowly fill coolant to avoid any bubbles or foam.

c. Close the radiator cover tightly to prevent any water l**eakage or pressure loss. Insert the cover′s** inside clip in the notch of the water inlet. Then press down the cover and turn the cover clockwise for a 1/3 revolution to close the cover.





Filling the expansion tank

a. Take off the water inlet cover of the expansion tank. Add coolant to the upper scale mark and then replace the cover.

b. Check the connections and rubber hoses connecting the expansion tank and radiator and make sure they are tight and not broken. Repair any discrepancies to avoid coolant leakage..

⚠WARNING

Close the radiator water inlet cover tightly. If it is not tight, coolant will evaporate quickly and lower pressure will cause higher temperatures. Also leaking steam or hot water may cause burns.

6.2 Check before Running

Please check the following items before running:

1) Remove any foreign matter in or around the genset

- **Check for tools or rags inside the cabinet**
- **Check for trash or inflammable matter around the muffler or engine.**
- **Ensure the air inlet and exhaust outlet is not blocke**

2) Check the general condition of the genset:

☒ Oil, fuel or coolant leaks

☒ Broken distribution lines, short circuits or loose connections

☒ Check all fasteners for tightness

☒ Check fan belt tension

☒ Check battery capacity

☒ Check grounding protection

⚠CAUTION

Do not run the genset before all discrepancies have been fixed.

6.3 Starting the Genset

Check that the surrounding area is safe before starting the genset.

Close all doors before starting.

There is one method to start the genset .

1. Please insert the start key and rotate it to "ON" and the digital controller indicator illuminate. Set the controller on "MANUAL" mode and then press to start the genset.

CAUTION

If the engine fails to start, turn the start key to "OFF" and wait for at least 15 seconds before restarting.

Don't try to start the engine more than twice every three minutes.

If you attempt to start the engine frequently or the starting time is too long, it will cause the loss of battery power and lower its voltage. Additionally the starting motor may be damaged.

WARNING

Starting the generator with loads applied is forbidden.

6.4 Initial Running

Run the genset initially without loads. It will deliver lube oil to all moving parts. Applying loads immediately can cause abnormal abrasion or damage to the pistons, cylinder sleeves, crankshaft, camshaft, bearings and other parts.

a. Check for alarms such as low oil pressure, high coolant temperature, charging failure or other faults.
b. Please warm up the engine for at least 5 minutes after starting.
c. Check for abnormal noise or fluid leaks.
d. Check the oil and coolant levels after stopping the engine. Wait five minutes to ensure fluids have returned to their reservoirs.

After initial running, some oil and coolant will remain in parts of the engine. Refill these fluids to the proper levels.

6.5 Running

DANGER

While the genset is running, avoid contact with the following parts.

Rotating parts such as the radiator fan and belts.

High temperature parts such as the engine block, cylinder heads, exhaust pipe and muffler.

High voltage parts.

Stop the genset before check or service.

Close and lock the door.

Stop the engine and wait until it cools before adding fuel, oil or coolant.

The radiator fan will keep rotating for a time after the engine is stopped. Make sure the fan has stopped completely before servicing.

Operate the genset with the buttons on the controller.

6.5.1 Check after running

1) Check and fill fuel

Regularly check the residual fuel level in the tank and add more fuel as necessary.

Remove sediment and water in the fuel tank, fuel filter or fuel-water separator.

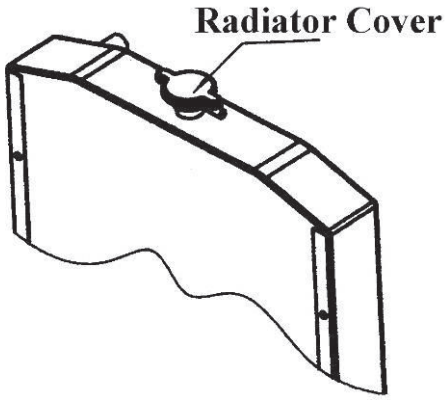
2) Check and fill lube oil

● Check the lube oil level with the dipstick.

● Add oil when the oil level is insufficient. Add oil to the upper scale mark.

3) Check and fill coolant

Check and fill coolant when the engine has cooled.



⚠WARNING

The genset is still hot after it shuts down. Do not open the water inlet cover of the radiator because escaping steam and hot water are extremely dangerous. After it has cooled, wrap the cover of the water inlet cover with cloth and then open the cover. Remove the water inlet cover after releasing the internal pressure.

⚠CAUTION

Confirm and check the coolant volume in the expansion tank.

Add coolant if the level is below the lower scale mark.

Check coolant level prior to running daily.

● Normal changes in water level:

Before running (cold status): low level

After stop (high-temperature status): upper level.

If there is no difference after running the genset, open the radiator cover and check and add coolant.

Check the rubber hoses connecting the radiator cover and the expansion tank. Ensure all connections are secure.

4) Check the grounding

Confirm the grounding for the genset and loads works well.

Do not connect the N-phase directly to ground.

5) Check for leaks

Open the doors and check in and around the genset for fluid leaks. Correct any discrepancies.

6) Check bolts and nuts and wiring

Check that bolts and nuts are secure especially the air filter, muffler & charging generator. Normal vibration will cause fasteners to loosen over time.

Ensure all electrical wires are connected and secure.

7) Check the fan belt

Check the fan belt tension. Keep it clean to prevent it from slipping.

8) Check the electric fan

There is an electric fan in front of the radiator. When the genset is running, check that the fan is working and there are no vibrations or abnormal noise.

The fan may not turn when the genset is running at idle speed. When the engine speed goes up and the genset power indicator lights up, the electric fan will start to work. Do not run the genset at idle for too long a time or the coolant temperature will rise.

The electric fan will continue to rotate after the genset has stopped.

If the genset runs at low speed for a long time after starting, water temperature may rise quickly as the electric fan is not rotating. Raise the engine speed and make sure the fan is operating before returning to idle.

Cut the power to the electric fan if it's not working or if there is an over or under current or if some foreign matter is ingested into the fan.

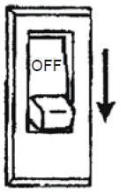
a. Fuse

Check if the fuse is broken in the control panel. Replace it with a fuse of the same amperage.

b. Electric fan circuit breaker

Check if the circuit breaker is "OFF". Turn the breaker to "ON". If the circuit breaker automatically goes off, investigate the source of the problem.

6.5.2 Starting without loads



Turn the main circuit breaker to "OFF" before starting.

It may damage the genset or loads if you start the genset with the main circuit breaker "ON"

Warm up the genset without load for 5 minutes.

Adjust voltage and frequency.

a. Adjust the regulating screw rod of the fuel pump until the frequency is at rated value.

b. Adjust the voltage with the AVR to specification.

6.5.3 Run at low load

⚠WARNING

Running at low loads for extended periods is harmful to the genset.

Don't run the genset at 1/8 1/4 of rated load for more than 5 hours.

Running the genset for long time at low load will cause carbon deposits on the engine and exhaust pipe reducing engine performance.

Running the genset above 1/4 of rated load for long periods is permissible.

6.5.4 How to apply loads

1) Check before start

a. Check that the voltage, current and frequency shown on the controller panel are in the normal range.

b. Check the surroundings of the genset and loads.

c. Turn the main circuit breaker to "OFF" and turn the loads circuit breakers to "OFF."

- Check the color of exhaust
  - ☒ Colorless or light gray: Normal.
  - ☒ Black: Abnormal (insufficient combustion).
  - ☒ Blue: Abnormal (Combustion of lube oil). Some blue smoke is normal immediately after startup if the genset has been idle for some time.
  - ☒ White: Abnormal (No combustion of fuel or too much water contained in the fuel). White smoke at startup is normal when starting in cold weather.
- Check the sound, running state and vibration
- Check for fluid leaks

2) Applying the load

a. Turn the main circuit breaker to "ON"

b. Turn the loads circuit breakers to "ON"

⚠CAUTION

Don't increase or decrease loads rapidly for the first 50 running hours of a new genset.

3) Adjust during running

Please adjust voltage and frequency to the normal range.

4) Check during running

Please check the following items during running:

a. Check parameters

Check that the voltage, current and frequency is in the normal range. Check for any alarms.

b. If the fuel indicator indicates low fuel, stop the engine and add fuel.

c. If the genset runs out of fuel while running, bleed air from the fuel system before restarting. See the engine manual.

⚠CAUTION

If there are alarms or other problems with the genset, stop it immediately to prevent a severe accident or damage.

6.6 Stopping the Genset

1. Normal shutdown

a. Turn off all loads;

b. Turn loads circuit breakers to "OFF";

c. Turn the main circuit breaker to "OFF";

d. Run the genset without load for 5 minutes

e. Turn the start key to "OFF" or press the "STOP" button on the controller panel to stop the genset.

f. Take out the start key and keep it in a secure location.

⚠WARNING

It is forbidden to stop the genset with a load applied except in case of emergency.

2. Emergency stop

a. In an emergency such as a short circuit, electric shock, overspeed, excessive vibration or

unusual noise, press the "EMERGENCY STOP" button to stop the genset.

b. After stopping the genset, please reset the "EMERGENCY STOP" button before a restart. Press the button and rotate it clockwise to restore it to the normal position.

⚠CAUTION

When pressing the "EMERGENCY STOP" button, the main circuit breaker will turn to the "OFF" position immediately and cut power to the loads. At the same time, the genset will stop and the digital control panel will show an alarm.

To resume operation, reset the "EMERGENCY STOP" button first and then press the "RECOVER" button on the control panel. After eliminate troubles and there are no alarms, then you can start the genset again.

⚠WARNING

Please don't press "EMERGENCY STOP" button if it's not a true emergency case, otherwise it can be harmful to the genset.

The engine temperature will rise rapidly and could lead to cylinder damage.

7. Service & Maintenance

Regular and systematic preventive and periodic maintenance is the key to a long service life of the generator. Repair and maintenance should be carried out by qualified technical personnel. Keep detailed records of all maintenance activities to guide future repairs and provide documentation for warranty.

During checks or maintenance, place the warning label "DANGER NOT RUN" at obvious positions around the genset such as starting switch to keep you safe and protected from an inadvertent startup.

Do not carry out any maintenance unless the generator has completely stopped, the circuit breakers placed in the off position and the battery cables disconnected.

☒ Always perform the daily checks before starting. Refer to section 6.1 for detailed instructions.

☒ Please replace spare parts with genuine spare parts. Parts have been engineered to fit your generator. The use of unauthorized parts may have an adverse effect on the performance of the generator and possibly void your warranty.

☒ Wear suitable clothing when working on the generator. Loose clothing can get caught in rotating parts and cause a serious injury.

☒ Dispose of all wastes such as used oil, coolant, and diesel fuel properly in accordance with local regulations.

☒ Don't pour waste liquids into streams, lakes, rivers or on the ground to prevent polluting the environment.

7.1 Routine and Periodic Service Chart

Routine service: check before every start.

Periodic service: certain items must be checked or parts replaced at regular intervals of 50, 250, 500, or 1000 hours.

Some items require specialized tools or advanced training. Contact the factory or your local distributor for technical assistance.

In case of running the generator in temperatures lower than -18℃ or higher than 38℃ often or the engine is exposed to dusty or frequent stop conditions, the maintenance interval should be shortened. This is especially critical for the oil lubricating oil and filters and the air filter.

○ Check ◎ Replace ● Special tools or knowledge are required for these items. Contact your local distributor

System	Items	Every day	50h	250h	500h	1000h	If necessary
Lube oil	Check oil level	○					
	Check oil leakage	○					
	Replace oil		◎ First time	◎			
	Replace oil filter element						
Fuel	Check fuel level	○					
	Check fuel leakage	○					
	Replace oil water separator		○Drain water	◎			
	Clean inner fuel tank				○		
	Replace fuel filter element				◎		
Coolant	Check coolant level	○					
	Check fan belt tension		○				
	Clean radiator element				○		
	Replace the coolant					◎	
Rubber hoses	Check all connections and hose conditions	○					◎
	Replace fuel and water lines					◎	
Intake system	Clean air filter	○		○			◎
	Replace air filter element				◎		
Exhaust system	Check connections	○					
	Check color of exhaust smoke	○					
The genset	Check vibration dampers	○				◎	
	Check noise absorption material	○					◎
Electrical parts	Check instruments, alarm, lights	○					
	Battery capacity and charging battery	○				◎	
	Check the genset grounding	○					
Governor	Check governor operation	○					
	Idle speed adjustment				●		
Cylinder head	Intake and exhaust valve clearance adjust			●First time	●		
	Replace intake and exhaust valve seals					●	
Injector & injection pump	Check and adjust injection pressure				●		
	Check and adjust injection timing					●	
	Adjust injectors & injection pump					●	
Generator	Check circuit leakage relay	○					
	Check insulation resistance			○			
	Check wiring and terminals				○		

For more information, please refer to the Engine Operation Manual.

⚠CAUTION

7.2 Service Intervals

(1) Initial 50 hours service

☒ Replace lube oil
☒ Replace oil filter
☒ Check fan belt tension
☒ Drain off water from oil water separator

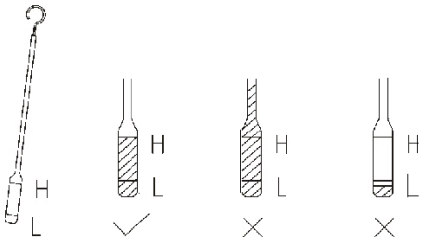
(2) 250 hours service

☒ Replace lube oil
☒ Replace oil filter element
☒ Clean air filter
☒ Test insulation resistance of generator (once a month)

(3) 500 hours service

☒ Replace air filter element
☒ Replace fuel filter element
☒ Clean the radiator
☒ Check electrical wirings and terminals
☒ Clean the internal fuel tank
☒ Perform all 250 hours service items.

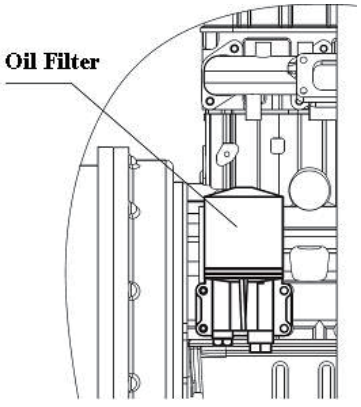
(4) 1000 hours service



☒ Drain the radiator and refill with fresh coolant
☒ Adjust fuel injection timing
☒ Check vibration dampers
☒ Check hoses
☒ Check noise absorption material
☒ Perform all 250 and 500 hours service items

For more information, please refer to the Engine Operation Manual

7.2.1 Initial 50 hours check



(1) Replace lube oil

Replace lube oil after the initial 50 hours and every 250 hours thereafter.

a. Remove the oil drain plug and drain the oil completely. It′ s easie

to drain the oil if you run the genset for 3-5 minutes.

b. Remove the oil drain plug.

c. Change the oil filter at this time. See (2) below. Reinstall the drain plug.

c. Remove the oil filler cap and add the recommended oil to the upper mark (H) of dipstick.

d. After adding oil, start the genset and run for a few minutes. Stop the genset to and recheck the oil level to be sure it is between the upper mark (H) and lower mark (L).

(2) Replace oil filter element

Replace the oil filter element after the initial 50 hours and every 250 hours thereafter.

Please replace more frequently when operating in dirty or dusty conditions.

a. Remove the oil filter element with an oil filter wrench.

b. Spread a thin film of oil on the new oil filter sealing surface. Install the filter by hand until it contacts the sealing surface and then tighten it with a filter wrench ¾ to 1 revolution.

c. Start the engine and recheck the oil level as above.

Normal oil level shall be between H and L

(3) Check fan belt tension

Poor belt tension may cause improper fan operation, the coolant pump and the charging generator, resulting in overheating or charging failure. Excessive belt tension will cause damage to the bearings of the water pump and charging generator. Adjust the belt tension as follows:

a. Open the side door and press the middle part of the belt with your finger to test its tension.

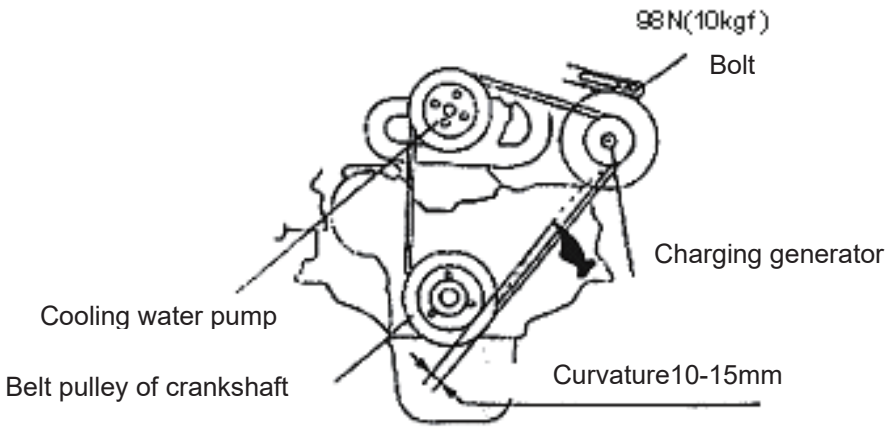
b. To adjust the belt tension, unscrew the adjusting bolt of the charging generator. Move the charging generator until the belt curvature is 10-15 mm or the tension is 98.1N (10 kgf).

c. Tighten the charging generator adjusting bolt and recheck the tension.

d. Keep oil and dirt away from the belt or it may slip or elongate.

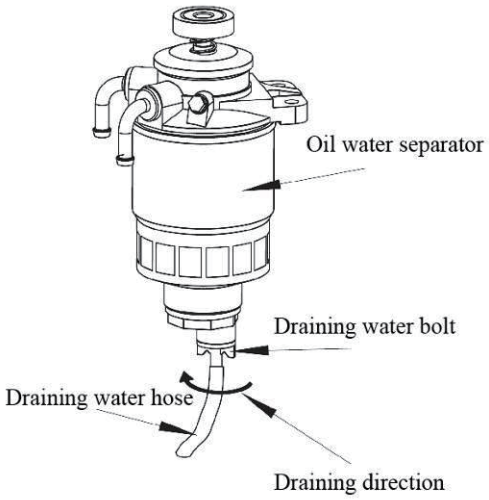
e. Replace a damaged belt immediately.

	Fan belt
Tension	98.1N (10kgf)
Curvature	10~15mm



(4) Drain the oil water separator

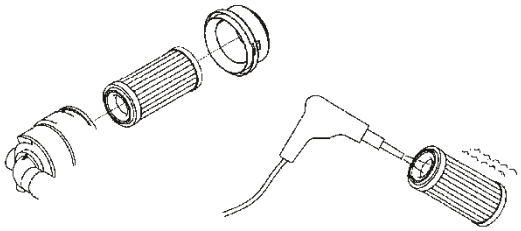
The oil water separator separates water from the diesel fuel before it is drawn into the engine. The water must be drained periodically.



a. Open the door and check if the oil water separator dirty, clogged or leaking. Clean or replace it immediately.
b. Put a container under the drain outlet of the oil water separator.
c. Rotate the draining bolt in the direction of the arrow and the unit will drain.
d. Drain off all water completely and then retighten the draining bolt.

7.2.2 250 hours check

(1) Clean the air filter element



a. Remove the air filter element and blow it out with clean compressed air.
b. Check the air filter element. If it is crushed or the filter media is torn, replace it.
c. Clean the air filter housing at this time.
d. Install the air filter element so it is sealed in the housing to prevent dirt intrusion.

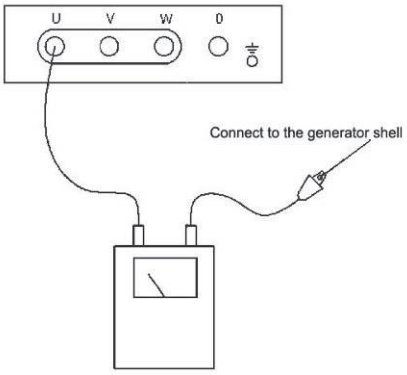
(2) Check the insulation resistance

⚠DANGER

Electric shock

■ Check the insulation resistance after stopping the engine.

■ Before measuring the insulation resistance, first disconnect the connection wire of the AVR and controller or they will be damaged.



Measure the insulation resistance once a month by using a 500V insulating resistance meter. The insulation resistance should be above 1 MΩ.

Measurement:

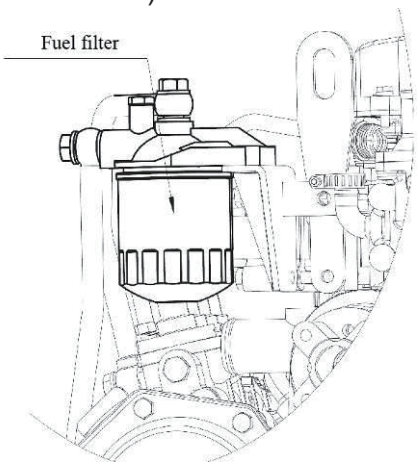
Dismantle the three phase power cables and turn the main circuit breaker to ON. Measure the

insulation resistance between the output terminal and the generator frame.

Insulation **resistance lower than 1 MΩ can be a shock or fire hazard. Clean and dry the output** terminals, breakers and cables. Consult the factory or your local distributor if you have any questions.

(4) Check the electrolyte specific gravity

A discharged battery will fail to start the engine and possibly cause other engine faults. Check the electrolyte specific gravity as scheduled. (Refer to 5.4.2 for more information)



7.2.3 500 hours service

(Perform the 250 hours service items at this time)

(1) Replace the fuel filter

a. Remove the fuel filter with a filter wrench and remove the spring seal gasket.

b. Clean the filter mounting area and spread a thin film of oil on a new spring seal gasket surface.

Tighten the new filter by hand until it contacts the seating area. Then tighten an additional 2/3 rotation with a filter wrench.

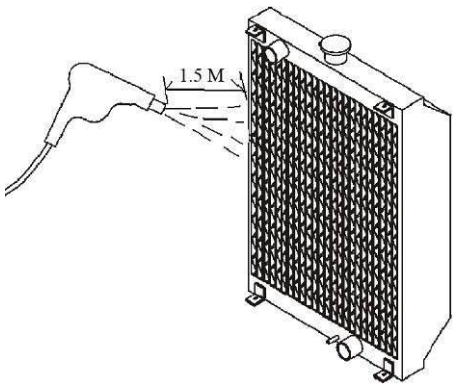
c. Bleed the air from the fuel lines after filter replacement. See the engine operation manual.

(2) Clean the radiator

Clean the radiator with steam or high-pressure air.

⚠CAUTION

If you clean radiator with high-pressure air, please keep it at least 1.5 meters away from the radiator to prevent damage to the radiator.



Remove the electric fan prior to cleaning.

(3) Check electrical wiring and terminals

Check all terminals and wires for signs of burning, chafing, cracking or other damage. Replace all damaged wires and terminals

(4) Clean the internal fuel tank

a. Prior to cleaning, run the generator to burn as much fuel as possible.

b. Remove the fuel tank cover and pump out the fuel. Clean all impurities and water from the tank.

c. Drain all fuel into a suitable container and dispose of safely.

d. Refill with fresh fuel and replace the fuel tank cover.

(5) Replace air filter element

7.2.4 1000 hours service

(Perform the 250 & 500 hours service items at this time)

(1) Replace the coolant

Please replace the coolant if it's dirty and every 12 months no matter what the hours.

⚠CAUTION

Please don't open the radiator cover while it's hot. Hot water or steam may burn you severely.

a. Open the door and remove the radiator cover.

b. Remove the drain plug at the bottom of the radiator and drain the coolant into a suitable container. Dispose of the old coolant properly

c. After draining, reinstall the drain plug.

d. Add new coolant to the radiator and expansion tank.

(2) Check the vibration dampers

If the vibration dampers are damaged or distorted contact the factory or local distributors for replacements.

(3) Check all hoses

If the hoses are cracked, brittle, distorted or have soft spots, replace them.

(4) Check sound absorbing material.

If the material glued to the inside of the cabinet and doors has been wet, peeled off or torn, the sound deadening effectiveness is diminished. Contact the factory or local distributor for replacement pieces..

(5) Check & adjust injection pressure

Precision test equipment and specialized training is needed to work on the fuel system. Contact your local distributor for assistance.

(6) Check & adjust valve clearance

If you don't have diesel engine experience, this service item is best left to your service center. The procedure is detailed in the Engine Operation Manual.

8. Troubleshooting

Stop the genset immediately if there are any abnormal noises, vibrations, smoke, etc.

Determine and the cause of the fault and repair before restarting the genset.

Moving Parts

Never touch rotating parts to prevent accidents

- ☒ Stop the engine before performing service and maintenance unless prescribed by the service manual
- ☒ The cooling fan may keep moving after the engine has stopped. Make sure it has stopped completely before performing service around the fan and radiator.

Electric Shock

Touching the output terminals or electric wiring will result in electric shock even death if you touch the output terminals or electrical wirings.

Turn the main circuit breaker to "OFF" and stop the genset before service.

Hot Parts

It's very dangerous to touch hot parts.

- ☒ Stop genet before check and service.
- ☒ The genset remains hot after you stop the genset. Check that the unit is cool before service.

The battery may produce flammable gas. Be careful to avoid any accident due to an explosion.

Disconnect the negative wire first before service.

Troubleshooting

Trouble	Possible reason	Corrective Action
Engine doesn′ t sta (**starting motor doesn′** run or speed is too slow)	Low or weak electrolyte	Check electrolyte specific gravity
	Battery terminals loose or dirty	Clean and tighten
	Poor negative ground connection	Get proper ground
	Starting switch defective	Replace
	Starting motor defective	Repair or replace
	Defective cables	Repair
Engine doesn′ t sta (starting motor runs normally)	Low fuel level	Add fuel
	Fuel filter is clogged	Clean or replace fuel filter
	Air in the fuel lines	Remove air
Engine doesn′ t start (ambient temperature is too low)	Fuel is frozen.	Use fuel suitable for the temperature
	Frozen water in the fuel system	Warm the engine carefully
The engine stops automatically or the rotating speed can't reach the rated value.	Air in the fuel lines	Remove air
	Fuel filter is clogged	Clean or replace fuel filter
	Low engine compression	Repair
	Clogged air filter	Clean or replace air filter
Low oil pressure	Low oil level	Add oil to the proper level
	Defective oil switch	Replace oil switch
	Oil filter is clogged	Replace the filter
Excessive noise	Loose exhaust connections	Tighten all connections
	Abnormal noise in engine	Consult engine manual
	Generator bearing is broken or alternator bolt is loose	Replace bearing or tighten the bolt
	Abnormal noise in canopy	Repair
Genset overheat	Exhaust vent is blocked	Remove any obstacles.
	Low coolant level	Check and refill coolant as necessary
	Fan belt is loose	Check and adjust belt tension
	Radiator is clogged	Clean radiator
	Thermometer is defective	Replace thermostat
	Genset overloaded	Remove excess loads

Trouble	Possible reason	Corrective Action
Abnormal voltage or no voltage	AVR fault	Check or replace
	Rotating rectifier is defective	Replace
	Rotor wiring is broken	Check and repair
	Engine fault	Check and repair
Low voltage	AVR fault	Replace
	Rotating rectifier defective	Replace
	Generator wiring is broken	Check and repair
	Low engine speed	Increase engine speed
High voltage	AVR fault	Replace
Voltage drops too much when connected with load.	Rotating rectifier is defective	Replace
	AVR fault	Check or replace
	Generator wiring is broken	Check and repair
	Unbalanced 3 phase loads	Balance the loads
Breaker doesn′ t worl	Breaker fault	Check and repair
	Over current fault	Check and repair
	Short circuit	Check

9. Extended Storage

9.1 Storage precautions

Store the genset in a dry and well-ventilated area for long time storage.

Pay careful attention to the following instructions:

1) Drain all coolant completely.

a. Open the door and remove the radiator cap

b. Remove the radiator drain plug and drain the coolant from the radiator into a suitable container **(don′ t empty onto the ground).**

c. Remove the engine block drain plugs and drain coolant from the engine

d. Drain the expansion tank.

e. Reinstall the radiator cap and drain plugs.

Coolant left in an engine for an extended time my fail and cause rust or freeze and cause severe engine damage.

2) Run the genset for 3 minutes and then stop the engine. Drain the oil while the engine is still warm and then refill with fresh oil. Change the oil filter at this time. Dispose of used oil properly

3) Drain any remaining fuel in the fuel tank and clean out any sediment in the tank.

4) Lubricate the speed regulation system.

5) Wipe off dirt and grease from the genset.

6) Remove the battery terminal wires, negative (-) first and then positive (+). Charge the battery with an external charger at least once a month.

7) Check and service the genset according to the maintenance schedule prior to storage. Correct any discrepancies before storage.

8) Cover the genset with a plastic cover or tarp to keep water and dust away from the genset. Use additional protective equipment for outdoor storage.

After long term storage, check the genset according to section 6.1 *Preparation before Startup*.

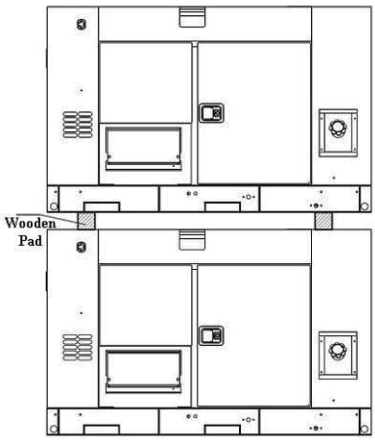
For more information, refer to the Engine Operation Manual″ .

9.2 Stacking

CAUTION

Gensets may fall or collapse if stacked improperly

Carefully follow these instructions"



1. Make sure the canopy is not damaged and fixing bolt is not loose or missing.
2. Put the genset on level ground which is hard enough to bear its weight.
3. Gensets can only be stacked two high and the upper genset cannot be larger or heavier than the lower one.
4. Never run gensets when they are stacked together. The vibration may cause them to fall or collapse.
5. Place several wooden pads at each corner of the genset (refer to the picture).

10. Technical Specifications

10.1 Power Derating

Test conditions:

Altitude: ⩽1000 m Ambient temperature: 5~25°C Relative humidity: 30%

If the genset is used in ambient conditions other than the test conditions, suitable adjustments must be made for these differences. Please refer to the following power derating table:

Power derating factor: C (@ 30% relative humidity).

Altitude (m)	Ambient temperature (°C)				
	25	30	35	40	45
1000	1	0.97	0.94	0.91	0.87
2000	0.87	0.84	0.81	0.78	0.74
3000	0.73	0.7	0.67	0.64	0.60
4000	0.60	0.57	0.54	0.51	0.47

Note:

(1) The power derating factor is C-0.01 @ 60% relative humidity
The power derating factor is C-0.02 @ 80% relative humidity
The power derating factor is C-0.03 @ 90% relative humidity
The power derating factor is C-0.04 @ 100% relative humidity

(2) When the altitude is above 4000 meters, the power derates 4% for every 300 meters

(3) When the ambient temperature is above 25°C, the power derates 3% for every 5°C increase in temperature
When the ambient temperature is above 40°C, the power derates 4% for every 5°C increase in temperature

(4) When the ambient temperature is lower than 5°C, the power derates 3% for every 5°C drop in temperature. Use heating equipment such as space heaters, water jacket heaters, fuel heaters, block heaters, etc. to raise the temperature.

For example:

The rated power of the genset is 20KW (P_N) in test conditions. To determine the power if the altitude is 2000 meters, the ambient temperature 40°C and the relative humidity is 80%:

The rated power is P=PN×(C-0.02) =20 × (0.78-0.02) = 15.2KW

10.2 Specifications

(1) Single phase genset

Generator set			HDE20SS		HDE26SS	
Generator set	Rated frequency	HZ	50	60	50	60
	Prime power	KVA	18	20	24	26
		KW	18	20	24	26
	Standby power	KVA	20	24	26	28
		KW	20	24	26	28
	Rated voltage	V	115/230	120/240	115/230	120/240
	Rated current	A	156/78.2	166.7/83.3	208.7/104.4	216.7/108.3
	Rated rotation speed	r/min	1500	1800	1500	1800
Generator	Generator manufacturer		Xingnuo			
	Generator type		XND184F-1	XND184F-2	XND184H-1	XND184H-2
	Pole No.		4			
	Excitation mode		Brushless, self-excitation and constant voltage (with AVR)			
	Power factor	COSΦ	1.0			
	Insulation grade		H			
Engine	Engine manufacturer		WEICHAI			
	Engine type		WP2.3D25E200	WP2.3D30E201	WP2.3D33E200	WP2.3D36E201
	Structure type		4-cylinder, in-lined, 4-stroke, direct-injected, water-cooled		4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled	
	Bore x stroke	mm	89×92			
	Displacement	L	2.289			
	Compression ratio		17.5:1			
	Rated power	KW	23	27	30	33
	Lubricating system		Pressure splashed			
	Lube oil brand		Above CD grade or SAE 10W-30,15W-40			
	Starting system		12V Electric starter			
	Starting motor capacity	V-KW	12V 3.5KW			
	Engine fuel consumption	g/KW.h	224	210	212	210
	Fuel type		Diesel : 0# (summer), -10# (winter), -35# (chillness)			
Genset	Control panel		HGM4010N			
	Noise level(@7m)	dB(A)	51	53	51	53
	Overall dimension	mm	1950×950×1200			
	Net weight	kg	960		1000	

Generator set			HDE35SS	
Generator set	Rated frequency	HZ	50	60
	Prime power	KVA	30	35
		KW	30	35
	Standby power	KVA	33	38.5
		KW	33	38.5
	Rated voltage	V	115/230	120/240
	Rated current	A	108.7	130.6
	Rated rotation speed	r/min	260.9/130.4	291.7/145.8
Generator	Generator manufacturer		XINGNUO	
	Generator type		XN184E-1	XN184E-2
	Pole No.		4	
	Excitation mode		Brushless, self-excitation and constant voltage (with AVR)	
	Power factor	COSΦ	1.0	
	Insulation grade		H	
Engine	Engine manufacturer		WEICHAI	
	Engine type		WP2.3D40E200	WP2.3D47E201
	Structure type		4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled	
	Bore x stroke	mm	89×92	
	Displacement	L	2.289	
	Compression ratio		17.5:1	
	Rated power	KW	36	43
	Lubricating system		Pressure splashed	
	Lube oil brand		Above CD grade or SAE 10W-30,15W-40	
	Starting system		12V Electric starter	
	Starting motor capacity	V-KW	12V 3.5KW	
	Engine fuel consumption	g/KW.h	216	213
	Fuel type		Diesel : 0# (summer), -10# (winter), -35# (chillness)	
Genset	Control panel		HGM4010N	
	Noise level(@7m)	dB(A)	51	53
	Overall dimension	mm	1950×950×1200	
	Net weight	kg	1050	

(2) Three Phase Genset

Generator set			HDE20SS3	HDE30SS3	
Generator set	Rated frequency	HZ	50	50	60
	Prime power	KVA	22.5	30	32.5
		KW	18	24	26
	Standby power	KVA	25	32.5	35
		KW	20	26	28
	Rated voltage	V	400/230	400/230	416/240
	Rated current	A	32.6	43.5	45.1
	Rated rotation speed	r/min	1500	1500	1800
Generator	Generator manufacturer		XINGNUO		
	Generator type		XN184E	XND184J-1	XND184J-2
	Pole No.		4		
	Excitation mode		Brushless, self-excitation and constant voltage (with AVR)		
	Power factor	COSΦ	0.8(lag)		
	Insulation grade		H		
Engine	Engine manufacturer		RAYWIN	WEICHAI	
	Engine type		4F24TIG11	WP2.3D33E200	WP2.3D36E201
	Structure type		4-cylinder, in-lined, 4-stroke, direct-injected, water-cooled	4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled	
	Bore x stroke	mm	87×103	89 × 92	
	Displacement	L	2.45	2.289	
	Compression ratio		19:1	17.5:1	
	Rated power	KW	37	30	33
	Lubricating system		Pressure splashed		
	Lube oil brand		Above CD grade or SAE 10W-30,15W-40		
	Starting system		12V Electric starter		
	Starting motor capacity	V-KW	12V 2.3KW	12V 3.5KW	
	Engine fuel consumption	g/KW.h	230	212	210
	Fuel type		Diesel : 0# (summer), -10# (winter), -35# (chillness)		
Genset	Control panel		Comap	HGM4010N	
	Noise level(@7m)	dB(A)	80	51	53
	Overall dimension	mm	2150×950×1480	1950× 950× 1200	
	Net weight	kg	1050	1000	

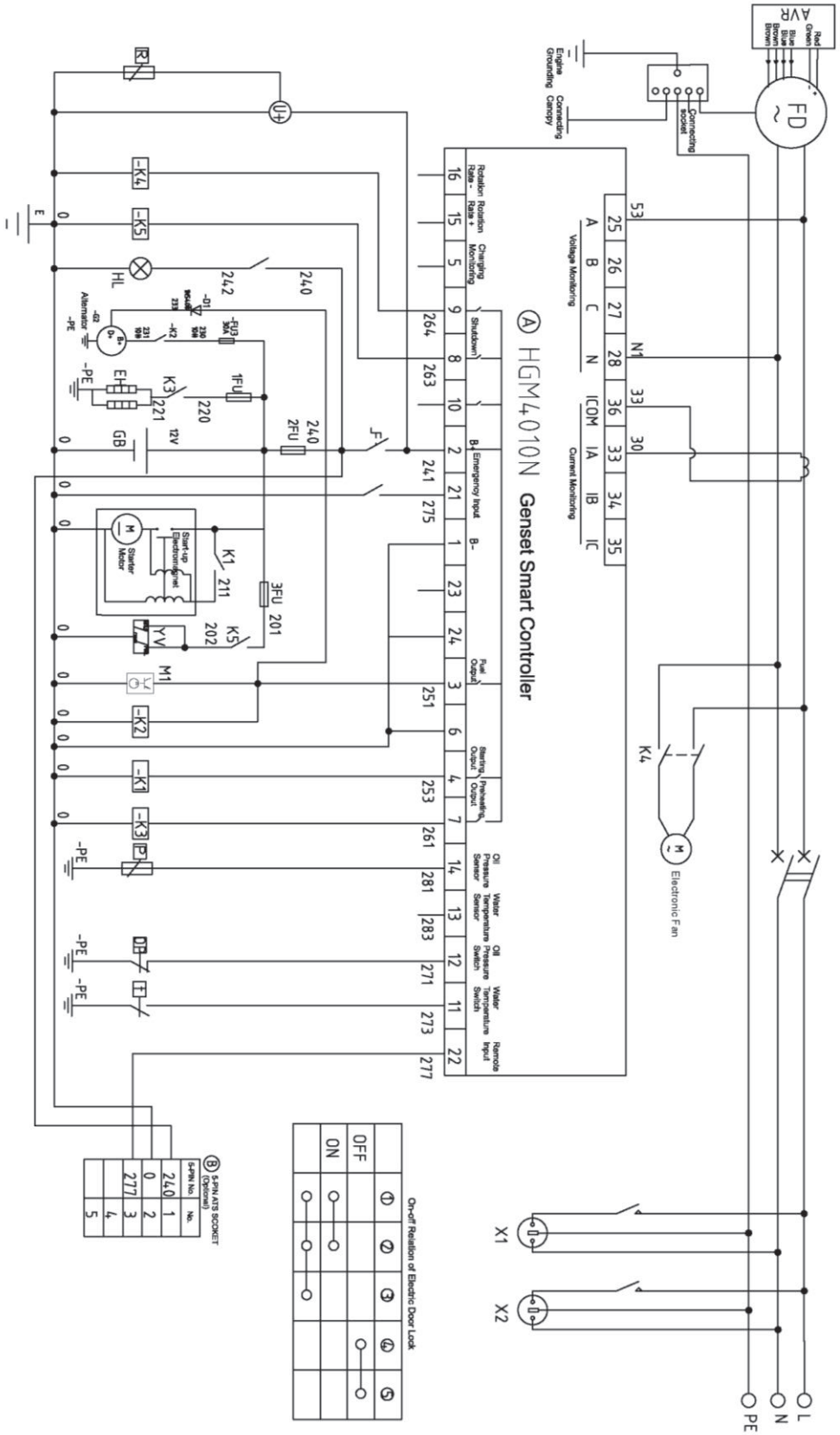
Generator set			HDE40SS3	HDE55SS3	
Generator set	Rated frequency	HZ	50	50	60
	Prime power	KVA	40	50	60
		KW	32	40	48
	Standby power	KVA	44	55	66.5
		KW	35.2	44	53
	Rated voltage	V	400/230	400/230	416/240
	Rated current	A	57.7	72.5	83.4
	Rated rotation speed	r/min	1500	1500	1800
Generator	Generator manufacturer		XINGNUO	FARADAY	
	Generator type		XN184J	FD2C-4	FD2C-4
	Pole No.		4		
	Excitation mode		Brushless, self-excitation and constant voltage (with AVR)		
	Power factor	COSΦ	0.8(lag)		
	Insulation grade		H		
Engine	Engine manufacturer		RAYWIN	WEICHAI	
	Engine type		4F24TIG10	WP4.1D66E200	WP4.1D80E201
	Structure type		4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled	4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled	
	Bore x stroke	mm	87×103	105×118	
	Displacement	L	2.45	4.087	
	Compression ratio		19:1	17.5:1	
	Rated power	KW	41	60	72
	Lubricating system		Pressure splashed		
	Lube oil brand		Above CD grade or SAE 10W-30,15W-40		
	Starting system		12V Electric starter	24V Electric starter	
	Starting motor capacity	V-KW	12V 2.3KW	24V 4.5KW	
	Engine fuel consumption	g/KW.h	230	235	235
	Fuel type		Diesel : 0# (summer), -10# (winter), -35# (chillness)		
Genset	Control panel		Comap	HGM4010N	
	Noise level(@7m)	dB(A)	80	53	57
	Overall dimension	mm	2150×950×1480	2350×1050×1300	
	Net weight	kg	1100	1270	

Generator set			HDE60E3	HDE60SS3
Generator set	Rated frequency	HZ	50	50
	Prime power	KVA	60	60
		KW	48	48
	Standby power	KVA	66	66
		KW	52.8	52.8
	Rated voltage	V	400/230	400/230
	Rated current	A	86.6	86.6
	Rated rotation speed	r/min	1500	1500
Generator	Generator manufacturer		XINGNUO	
	Generator type		XN224E	XN224E
	Pole No.		4	
	Excitation mode		Brushless, self-excitation and constant voltage (with AVR)	
	Power factor	COSΦ	0.8(lag)	
	Insulation grade		H	
Engine	Engine manufacturer		RAYWIN	
	Engine type		4D36TIG01/5	4D36TIG01/5
	Structure type		4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled	4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled
	Bore x stroke	mm	100×115	
	Displacement	L	3.612	
	Compression ratio		16.8:1	
	Rated power	KW	76.5	76.5
	Lubricating system		Pressure splashed	
	Lube oil brand		Above CD grade or SAE 10W-30,15W-40	
	Starting system		24V Electric starter	
	Starting motor capacity	V-KW	24V 5KW	
	Engine fuel consumption	g/KW.h	215	215
	Fuel type		Diesel : 0# (summer), -10# (winter), -35# (chillness)	
Genset	Control panel		Comap	
	Noise level(@7m)	dB(A)	90	80
	Overall dimension	mm	1880X1050X1510	2550X1200X1750
	Net weight	kg	950	1350

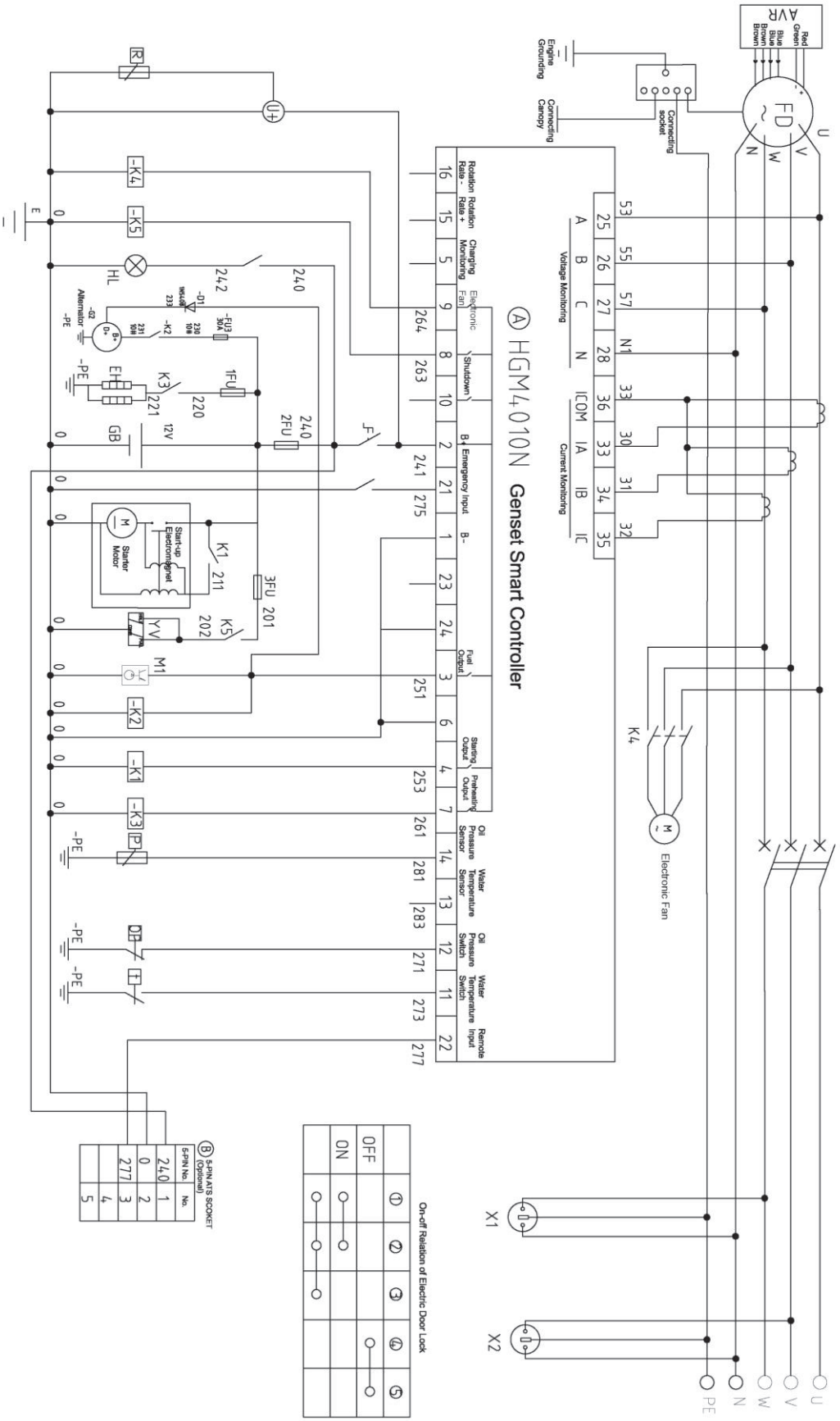
Generator set			HDE70SS3		HDE80SS3	
Generator set	Rated frequency	HZ	50	60	50	60
	Prime power	KVA	62.5	75	75	94
		KW	50	60	60	75
	Standby power	KVA	69	82.5	82.5	103
		KW	55	66	66	82.5
	Rated voltage	V	400/230	416/240	400/230	416/240
	Rated current	A	90.6	104.2	108.7	130.6
	Rated rotation speed	r/min	1500	1800	1500	1800
Generator	Generator manufacturer		FARADAY			
	Generator type		FD2CL-4	FD2CL-4	FD2DS-4	FD2DS-4
	Pole No.		4			
	Excitation mode		Brushless, self-excitation and constant voltage (with AVR)			
	Power factor	COSΦ	0.8(lag)			
	Insulation grade		H			
Engine	Engine manufacturer		WEICHAI			
	Engine type		WP4.1D66E200	WP4.1D80E201	WP4.1D80E200	WP4.1D95E201
	Structure type		4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled		4-cylinder, in-lined, 4-stroke, direct-injected, turbo charge,water-cooled	
	Bore x stroke	mm	105×118			
	Displacement	L	4.087			
	Compression ratio		17.5:1			
	Rated power	KW	60	72	72	85
	Lubricating system		Pressure splashed			
	Lube oil brand		Above CD grade or SAE 10W-30,15W-40			
	Starting system		24V Electric starter			
	Starting motor capacity	V-KW	24V 4.5KW			
	Engine fuel consumption	g/KW.h	235	235	235	235
	Fuel type		Diesel : 0# (summer), -10# (winter), -35# (chillness)			
Genset	Control panel		HGM4010N			
	Noise level(@7m)	dB(A)	53	57	53	57
	Overall dimension	mm	2350×1050×1300			
	Net weight	kg	1300		1380	

10.3 Wiring diagrams

(1) HDE20SS,HDE26SS,HDE35SS single phase electrical diagram

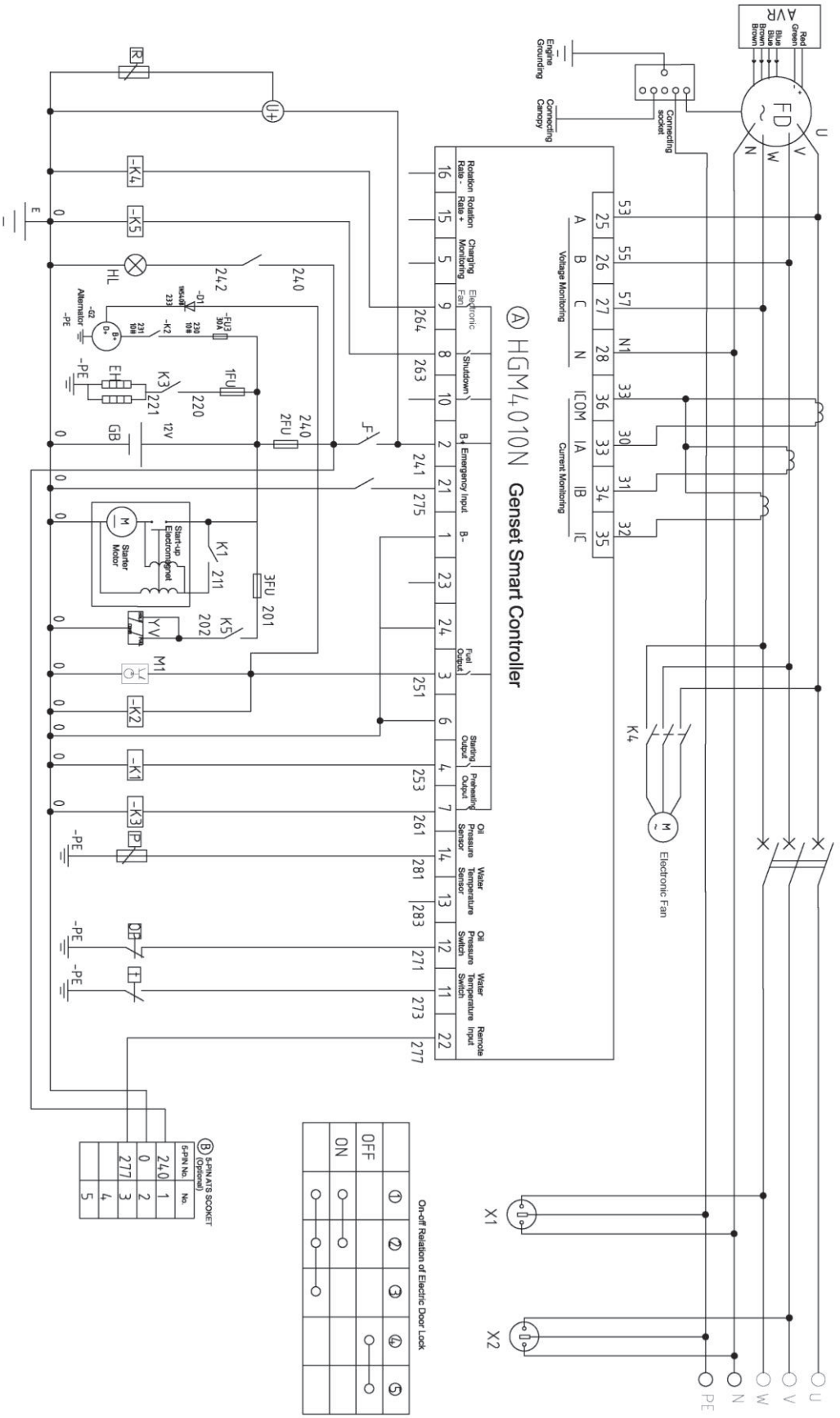


(2) HDE20SS3,HDE30SS3,HDE40SS3,HDE55SS3,HDE60SS3,HDE70SS3,HDE80SS3 three phase electrical diagram



(3) HDE60E3

three phase electrical diagram



11. Warranty

Limited Warranty

WARRANTY LENGTH

The product warranty for products of 10 kVA or more is 12 months or 1000 running hours whichever comes first. For products of 10 kVA or less, the warranty period is 12 months or 500 running hours whichever comes first. The warranty start date is the issuing date of the bill of lading. The warranty coverage is continuous from the original start date and does not restart upon the replacement of any part or complete unit. Individual parts replaced at any point during the warranty period are only eligible for warranty coverage for the balance of the warranty period. This warranty applies to the dealer and direct importer only and is not transferable.

COVERAGE

Parts will be covered for any failure that is proven to be a failure in material or workmanship under normal use during the applicable warranty time period. The dealer must bear labor and other local fees for warranty service. Reserves the right to repair or replace these parts at its option. May request defective parts to be returned. Anything replaced under warranty becomes the property .

EXCLUSION

This warranty does not extend to parts affected or damaged by accident and/or collision, normal wear, fuel contamination, rust, cosmetic damage, use in an application for which the product was not designed or any other misuse, neglect, incorporation or use of unsuitable attachments or parts, unauthorized alteration, or any causes other than defects in material or workmanship of the product. This warranty does not extend to normal maintenance items or easy worn parts such as spark plugs, hoses and filters. Starting batteries are not included in the warranty.

We will not provide direct warranty service to end users unless the selling dealer has ceased operations or has ceased being a dealer for a period of one year.

HOW TO GET THE WARRANTY SERVICE

The dealer or direct importer must present a detailed fault description including necessary defective part pictures, serial number and order number to along with a completed Warranty Claim Form.

HAHN
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