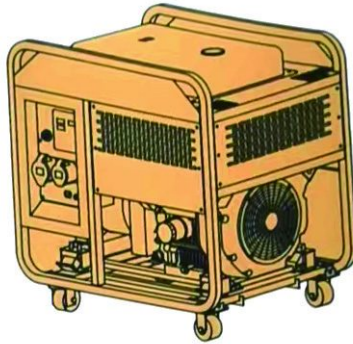
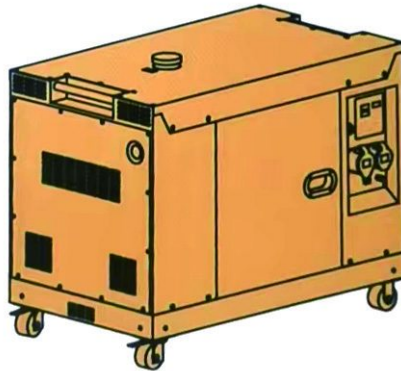




Diesel Generator Set Operation Manual



Please read the operation manual carefully

CONTENTS

Part 1.Main Technical Specification and Model Definition-----	- 1 -
1-1 Open frame generator set-----	1 -
1-2 Silent generator set-----	2 -
Part 2.Operation of Diesel Generator-----	3 -
2-1 Notes for diesel generator set operation-----	3 -
2-2 Preparation before starting-----	4 -
2-3 Operating the generator-----	7 -
2-4 Adding the load-----	9 -
2-5 Stop the generator-----	10 -
Part 3.Maintenance of diesel generator-----	11 -
3-1 Maintenance at fixed period-----	11 -
3-2 Long-term storage-----	12 -
Part 4.Trouble shooting and Remedy-----	14 -
4-1 Causes and remedies-----	14 -
Part 5.Guarantee-----	15 -

Part 1.Main Technical Specification and Model Definition

1-1 Open frame generator set

Model		HDE12000EA		HDE15000EA		HDE18000EA	
ALTERNATOR	Frequency(Hz)	50	60	50	60	50	60
	Speed(rpm)	3000	3600	3000	3600	3000	3600
	Rated volatge(V)	220, 230, 220/380, 230/400					
	Rated power(kW)	10	11	11	12	15	16
	Max.power(kW)	10.5	11.5	11.5	12.5	15.5	16.5
	Power factor Φ	1\0.8					
	Phase NO	Single\ Three					
	Excitation way	Self-exciting and voltage-constant with AVR					
	Insulation	F					
	Pole No	2					
DIESEL ENGINE	Engine model	2V88		2V92		2V95F	
	Type	V-twin double cylinder, air-cooled					
	Bore× stroke (mm)	88x75		92x75		95x88	
	Total displacement(L)	0.912		0.997		1.247	
	Compression Ratio	19.5:1		19.5:1		19.5:1	
	Rated power(KW/rpm)	13.5 /3000	14.5 /3600	15 /3000	16 /3600	18 /3000	19 /3600
	Fuel	0#(Summer),-10#(Winter),-35#(Chill Cold) diesel oil					
	Lube	SAE15W40(CF grade above)					
GENERATOR	Fuel Consumption(g/KW.h)	≤340					
	Capacity of fuel tank(L)	28					
	Working time at full fuel tank(hr)	10	9.5	9	8.5	8	7.5
	Noise level(Dba@7m)	80		82		85	
	Gross weight(Kg)	199		211		252	
	Overall dimension(mm)	885x655x890		885x655x890		935x655x975	
	Starting system	Electric start					
	Structure type	Open frame					

1-2 Silent generator set

Model		HDE12000SA		HDE15000SA		HDE18000SA	
ALTERNATOR	Frequency(Hz)	50	60	50	60	50	60
	Speed(rpm)	3000	3600	3000	3600	3000	3600
	Rated volatgeV)	220, 230, 220/380, 230/400					
	Rated power(kW)	10	11	11	12	15	16
	Max.power(kW)	10.5	11.5	11.5	12.5	15.5	16.5
	Power factor Φ	1\0.8					
	Phase NO	Single\ Three					
	Excitation way	Self-exciting and voltage-constant with AVR					
	Insulation	F					
	Pole No	2					
DIESEL ENGINE	Engine model	2V88		2V92		2V95F	
	Type	V-twin double cylinder, air-cooled					
	Bore× stroke (mm)	88x75		92x75		95x88	
	Total displacement(L)	0.912		0.997		1.247	
	Compression Ratio	19.5:1		19.5:1		19.5:1	
	Rated power(KW/rpm)	13.5 /3000	14.5 /3600	15 /3000	16 /3600	18 /3000	19 /3600
	Fuel	0#(Summer),-10#(Winter),-35#(Chill Cold) diesel oil					
	Lube	SAE15W40(CF grade above)					
	GENERATOR	Fuel Consumpition(g/KW.h)	≤340				
Capacity of fuel tank(L)		25					
Working time at full fuel tank(hr)		8	8.5	8	7.5	7	6.5
Noise level(Dba@7m)		71		73		75	
Gross weight(Kg)		257		269		312	
Overall dimension(mm)		1110x660x875		1110x660x875		1175x710x925	
Starting system		Electric start					
Structure type		Silent					

Part 2.Operation of Diesel Generator

2-1 Notes for diesel generator set operation

Before operating diesel generator, please read the manual. Especially following points should be paid attention to for preventing the accident happened.

2-1.1 Preventing the fire

The engine fuel is light diesel. It is forbidden to adopt gasoline and kerosene etc.

When the oil overflows, please use clean cloth to remove the oil. It is not permitted to have diesel generator near to gasoline, kerosene, match and inflammable material, because the temperature around the muffler is very high when the engine is operated.

For the sake of better ventilation during the generator operation, the distance between diesel generator and the building should be more than 1.5 meters.

The diesel generator should be operated on plain ground. Otherwise, the oil will overflow from diesel generator.

When the generator is a heat engine, do not place the generator set in the indoors.

2-1.2 Preventing the suction of exhaust gas

For avoiding exhaust gas sucked by the person, the diesel generator will be not allowed to work under condition of worse ventilation, because exhaust gas emitted from the engine includes harmful CO.

2-1.3 Preventing the damage by high-temperature parts

When diesel engine is working, it is not allowed to touch high-temperature parts, such as muffler and its shell etc.

2-1.4 Preventing the electric shock or short circuit

For avoiding the shock by electricity or short circuit, it is forbidden to touch with hand the alternator when working. Do not operate the generator in raining or foggy.

For preventing the shock by electricity, the grounding should be made with adoption of the wire, which of one end is connected with the

grounding terminal of the generator and another end is connected with the device outside. The grounding terminal of the generator is on control panel.

Note: 1.The start power of a large number of generator is greater than the power for normal operation. When purchasing a generator, you should fully consider the sufficient power margin.
2.Do not exceed the current limit of the socket.
3.Do not connect the generator to the household circuit. Otherwise, household appliances and generator will be damaged at the same time.

2-1.5 Charging the accumulator

The diesel generator has automatic charging function. The electrolytic liquid of the accumulator contains the sulfuric acid. For protecting the human being, should make suitable protection measurement.

As the hydrogen resulting from the accumulator is of easy explosive gas, do not smoke when charging. It is not also permitted to make the spark around the accumulator. Be sure that there is better ventilation for charging.

2-1.6 Other safety points

It is very important to know how to stop the generator and the functions of all switches. The untrained person is not permitted to operate the generator. The operator should wear safe clothes and shoes during working.

2-2 Preparation before starting

2-2.1 selection of the fuel

Fuel tank can only use light diesel fuel.

Fill fuel tank with diesel fuel, there must be no dirt or water in fuel. Otherwise, fuel injection pump and the fuel injection nozzle will exit the serious problems, which will result that engine unit can not work normally.

Adding too much fuel is very dangerous. When adding fuel, pay attention to the red display of fuel standard on the fuel tank.

Note:1. Smoking is prohibited in the refueling place of the diesel generator set or the storage place of diesel fuel, and sparks cannot enter this area.

2. When refueling, it cannot be overflowed. If you accidentally overflow fuel, you must clean it with a cloth to ensure that the overflowed fuel is dry before generator unit starts.

3. After refueling, be sure to tighten the lid of fuel tank.

4. Do not refuel when diesel generator is running.

2-2.2 Filling in lube oil

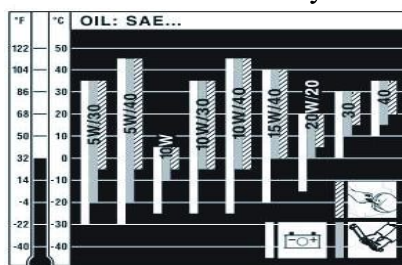
2-2.2.1 Lube oil quality

The qualified lube oil should meet following condition.

①ACEA B2/E2 or higher-grade specification

②API CF-4/CH-4 or higher-grade specification

Lube oil viscosity



Select lube oil viscosity based on ambient temperature when starting at cold temperature.

It is very important to select the applicable engine oil for keep up the performance and life of the generating set. If inferior engine oil is used, or if your engine oil is not replaced periodically, the risk of piston seizure, piston ring sticking and accelerated wear of the cylinder liner, bearing and other moving components increases significantly. So the generating set life will be shortened. We recommend CC/CD oil classified by API. Choose the applicable viscosity oil according to the local ambient temperature.

50 hours at first

Every 100 hours

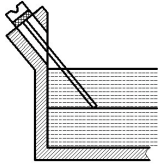
Interval for changing lube oil

When use inferior engine oil, the interval for changing lube oil will be shortened to every 50 hours running.

2-2.2.2 Lube oil level of engine

Opening for filling in lube oil

Put the generator on plain ground, then fill in lube oil through the opening of oil dipstick. When checking oil level, only screw the dipstick into the opening.



Upper level limit (H)

Lower level limit (L)

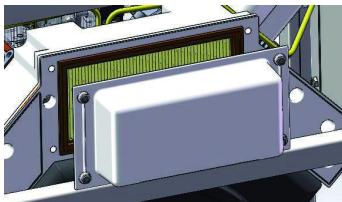
When starting the generator each time, should check oil level. If not being enough, should add the lube oil to the stipulated level. Draining off lube oil can be immediately done after engine stopped, because it is difficult to drain off the oil thoroughly when the engine is in cold state.

After filling fuel, you should tighten the fuel dipstick. Otherwise, rain, dust, and other dirt may enter diesel engine, which can cause accelerated wear of internal components. It can cause serious problems.

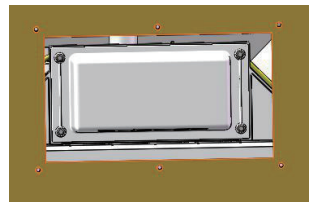
Note:1. If engine fuel is insufficient, it will damage the engine.

2. If engine fuel is sufficient, engine fuel will enter the cylinder and participate in the combustion, which can cause the engine to suddenly increase speed and emit blue smoke.

2-2.3 Check air cleaner



Open frame generator



Silent generator

(1) Loosen the bolts, remove the air filter element cover, and remove the filter element.

Note:1. It is forbidden to clean the element with detergent.

2. When output power drops or exhaust gas is black, should change the element.

3. It is not permitted to start the generator without air cleaner. Otherwise, it will cause the generator to be worn easily.

(2) Install the filter element, install the air filter element cover, and loosen the bolts.

2-2.4 Accumulator

If the accumulator is of liquid-added type, should check the electrolytic level every month. Hence it is necessary to add the distillatory water to stipulated limit.

It is very important to keep the electrolytic level within stipulated level. When the level is at lower position, the engine can not be started. If the electrolytic level is high, the liquid will overflow to corrode the parts nearby.

During the operation, the generator can automatically charge the accumulator. If the generator is used for stand-by application, should charge the accumulator.

If the accumulator is of valve-controlled lead-acid type, it will be charged if necessary.

Warning: Do not let two terminals contact with each other, which will make the circuit short.

2-2.5 Control panel inspection

Turn off main switch for unloading, like lamp and motor etc.

Warning: 1. Before starting the generator, must turn off main switch. If not in this position, it is very dangerous for the generator to be started with the load.
2. The alternator should be grounded correctly to prevent the shock by electricity.

2-3 Operating the generator

2-3.1 Operating the engine.

(1) Insert the switch key, it is in the “OFF” position.

(2) Start the switch clockwise board, it is in the “start” position.

(3) When the generator is started, the hand is released from the switch handle, which will automatically reset the switch to the “ON” position.

(4) If the generator does not start after 5 seconds, please wait for about 30 seconds and start it again.

Warning: The number of starts within one minute cannot exceed 2 times. If the 3 starts are not successful, and the voltage of the electromechanical bottle of the fuel supply system should be checked. Moreover, conduct maintenance according to the instructions. If it is started forcibly for many times, the starting motor will be burnt out.

In cold weather, when it is difficult to start the generator, at this time, your engine needs to be added with a cold start device (when ordering, you need to specify).

(5) Under the condition of without the load, the diesel engine should be warmed up for 3 minutes.

Note: 1. When the fuel pressure is too low, the low fuel pressure alarm system will act for braking the engine. If fuel is not added, the engine will still not start. Please check the fuel position, then adding the proper amount of fuel.

2. Do not loosen the fuel controller components or speed regulating bolts (they are adjusted correctly at the factory) that adjust the speed limit of the diesel engine, otherwise, the performance will be affected.

2-3.2 The operation during the running-in period

When your diesel engine is new, increasing the load will shorten the life of the motor. Within the first 20 hours, running-in should be performed.

(1) Start for the first time

After the generator is started for the first time, the generator runs without load for 5 minutes.

(2) Avoid overload

During the commissioning phase, avoid increasing the load.

(3) Change fuel of diesel engine according to the regulations

At the beginning of use, the first time is 50 hours, please refer to 2-2.2.1 in details for future fuel changes.

2-3.3 Make the inspection during the operation.

(1) Check whether there is abnormal sound or strong vibration.

(2) Check whether the engine works out of order.

(3) Check the color of exhaust gas: black or too white.

If any of them mentioned above happens, should stop the generator and then contact with local dealer or our company directly.

2-4 Adding the load

2-4.1 Load

Note: 1. Do not start two or more loads at the same time, but start the loads in order.
2. Do not use floodlights together with other loads.
3. First, start the motor load, and then start the resistive load.

(1) When the generator conducts rotational speed, it must be increased to the rated speed. Otherwise, the voltage, frequency and power will be lower than the rated value, and the automatic voltage regulator (AVR) will conduct forced excitation. It is run for a long time, which will burn out the AVR.

(2) Keep the voltage on the panel of the control box within $\pm 10\%$ of the rated voltage, you can increase the load. Refer to the first chapter 1-1, 1-2 the main technical specifications and data for generator to load.

(3) When the dual-voltage generator converts voltage, the circuit breaker should be in the “off” position. Otherwise, it will burn out the generator and load.

(4) Various devices are connected to the generator in sequence. If the motor load is connected, the high-power motor should be started first. After it is successfully started, the low-power motors are started in turn. They cannot be started at the same time. If the operation is wrong, the generator will stall or suddenly stop. At this time, you should immediately disconnect the load, turn off the switch of the generator, and check the cause of the failure.

2-4.2 Load reference

Type	The number of watts		Typical device	Case		
	Start	Rated		Device	Start	Rated
Incandescent lamp heating device	×1	×1	Incandescent lamp Television	Incandescent lamp 100W	100 W	100W

Fluorescent lamp Spotlights Sodium lamp	×2	×1.5	Fluorescent lamp	Fluorescent lamp 40W	80 W	60W
Motor driving device	×3-5	×2	Refrigerator Electric fan	Refrigerator 150W	450-750 W	300W
Switching power supply Rectified power supply	×2	×2	Motor, electric drill Computer UPS power supply	Computer UPS power supply 200W	400 W	400W

2-5 Stop the generator

2-5.1 Normal shutdown

- (1) Turn off the generator circuit breaker.
- (2) Turn off the start switch of the generator and set the switch from “Run” counterclockwise to the “Stop” position.

Note: The generator is not allowed to stop with loads. It should be shut down after disconnecting from the load.

2-5.2 The emergency shutdown

(1) When the generator runs, the operator should pay close attention to the running state of the generator. If an abnormality is found, you should use the normal shutdown procedure to shut down.

(2) If the generator is in an emergency, the machine will be greatly damaged or a personnel accident will be caused. Such as: machine runaway, short circuit, personnel electric shock and other special accidents. The operator should take an emergency shutdown decisively. You press the “emergency stop button” hard, the generator will stop shut down.

(3) After shutdown, reset the “emergency stop button”. The emergency stop button is rotated in the direction of the arrow, and the button can be ejected and reset.

Note: For non-emergency situations, you cannot use the “emergency stop button” to shut down

Part 3.Maintenance of diesel generator

3-1 Maintenance at fixed period

For the generator works in order, maintenance at fixed period is very important. The diesel generator is consisted of diesel engine, alternator, control panel, frame etc. Please read relative manual for the maintenance.

Note:1.Before maintaining the generator, stop the engine. The surrounding condition of the generator is of better ventilation, because engine exhaust includes harmful CO.

2.After stopping the generator, clean it immediately to prevent the corrosion and to remove the sediment.

3-1.1 Change lube oil (50 hours for first time and 100 hours for normal operation.)

Loosen oil-drained plug located at the bottom of cylinder block when the engine is at hot state. After removing used lube oil, screw in the plug and add the stipulated oil.

3-1.2 Change fine filte

Changing time	First time 50 hours then every 100 hours
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3-1.3 Clean or change fine filte

Cleaning time	First time 50 hours then every100 hours
Changing time	Every 500 hours

3-1.4 Change the element of air cleaner

Changing time	Every 100 hours
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When the generator is working in dusty places (such as quarries, coal yards, road construction yards), you should clean the filter element frequently to remove impurities in the air filter housing. At the same time, you should shorten the replacement time of filter.

Note: If there is no filter element, the generator cannot be started. You also cannot use a bad filter element.

3-1.5 Change fuel filter

Changing time	Every 100 hours
---------------	-----------------

3-1.6 Re-checking bolt retightened moment of cylinder head with special tool, shown in engine manual.

3-1.7 Check the injector and fuel pump

- (1) Adjust the clearance of intake / exhaust valves
- (2) Grind the intake / exhaust valves
- (3) Change piston rings

Warning: Do not test the performance of the fuel injection nozzle when it is close to an open fire or other fires. Otherwise, the sprayed fuel may cause a fire. Do not expose your skin in fuel spray. Fuel can damage the body by the skin. Keep away from the fuel injection nozzle.

3-1.8 Check the electrolytic and charge the accumulator

The 12V accumulation, used in the engine, will consume the electrolytic due to charging and discharging continuously. Check the accumulator before starting. The distillatory water can be added to stipulated limit if necessary. If the accumulator is damaged, exchange it in time.

Check the electrolytic of the accumulator	Once a month
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3-2 Long-term storage

When the generator is not operated for more than three months, it should be stored. After the storage for six months, be restored again as follows.

The storage steps are as follows:

- (1) After running the engine for 3 minutes, then perform shutdown.
- (2) When the engine is turned off, when the engine is still hot, drain the old engine fuel and add new engine fuel.
- (3) Wipe off dirt and fuel stains on the casing of the generator. Completely drain fuel the fuel tank and remove the deposits in fuel tank. The support points and connection points of the speed control system are lubricated with oil.
- (4) Disconnect the negative line of the battery.
- (5) By using a sealed plastic cover, the entire generator is covered to prevent the intrusion of water vapor and dust. The generator is stored

in a dry and ventilated place.

(6) Charge the battery once a month to compensate for the self-discharge of the battery. When starting a generator stored for a long time, you should perform the preparation procedures specified in “2-2 preparations before starting the generator”.

Inter val	Daily	50 hours	100 hours	500 hours	one year or 1000 hours
Check the fuel	○				
Check the oil	○				
Check oil leakage	○				
Check each fastening				●	
Change lube oil		○ (first time)	○		
Change fine filter		● (first time)	●		
Clean or change primary oil filter		○(first time,clean)	○ (clean)	○ (change)	
Change air filter	(shorten the interval in more dust condition)		○		
Clean air filter		○			
Change fuel filter			○		
Check fuel pump				●	
Check the injector				●	
Check fuel pipe				○	
Adjust valve clearance of inlet		● (first time)			
Grind holder of inlet& exhaust valve					●
Change piston ring					●
Check battery liquid	Every month				
Clean fuel tank	Every month				
Check the carbon brush and slip ring				●	
Check the insulation resistance	If the generator has been stored for more than 10 days, it must be checked.				

REMARK: The mark “●” indicates special spanner to be used. Please contact local dealer.

Part 4. Trouble shooting and Remedy

4-1 Causes and remedies

	Causes	Remedies
No start of the engine	Insufficient fuel	Fill in the fuel
	No spray on injector or a little quantity	Repair and adjust the injector
	Start solenoid valve without electrify	The control panel key is in the “on”, and at the same time, a short start signal is issued. At this time, the start solenoid valve control line will be energized for 12S, check whether the fuel stop solenoid valve control line has voltage output (12V to 13V)
	Check lube oil lever	The level between upper mark “H” and lower mark “L”
	Dirt on the nozzle	Clean the nozzle
	No electricity in accumulator	Charge or change the accumulator
No output of generator	Not turn on the circuit breaker	Turn to “CLOSE” position
	Worse contact of the socket	Adjust the socket
Voltage too low	Check AVR	Adjust the resistance clockwise
Automatic stop after a certain time of operation	(1)lack of the fuel (2)lack of lube oil (3)voltage too low/too high (4)frequency too low/too high (5)over-current	Repair according to relative alarming of control panel

If the generator can not deliver the output after checking, please contact with RUNSUN company or local dealer.

Part 5.Guarantee

Thank you for purchasing our products. If the product purchased is unqualified, the company will guarantee the following items according to the guarantee.

Guarantee content

If there are unqualified materials or manufacturing on the good parts of the generator purchased. The company will provide free repairs. (Free repairs in the following are called guaranteed repairs.) Guaranteed repairs refer to replaceable parts or repairs. In addition, the disqualified products dismantled will belong to our company.

Guarantee period

The guarantee repair period is within one year from the date of purchase of the goods. However, under the conditions of long-term, frequent business and harsh environment (sand dust) use, the guarantee period is six months.

Other guaranteed matters

The battery will be guaranteed according to the guarantee standards specified by the manufacturers of various parts.

The things that cannot be guaranteed

If it is a malfunction caused by the following reasons, it cannot be guaranteed for repairs.

- (1) You have not carried out regular inspection and maintenance in accordance with the company's instructions.
- (2) You have not operated it according to the instructions in the instruction manual.
- (3) Improper maintenance or errors.
- (4) When using, it exceeds the working limit specified by the company.
- (5) The malfunction caused by the user's inattention.
- (6) Use non-genuine parts and non-specified

greases.

The following items are not guaranteed for repair

- (1) The aging phenomenon occurs after a period of time (The surface of the paint decoration and the surface of the metal coating appear natural fading, etc.)
- (2) The general sensory phenomena (sound, vibration, oily smell, etc.) that do not affect quality and performance.
- (3) Problems caused by natural disasters such as typhoons and floods.
- (4) Problems caused by drugs, salt damage, etc.

Do not bear the expenses of the following items

- (1) Consumables (air filter element, fuel filter, gaskets, fuses, etc. and consumables belonging to this category) and grease etc.
- (2) It is repaired at a seller or outside the company.
- (3) Inspection, cleaning, adjustment and regular inspection and maintenance.
- (4) Inconvenience or loss caused by the inability to use the machine (such as suspension loss or business loss, etc.).
- (5) Compensation for expenses outside the conditions stated in the grantee.

Methods of accepting grantee repairs

When you need to accept grantee repairs, please bring the generator and grantee, purchase invoice to the store where you purchase the goods or our service store to apply for and repair. We will not guarantee repairs without carrying the grantee.

Guarantee service

When the customer purchase the goods, fill in the necessary items on the goods purchase invoice and guarantee with the store and sign and seal. It will take effect.