



GENERATOR

OPERATION MANUAL



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1- PREFACE

Thank you for choosing STAR generator.

Our company manufactures generator sets between 10 kVA and 2.250 kVA powers with fully automatic control panels, sound proof canopies, trailers and synchronization systems and provides technical service and spare parts support.

This instruction and maintenance manual is prepared to be used your generator in the best way and to help the installation of it.

General safety rules and technical informations are in the content.

We wish you healthy and beautiful days.

INTRODUCTION

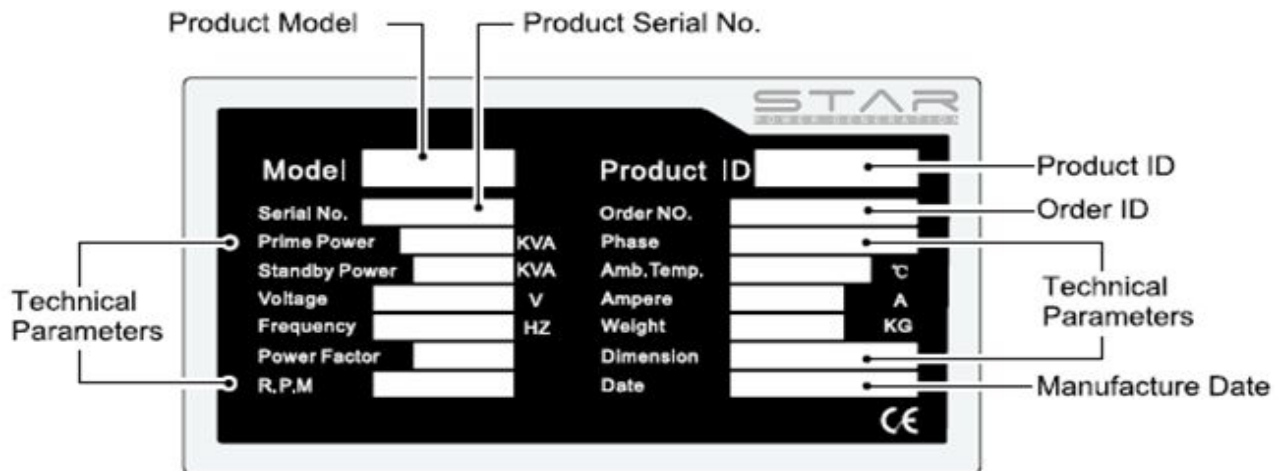
2- INTRODUCTION

Generators are delivered to our customers as ready for operation, motor oil and antifreeze coolant are filled, the battery is charged.

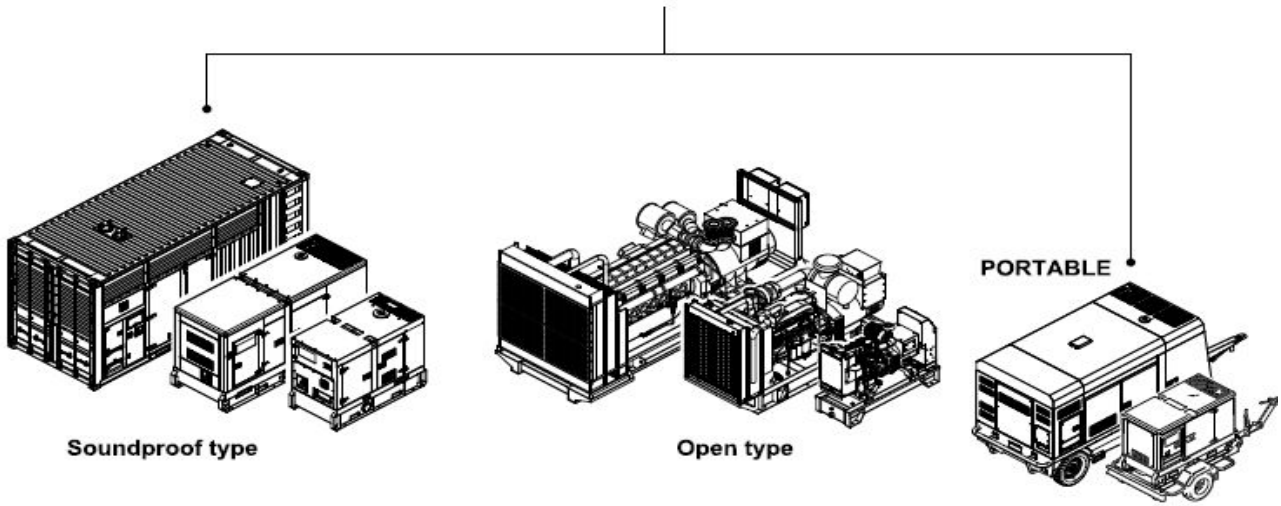
After the generator exhaust system and electrical connections are made in the supervision of authorized service, can be operated immediately after refueling.

All informations about your generator are declared on the product label as the following example. Product label is located on the automatic control panel of open the generator or the sound proof canopy of canopied generator.

3- PRODUCT LABEL

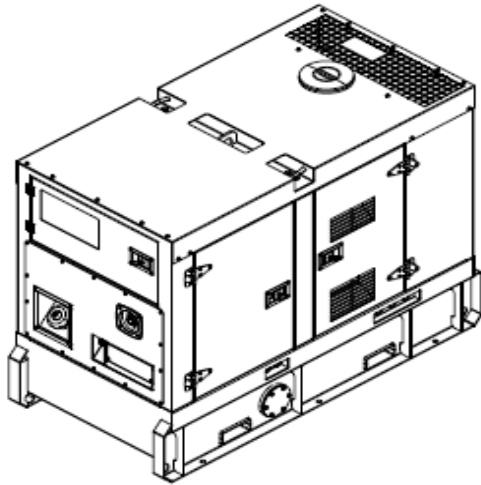


STAR



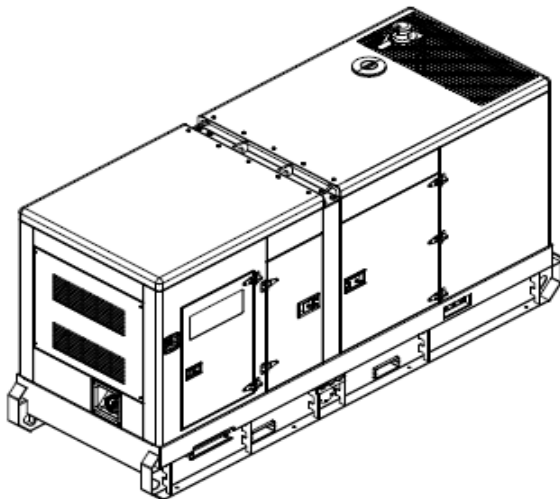
	Series	Engine
SDG	R	RICARDO
SDG	K	KOFO
SDG	Q	QUANCHAI
SDG	Y	YANGDONG
SDG	YM	YANMAR
SDG	B	BAUDOUIN
SDG	W	WEICHAI
SDG	V	VOLVO
SDG	HD	HYUNDAI-DOOSAN
SDG	P	PERKINS
SDG	C	CUMMINS
SDG	SD	SDEC

PRODUCT OVERVIEW



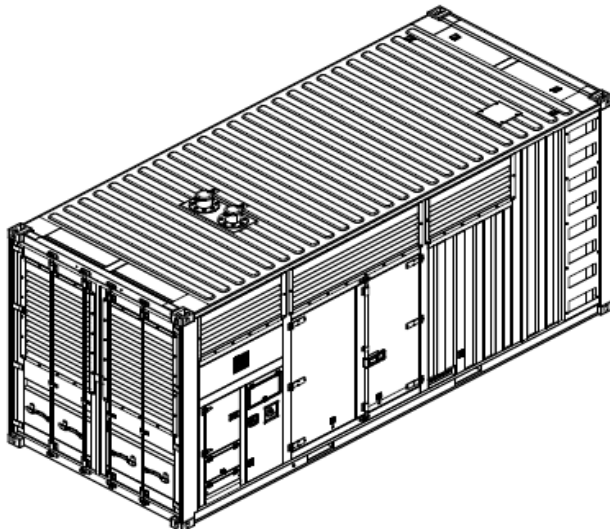
S Type

- Output power range: 5-20kVA.
- Equipped with fuel tank for 8h running at least, used as standby or emergency power service.
- Excellent sound-proof technology, noise at 7m < 65 dBA.
- Supremely compact configuration & easy operation.



R Type

- Output power range: 5-625kVA.
- Equipped with fuel tank for 8h running at least, not just used as standby or emergency but also continuous service.
- Excellent sound-proof technology, noise at 7m < 75 dBA.
- Compact configuration & easy operation.
- Steady performance and long service life.



C Type

- Output power range: 725-2000kVA.
- Equipped with fuel tank for 8h running, coupled with external fuel tank, which can be used as continuous, standby or emergency service.
- Excellent sound-proof technology, noise at 7m < 85 dBA.
- Container configuration & easy transport.
- Powerful output is suitable for heavy loads

SAFETY

Safety Before Operation

- Do not allow any child or animal to access the operating area when the genset is working.
- All internal combustion engines create carbon monoxide gas during operation. Accumulation of this gas in an enclosure could cause illness or even death. Never operate the genset in an enclosed area without proper ventilation. Ensure the exhaust pipe and muffler are far from flammable and explosive subjects.
- Ensure the load connections and distributions are made by a qualified and experienced electrician and accord with relevant regulations, standards and other criterions of the electrical appliance.
- Ensure all insulating and grounding connections are in accord with requirements.
- Check engine oil, coolant and fuel, make sure that there is no leakage.
- Check the level of engine oil, coolant and fuel, make sure each of which is in accord with requirement.



Safety During Operation

- The operator should always wear ear protections to protect ears from being harmed due to long noise.
- Before starting the engine, make sure that all circuit breakers are set to the "OFF" position.
- Do not touch any wire when the genset is running, because they are live and may cause electrical shock.
- Do not connect or disconnect loads during running. There is high voltage whenever the engine is running. Electrical shock can cause serious or fatal injury. Loads should be connected correctly before starting.
- Do not touch the engine, radiator or exhaust gas outlet, because the temperature of their surfaces is very high and touching may cause scald.
- Do not try to move the genset when it is running.
- Do not smoke or make a fire near the genset during running. It may cause fire because the burning point of fuel is low.
- Do not press the emergency stop button at will. Only use it in an actual emergency.
- If the genset shuts down due to a fault, do not restart it until the cause has been checked out and repaired.
- Stop the genset and let it cool down completely before performing maintenance and repair.



Electric Safety Instructions

- Turn off the battery switch before installing and servicing the electrical system.
- Do not stand in water or on wet ground during operating and servicing the electrical system. Keep your hands and other body parts away from live parts such as cables, harness or connect terminals.
- Replace the protective cover plate of the field wiring distribution box immediately after serving and maintenance. Never operate the genset while the protective cover plate is open.
- Check and make sure the genset's characteristics are compatible with the main or standby power source system and the loads. Cut off all the power before maintenance and repair.
- Check the electrical harness for crack, abrasion, and damaged or corroded connections. Always keep the connectors and terminals clear and tight connected.
- Check and make sure all the electrical elements, harness and cables are insulated properly.



Safety During Lifting and Transporting

- Always shut down the engine before lifting and transporting.
- Check the fuel and oil cap, make sure they have been tightened.
- Close all doors and lock them before lifting and transporting.
- Only use the special lifting lugs to lift the genset. It is totally forbidden to use any other lifting lugs located over the engine, alternator or other components.
- Check the lifting lugs before lifting, make sure they have been mounted correctly and welded firmly. In addition, the lifting devices should have enough capacity to lift the genset safely.
- Check the welding area of all lifting lugs. They could not be used if there is a crack.
- Do not stand nearby while lifting.
- Be careful during lifting or transporting to avoid the unnecessary damages and abrasions.
- It is totally forbidden to install or use the machine in a space storing dangerous goods.



Safety During Engine Running

- Do not add or change coolant while operating the genset or immediately after stopping the machine. Otherwise it may cause serious burns.
- Do not open the radiator cap unless the coolant has been cooled down completely. First loosen the cap and release the air pressure, then open it entirely.
- Do not add fuel or oil during genset operation or shortly after shutdown, only process it when the machine is cooled down. Keep sparks, open flame or any form of ignition well away when refueling for them may cause a fire.
- Do not try to start the engine when the fan protector or other protective devices are disassembled. Never put your hand inside or near these protectors for repair or maintenance when the generator set is running.
- Keep your hands and other body parts away from the hot engine surfaces such as the muffler, exhaust pipe, turbocharger (if equipped) and engine block during operation and shortly after you shut the engine down. These surfaces are extremely hot while the engine is operating and could seriously burn you.
- Keep your hands and other body parts away from moving/rotating parts. Wear tight-fitting clothing and keep your hair short or tie it back while the engine is running.
- Never operate the engine in an enclosed area. All internal combustion engines create carbon monoxide gas during operation. Accumulation of this gas within an enclosure could cause illness or even death.





1



Occurrence of electric shock

First aid must be taken in the right way at once to the person who gets an electric shock to the ground by electricity.



2

Get the victim rid of electricity

Turn off all the power first if possible and then wear personal protective equipment such as insulating gloves and insulating boots and use special insulating device such as insulating sticks to get the victim rid of the power and far away from the electricity.



3

Keep breathing expeditely

Tilt the victim's head back and raise his/her chin to take the external things such as false teeth and cachou out of his/her mouth to keep breathing expeditely.



4

Artificial respiration

Check the breathing status of the victim via looking, listening and feeling. If the victim breathes faintly, artificial respiration should be taken immediately.

During artificial respiration, pinch the victim's nose and seal your lips tightly around the victim's mouth. You should exhale to him/her after deep inspiration every 1~2 seconds.



5

Cardiopulmonary resuscitation

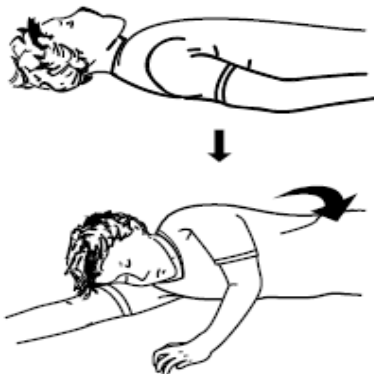
If the victim is unresponsive with no breathing or only gasps, CPR should be adopted. When doing CPR, you should press on the victim's chest 80 times per minute to stimulate the action of the victim's heart and do artificial respiration twice after every 15 times of CPR.



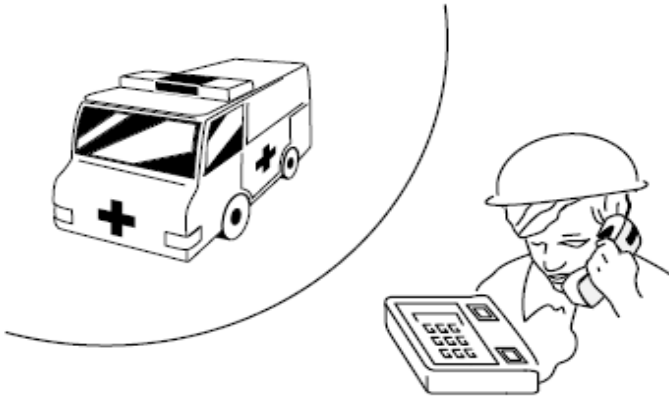
6

In case of the breath recovering

Roll the victim to get him/her lateral to keep him/her breathing expeditely if his/her breath is recovered. Check the victim's breath and pulse at intervals and find out whether there is something unusual occurs. If there is, rescue the victim according to the measures above.



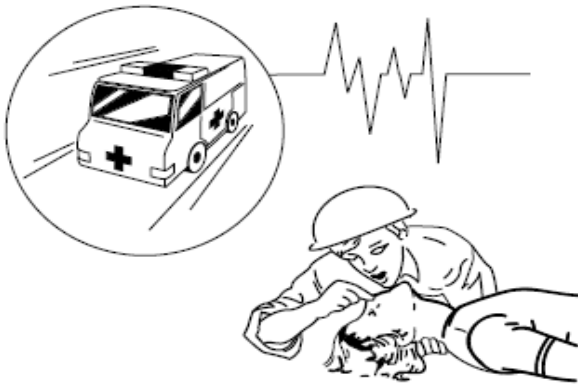
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In case of the breath not recovering

If the circs isn't going better, call the ambulance for help and keep the other person stay with the victim to watch out for him/her.

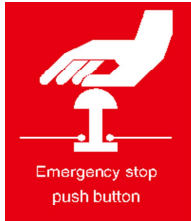
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Before the ambulance comes

Before the ambulance comes, keep the victim's head tilted back, pinch his/her nose, do artificial respiration every 5 seconds, observe the breathing status of the victim and check carotid pulse every 5~10 seconds. Keep artificial respiration operating if the victim still has a pulse, but is not breathing (respiratory arrest).

4- WARNINGS



- * If the danger occurs when the generator is running, primarily press the emergency stop button which located on the control panel or canopy. After eliminating dangerous situation, open button by turning back.
- * If your generator does not run automatically despite electrical power shortage, the emergency stop button could have stayed down. Please check it.



- * Generator is very important device due to it's usage purpose, supplies electrical energy for critical facilities like airports, hospitals, fire suppression systems, elevators, ventilation systems etc. need uninterrupted power. For this reason, the generator's production, transportation, installation, inspection and maintenance, training of personnel etc. are issues that need to be very careful.
- * Because the generator is a device which is activated automatically, when the mains fails, electrical systems in the generator and the building should not be interfered.
- * Before operating the generator, this instruction manual and engine, alternator and control module manuals must be read.
- * If the control module indicates the failure alarm, never start the generator without eliminating entirely the fault.



- * Do not connect the generator directly to the load without using transfer panel or selection switch with generators and mains positions.
- * While assembling power cables, the load must be distributed in a balance to each phase.
- * If the generator used in accordance with the information and security measures in this instruction manual, is designed to be safe device.

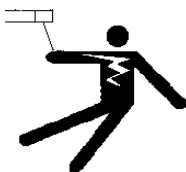


- * If you think in any way occurs a dangerous situation at generator, press the emergency stop button, disconnect the battery 's negative (-) terminal, do not use the generator until the dangerous situation eliminated.
- * The load and control cables of generator must be passed through the cable channel. The same channel must not be used for fuel pipes of an external fuel tank.
- * Before starting to maintenance or cleaning of generator, certainly the battery negative (-) terminal must be disconnected.



- * Staff will use the generator must wear thick rubber soled shoes and if possible, should work on rubber mat. The hand tools used must be insulated.

- * For a safe operation of electrical equipment, they must be installed and used properly.



- * Generator's control and load cable connections must be performed by an experienced electrician necessarily. Mistakes to be made in a cable connections of generator may occurs danger, as well as it will cause severe damage to your generator.

- * Wiring between the generator and the load must be used according to the power of generator. The use of unsuitable materials may cause a fire or electric shock.



- * When installing and removing the generator's load connections, make sure that the ground is not wet.
- * No one should touch the electrical parts of generator except the authorized electrician.
- * Connect the generator to the load which has and appropriate power and electrical characteristics.



* Generator's electrical connections must be made in accordance with the electrical standards and generator must be grounded by making the connection to the grounding bolt on the chassis of the generator. All metal surfaces including doors of the generator is electrically connected to the grounding bolt.



* Engine exhaust gas is extremely harmful to human health . When using a generator indoors, exhaust gas must be thrown out through pipes in compliance with related standards. Exhaust gases must be continuously checked whether the leak.

* Flammable material should not be placed on the exhaust system .

* Generator exhaust system must not be touched during operation. Flammable materials and objects should not be approached to the exhaust system.



* Engine should not be touched while the engine is hot and should not open the radiator cap

* Check the exhaust system output and rain cover are open while the generator is running .

* Generator fuel can ignite or explode improper use. Therefore, should certainly have fire extinguishers around the generator and fire fighting personnel should be given training.



* Generator room must be airy. Fuel, oil, antifreeze and electrolytes should not be poured on floor.

* Do not keep flammable liquids near the engine.

* Generator should not be near the fire burning , smoking should be avoided .

* Do not fill the fuel while generator running



* While open-type generator is running, must be avoided from rotating parts.

* While generator is running, do not fill fuel, oil and radiator cooling water.

* While generator is running, do not make maintenance and cleaning. Do not forget that generator radiator fan can pull lightweight materials such as cleaning cloth into the radiator.

* While generator is running, if an adjustment needs to be made should be very careful.



* Noise level of open type generator may be greater than 105 dBA and long-term exposure to more than 85 dBA, may harm your hearing.

* When you are next to the open type generator, absolutely ear protection must be used.



* Open and canopied type generators must be lifted from signed lifting points.

* While lifting generator, appropriate lifting equipments must be used in compliance with weight indicated on product lable.

* While lifting generator, around lifting equipment should not be staff with the exception of the operator.



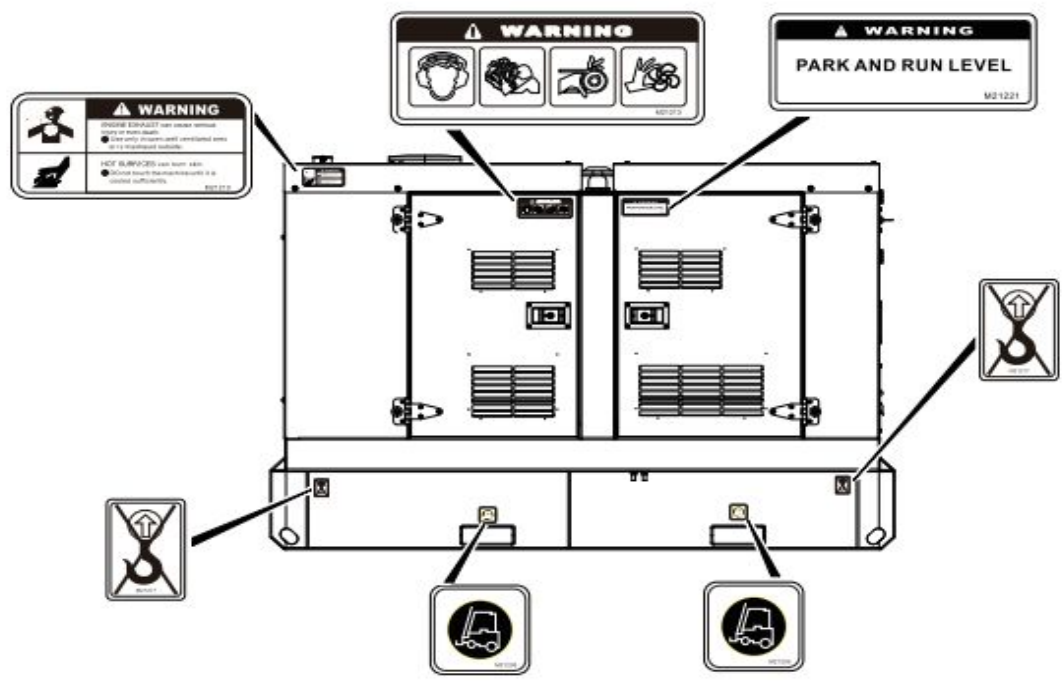
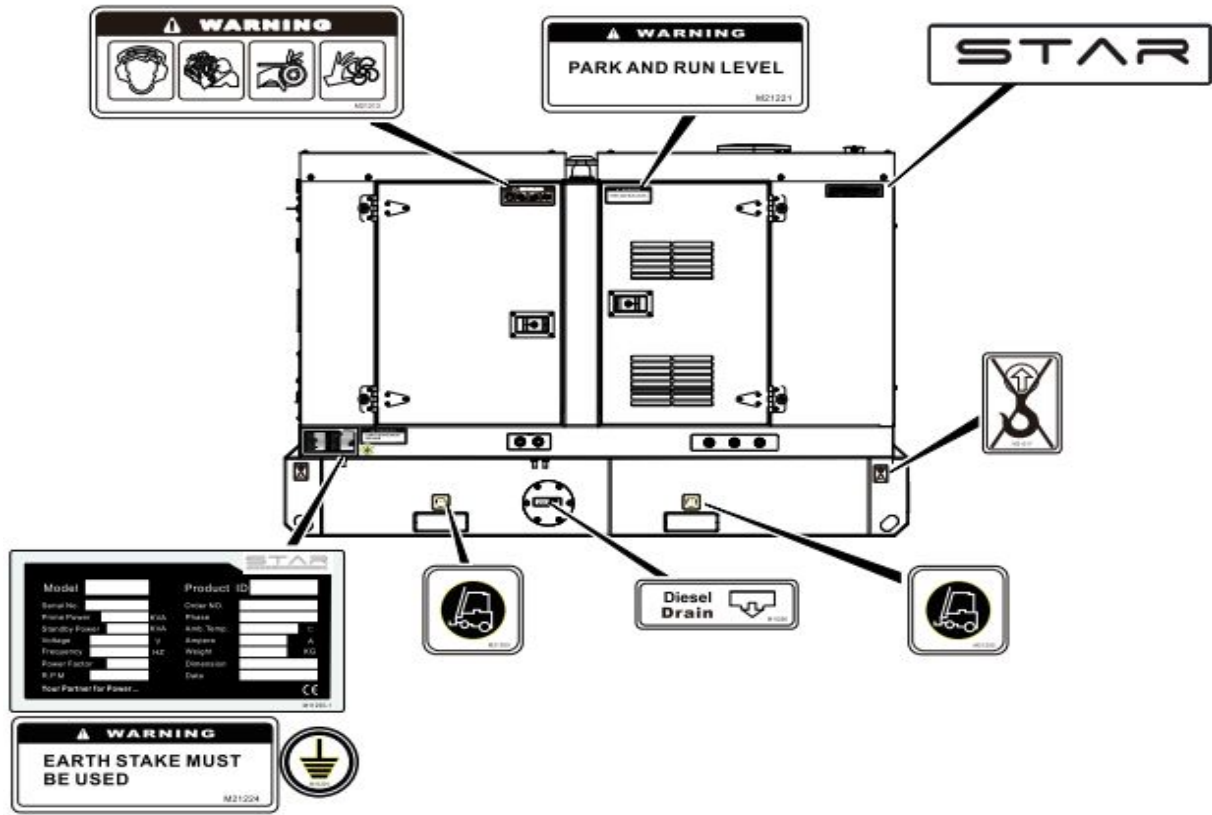
* Generator should be interfered by authorized repair service.

* Automatic generator may be runned suddenly, please prevent the intervention of unexperienced people.



* Generator must be protected against water and humidity as possible to that of an electrical device.

* Open type generators and transfer switches must be protected against weather environment. There is not such a need for canopied type generators.



Operating Instructions

Before start-up:

1. Read Operator's Manual.
2. Check level only.
3. Check ground seat.
4. Check oil level.
5. Check engine-cooling fan and fan degree of rotation.
6. Check all gears to ensure no backlash.
7. Check battery cable to ensure no disconnection.

Manual starting (for key start panel):

1. Disconnect all external leads.
2. Turn the key to "OFF" position.
3. Insert the key.
4. Pre-heat the machine.
5. Turn Emergency Stop button to "ON" position.
6. Turn the key to "ON" position.

Automatic start and remote start:

1. Read Operator's Manual.

Stopping:

1. Disconnect all external leads.
2. Turn the key to "OFF" position, for automatic start or remote start machine, press the "STOP" button.
3. Fill fuel tank.

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SAFETY INSTRUCTIONS

Improper operation of this machine can cause serious injury or even death. Read Operator's Manual carefully before operating or servicing.

This machine should only be operated by a person with sufficient knowledge and skills to ensure safe operation.

High voltage or faults are located inside the output terminals and control panel.

The green and neutral panel should be closed before operating.

The movable parts and hot surfaces should be outside when the enclosure.

All the doors should be closed and locked before operating.

WARNING

- Do not touch the output terminals.
- Do not touch the control panel.
- Do not touch the hot surfaces.

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WARNING

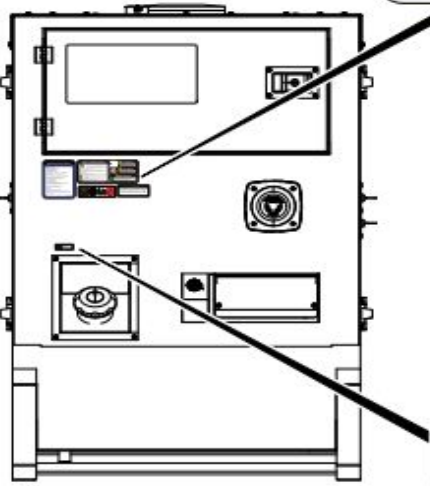
- Do not touch the output terminals.
- Do not touch the control panel.
- Do not touch the hot surfaces.

Icons for safety instructions: open book, fire, electrical plug, hand with flame, and hand with lightning bolt.

WARNING

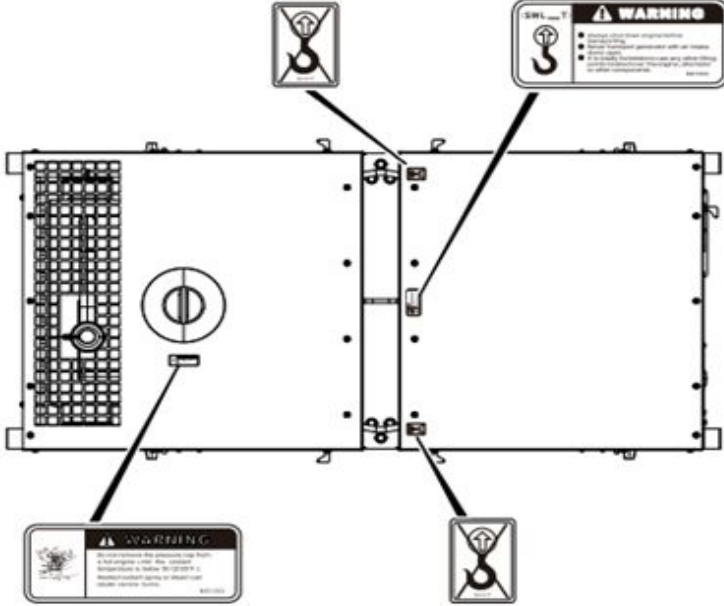
PARK AND RUN LEVEL

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diesel

M11201



Hook symbol warning icon.

WARNING

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- Do not touch the control panel.
- Do not touch the hot surfaces.

WARNING

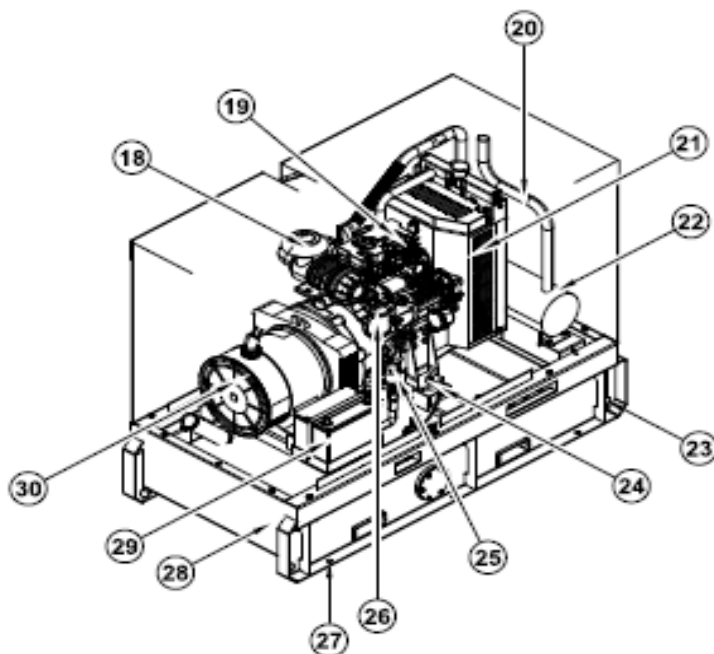
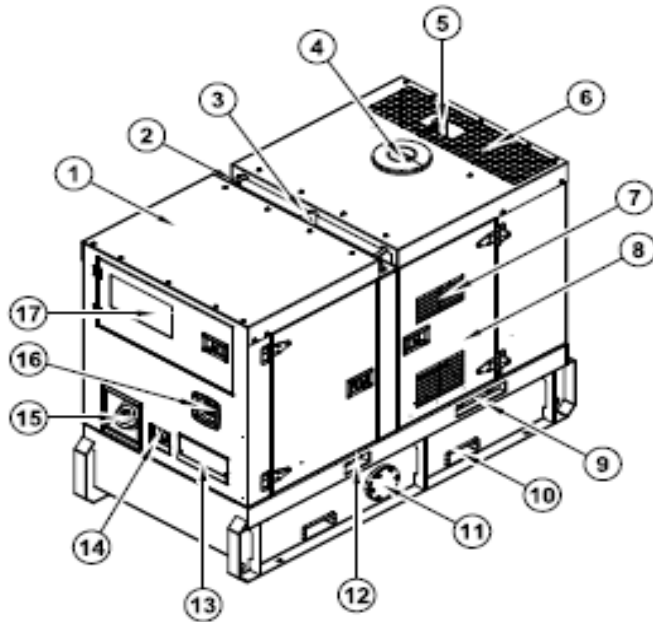
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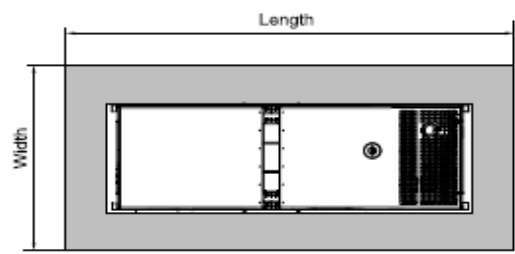
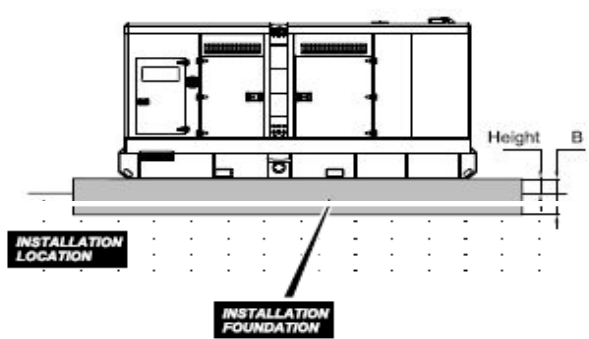
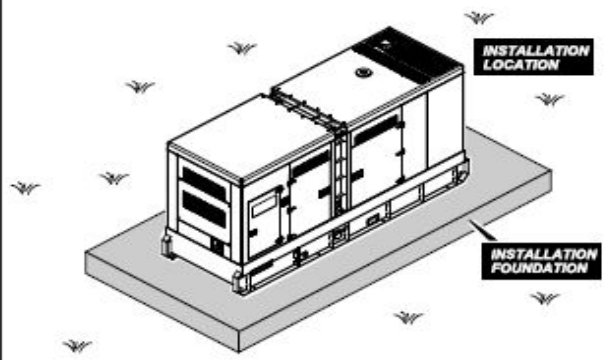
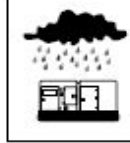
Hook symbol warning icon.

Component Identification



- ① Soundproof canopy
- ② Roping lug
- ③ Lifting lug
- ④ Coolant inlet
- ⑤ Exhaust outlet
- ⑥ Air outlet
- ⑦ Air inlet
- ⑧ Access door
- ⑨ Oil/water drain
- ⑩ Fork lift channel
- ⑪ Fuel drain
- ⑫ Connector for external fuel tank
- ⑬ Field wiring cabinet
- ⑭ ATS/remote control receptacle
- ⑮ Fuel inlet
- ⑯ Emergency stop button
- ⑰ Control cabinet
- ⑱ Air cleaner
- ⑲ Engine
- ⑳ Exhaust pipe
- ㉑ Radiator
- ㉒ Muffler
- ㉓ Dragging hole
- ㉔ Vibration isolator
- ㉕ Oil pump
- ㉖ Fuel filter
- ㉗ Mounting hole
- ㉘ Base frame
- ㉙ Battery
- ㉚ Alternator

Installation



WARNING

1. Select Installation Location

The installation location should be flat, smooth, noncombustible and level.

The safe bearing capability of the geological material should be carefully evaluated when selecting for the location. Please refer to the formula and details below:

$$SAFE\ BEARING\ CAPACITY > SBL = \frac{9.81TW}{L \times W} \times 10^{-6}$$

SBL— Bearing capacity of the foundation (MPa)
 TW— Weight of the genset and foundation (kg)
 L— Length of the foundation (m)
 W — Width of the foundation (m)

Geological Material	Safe Bearing Capability(MPa)
Granite	2.394-9.575
Oil shale	0.961-1.432
Rock	0.765-0.961
Soft rock	0.481-0.962
Tamped gravel	0.481-0.579
Pebble and gravel	0.383-0.481
Tamped sandy clay	0.284-0.383
Sandy clay	0.196-0.383
Sand	0.098-0.196
Soft clay	<0.098

2. Build Installation Foundation

Never use rigid connection between the foundation and Location.

The surface of the foundation should be oil-water proof (concrete is a good choice), and equipped with drainage.

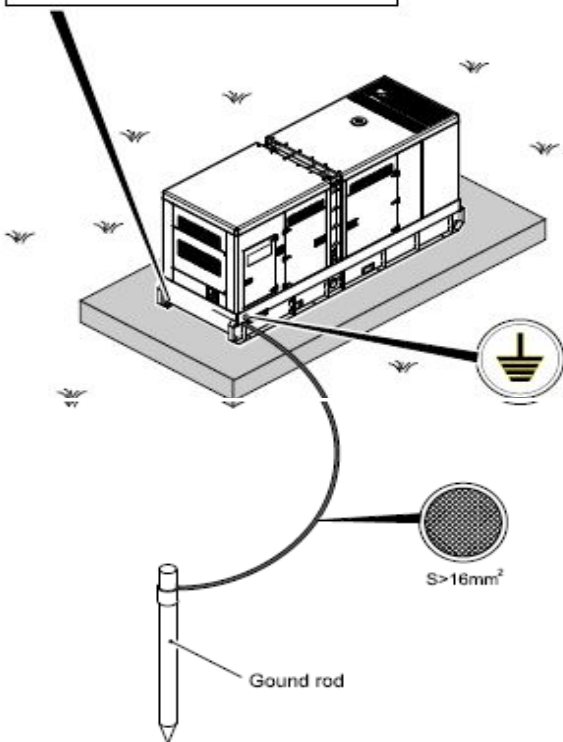
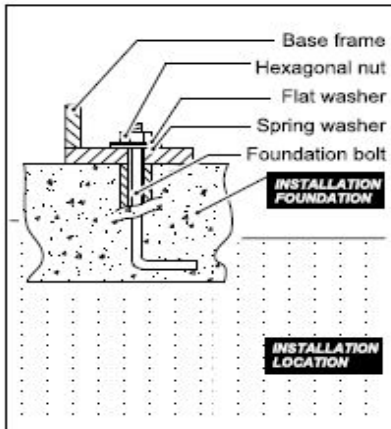
Foundation Dimensions(mm)			
Length	Width	Depth	Height
Genset Length + 300	Genset Width + 300	≥B	≥150

$$B = \frac{2M}{W \times L \times \rho} \times 1000$$

B — Depth of foundation (m)
 M — Weight of genset (kg)
 ρ — Density of concrete (2322 kg/ m³)
 L — Length of foundation (m)
 W — Width of foundation (m)



WARNING



WARNING

3. Generator Set Fixation

Fix the base frame of the genset with foundation bolts before using the machine.

Each foundation bolt needs to use a hexagonal nut, flat washer and spring washer. The amount and dimension of foundation bolts should be decided by the installation hole of the base frame.

4. Generator Set Grounding

The metal parts of the generator set may be with some charge due to insulation flaw or other reasons and cause an electric shock. So these must be connected to the ground.

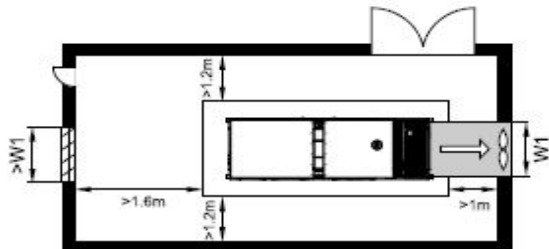
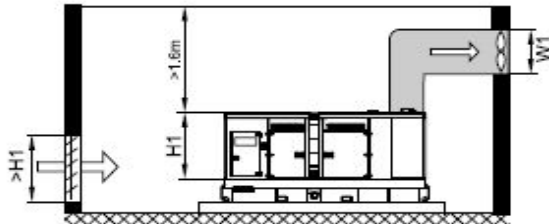
The genset and electric components have been equipped with their respective grounding terminals which are all connected to the ground bar in the control cabinet. The ground bar is connected to the ground bolt on the base frame. Connect the ground bolt to the ground rod, and insert the rod into the ground before use.

The ground rod should be buried at a minimum depth of 20cm into the ground.

The cross section of ground wire should be not less than 16 mm².



WARNING



WARNING

3. Generator Set Room Requirements

The size of room and cooling air ventilation should be carefully considered when the generator set is installed indoors.

- Enough space must be provided to allow the access door or control cabinet to be opened or removed for service and maintenance in the room.
- It is advisable to set up the shutters in the air inlet and outlet to protect the generator set from bad weather. The page plate can be fixed, but movable one is preferred. Close the shutter to keep the room warm if the generator set is not in use when the weather is cold. It is helpful to start the generator set and add loads next time.

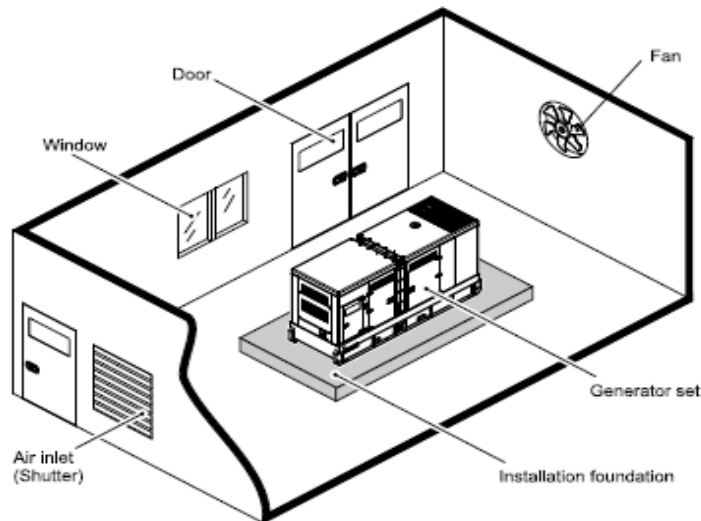


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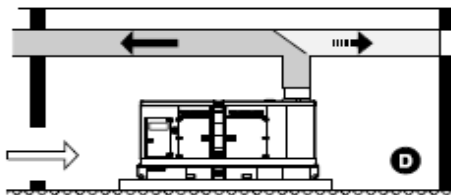
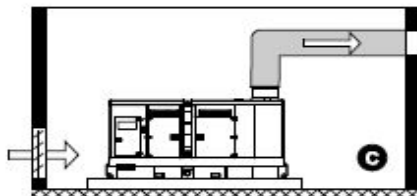
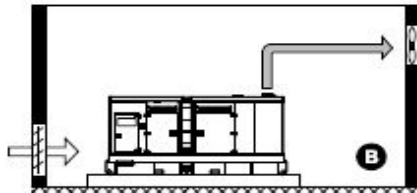
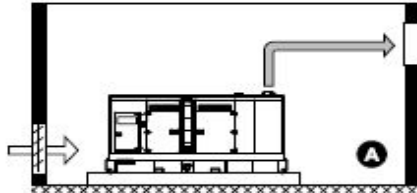


The engine of this generator requires an adequate free flow of fresh air.

NEVER operate the generator in any enclosed or narrow area where free flow of air is restricted. If the air flow is restricted it will cause serious damage to the generator engine and may cause personal injury.



 **WARNING**



 **WARNING**

4. Ventilation requirements



Attention! Arrange the generator set intake openings or ducts such, so that dangerous admixtures (e.g. explosive or chemically unstable materials) cannot be drawn in.

- Arrange supply air openings close to the floor.
- Arrange exhaust air openings in the ceiling or at the top of the wall.
- The required cross sections for the supply openings (as well as for the cover and protective hood) are indicated in former figure "GS-IN9".
- Ensure that the flow rates in the ducts do not exceed 16 km/h.

• Never position air ducts directly on the generator set. Always use a compensator to avoid distortion and the transfer of vibration.

A: Supply and exhaust air openings in the outside walls (free-standing installation)

B: Supported by exhaust air fan.

C: Exhaust air duct into the open.

D: Using the hot exhaust air for heating.

In winter, the hot exhaust air is used for room heating. In summer it is directed into the open.

5- GENERATOR AND IT'S PARTS

5.1- Definition: Generator is a system which is mainly consist of diesel engine that produces rotational movement and alternator that is coupled to diesel engine and generates electrical energy. Generator can be used in the regions where there is not electricity (mining, road construction, suburban sites, movie sets, border patrol etc.) as permanently and can be used in applications where electricity usage is critical (airports, hospitals, schools, factories, rail, etc.) as a network (mains) backup.

Generally, generator is a device which generates the alternating current at 400/230 V - 50 Hz or 480/277 V - 60 Hz or 380 /220 V - 60 Hz or 220/127 V - 60 Hz voltages and frequencies.

5.2- Chassis: All equipment of the generator is mounted on the steel chassis, inside of it the fuel tank is available. Diesel suction and return hoses, fuel filler cap, fuel level indicator float, lifting holes located on the generator chassis (frame). The fuel tank is designed to feed to the generator at least eight hours of continuous operation. External fuel tank is provided for the generators above 1100 kVA power. Engine and alternator are mounted on chassis with anti- vibration mounts .

5.3- Engine: Diesel engine that rotates the alternator to generate electricity. Diesel engines used in our generators are long-life industrial type, 4-stroke, water cooled, 3-4-6-8-10-12-16 cylinders, in-line or V-type cylinder and with mechanical or electronic governor.

Electrical system: According to the model and power of the engine, electrical system voltage is 12 V or 24 V DC. Starter that provides the first movement to engine, charging alternator, stop solenoid ,actuator, fuel solenoid, electronic voltage regulator, control panel, control module, protection and alarm devices, sesors, switches, etc, are parts of electrical systems.

Lubrication system: Oil pump, oil filter and oil cooler are the parts of lubrication system. Changing engine oil and filter on time ensures efficiency and long lasting of engine.

Recommended lubrication oil for diesel engines quality level API is CH / CI-4. SAE values of the oil to be used according to the ambient temperature are,

* Every Season

- 15 °C / + 50 °C degrees ambient temperature ----- SAE: 5W40 - 15W40

- 20 °C / + 40 °C degrees ambient temperature ----- SAE: CI-4 10W30

* Winter Season

- 30 °C / + 20 °C degrees ambient temperature ----- SAE: 5W30

- 40 °C / + 0 °C degrees ambient temperature ----- SAE: 0W30

Cooling system: Our generator's engines are water-cooled engines . Cooling system is consist of radiator, fan, recirculating pump and a thermostat . When the engine hot, the radiator cap should not be opened.

Jacket water heater: While the engine is not working that is used to keep the engine body at a constant temperature in summer and winter. This type heaters work with the external electricity. Where the absence of network (electricity), heaters working with diesel fuel are used as option.

When the cooling system is emty, the engine jacket water heater must not be operated .

Filters: Our generator's engines have changeable air filter, oil filter, fuel filter and water filter (opsion).

Sensor and alarm switches: OLCUSAN VDO brand oil and temperature sensor / alarm switches are used in

our generators.

Battery: The battery feeds the starter that provide the first movement of the engine. That's why the battery is one of the most important part of generator.

If the battery has been discharged does not start the generator. Therefore it must be checked frequently.

While generator is not running, the battery is charged by charger which is located in automatic control panel.

While generator is running, the battery is charged by charge alternator which is a part of the engine.

The batteries are being used in our generators, are lead-acid type and have different amperage and voltage (12 V or 24 V DC) depending on the generator's power and model . Two units of 12 V batteries are used in 24 V systems. When connecting the battery cables, firstly the positive (+) terminal and secondly the negative (-) terminal must be connected. When disconnecting the battery cables, firstly the negative (-) terminal and secondly the positive (+) terminal must be disconnected.

Batteries emit explosive gas while charging . This is why approaching to the battery with fire is dangerous.

Generator efficiency: To use generator efficiently with low fuel consumption required to do the followings:

- * Timely maintenance
- * Quality fuel and oil use
- * Engine fuel injectors must be clean and regulated.
- * Having been the engine valve timing.
- * Not using generator in overload.
- * Replacing worn parts on the time.
- * Not using the generator below 35 % of the standby power.

- * Please read the engine manual for more information.

5.4- Alternator: The alternator is an equipment which generates electrical energy. Our alternators having an IP21 protection class, self excited, self regulated and brushless.

- * Please read the alternator manual for more information.

5.5- Control Panel: The control panel execute the followings: provides start and stop of the generator, controls the mains and generator voltages, protect the generator, display technical information to user.

The control panel consists of control module, battery charger, emergency stop button, an audible and visible alarm, fuses, electrical wirings, etc.

Control Module:

Our products are used as standard DATAKOM DKG309 control module .

General features and usage of these modules are described below.

The unit is a control and protection panel used in gensets. It shows the measured values on its displays. The unit is designed to provide user friendliness for both the installer and the user. Programming is usually unnecessary, as the factory settings have been carefully selected to fit most applications. However programmable parameters allow the complete control over the generating set. Programmed parameters are stored in a Non Volatile Memory and thus all information is retained even in the event of complete loss of power.

The measured parameters are:

Mains voltage phase L1 to neutral	Gen voltage phase L2-L3	Gen pf phase L1
Mains voltage phase L2 to neutral	Gen voltage phase L3-L1	Gen pf phase L2
Mains voltage phase L3 to neutral	Gen current phase L1	Gen pf phase L3
Mains voltage phase L1-L2	Gen current phase L2	Gen total pf
Mains voltage phase L2-L3	Gen current phase L3	Battery voltage,
Mains voltage phase L3-L1	Gen frequency	Coolant temperature
Mains frequency	Engine speed (rpm)	Oil pressure
Gen voltage phase L1 to neutral	Gen KW phase L1	Oil temperature
Gen voltage phase L2 to neutral	Gen KW phase L2	Fuel level
Gen voltage phase L3 to neutral	Gen KW phase L3	
Gen voltage phase L1-L2	Gen total KW	

Led Displays:

The unit has 12 LEDs, divided in 3 groups:

Grup_1: Operating mode: This group indicates the genset function.

Grup_2: Mimic diagram: This group indicates the current status of the mains and genset voltages and contactors.

Grup_3: Warnings and alarms: This group indicates the existence of abnormal conditions encountered during operation.

<u>Function</u>	<u>Color</u>	<u>Description</u>
MAINS ON	Green	The LED will turn on when all 3 mains phase voltages are within the limits.
MAINS OFF	Red	The LED will turn on when at least one of the mains phase voltages is outside limits.
LOAD MAINS	Green	It turns on when the mains contactor is activated.
LOAD GENERATOR	Yellow	It turns on when the generator contactor is activated.
GENERATOR	Yellow	The LED will flash when the engine is running. It will turn on steadily when all 3 generator phase voltages are within the programmed limits.
TEST	Yellow	It turns on when the related operation mode is selected. One of these LEDs is always on and indicates which operation mode is selected. If the operation of the genset is disabled by the weekly operation schedule, then the AUTO led will flash.
RUN	Yellow	
STOP	Yellow	
AUTO	Green	
ALARM	Red	If a fault condition resulting to the engine shutdown has occurred, the alarm led turns on steadily. If a loaddump condition occurs, this led will flash. Alarms work on a first occurring basis. The occurrence of a fault will disable other faults of lower or equal priority.
WARNING	Red	If a warning condition has occurred, this led turns on steadily. The warnings work on a first occurring basis. The occurrence of a warning will disable other warnings, however shutdown and loaddump alarms are still allowed.
SERVICE REQUEST	Red	Engine periodic maintenance request indicator. It turns on when the preset engine hours or time duration after previous service has elapsed.

Alarms and Warnings:

Alarms indicate an abnormal situation in the generating set are divided into 3 priority levels:

1- ALARMS: These are the most important fault conditions and cause:

- * The ALARM led to be on steadily,
- * The genset contactor to be released immediately,
- * The engine to be stopped immediately,
- * The genset contactor to be released immediately,
- * The Horn, Alarm, Alarm+Load_dump and Alarm+Load_dump+Warning digital outputs to operate, (if selected via programming menu)

2- LOAD_DUMPS: These fault conditions cause:

- * The ALARM led to flash,
- * The genset contactor to be released immediately
- * The engine to be stopped after Cooldown period,
- * The Horn, Alarm+Load_dump and Alarm+Load_dump+Warning digital outputs to operate, (if selected via programming menu)

3-WARNINGS: These conditions cause:

- * The WARNING led to be on steadily,
- * The Horn and Alarm+Load_dump+Warning digital outputs to operate, (if selected via programming menu)

If the ALARM MUTE button is pressed, the Horn output will be deactivated; however the existing alarms will persist and disable the operation of the genset.

Alarms operate in a first occurring basis:

- * If an alarm is present, following alarms, load_dumps and warnings will not be accepted,
- * If a load_dump is present, following load_dumps and warnings will not be accepted,
- * If a warning is present, following warnings will not be accepted.

Alarms may be of LATCHING type following programming. For latching alarms, even if the alarm condition is removed, the alarms will stay on and disable the operation of the genset. The existing alarms may be canceled by pressing one of the operating mode buttons (LOAD TEST / TEST / OFF / AUTO).

Most of the alarms have programmable trip levels. See the programming chapter for adjustable alarm limits.

Low Oil Pressure: Set if a signal is detected at the Low Oil Pressure Switch input or the oil pressure value measured from the sender is below the programmed limit. Warning and alarm limits are separately programmable for the oil pressure sender input. This fault will be monitored with Holdoff Timer delay after the engine is running. Also if the oil pressure switch is open at the beginning of a start attempt, then the engine will not be started and "Oil Pressure Exists!" information is displayed. When the oil pressure switch closes, normal operation will be resumed.

High Temperature: Set if a signal is detected at the High Temperature Switch input or the coolant temperature value measured from the sender is above the programmed limit. Warning and alarm limits are separately programmable for the temperature sender input.

Low Temperature (warning) : Set if the coolant temperature value measured from the sender is below the Engine Heating Temperature limit.

Low Fuel: Set if a signal is detected at the low fuel level input or the the fuel level measured from the sender is below the programmed limit. Warning and alarm limits are separately programmable for the fuel level sender input.

Low Coolant Level: Set if a signal is detected at the low coolant level input.

Rectifier Fail: Set if a signal is detected at the rectifier fail input. This input is only monitored when mains voltages are present.

Emergency Stop: Set if a signal is detected at the emergency stop input.

Spare-1 / Spare-2: Set if a signal is detected from the related spare fault input.

Low Speed / High Speed: Set if the generator frequency is outside programmed limits. These faults will be monitored with Holdoff Timer delay after the engine is running. Low and high limits for warning and alarm are separately programmable. Another high frequency shutdown limit which is 12% above the high limit is always monitored and stops the engine immediately.

Start Fail (alarm): Set if the engine is not running after programmed number of start attempts.

Stop Fail (warning): Set if the engine has not stopped before the expiration of the Stop Timer.

Overload (load dump): Set if at least one of the genset phase currents goes over the Overcurrent Limit for Overload Timer. If currents goes below the limit before expiration of the timer then no alarm will be set.

Excess Power (load dump): Set if the genset power (KW) supplied to the load goes over the Excess Power limit for Overload Timer. If the power goes below the limit before expiration of the timer then no alarm will be set.

Genset Low Voltage: Set if any of the generator phase voltages goes outside programmed limits for Overload Timer. This fault will be monitored with holdoff timer delay after the engine is running.

Genset High Voltage: Set if any of the generator phase voltages goes outside programmed limits for Overload Timer. This fault will be monitored with holdoff timer delay after the engine is running.

Low Battery Voltage (warning): Set if the battery voltage goes below the programmed limit. During engine cranking this fault is not monitored.

High Battery Voltage: Set if the battery voltage goes above programmed limits. Both warning and alarm levels for high battery voltage are programmable.

Charge: Set if a charge alternator failure (or broken belt) occurs. This fault condition may result to a **warning** or alarm following programming.

Mains Phase Order Fail (warning): Set if the mains phase order checking is enabled, mains phases are present and mains phase order is reversed. This fault prevents the Mains Contactor to close.

Ecu Fail (warning): Set when an engine fault code is received from the ECU of the electronic engine. This fault will not cause an engine stop. If necessary, the engine will be stopped by the ECU.

Ecu Fail (alarm): Set if no information has been received during 3 seconds from the ECU of the electronic engine. This fault condition is only controlled if fuel is on.

Modes of Operation:

The modes of operation are selected by pushing the front panel keys. Changing the operation mode while the genset is running will result into a behavior suitable for the new operating mode. For example, if the LOAD TEST mode is selected when genset is running at TEST mode, then the genset will take the load.

STOP: In this mode, the mains contactor will be energized if mains phase voltages are within the programmed limits. The engine will be stopped.

AUTO: It is used for genset and mains automatic transfer. If at least one of the mains phase voltages is outside limits, the mains contactor will be deactivated. The diesel will be started for programmed times after the preheat timer. When the engine runs, the crank relay will be immediately deactivated. The engine will run without load during engine heating period. After this, if alternator phase voltages and frequency are within limits, then the unit will wait for the generator contactor period and the generator contactor will be energized. When all the mains phase voltages are within the limits, the engine will continue to run for the mains waiting period. At the end of this period the generator contactor is deactivated and the mains contactor will be energized. If a cooldown period is given, the generator will continue to run during cooldown period. At the end of the period, the fuel solenoid will be de-energized and the diesel will stop. The unit will be ready for the next mains failure. If the operation of the genset is disabled by the weekly schedule, then the AUTO led will flash, and the operation of the genset will be as in the OFF mode.

RUN: It is used to test the generator when the mains are on, or keep the generator running in the emergency backup mode. The operation of the generator is similar to the AUTO mode, but the mains contactor will not be deactivated if the mains are not off. If the mains are off, mains contactor will be deactivated and the generator contactor will be activated. When the mains are on again, a changeover to the mains will be made, but the engine will be kept running unless another mode is selected. To stop the engine, select AUTO or OFF mode.

TEST: It is used to test the genset under load. Once this mode is selected, the engine will run and the load will be transferred to the genset. The genset will feed the load indefinitely unless another mode is selected.

* Read the control module manual for more information.

Battery Charger:

The battery charger is an electronic device which charges the battery with energy received from the network / mains in cases where long-term non operation of the generator. It keep the appropriate value of the battery voltage

5.6- Circuit Breaker Panel: It is located at the bottom of the control panel. Thermal-magnetic circuit breaker prevents damage to the alternator by opening the circuit, in case of excessive current drawing from the generator.

Thermal-magnetic circuit breaker can cut energy of the power cables manually by setting to the OFF position . Power and control cable connections are made between the circuit breaker panel and the transfer panel.

5.7- Transfer Panel: It allows to transfer the electrical load from the grid / mains to the generator under the control of control panel. Thus, when electricity came, running generator is prevented conflicts with the network. Two contactors or motorized circuit breaker are located in transfer panel. Power and control cable wiring connections are made between generator and transfer panel.

5.8- Exhaust System: Used for the purpose of ejecting the gases and the heat comes from engine to the outside and reducing the engine noise. Muffler and fittings are industrial type for open generators and are given as disassembled together with the generator. Residential exhaust system is used in canopied generators and is mounted inside the canopy.

5.9- Sound Proof Canopy: Used for to protecting the generator from external factors and reducing the sound of generator. Our canopies has been designed to ensure the safe and efficient operation of the generator and also is aimed at ease of use and maintenance. Against corrosion and painted with electrostatic powder paint.

5.10- Heaters: In addition to the jacket water heater is described in the engine section, if requested by our customers as options, the anti-humidity heater for alternator, engine oil sump heater and fuel tank heaters can be fitted to our generators.

5.11- Fuel Transfer Pump: Used with the aim of transferring the fuel from the external fuel tank to the generator's own fuel tank automatically. Control of the fuel transfer pump is made by control panel.

6- STARTING UP THE GENERATOR

Before starting up the generator:

- * Please check the generator by eye. Make sure that there is no fuel, oil, water leaking and broken, cracked, loose parts. Any warnings and alarms should not be displayed on the control module. If you think you have a problem related with generator, do not operate the generator without eliminating the problem.
- * There should be no foreign substances around and on the generator that may be fall down and taken by radiator fan.
- * Please check the oil level. The oil level should be close to the maximum level.
- * Please check the coolant level. Water level should be 2 cm from the radiator cover.
- * Please check the coolant antifreeze ratio which shall be in accordance with the winter conditions.
- * Please check that there is not a situation that will prevent the generator air intake and outlet .
- * Please be sure that air filter is clean.
- * Make sure the battery cable is tightened.
- * For the generators will be used in automatic mode, the output circuit breaker must be in the ON position.
- * For the generator will be used in manual mode, while starting the generator output circuit breaker should be in the OFF position after that it should be brought to the ON position before loading the generator.
- * Check that the emergency stop button is not pressed . If it is pressed, unscrew the hold.

Starting up the generator:

- * For the generator will be used in automatic mode, press the AUTO button on the control module and observe that the LED on the button is lighting. After the this procedure, the generator is ready to run and will be operated automatically when electricity fails. The generator will stop automatically when electricity comes back. There is no need for further action.
- * For the generator will be used in manual mode, firstly be sure that generator is not connected to the load, press the RUN button on the control module and observe that the LED on the button is lighting and generator is running. After warming up the generator, bringing the output output circuit breaker in the ON position and power the load.

After starting up the generator:

- * Please check whether there is a strange noise except the sound of the engine.
- * Please check whether excessive vibration on generator.
- * Please check that there are no leaks in the fuel, oil and cooling system.
- * Please check for leaks in the exhaust system. (At the first runing, black smoke could be out for 2-3 seconds)
- * Please check that the output voltages of the generator are phase - phase as 400 V, phase - neutral as 230 V and the frequency as 50 Hz (+ - 2%). Please stop the generator and call the service, if an extreme deviation can be read in one of the phase voltage or absence of voltage or abnormal frequency.

PERIODIC MAINTENANCE

7- PERIODIC MAINTENANCE TABLE

Please follow the instructions in the periodic maintenance table for reliability and longevity of your generator. Please record the procedures and history.

Daily or every 25 hours controls and procedures :

- * Please visually check the automatic control and transfer panels, if you determine the followings, inform the technical service which was installed the generator: a burning smell, color change at the cables, abnormal sounds .
- * Please check that there is no fuel, oil, and coolant leakages from engine. Please add the oil and cooling water, if they are insufficient.
- * Please check the engine fan blades, the tension of the fan belt and charge alternator belt.
- * Please check the battery charge level.
- * Please check the fuel level. If necessary fill the fuel. While generator is in operation, running out of fuel makes the engine suck the air and stop. Even after refilling the generator may run harder. For this reason, please check the fuel level frequently.
- * Please check that jacket water heater is on and no water leakage.
- * Please check the alternator output voltage between phases is about 400/230 V - 50Hz.
- * Please check frequently whether exhaust gas leakage where the generator is running in closed environments.
- * Please check that the doors of sound proof canopy and transfer panel are locked.
- * Please check whether control module gives alarm. Do not operate the generator before removing the reason of the alarm.

Weekly or every 50 hours controls and procedures :

- * Please do the following checks in addition to the daily checks.
- * Please check for leakages in the fuel suction and return hoses, if needed, tighten clamps.
- * Please check for leakages in the cooling system hoses, if needed, tighten clamps.
- * Please check the air filter connections. Be sure that front of the air intake and outlet louvers of canopy or generator room is not closed by foreign things / materials etc.
- * Please check for leakages in the exhaust system. Be sure that when generator running, exhaust rain cover could be open and after stoping, should be closed.
- * Please check for the alternator, intake vents are open and no an abnormal noise coming.
- * Please observe the operation of the transfer panel under load. Check whether an unusual sound, a color change and a smell at cables.

Each 3 months or every 100 hours controls and procedures :

- * Please do the following checks in addition to the weekly checks.
- * Please check air filter pollution indicator (if available).
- * Please check the tightness of the bolts which connect the engine, alternator and radiator to the chassis.
- * Please check the tightness of the canopy lifting eyebolts.

Each 6 months or every 200 hours controls and procedures :

- * Please do the following checks in addition to the 3 months checks.
- * Please change the engine oil and oil filter.
- * Please change the fuel filter and drain the contaminated fuel and water accumulated at the bottom of the fuel tank.
- * Please check the ratio of the coolant antifreeze .
- * Please change the water filter (if any) .
- * Please check the fan blades, lubricate bearings, and tighten the screws.
- * Please check the tightness of bolts of the vibration dampers which connects the generator to the chassis.
- * Please check the exhaust system fasteners .
- * Please clean the engine and alternator with pressurized air.
- * Please check the control and transfer panel control wirings.

Each 12 months or every 1000 hours controls and procedures :

- * Please do the following checks in addition to the 6 months checks.
- * Please check the valve adjustments.
- * Please check the injector adjustments.
- * Please check the water pump.
- * Please replace the air filter.
- * Please check the suction and discharge sections of the radiator and clean the pads with pressurized air.
- * Please check the magnetic pick up (if available) and it's connections.

Each 24 months or every 2000 hours controls and procedures :

- * Please do the following checks in addition to the 12 months checks.
- * The following settings can be made by technical service.
- * Please check the turbocharger .
- * Please make the controls and adjustments described in engine instruction manual.
- * Please make the controls and adjustments described in alternator instruction manual.

8- FAILURES AND CAUSES

Engine failures and causes:

* The starter rotates slowly or does not rotate.	* Voltage of the battery is low or the battery is faulty. * Loose connection of battery cables. * The starter is defective.
* The diesel engine is running hard, does not have enough power or does not run at all.	* There is no fuel. * Proper fuel is not used. * Jacket water heater does not work, the engine is cold . * Starter can not rotate the diesel engine. * Fuel circuit hoses or elements have air in. * The fuel filter is dirty. * Stop solenoid does not work or loose cable connections. * Fuel solenoid does not work or loose cable connections. * Fuel transfer pump does not work (if any) or loose cable connections. * The oil pressure is too low. * Oil sensor or switch are defective or loose wiring. * The injector is defective. * The fuel tank vent is clogged. * The air filter is dirty or clogged. * There is leakage at aftercooler or intercooler's pipe connections. * The diesel engine temperature is too high or low. * Clogged exhaust system.
* The oil pressure is too low.	* Not enough oil in the diesel engine. * Oil viscosity wrong. * Oil pressure sensor or indicator is faulty. * Oil filter is clogged.
* Black exhaust smoke. (At the begining, diesel engines can produce black smoke. After heated, color of smoke should be transparent).	* Appropriate fuel is not used. * Jacket water heater does not work, the engine is cold . * Injectors and valves are defective or unregulated. * Engine running on overload.
* White exhaust smoke.	* Fuel circuit's hoses or components have air in. * Oil viscosity wrong.
* Knocking noise coming from the engine and the engine is not running smoothly.	* Injector defective. * Unadjusted valves. * Poor quality fuel. * Jacket water heater is defective. * Fuel circuit's hoses or components have air in. * Fuel hose clogged. * The fuel filter is dirty. * Dirty or clogged air filter. * Engine temperature is too high. * The fuel tank vent is clogged.
* The diesel engine temperature is too high.	* The thermostat is faulty. * Injector defective. * The air filter is dirty or clogged. * Jacket water heater is defective. * The radiator fan is damaged or clogged radiator cores. * The cooling system is damaged or inadequate. * The exhaust system is clogged. * The oil level is too high .
* The oil pressure is too high.	* Crankcase ventilation pipe clogged.

9- TECHNICAL TABLES

Fuel, Oil, Cooling Water Capacities:

Generator Model	Fuel Tank Capacity (lt)	Fuel Consumption Full Load (lt/saat)	Oil Capacity (lt)	Cooling Water Capacity (lt)
SDG-15S	95	3.9	5	10.06
SDG-25S	95	5.2	7	10
SDG-35S	95	6.9	13	13
SDG-40S	95	6.9	13	13
SDG-55S	95	10.0	13	13
SDG-70S	95	14.0	13	13
SDG-75S	165	14.0	16	16
SDG-90S	165	17.95	16	16
SDG-110S	165	21.0	17	23
SDG-125S	304	23.0	17	23
SDG-150S	304	27.0	17	23
SDG-175S	304	32.0	17	23
SDG-225S	304	40.0	17	23
SDG-300S	368	52.3	35	70
SDG-400S	368	53.0	35	70

Power Cable Selection Table:

Generator Model	Standby Power (kVA)	Maximum Current (A) - 400 V	Single Core Power Cable	
			Current Capacity (A)	Area (mm ²)
SDG-15S	15	22	25	2.5
SDG-25S	25	30	33	4
SDG-35S	35	51	57	10
SDG-40S	40	58	76	16
SDG-55S	55	79	101	25
SDG-70S	70	101	123	35
SDG-75S	75	111	123	35
SDG-90S	90	119	155	50
SDG-110S	110	159	191	70
SDG-125S	125	180	228	95
SDG-150S	150	222	267	120
SDG-175S	175	247	305	150
SDG-225S	225	317	382	2 x 70
SDG-300S	300	433	456	2 x 95
SDG-400S	400	556	610	2 x 150

10- ELECTRICAL DRAWINGS

Electrical drawings are provided together with generator and located in control panel.

Note:

Specification may change without prior notice.

For more info,contact Star generator or your local distributors please

