



USER

MANUAL

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# 1. INTRODUCTION

In each process of our generator production; process controls, production tests and last quality controls have been made punctiliously. The generator is guaranteed with one year if it is used in accordance with the usage that is specified in the User's Manual and under the circumstances specified in Warranty Document.

This manual contains the required information for starting the machine, maintenance and accordingly for the long-life usage of the machine.

If you want to get a good performance and benefit from our production for long years, you have to practice/apply the operations that are explained under the headlines of "Maintenance" and "Installing the Generator".

Do never have your generator repaired in the hands of unauthorized repairmen. Use our firm, services or advised firms. Otherwise, it may cause your warranty to be void, if it is still in the warranty period. Also, any replacement of part made without the confirmation of our firm or the usage of parts that are not original may threaten the validity of the warranty. Thank you for choosing our product and we hope you to benefit from it for long years.

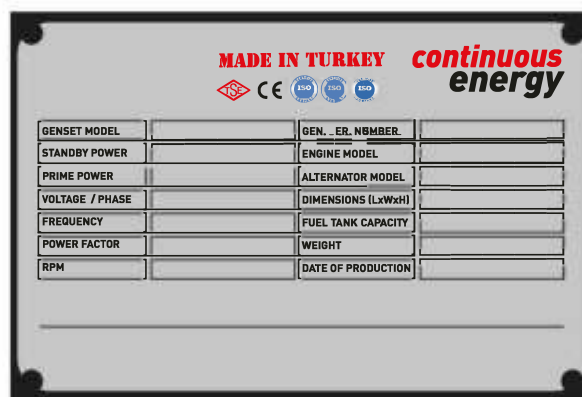


Figure 1.1 : Description of goods.

# 2. DEFINITIONS

**2.1 Air Filter:** It is a part that filters out the air before it comes to combustion space. It is a part that affects the engine performance and life. is using high-quality air filters in its productions.

**2.2 Air-cooled Engine:** A cooling method relies on the circulation of air directly over hot parts of the engine to cool them.

**2.3 Alternative Current:** Alternative current is used in many houses and firms. It is described as an electric current that reverses direction (positive and negative) in a circuit at regular intervals. These intervals usually described with seconds, the frequency is 60 Hz in USA and it is 50 Hz in Turkey and European Countries.

**2.4 Alternator:** It is a device which converts the mechanic energy into electrical energy. We use brushless and synchronous alternators in our generators.

**2.5 Prime Power:** It is the power can be described as the execution in permanent and unchanged load for unlimited of hours. It is the availability of the generator to run with maximum power and steadily.

**2.6 Stand-by Power:** It is the power measured/obtained by leaving the engine for cooling after running and then restarting the cooled generator. Standby Power can be calculated as the 1.1 times of Prime Power. For example it is mentioned that a generator, which has 100 kVA of Prime Power, has 110 kVA Standby Power.

**2.7 Decibel:** Is a measurement of sound level. A logarithmic unit of sound intensity. 10 times the logarithm of the ratio of the sound intensity to some reference intensity. It is shown as “db”. It is originated from the inventor of Alexander Graham Bell.

**2.8 Triangle Connection:** To connect the phases of the generator in triangle form in three-phase generators. When you use the two phases of three-phase system in order to get 120 / 240 V, the power decreases to one third.

**2.9 Four-stroke Engine:** Internal combustion engine has to do the four movements in order to complete its power cycle.

**a. Intake stroke:** With the descending movement of the piston inside the cylinder line, the mixture of fuel and air fill in.

**b. Compression stroke:** With both intake and exhaust valves closed, the piston returns to the top of the cylinder compressing the fuel-air mixture.

**c. Power stroke:** While the piston is close to Top Dead Center, the compressed air–fuel mixture is ignited, usually by a spark plug (for a gasoline) or by the heat and pressure of compression (for a diesel cycle or compression ignition engine). The resulting massive pressure from the combustion of the compressed fuel-air mixture drives the piston back down toward bottom dead center with tremendous force.

**d. Exhaust stroke:** During the exhaust stroke, the piston once again returns to top dead center while the exhaust valve is open. This action evacuates the products of combustion from the cylinder by pushing the spent fuel-air mixture through the exhaust valve(s).

**2.10 Frequency:** In alternative voltage and current, it is the number of waves occurred at regular intervals. The wave occurred in one second is indicated as “Hz”.

**2.11 Fuel Injector:** It is the part which atomizes the fuel to the combustion space in specific amounts.

**2.12 Governor:** It is system which perceives the velocity/speed of the engine by following the magnetic receptor or by following the frequency that exits from the generator. In the direction of the engine speed, it provides sending fuel into the combustor with the electrical control system in order to administer the required revolution.

**2.13 Fuel-feed pump:** It is the part which measures the fuel and sends it to the combustor.

**2.14 Kilowatt:** The real electrical power which equals to 1000 watt.

**2.15 Water Cooled Engine:** It is an engine type that is cooled with water surrounding around the hot parts. The hot water goes to the radiator and is cooled by the help of the fan; it goes to the engine again. This is the cycle of the system.

**2.16 Voltage Regulator:** It is a device that provides to hold the generated voltage in required values both inside and outside the system.

**2.17 Star Connection:** It is a method in which the three phase generators are connected with each other in the form of “Y”. A connection used in a polyphase electrical device or system of devices in which the windings each have one end connected to a common junction, the star point, and the other end to a separate terminal.

### 3. WARNING SIGNS AND EXPLANATIONS

**GÜVENLİK TALİMATLARI**  
**SAFETY INSTRUCTIONS**

**!** Bu makinede yapılacak uygun olmayan bir bakım/operasyon çok ciddi yaralanmalara hatta ölüme neden olabilir.

**!** Servis/bakım çalışmasından veya makine devreye girmeden önce jeneratörün kullanım kılavuzunu mutlaka okuyun.

**!** Bu makine yalnızca güvenliği sağlayacak teknik bilgi ve becerisi yeterli olan bir kişi tarafından çalıştırılmalıdır.

**!** Yüksek voltaj devreleri çıkış klemensleri ve kontrol paneli içinde yer almaktadır.

- Kapak ve kontrol paneli makine devreye girmeden önce kapalı olmalıdır.
- Taşınabilir parçalar ve sıcak yüzeyler kabln/muhafaza içinde izole edilmelidir.
- Makine devreye girmeden önce kapılar kapalı ve kilitlemelidir.

**!** 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 skill to ensure safe operation.

**!** High voltage circuits should be located inside the output terminals and control panel.

- The cover and the control panel should be closed before operating.
- Movable part and hot surfaces should be isolated within the enclosure
- All the doors should be closed and locked before operating

**UYARI / WARNING**

**!** Motor egzozu karbon monoksit(CO) salınımı nedeniyle çok ciddi yaralanmaya hatta ölüme neden olabilir.

**!** Sadece açık iyi havalandırmaya sahip dışarı havalandırma egzozu olan bölgelerde kullanınız.

**!** Engine exhaust can cause serious damage or even death because of carbon monoxide(CO) emission.

**!** Use only open, well ventilated areas of vent exhaust outside.

**UYARI / WARNING**

**!** Makine devreyken dahilliç elektrik kablolarına / devrelerine veya bağlantılarına dokunmayınız.

**!** Servis/bakım çalışmasından önce gücü kapatınız.

**!** Do not touch internal wiring or connections while this machine is operating or servicing.

**!** Turn power off before servicing.

**UYARI / WARNING**

**!** Jeneratörü binaya bağlamadan önce; elektrik sistemi, izole edilmiş transfer panosu yetkili / lisanslı bir elektrikçi tarafından kurulmalıdır.

**!** Transfer panosu olmaması ciddi yaralanmalara hatta ölümlere neden olabilir.

**!** Before connecting this generator to any buildings electrical system, an isolation (transfer) switch must be installed by a licensed electrician

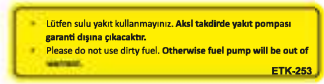
**!** Serious injury or even death can result without this transfer switch.

ETK-251

ETK251: Safety Instructions & Warning



ETK252: Hot Surface



ETK253: Please do not use dirty fuel.



ETK256: Danger! High Voltage



ETK257: Read the user's manual before using the machine.



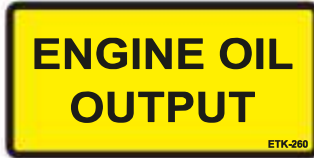
ETK254  
Emergency Stop



ETK255  
Generator  
Lift Locations



ETK259: Fuel Output



ETK260: Engine Oil Output



ETK258  
Automatic Work



ETK262: Do not operate with doors.  
Stop engine before servicing.



Delivered and Approved.



ETK261  
Quality Control Test has been done.

## 4. SAFETY INSTRUCTIONS

### 4.1 Warnings and Safety Instructions

- ! If you do not understand an issue or you are in doubt in any point that is specified in the manual, please call our technical service from contact numbers. Our technical service will give the required explanation.
- ! Please read the user's manual that is given with the generator carefully.
- ! It is required getting the confirmation of the producer for any replacement about engine, alternator, control panel and additional devices.
- ! Otherwise the product will not be under the warranty anymore.
- ! Do not smoke while filling the tank.
- ! Clean the poured out fuel, oil or water and do not leave the swab around the engine, junk it.
- ! Do not fuel up the generator while it is running
- ! Do not clean, carry out maintenance, lubricate or set-up the generator while it is running.
- ! The exhaust gas is harmful and hazardous for human health. Beware the gas exit when you choose a place for installing the generator. In order to prevent from the poisonous gas, the gas must be carried by a pipe to open air. Our firm is not responsible for this operation.
- ! During the starting operation, warn the individuals around the generator. Do not wear overhang clothes while working around the generator. You may not see the fan while it is running.
- ! Do not start the generator without keeping the moving parts under safety guard. Do not open the radiator cup when the engine is hot. Do not put water while the engine is running. Do not fill the cooling system with sea water, river water or any other electrolyte materials.
- ! Do not approach the accumulator with open fire. The electrolyte gas is flammable, also the acid in it is hazardous for your skin and eyes.
- ! The genset must be under the responsibility of one person.
- ! If your skin is subject to high pressure gas, see doctor immediately.
- ! Use protective gloves and cream if you are allergic to fuel. In case of accidentally engine-starting, turn off the engine, cut the electricity and demount the accumulator poles before repairing the generator or carrying out maintenance.
- ! Do not use derivatives of petroleum or flammable liquids to clean the parts. Just use the advised materials for cleaning.
- ! Use the parts that are advised by
- ! Make the electrical connections in accordance with the standards.
- ! Do not use the blasted, uninsulated and damaged cables for connection. The glycol inside the antifreeze is too dangerous if it is drunk. Keep away from your skin and eyes also.
- ! Hot water and oil may cause serious burnt. Keep your skin away from the hot water and oil. Before beginning any operation, be sure that the system is not under high pressure.
- ! Do not change the positive and negative poles on the accumulator. Any change on the accumulator may damage the electrical system. See and control the electric diagram.
- ! Use the lifting hooks while you are carrying the generator. Control your equipment if it is strong enough for lifting. Additional parts which are assembled to the generator may change the center of gravity. Thus, you may need additional equipment for lifting.

- ! Do not apply any operation to the generator while it is being lifted.
- ! The generator must not be run on a place where explosive materials exist. Some of the electrical parts are not covered, it may cause an explosion.
- ! Always use the advised and dewatered fuel. Poor quality fuel may damage the fuel pump, and this leads the engine to lose performance and may cause mechanical problems.
- ! Do not use high pressured cleaners to clean the engine or other equipments. Radiator, flexible pipes and electrical equipment may be damaged.
- ! Although the generator set is installed in a suitable place where airing system is good, there must be extra fire extinguishers in case fire.
- ! If the panel connection of the generator is made by you, it must be done by authorized technical personnel and must be done with the written permission of our firm. Otherwise it will be regarded as your fault and it will not be covered by the guarantee anymore.
- ! The static grounding of the generator must be done properly. The operation of static grounding is under the responsibility of the buyer or the firm. For this operation you can benefit from the static grounding gib on the chassis.
- ! While doing any operation or electrical connection, be sure that the generator is in off-mode and make provision against starting.
- ! If the electrical system is installed by you, use durable and flexible cables coated with rubber. The cable sections are stated in the table.

#### 4.2 FIRST AID FOR ELECTRIC SHOCK WARNING

- ! Do not touch the victim's skin with bare hands until the source of electricity has been turned off.
- ! Switch off power if possible other wise pull the plug or the cable away from the victim.
- ! If this is not possible, stand on dry insulating material and pull the victim clear of the conductor, preferably using insulated material such as dry wood.
- ! If victim is breathing, turn the victim clear of the conductor, preferably using insulated material such as dry wood.
- ! If victim is breathing, turn the victim into the recovery position described below. If victim is unconscious, perform resuscitation as required;



#### 4.2.1 Open the airway

- Tilt the victim's head back and lift the chin upwards. Remove objects from the mouth or throat (including false teeth, tobacco or chewing gum).

#### 4.2.2 Breathing

- Check that the victim is breathing by looking, listening and feeling for the breath.

#### 4.2.3 Circulation

- Check for pulse in the victim's neck.

#### 4.2.4 If no breathing but pulse is present

- Pinch the victim's nose firmly.
- Take a deep breath and seal your lips around the victim's lips.
- Blow slowly into the mouth watching for the chest to rise.
- Let the chest fall completely. Give breaths at a rate of 10 per minute.
- If the victim must be left to get help, give 10 breaths first and then return quickly and continue.
- Check for pulse after every 10 breaths. When breathing restarts, place the victim into the recovery position described later in this section.

#### 4.2.5 If no breathing and no pulse

- Call or telephone for medical help.
- Give two breaths and start chest compression as follows:
- Place heel of hand 2 fingers breadth above ribcage/breastbone junction.
- Place other hand on top and interlock fingers.
- Keeping arms straight, press down 4-5 cm at a rate of 15 times per minute.
- Repeat cycle (2 breaths and 15 compressions) until medical help takes over.
- If condition improves, confirm pulse and continue with breaths. Check for pulse after every 10 breaths.
- When breathing restarts, place the victim into the recovery position described below

#### 4.2.6 Recovery position

- Turn the victim onto the side.
- Keep the head tilted with the jaw forward to maintain the open airway.
- Make sure the victim cannot roll forwards or backwards.
- Check for breathing and pulse regularly. If either stops, proceed as above

#### 4.2.7 WARNING

- ! *Do not give liquids until victim is conscious.*

## 5. LANDING and CARRYING

### 5.1 Landing

While landing the generator set, follow the instructions below for maximum safety.

- The lifting devices and lanyard must be at proper capacity.
- The lifting lanyard must be hooked at the right places that are specified on the generator set.



**Figure 5.1:** Generator Lifting Places

- During the lifting operation, the slack must be taken up slowly.
- If a forklift is used, the forks must be long enough to carry the generator from two sides.
- During the forklift carrying, the generator set must be kept close to the ground.
- The ground must be strong enough to carry the generator set. Otherwise other precautions must be taken to spread out the weight.
- The generator set must be landed to the closest place where it will be installed.

### 5.2 Carrying the Genset to Its Place

If the Genset cannot be carried to the installation place by forklift or crane, pallet trucks must be used with suitable capacity for short remove.

#### **WARNING!**

These operations can be done on flat surface.

The surface, where the generator set will be placed, must be controlled with setsquare and must be adjusted in accordance with the weight of the generator set.

### 5.3 Assembly, Start-up and Connection of the Generator Preparation:

In order to get the greatest performance from the genset, the installation must be done in accordance with some rules. Otherwise, the generator set may suffer damage or there may be amortization in a short period. Before starting up the machine, examine the genset with bare eyes. Control the machine if there is any crack, broken part, disconnection or fuel leakage. Checkup whether the electrical connections have been done properly. Checkup if any wrench, toll, oakum, cartoon, etc. has been forgotten on the engine or alternator. The points specified below are the rules that must be carried during the installation of a standard diesel generator set. In the case of special circumstances please contact our technical personnel.

## 6. INSTALLATION, START and LOAD

Although the choice of the genset place changes according to the business location, the following points must be taken into account.

1. The place must be dry, free from dust, airy and bright field.
2. Fuelling
3. The structure of the surface
4. The availability of access and exit to the place
5. Proper air entrance
6. Proper exhaust exit
7. Proper warm air exit
8. Noise level
9. Static grounding

### Assembly:

Failing that the assembly is not done by our firm or our authorized technical service, the product will not be covered by the guarantee anymore. If the assembly will be done by your firm, follow the instructions below.

- The place of the generator must be suitable for mounting and dismounting operations of the genset without any time loss. Clear up the place for comfortable entrance and exit.
- In case the generator set may need to be dismantled in the future, do not change the lifting hooks on the generator.
- The fuel pump, injectors and the filters must be in a reachable point for easy replacement.
- If there is a mark on the flywheel for the adjustment of the timing-gear, make it seeable.
- Cylinder heads, rocker cover and valve mechanism must be dismantlable without demounting other parts.
- Oil filler cap, oil drain tap and oil level gauge must be in a reachable point.
- Water filler cap and drain tap must be in a reachable point.



In order to get the required performance, the connection between the generator set and the facility must be done properly. The proper connection is shown in the Figure 6.2. There are two cables that are connected to the panel. One is for the control of the mains entrance, and the other one is the generator exit. The main which is taken from the counter or compensation panel is transferred to the receiver by the contactor. The important point is that the generator is connected to the load after the counter.

## 6.2 The Cables That Must Be Used

In some cases, the engine sucks air from the outside can be due to lack of available rooms is located. In such cases it needs to be aware of the following.

The Power of the Generator (kVA)	Advised Cable (NYY) mm
Between 15-16	4 x 4
Between 20-35	4 x 6
Between 40-55	4 x 10
Between 55-63	4 x 16
75	3 x 25 + 16
Between 110-150	3 x 50 + 25
Between 150-165	3 x 70 + 35
210	3 x 95 + 50
250	3 x 120 + 70
Between 320-350	2 x ( 3 x 70 + 35 )
Between 400-450	2 x ( 3 x 95 + 50 )
500	( 3 x 95 + 50 ) + ( 3 x 120 + 70 )
550	2 x ( 3 x 120 + 70 )
Between 600-720	3 x ( 3 x 95 + 50 )
Between 800-880	4 x ( 3 x 95 + 50 )
1080	4 x ( 3 x 120 + 70 )
1154	( 3 x 120 + 70 ) + ( 3 x 150 + 70 )
1443	4 x ( 3 x 180 + 95 )

Figure 7.1 : Cable section chart

## 6.3 The Important points Must Be Taken into Account While The User Connects the Generator With

Generator mustn't be overloaded more than its capacity. Overloading leads high voltage decrease which means that the devices connected to the circuit work improperly or may be damaged. Additionally, loading must be done in balance. A balanced loading means that each phase has to draw equal current. You can observe that from the ammeter of the three-phase on the control panel.

Imbalanced loaded phases will draw over current and heat even will take fire. The devices that are connected to the imbalanced load will be damaged, too. In order to prevent this, the mono phases in the facility must be distributed equally to three-phase.

## 6.4 Required Air for Combustion:

It is advised that the temperature of the intake air that is required for combustion must be less than 30 Celsius. If the temperature of the intake air is more than 30 Celsius, the engine will not work in good performance. The given power values are obtained from the standard tests. If the generator is being used in a hot climate, the power that is given by the generator must be regulated.

## 6.5 Getting the Intake-air From Outdoor

In some cases the required intake-air can be obtained from outdoor because of the unavailability of the room in which the genset has installed.

- The intake air must be clean.
- It must be considered that the exhaust gas and the warm air passes through the radiator mustn't be taken by the generator again.
- It must be considered that the chemical pollutions mustn't mix with the intake air.
- The intake air system must be designed in a manner that it mustn't be blocked by water, snow, dust or polluted materials.
- The length of the pipe should be kept short.
- There mustn't be dogleg elbow pipes along the route.
- The pipes have to be clean and smooth.
- If it is used hosepipes along the route, the hosepipes must be strengthened against contraction during the intake.

On the other hand, it must be considered that the room temperature mustn't be more than 60 Celsius. Otherwise the electrical parts on the generator may suffer damage.

There must be placed a fan in order to decrease the room temperature if the room temperature increases up to 60 Celsius. While calculating the air consumption and the temperature, take into account the other machines or devices that are planted at the same room.

## 6.6 Getting the Intake Air from Inside

If the intake air is obtained from inside;

- The circulation of the clean-air must be guaranteed.
- The dimensions of the intake-air entrance must be large enough to prevent an occurrence of a vacuum in the room. Addition to the intake air that is required for the combustion; the fan also blows out air to outside. Thus, in order to prevent the vacuum occurrence, the air entrance of the room must be 1.5 times of the radiator space.
- Entrance of the air needs to be arranged as it will be affected minimally from the heat created by exhaust and radiator.
- It is needed to design the intake system as it will not be blocked accidentally.

As mentioned before, the temperature of the intake air is so important for the performance of the generator that the heat of the exhaust and the radiator must be taken into account. Thus, the insulation of the pipes may be a precaution for this issue. It is obligatory to set up a fan inside the room, if the temperature of the room increases by the other machines and devices that are planted in the same room. The settlements are shown in *Figure 7.1,7.2,7.3*.

### **6.7 The Height from Sea-level**

The pressure of fuel pumps of the engines are adjusted in the factories equal to 760mm Hg. The altitude affects the performance of the generators. The effect of the altitude is less in turbo-engines compared to natural intake engines.

### **6.8 Fuel System**

For proper running, there must be a steady and proper flow in the fuel system. Thus, the filters must be replaced in due time and the flex pipes must be controlled duly.

A breakage or smash in the hosepipes that transfers fuel to the pump leads the engine to lose performance or to stop.

If the fuel tank is planted in a high place, it is better to put a valve for the demounting in case of a fault.

On the other hand, if the fuel temperature is higher than 35 Celsius, it causes the performance to decrease. Thus, keep the fuel hosepipes away from the radiator, exhaust, sunlight...etc.

Place the taps, which are used for drainage from tank during the group assembly, in a reachable and demountable point.

### **6.9 Exhaust and the Muffler:**

It is important for the group generator room to be insulated in terms of temperature control. But, a thermal insulation solely has a negative effect on sound insulation.

On exhaust lines the place of the muffler has an important effect in terms of sound insulation. In order to get the best result for sound insulation, the length of the pipe after the muffler must be between 0.8 and 1.5m.

It is beneficial to place the muffler close to the engine exhaust exit, if it is difficult to place it close to the pipe exit.

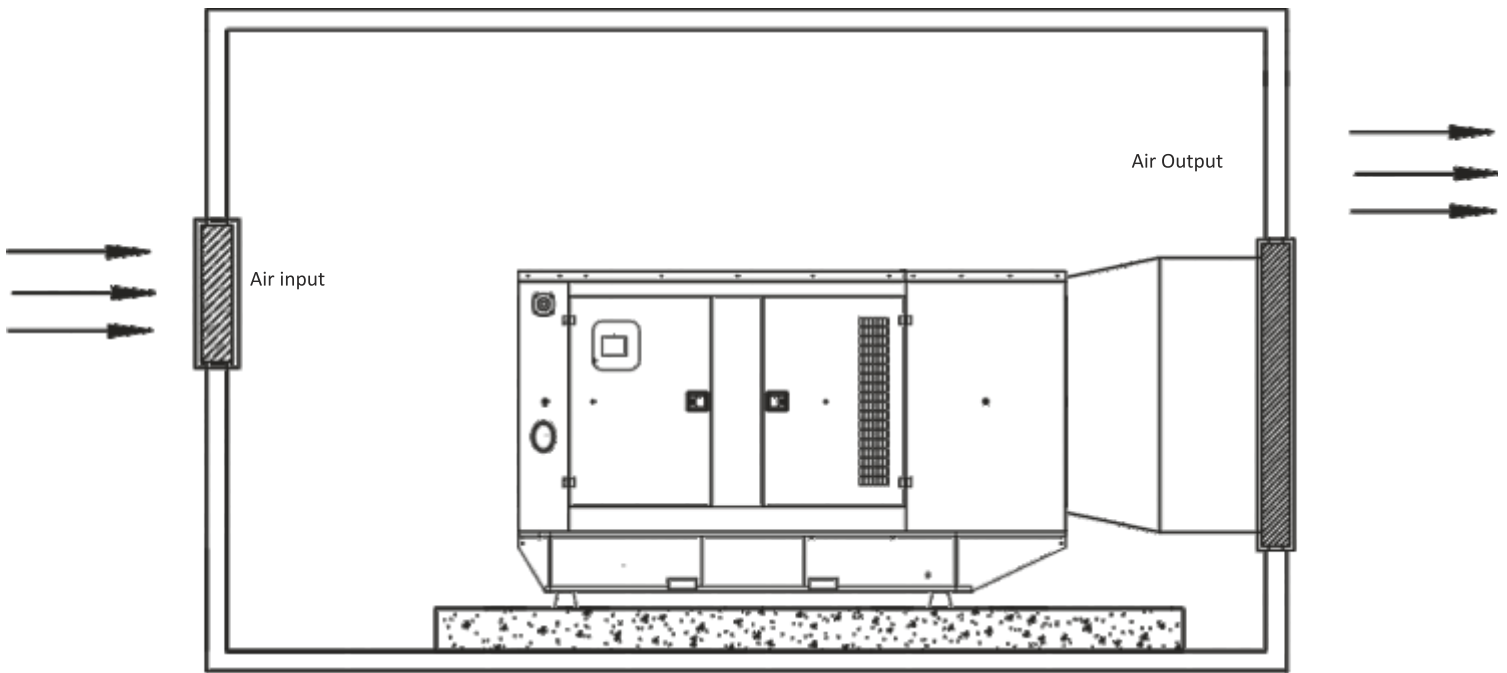


Figure 6.1: Ventilator settlement plan for the canopy genset group

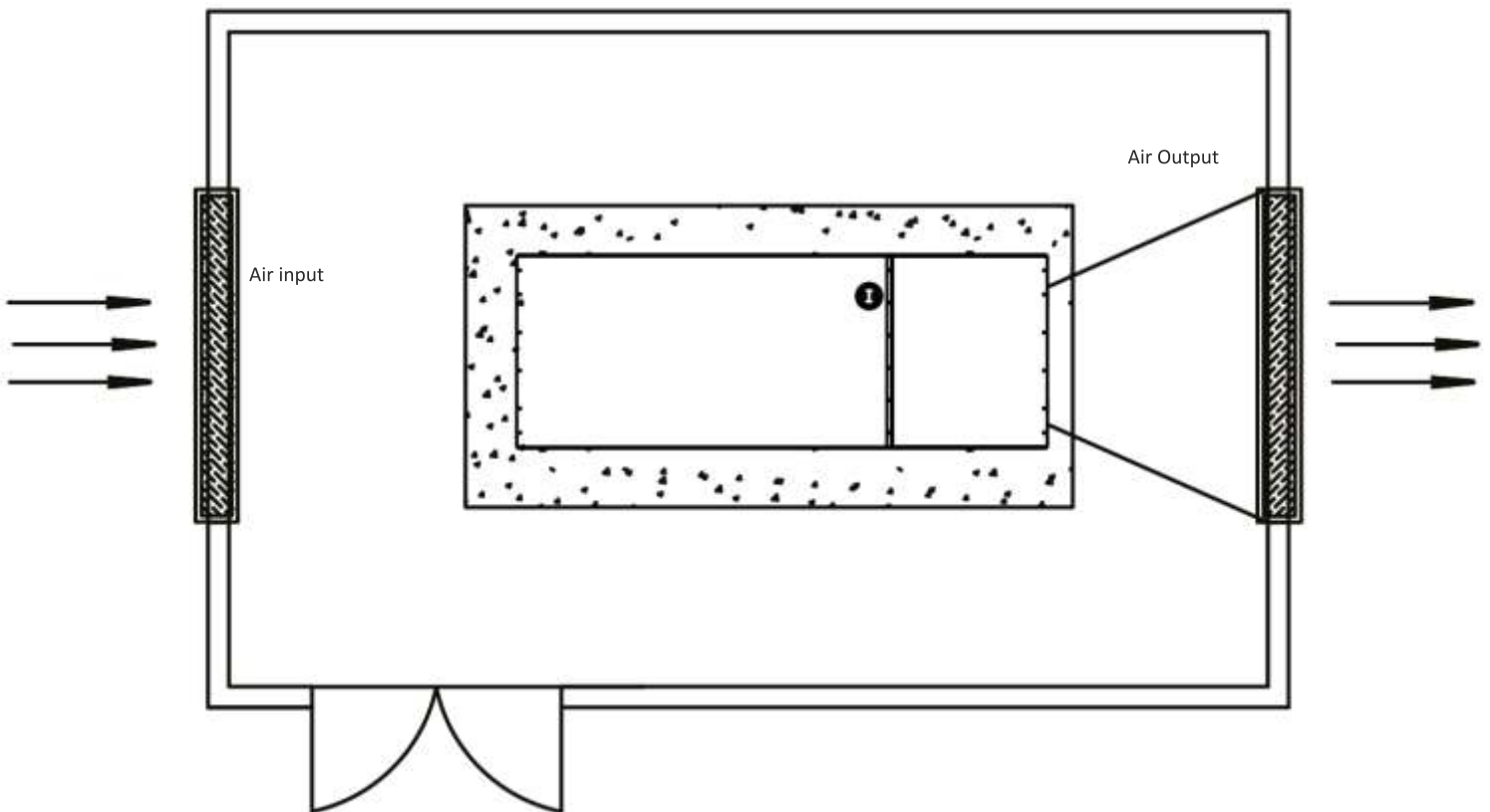
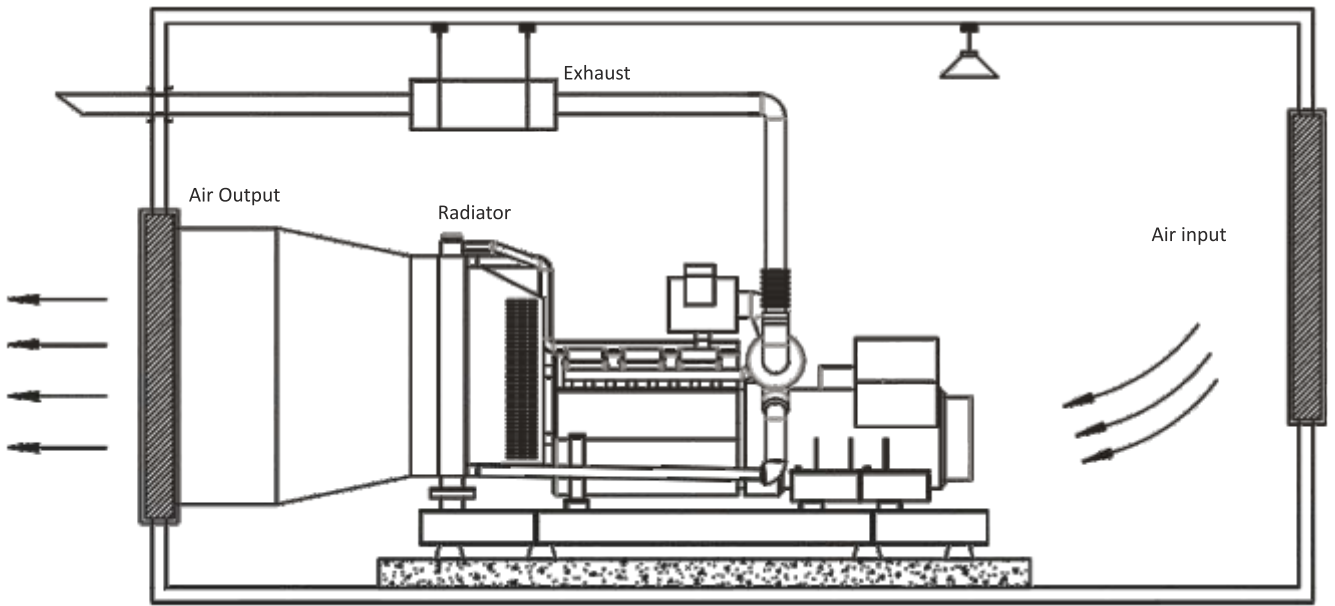
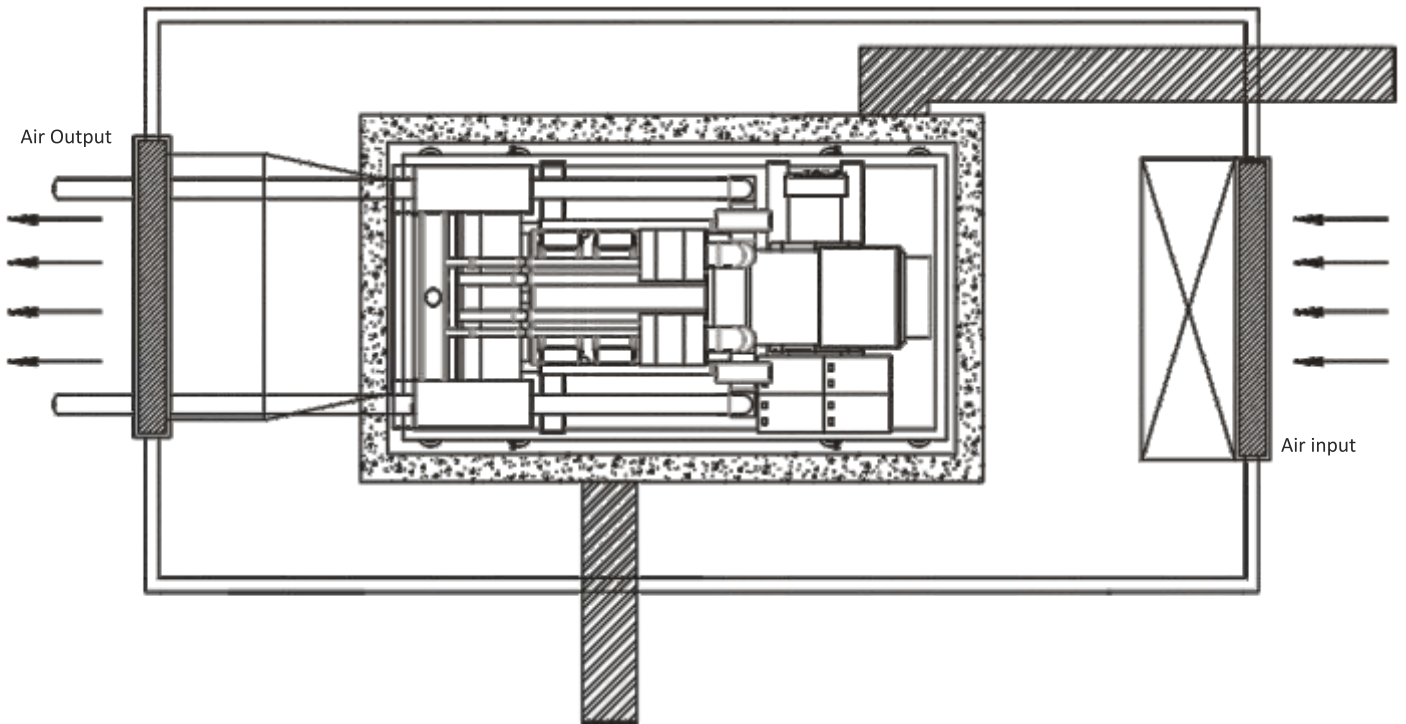


Figure 6.2: Ventilator settlement plan for the canopy genset group



**Figure 6.3:** Ventilator settlement plan for the open type genset group



**Figure 6.4:** Ventilator settlement plan for the open type genset group



## 7. FUEL, OIL AND ANTIFREEZE

### 7.1 FUEL

The producers of the diesel engines request and advise that the fuel, which is used in our productions, must be conform to ASTM D-975-77-2D or BS EN590:1995 CLASS 1 Quality.

### 7.2 Oil

Viscosity-Temperature Diagram: you can check it from the diagram whether the oil, which you use in your region, is suitable or not.

### 7.3 Antifreeze

Never exceed 65/35 mixture of antifreeze to water. If the water temperature gets cold in the winter hot in the summer, be sure that you have enough antifreeze in your system to protect you engine lifetime and agueduets.

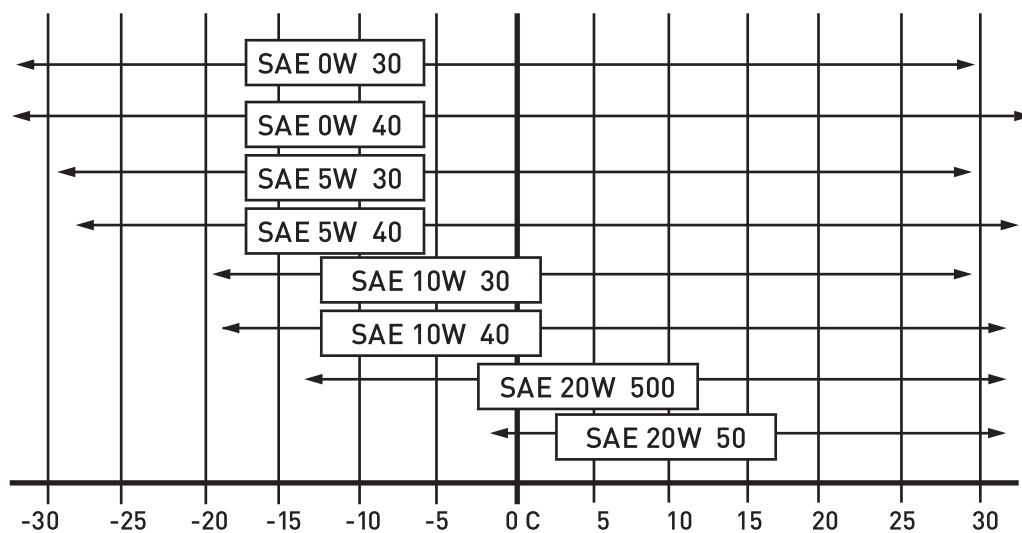


Figure7.2.2 Compatibility chart for using oil.

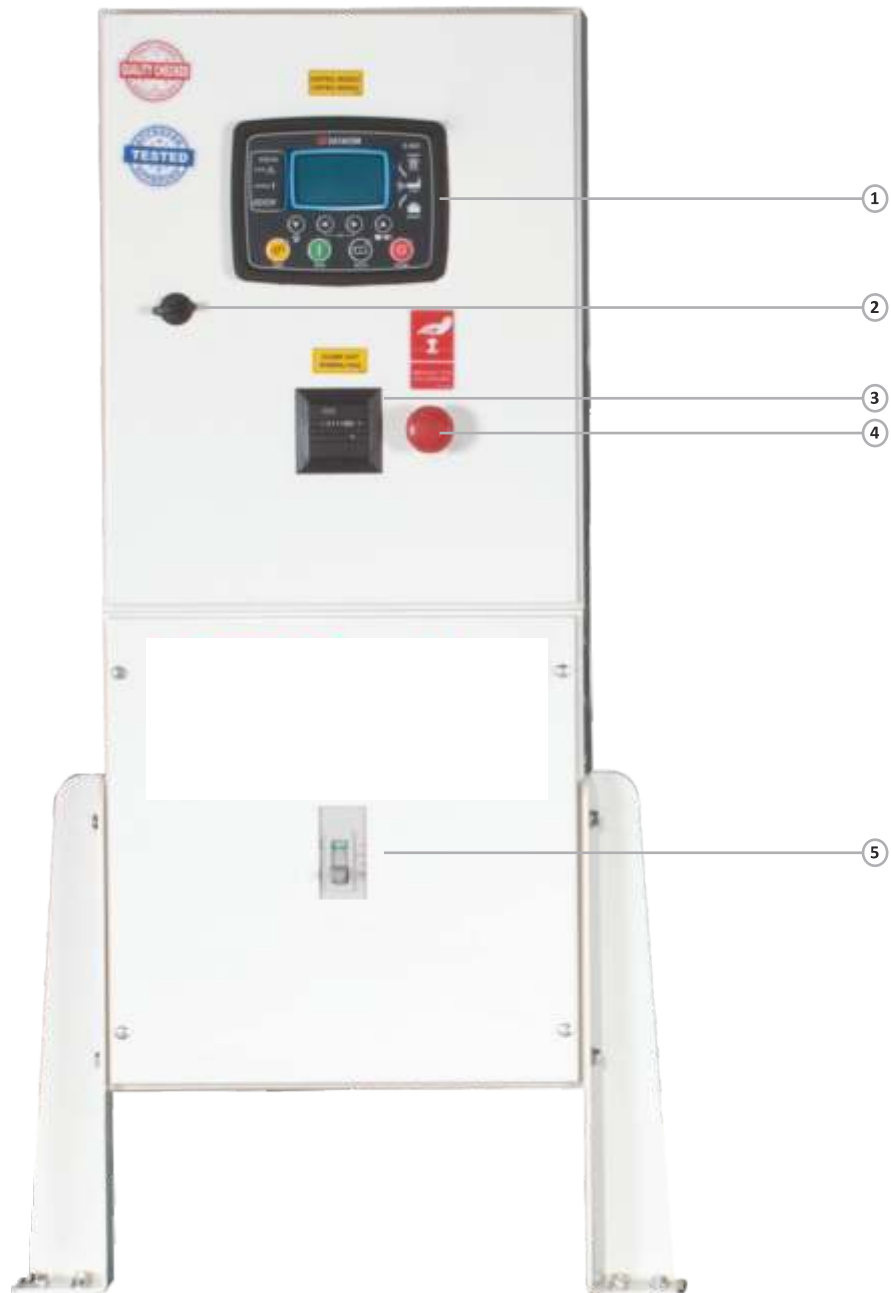
## 8. THE IMAGE OF THE ENGINE

### 8.1 Generator Description of Goods



- |                        |                                |
|------------------------|--------------------------------|
| 1. Alternator          | 10. Battery                    |
| 2. Engine              | 11. Starter Motor              |
| 3. Air Filter          | 12. Fuel Tank                  |
| 4. Control Board       | 13. Thermal Magnetic Switch    |
| 5. Fuel Pump           | 14. Tank Cap                   |
| 6. Radiator            | 15. Engine Label               |
| 7. Fuel Filter         | 16. Engine Antivibration Wedge |
| 8. Jacket water heater |                                |
| 9. Antivibration Wedge |                                |

## 9. CONTROL PANEL



1. Generator Control Panel
2. Panel Cover Lock
3. Electromechanical Meter
4. Emergency Stop
5. Circuit Breaker

## 10. TROUBLESHOOTING

### The generator is running even the electric network is off or electric network is on:

- The motor body must be static grounded, check it.
- The mains voltage may digress from the programmed values, measure the phase voltage.
- Check whether the main voltage is being measured right by pressing the MENU button on the control panel.
- Upper and lower limit of the mains voltage may be narrow. Enter the program mode and control the P\_004 and P\_005. Standard values must be 170 / 270.
- Hysteresis voltage may be too high. If the mains voltage is off, increase the lower limit as well as the hysteresis voltage and for the upper limit decrease it as well as the hysteresis voltage. Enter the program mode and checkup the P\_021, standard value is 8 volt.

### The AC Voltages are being read incorrect or the generator frequency is being read incorrect

- The motor body must be static grounded, check it. Connect the negative (-) terminal and neural and check whether the problem is gone.
- Read error is -/+ 3 volt.
- If you get errors only while the generator is running; there may be fault in the charge alternator or charge regulator. Demount the connection of charge alternator and try again.
- If you are experiencing errors only when the mains voltage is on; the accumulator charge rectifier may have been damaged. Switch off the rectifier circuit breaker and try again.

### \* The Phase-Phase Voltages are being read incorrect even the Phase-Neutral voltages are right

- The Phase Line is incorrect. Put the phase voltages in correct order.

### \* The KW and COSQ values are incorrect even the current is being measured correct:

- Current transformers may have been set with incorrect phases or the poles of some current transformers may have been set inversely. Connect the current transformers with the device and measure the KW and COSQ one by one, when you complete all connect all.

**WARNING!!!** By pass the exits of the current transformers that you do not use.

### \* When the mains voltage is gone, the ignition switch is opening but the engine is not starting and the oil indicator light is flickering:

Accumulator (-) may have not been connected with the oil pressure entrance of the device.

- The oil pressure nib may have been left void.
- The oil pressure cable may be disjointed.
- The oil pressure sensor may be broken.
- The oil pressure sensor is closing lately; upon request the oil pressure sensor is changed.

### The engine is not starting at the first march, when repeated engine is not cranking, the oil pressure sensor is flickering:

- The oil pressure sensor is closing lately. When the engine off, start the engine; upon request the oil pressure sensor is changed.

**When the mains voltage is off the generator is starting but later the device is giving crank error and the engine is stopping:**

- Generator phase voltage is not reaching to the device. Measure the voltage between the Phase-U (2) and generator neutral (5) while the engine is running. The generator phase circuit breaker may have been blown or may be closed; there may be a connection problem. If everything is ok switch off the entire breakers on the panel, later Start from the DC feeder breaker and open all one by one, test them again.

**Device is cutting the starter lately:**

- The voltage of alternator is increasing tardily and the alternator remanance voltage is under 20 volt. The device cuts the starter by reading the frequency of the generator and in order to read the frequency, it needs 20 volt at least. Adding relay is the only way for solution. The coil/bobbin of the relay must be between Accumulator (-) and the D+ (light) nib of the charge alternator. The march exit of the device must pass through the off-mode contact of the relay serially.

**The device is not working:**

Please measure the DC Voltage between the battery (+) terminal and battery (-) terminal behind on the device. If voltage exists, switch of the entire breakers then start to switch the entire breakers on. Attention that firstly the DC feeder breaker switch on and check up again.

**Does not enter programming mode:**

Measure the DC voltages between the numbers 11 and 12 electric terminals behind the device. If voltage exists, switch off the entire breakers and start to switch the entire breakers on but first the DC feeder breaker and check up again.

**Cannot enter the program mode:**

Separate the Accumulator (-) from the program lock (23). After you are done, reconnect it in case unauthorized usage.

<p><b>The Engine is not cranking</b></p>	<ul style="list-style-type: none"> <li>a. Low or uncharged battery</li> <li>b. Inverse or bad battery connection</li> <li>c. A blow in the breakages on the control panel</li> <li>d. Emergency stop button is pushed</li> <li>e. One of the led in shelves is on, a fault exists.</li> <li>f. The control panel is off.</li> </ul>	<ul style="list-style-type: none"> <li>a. Charge the battery or replace it</li> <li>b. Check up the connections</li> <li>c. Switch the breakage on</li> <li>d. Turn the emergency button to right and switch it on.</li> <li>e. Debug the fault</li> <li>f. Turn the control panel into automatic mode</li> </ul>
<p><b>The Engine is marching but not running</b></p>	<ul style="list-style-type: none"> <li>a. Solenoid is not working.</li> <li>b. Low quality fuel</li> <li>c. Air filter is clogged</li> <li>d. Air in the fuel system</li> <li>e. Fuel tank is empty.</li> </ul>	<ul style="list-style-type: none"> <li>a. Control the energy</li> <li>b. Change the fuel</li> <li>c. Change or clean the filter</li> <li>d. Take the air in the system</li> <li>e. Fill fuel</li> </ul>
<p><b>Alternator is not producing nominal voltage, when it is neutral</b></p>	<ul style="list-style-type: none"> <li>a. Loss of permanence voltage</li> <li>b. The voltage is in adjust potentiometer circuitry</li> </ul>	<ul style="list-style-type: none"> <li>a. The remanance voltage between the phases must be the 10% of the nominal voltage.</li> <li>b. Straighen out the disconnection</li> </ul>

<p><b>The voltage is down, when the generator is overloaded</b></p>	<p>a. Rotative diodes are out of order  b. Engine speed is decreasing when overloaded  c. Regulator board is out of order  d. Generator exit is decreasing too much</p>	<p>a. Control the diodes with a 4.5 volt battery and a lamp serially connected to it. The lamp has to be on in one pole and off for the other pole.  b. The fuel pump may be unbalanced; hosepipes may be plugged or broken.  c. Replace the regulator board  d. Check up the load</p>
<p><b>The generator voltage is too high</b></p>	<p>a. One of the phases goes to regulator is plucked  b. Regulator board is out of order</p>	<p>a. Check the terminals that go to the regulator from the terminal of U –V –W in exit terminal circuit  b. Replace the regulator board</p>
<p><b>Oscillator current</b></p>	<p>a.) The stabilization adjustment the regulator is out of order</p>	<p>a. Adjust it from the regulator</p>
<p><b>The voltage between phases is unbalanced</b></p>	<p>a) Unbalanced load</p>	<p>a.) Balance your mains load</p>
<p><b>Voltage exists and Circuit breakers is blowing</b></p>	<p>a) Unbalanced load</p>	<p>a. Control the short circuit  b. Adjust the load according to the current written on the group label</p>
<p><b>Generator is stopping suddenly</b></p>	<p>a. Low oil pressure  b. High engine temperature  c. Fuel empty  d. March Fault  e. Breakages on the control panel may have been blown.  f. The engine is not working properly.  g. Over speed fault  h. High oil temperature  i. The control panel is offj. Emergency stop button may have been pushed.</p>	<p>a. Check the oil level add if needed  b. Check the exits and entrance of the air to the room  c. Fill fuel to the depot  d. Reset the control panel by restarting (close it and start it again)  e. Switch the breakage on. If blows again call the service  f. Call the service  g. Reset the machine, call service if repeated  h. Check the oil level and type. Call service if continued  i. Turn it into automatic mode  j. Open the button</p>

# 11 . GENERATOR CONTROL PANEL

## 11.1 WEB BASED D-300

The D-300 is a cost effective comprehensive genset controller ready for internet monitoring.



### FEATURES

- Diesel and gas genset support
- 400Hz operation support
- 400 event logs, full snapshot
- All parameters front panel editable
- 3 level configuration password
- 128x64 graphical LCD display
- Downloadable languages
- Waveform display of V & I
- Harmonic analysis of V & I
- 16Amp MCB & GCB outputs
- 8 configurable digital inputs
- 6 configurable digital outputs
- 3 configurable analog inputs
- Both CANBUS-J1939 & MPU
- 3 configurable service alarms
- Multiple automatic exerciser
- Weekly operation schedule
- Dual mutual standby with equal aging of gensets
- Manual "speed fine adjust" on selected ECUs
- Automatic fuel pump control
- Disable protections feature
- Excess power protection
- Reverse power protection
- Overload IDMT protection
- Load shedding, dummy load
- Multiple load management
- Current unbalance protection
- Voltage unbalance protection
- Fuel filling & fuel theft alarms
- Battery back-up real time clock
- Idle speed control
- Battery charge run enabled

- Combat mode support
- Multiple nominal conditions
- Contactor & MCB drive
- 4 quadrant genset power counters
- Mains power counters
- Fuel filling counter
- Fuel consumption counter
- Modem diagnostics display
- Configurable through USB, RS-232 and GPRS
- Free configuration program
- Allows SMS controls
- Ready for central monitoring
- Mobile genset support
- Automatic GSM geo-location
- GPS connectivity (RS232)
- Easy USB firmware upgrade
- IP65 rating with optional gasket

### MEASUREMENTS

- Mains & genset PN/PP voltages
- Mains & genset frequency
- Mains & genset phase currents
- Mains & genset neutral currents
- Mains & genset, phase & total, kW, kVA, kVA<sub>r</sub>, pf
- Engine speed
- Battery voltage

### COMMUNICATION

- 4-band GPRS modem (optional)
- USB Device
- RS-232 (2400-57600baud)
- J1939-CANBUS
- Geo-locating through GSM
- GPS support (RS-232)
- Internet Central Monitoring
- SMS message sending
- E-mail sending
- Free PC software: Rainbow Plus
- Modbus RTU

### FUNCTIONALITIES

- AMF unit
- ATS unit
- Remote start controller
- Manual start controller
- Engine controller
- Remote display panel

### TOPOLOGIES

- 3 ph 4 w, star & delta
- 3 ph 3 w, 2 CTs
- 2 ph 3 w
- 1 phase 2 wires

## TECHNICAL SPECIFICATIONS

**Alternator voltage:** 0 to 300 V-AC (Ph-N)  
**Alternator frequency:** 0-600 Hz.  
**Mains voltage:** 0 to 300 V-AC (Ph-N)  
**Mains frequency:** 0-600 Hz.  
**Topology:** 1-2-3 phases, with or without neutral  
**DC Supply Range:** 8.0 to 36.0 V-DC.  
**V-A-cos Accuracy:** 0.5% + 1 digit  
**kW-kVA-kVAr Accuracy:** 1.0% + 1 digit  
**Current consumption:** 500 mA-DC max @ 12V-DC  
**Current Inputs:** from current transformers. .../5A.  
**Digital inputs:** input voltage 0 to 36 V-DC.  
**Analog input range:** 0-5000 ohms.  
**Mains and genset contactor outputs:** 16Amps@250V  
**DC Outputs:** Protected mosfet semiconductor outputs, rated 1Amp@28V-DC  
**Cranking dropouts:** survives 0V for 100ms.  
**Magnetic pickup voltage:** 0.5 to 50Vpk.  
**Magnetic pickup frequency:** 0 to 20000 Hz.  
**Charge Alternator Excitation:** 2W.  
**Display Screen:** 2.9", 128x64 pixels  
**USB Device:** USB 2.0 Full speed  
**RS-232 Port:** selectable baud rate (2400-57600baud)  
**Operating temperature:** -20°C to 70°C (-4 to +158 °F)  
**Storage temperature:** -40°C to 80°C (-40 to +176°F)

**Maximum humidity:** 95% non-condensing.  
**IP Protection:** IP65 from front panel, IP30 from the rear (with gasket)  
**Dimensions:** 172 x 134 x 46mm (WxHxD)  
**Panel Cut-out Dimensions:** 151 x 111 mm minimum.  
**Weight:** 300 g (approx.)  
**Case Material:** High Temperature, non-flammable ABS/PC  
**Installation:** Flat surface mounting on a Type 1 enclosure. Rear retaining plastic brackets.

## CONFORMITY

### EU Directives Conformity

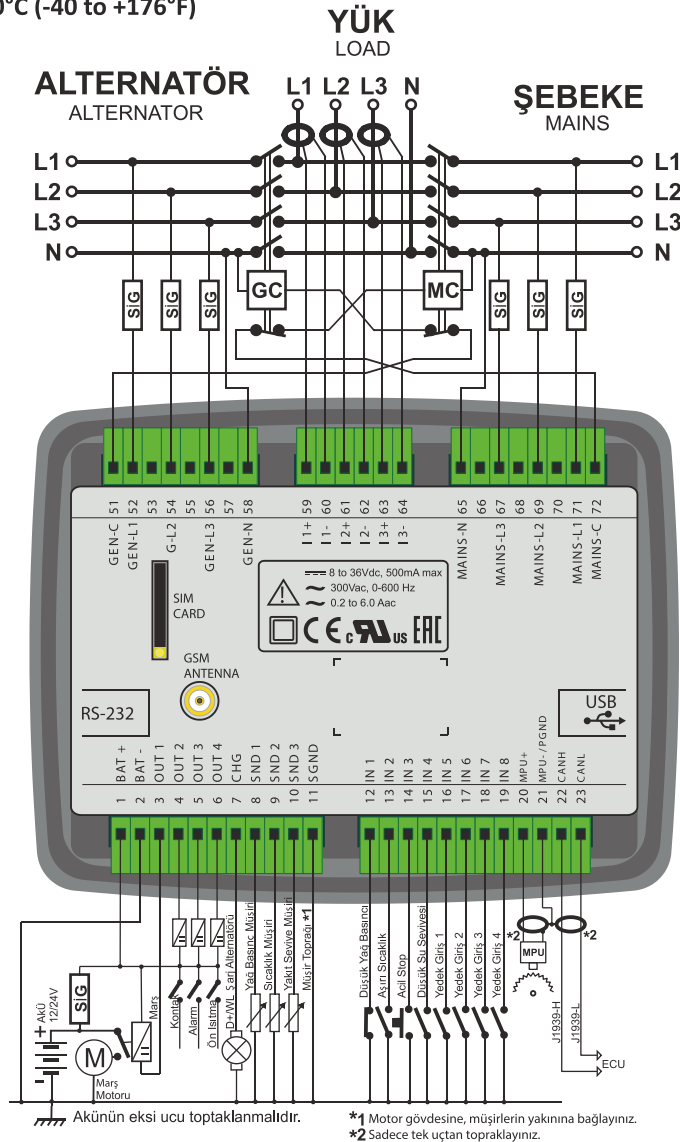
-2006/95/EC (low voltage)  
-2004/108/EC (electro-magnetic compatibility)

### Norms of reference:

EN 61010 (safety requirements)  
EN 61326 (EMC requirements)

### UL & CSA Compatibility:

-UL 6200, Controls for Stationary Engine Driven Assemblies (Certificate # - 20140725-E314374)  
-CAN/CSA C22.2 No. 14-13 – Industrial Control Equipment







**FEATURES**

- Diesel and gas genset support
- 400Hz operation support
- 400 event logs, full snapshot
- All parameters front panel editable
- 3 level configuration password
- 128x64 graphical LCD display
- Downloadable languages
- Waveform display of V & I
- Harmonic analysis of V & I
- Synchroscope & check synch
- Allows closed transfers
- 16Amp MCB & GCB outputs
- 8 configurable digital inputs
- Inputs expandable to 40
- 8 configurable digital outputs
- Outputs expandable to 40
- 7 configurable analog inputs
- Both CANBUS-J1939 & MPU
- 3 configurable service alarms
- Multiple topologies
- 6xCT, true mains metering
- Supports up to 48 gensets
- Automatic learning/self adjust
- Direct governor & AVR control
- Voltage and phase matching
- kW & kVAR load sharing
- True soft transfer in both ways
- PLC functions
- Peak Lopping / peak shaving
- Mains de-coupling protection
- R.O.C.O.F protection
- Vector shift protection
- Reverse power protection
- Over/under freq. Protection
- Over/under voltage protection
- Smart load management
- Smart genset sequencing
- Run/stop priority support
- Equal aging of gensets
- Base load (power export)

- Unmanaged distributed power export support
- AVR & GOV droop support
- Dead bus sensing
- Multiple automatic exerciser
- Weekly operation schedule
- Dual mutual standby with equal aging of gensets
- Manual “speed fine adjust” on selected ECUs
- Automatic fuel pump control
- Disable protections feature
- Excess power protection
- Reverse power protection
- Overload IDMT protection
- Load shedding, dummy load
- Multiple load management
- Current unbalance protection
- Voltage unbalance protection
- Fuel filling & fuel theft alarms
- Contactor & MCB drive
- Battery back-up real time clock
- Idle speed control
- Battery charge run enabled
- Combat mode support
- Multiple nominal conditions
- 4 quadrant genset power counters
- Mains power counters
- Fuel filling counter
- Fuel consumption counter
- Modem & ethernet diagnostics
- Configurable through USB, RS-485, Ethernet and GPRS
- Free configuration program
- Allows SMS controls
- Ready for central monitoring ethernet & GPRS
- Mobile genset support
- Automatic GSM geo-location
- GPS connectivity (USB&RS232)
- Dynamic DNS support
- Easy USB firmware upgrade
- IP65 rating with standard gasket

**COMMUNICATION**

- 2G GSM Modem
- 3G GSM Modem
- 4G GSM Mode
- Wi-Fi (802.11 b/g/n)
- Ethernet 10/100 Mbits
- USB Host
- RS-232 (isolated)
- RS-485 (isolated)
- Synchro/LoadShare Module
- 3x AC Current Inputs
- 3x Analog Inputs

**FUNCTIONALITIES**

- Multi genset synch & load share
- Mains synchronization
- Single genset parallel with mains
- AMF unit (uninterrupted transfer)
- ATS unit (uninterrupted transfer)
- Remote start controller
- Manual start controller
- Engine controller
- Remote display panel

**CONNECTION**

- Central Monitoring
- Embedded Web Server
- USB
- GPS (geo-location)
- SMS
- E-mail
- Modbus
- Modbus TCP/IP
- SNMP 1.0 with trap
- HTML
- UDP
- SNTP

## TECHNICAL SPECIFICATIONS

**Alternator voltage:** 0 to 300 V-AC (Ph-N)

**Alternator frequency:** 0-600 Hz.

**Mains voltage:** 0 to 300 V-AC (Ph-N)

**Mains frequency:** 0-600 Hz.

**Topology:** 1-2-3 phases, with or without neutral DC Supply

**Range:** 8.0 to 36.0 V-DC. V-A-cos

**Accuracy:** 0.5% + 1 digit kW-kVA-kVAR

**Accuracy:** 1.0% + 1 digit

**Current consumption:** 500 mA-DC max.

**Current Inputs:** from current transformers. ../5A or ../1A.

**Digital inputs:** input voltage 0 to 36 V-DC.

**Analog input range:** 0-5000 ohms.

**Mains and genset contactor outputs:** 16Amps@250V DC

**Outputs:** Protected mosfet semiconductor outputs, rated 1Amp@28V-DC

**Cranking dropouts:** survives 0V for 100ms.

**Magnetic pickup voltage:** 0.5 to 50Vpk.

**Magnetic pickup frequency:** 0 to 20000 Hz.

**Charge Alternator Excitation:** 2W. Display Screen: 2.9", 128x64 pixels

**Ethernet Port:** 10/100 Mbits USB Device: USB 2.0 Full speed

**USB Host:** USB 2.0 Full speed RS-485 Port: selectable baud rate (2400-115200baud)

**RS-232 Port:** selectable baud rate (2400-115200baud)

**Operating temperature:** -20°C to 70°C (-4 to +158 °F)

**Storage temperature:** -40°C to 80°C (-40 to +176°F)

**Maximum humidity:** 95% non-condensing.

**IP Protection:** IP65 from front panel, IP30 from the rear (with gasket)

**Dimensions:** 211 x 162 x 42mm (WxHxD)

**Panel Cut-out Dimensions:** 176 x 121 mm minimum.

**Weight:** 500 g (approx.)

**Case Material:** High Temperature, non-flammable ABS/PC

**Installation:** Flat surface mounting on a Type 1 enclosure. Rear retaining plastic brackets.

## CONFORMITY

### EU Directives Conformity

-2014/35/EC (low voltage)

-2014/30/EC (electro-magnetic compatibility)

### Norms of reference:

-EN 61010 (safety requirements)

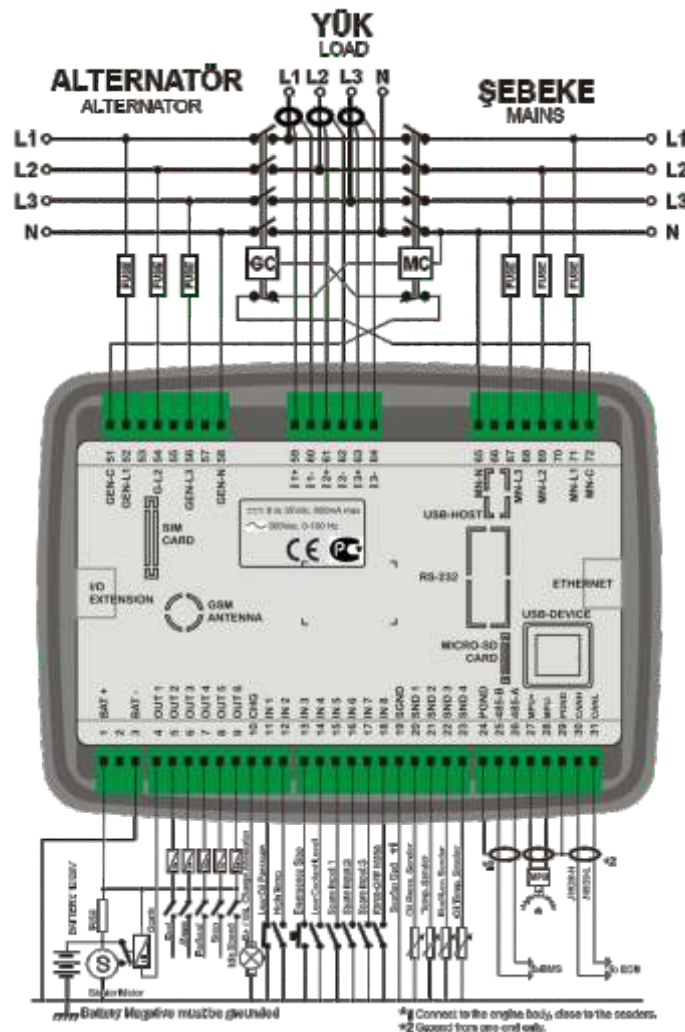
-EN 61326 (EMC requirements)

### UL & CSA Compatibility:

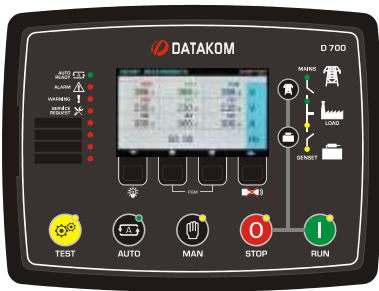
• UL 6200, Controls for Stationary Engine Driven

Assemblies (File# - 20140725-E314374)

• CAN/CSA C22.2 No. 14-13 – Industrial Control Equipment



## 11.3 D-700 AUTO LEARNING SYNCHRONIZATION CONTROLLER



- Tailored for the most demanding applications, the D-700 provides synchronization, load share, mains synchronization, soft transfer, AMF, ATS, Remote Start, Engine control and remote display panel functionalities in a single unit,

- Easy commissioning is achieved with the automatic learning feature, a first in the industry.

- Unequalled communication capabilities allow integration to virtually any management system.

### FEATURES

- 4.3" 480x272pixels color LCD
- Diesel and gas genset support
- Supports up to 48 gensets
- Automatic learning/self adjust
- Direct governor & AVR control
- Voltage and phase matching
- kW & kVAr load sharing
- Multiple topologies
- 6xCT, true mains metering
- True soft transfer in both ways
- Peak Lopping / peak shaving (mains or genset priority)
- Mains de-coupling protection
- R.O.C.O.F protection
- Vector shift protection
- Reverse power protection
- Over/under freq. Protection
- Over/under voltage protection
- Smart load management
- Smart genset sequencing
- Run/stop priority support
- Equal aging of gensets
- Base load (power export)
- Unmanaged distributed power export support
- AVR & GOV droop support
- Dead bus sensing
- 400Hz operation support
- 400 event logs, full snapshot
- All parameters front panel editable
- 3 level configuration password
- 128x64 graphical LCD display
- Downloadable languages
- Waveform display of V & I
- Harmonic analysis of V & I
- Synchroscope & check synch
- 12 configurable digital inputs
- Inputs expandable to 44
- 8 configurable digital outputs
- Outputs expandable to 40
- 7 configurable analog inputs
- Both CANBUS-J1939 & MPU
- 3 configurable service alarms
- Multiple automatic exerciser
- Weekly operation schedule
- Dual mutual standby with equal aging of gensets
- Manual "speed fine adjust" on selected ECUs
- Automatic fuel pump control
- Disable protections feature
- Excess power protection
- Overload IDMT protection
- Load shedding, dummy load
- Multiple load management
- Current unbalance protection
- Voltage unbalance protection
- Fuel filling & fuel theft alarms
- Battery back-up real time clock
- Idle speed control
- Battery charge run enabled
- Combat mode support
- Multiple nominal conditions
- Contactor & MCB drive
- 4 quadrant genset power counters
- Mains power counters
- Fuel filling counter
- Fuel consumption counter
- Modem & ethernet diagnostics
- Configurable through USB, RS-485, Ethernet and GPRS
- Free configuration program
- Allows SMS controls
- Ready for central monitoring ethernet & GPRS
- Mobile genset support
- Automatic GSM geo-location
- GPS connectivity (USB&RS232)
- Dynamic DNS support
- Easy USB firmware upgrade
- IP65 rating with standard gasket

### COMMUNICATION

- Ethernet (10/100Mb)
- 4-band GPRS modem (optional)
- USB Host & USB Device
- RS-485 (2400-115200baud)
- RS-232 (2400-115200baud)
- Micro SD card slot
- J1939-CANBUS
- Geo-locating through GSM
- GPS support (USB & RS-232)
- Embedded web server
- Web monitoring & programming
- Internet Central Monitoring
- SMS message sending
- E-mail sending
- Free PC software: Rainbow Plus
- Modbus RTU & Modbus TCP/IP
- SNMP (with TRAP messages)
- SNTP

### FUNCTIONALITIES

- Multi genset synch & load share
- Mains synchronization
- Single genset parallel with mains
- AMF unit (uninterrupted transfer)
- ATS unit (uninterrupted transfer)
- Remote start controller
- Manual start controller
- Engine controller
- Remote display panel
- Long term data record on flash
- On-board Input&output extension

### MEASUREMENTS

- Mains & genset PN/PP voltages
- Mains & genset frequency
- Mains & genset phase currents
- Mains & genset neutral currents
- Mains & genset, phase & total, kW, kVA, kVAr, pf
- Engine speed
- Battery voltage

## TECHNICAL SPECIFICATIONS

**Alternator voltage:** 0 to 300 V-AC (Ph-N)  
**Alternator frequency:** 0-600 Hz.  
**Mains (Busbar) voltage:** 0 to 300 V-AC (Ph-N)  
**Mains (Busbar) frequency:** 0-600 Hz.  
**Topology:** 1-2-3 phases, with or without neutral  
**DC Supply Range:** 8.0 to 36.0 V-DC.  
**V-A-cos Accuracy:** 0.5% + 1 digit  
**kW-kVA-kVAr Accuracy:** 1.0% + 1 digit  
**Current consumption:** 500 mA-DC max.  
**Current Inputs:** from current transformers. .../5A.  
**Digital inputs:** input voltage 0 to 36 V-DC.  
**Analog input range:** 0-5000 ohms.  
**DigitalOutputs:** Protected mosfet semiconductor outputs, rated 1Amp@28V-DC  
**Cranking dropouts:** survives 0V for 100ms.  
**Magnetic pickup voltage:** 0.5 to 50Vpk.  
**Magnetic pickup frequency:** 0 to 20000 Hz.  
**GOV Control Output:** 0-10V-DC  
**AVR Control Output:**  $\pm 5V$ -DC, fully isolated  
**Charge Alternator Excitation:** 2W.  
**Display Screen:**  
     B/W versions: 2.9", 128x64 pixels  
     TFT versions: 4.3", 480x272 pixels  
**Ethernet Port:** 10/100 Mbits  
**USB Device:** USB 2.0 Full speed  
**USB Host:** USB 2.0 Full speed  
**RS-485 Port:** selectable baud rate  
**RS-232 Port:** selectable baud rate

**Data Link Port:** Fully Isolated CANBUS  
**Operating temperature:** -20°C to 70°C (-4 to +158 °F)  
**Storage temperature:** -40°C to 80°C (-40 to +176°F)  
**Maximum humidity:** 95% non-condensing.  
**IP Protection:** IP65 from front panel, IP30 from the rear.  
**Dimensions:** 243 x 183 x 47mm (WxHxD)  
**Panel Cut-out Dimensions:** 216 x 156 mm minimum.  
**Weight:** 700 g /1.55lb (approx.)  
**Case Material:** High Temperature, non-flammable ABS/PC  
**Installation:** Flat surface mounting on a Type 1 enclosure.  
 Rear retaining plastic brackets.

## CONFORMITY

### EU Directives Conformity

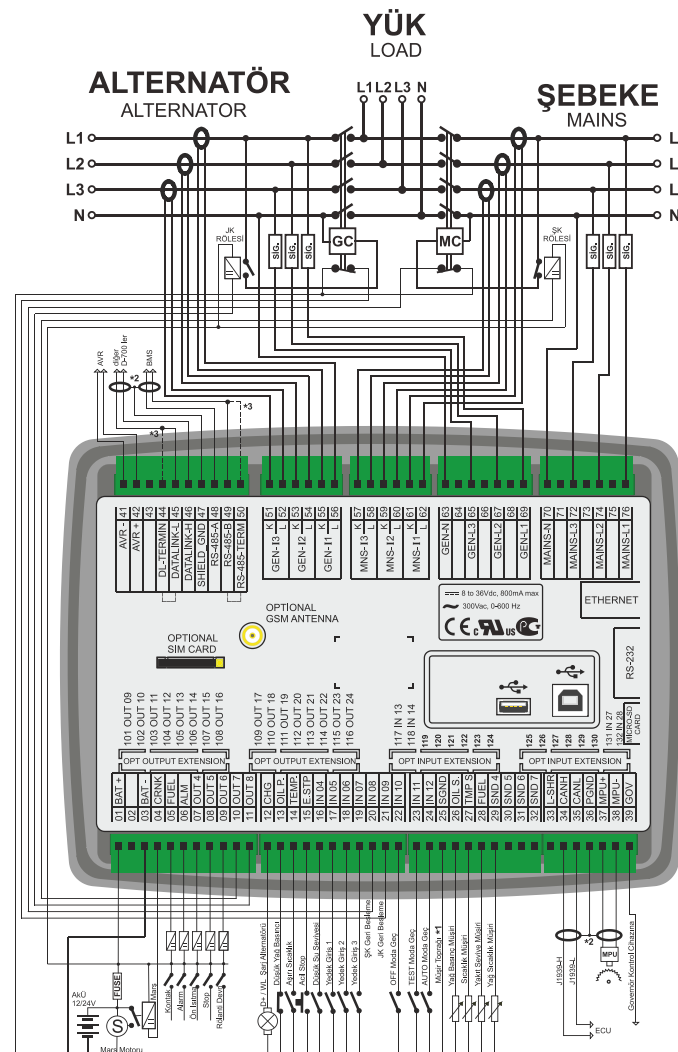
-2014/35/EC (low voltage)  
 -2014/30/EC (electro-magnetic compatibility)

### Norms of reference:

EN 61010 (safety requirements)  
 EN 61326 (EMC requirements)

### UL & CSA Compatibility:

- UL 6200, Controls for Stationary Engine Driven Assemblies (File# - 20140725-E314374)
- CAN/CSA C22.2 No. 14-13 – Industrial Control Equipment



## 12 . GENERATOR OIL and WATER CAPACITY

### 12.1 PERKINS DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GP10	10	8	9	7,2	403A-11G1	248	4,9	5,2
GP15	15	12	13	10	403A-15G1	248	6	6
GP22	22	17,6	20	16	404A-22G1	237	10,6	7
GP33	33	26,4	30	24	1103A-33G	< 0,15	8,3	10,2
GP50	50	40	45	36	1103A-33TG1	218	7,9	10,2
GP66	66	53	60	48	1103A-33TG2	< 0,15	8,3	10,2
GP72	72	58	65	52	1104A-44TG1	< 0,15	8	13
GP88	88	40	80	64	1104A-44TG2	< 0,15	8	13
GP110	110	88	100	80	1104C-44TAG2	< 0,15	8	12,6
GP150	150	120	135	108	1106A-70TG1	< 0,1	18	21
GP165	165	132	150	120	1106A-70TAG2	< 0,1	18	20,5
GP200	200	160	180	144	1106A-70TAG3	< 0,1	18	20,5
GP220	220	176	200	160	1106A-70TAG4	< 0,1	18	20,5
GP250	250	200	230	184	1506A-E88TAG2	< 0,1	41	29,6
GP275	275	220	250	200	1506A-E88TAG3	< 0,1	41	29,6
GP300	300	240	275	220	1506A-E88TAG4	< 0,1	41	33,2
GP330	330	264	300	240	1506A-E88TAG5	< 0,1	41	33,2
GP400	400	320	350	280	2206A-E13TAG2	< 0,15	40	51,4
GP450	450	360	400	320	2206A-E13TAG3	< 0,15	40	51,4
GP500	500	400	450	360	2506A-E15TAG1	< 0,1	62	58
GP550	550	440	500	400	2506A-E15TAG2	< 0,1	62	58
GP630	630	504	570	456	2806A-E18TAG1A	< 0,1	62	61
GP660	660	528	600	480	2806A-E18TAG1A	< 0,1	62	61
GP700	700	560	650	520	2806A-E18TAG2	< 0,1	62	61
GP825	825	660	750	600	4006-23TAG2A	< 0,25	113,4	120
GP900	900	720	800	640	4006-23TAG3A	< 0,25	113,4	120
GP1000	1000	800	900	720	4008-30TAG1	< 0,25	153	140
GP1100	1100	880	1000	800	4008-TAG2A	< 0,25	153	149
GP1250	1250	1000	1125	900	4008-TAG3A	< 0,25	153	140
GP1385	1385	1108	1250	1000	4012-46TWG2A	< 0,25	177	201
GP1500	1500	1200	1350	1080	4012-46TWG3A	< 0,25	177	201
GP1650	1650	1320	1500	1200	4012-46TAG2A	< 0,25	177	210
GP1875	1875	1500	1700	1360	4012-46TAG3A	< 0,25	177	207
GP2000	2000	1600	1850	1480	4016-TAG1A	< 0,25	214	316
GP2250	2250	1800	2000	1600	4016-61TRG2	< 0,25	213	300
GP2500	2500	2000	2250	1800	4016-61TRG3	< 0,25	213	270

## 12.2 RICARDO DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GR20	20	16	18	14,4	R485	<0,5	8,5	16
GR25	25	20	22,5	18	R490	<0,5	9	20
GR40	40	32	36	29	R4100D	<0,6	13	52
GR50	50	40	45	36	R4100ZD	<0,6	13	16
GR55	55	44	50	40	R4105D	<0,6	10	16
GR75	75	60	68	54,4	R4105ZD	<0,6	13	16
GR90	90	72	81	65	R4105ZLD	<0,6	13	18
GR110	110	88	100	80	R6105ZD	<0,6	18	25
GR125	125	100	113	90,4	R6105ZLD	<0,6	18	25
GR150	150	120	135	108	R6105AZLD	<0,6	18	25
GR175	175	140	160	128	R6105ZLD	<0,6	18	25
GR220	220	176	200	160	R6113AZLD	<0,6	18	35
GR306	306	244,8	275	220	R6126ZLD4	<0,6	19	50
GR330	330	264	300	240	R6126ZLD5	<0,6	19	50
GR400	400	320	350	280	R6D12D320A	<0,6	18	25

## 12.3 XENIC DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GW250X	250	200	225	180	TAD830GE	≤0,3	22	90
GW300X	300	240	270	216	TAD831GE	≤0,3	22	92
GW350X	350	280	315	252	TAD1332GE	≤0,4	35	120
GW440X	440	352	400	320	TAD1333GE	≤0,4	35	125
GW520X	520	416	470	376	TAD1534GE	≤0,4	36	125
GW550X	550	440	500	400	TAD1534GE	≤0,4	38	140
GW580X	580	464	525	420	TAD2636GE	≤0,6	53	180
GW630X	630	504	570	456	TAD2637GE	≤0,6	53	180
GW700X	700	560	630	504	TAD2638GE	≤0,6	53	180
GW750X	750	600	675	540	TAD2839GE	≤0,6	55	190
GW900X	900	720	810	648	TAD2840GE	≤0,6	55	190
GW1000X	1000	800	900	720	TAD2841GE	≤0,6	55	190
GW1100X	1100	880	1000	800	TAD3342GE	≤0,6	61	190
GW1250X	1250	1000	1125	900	TAD3343GE	≤0,6	61	192
GW1385X	1385	1108	1250	1000	TAD3344GE	≤0,6	61	202

## 12.4 BAUDOUIIN DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption	Oil Capacity	Water Capacity
	Stand By		Prime					
	kVA	kW	kVA	kW		(% fuel)	lt.	lt.
GB17	17	13,6	15,3	12,24	4 M05G17/5	≤ 0.4 %	8	9,8
GB22	22	17,6	20	16	4 M06G22/5	≤ 0.4 %	11,5	16
GB33	33	26,4	30	24	4 M06G33/5	≤ 0.4 %	11,5	16
GB44	44	35,2	40	32	4 M06G44/5	≤ 0.4 %	11,5	16
GB50	50	40	45	36	4 M06G50/5	≤ 0.4 %	11,5	12,9
GB55	55	44	50	40	4 M06G55/5	≤ 0.4 %	9,2	12,9
GB72	72	57,6	65	52	4 M11G70/5	≤ 0.2 %	13	17
GB88	88	70,4	80	64	4 M11G90/5	≤ 0.2 %	13	17
GB110	110	88	100	80	4 M11G110/5	≤ 0.2 %	13	13,3
GB150	150	120	135	108	6 M11G150/5	≤ 0.2 %	19	17
GB165	165	132	150	120	6 M11G165/5	≤ 0.2 %	19	17
GB220	220	176	200	160	6 M16G220/5	≤ 0.2 %	30	44
GB250	250	200	230	184	6 M16G250/5	≤ 0.2 %	30	44
GB275	275	220	250	200	6 M16G275/5	≤ 0.2 %	30	44
GB330	330	264	300	240	6 M16G330/5	≤ 0.2 %	30	50
GB385	385	308	346,5	277,2	6 M21G385/5	≤ 0.2 %	32	55
GB440	440	352	396	316,8	6 M21G440/5	≤ 0.2 %	32	55
GB500	500	400	455	364	6 M21G500/5	≤ 0.2 %	32	55
GB550	550	440	500	400	6 M26G550/5	≤ 0.3 %	55	108,7
GB660	660	528	600	480	6 M33G660/5	≤ 0.3 %	64	129
GB715	715	572	645	516	6 M33G715/5	≤ 0.3 %	64	129
GB825	825	660	750	600	6 M33G825/5	≤ 0.3 %	64	159
GB900	900	720	800	640	12 M26G900/5	≤ 0.3 %	113	148
GB1000	1000	800	900	720	12 M26G1000/5	≤ 0.3 %	114	148
GB1100	1100	880	1000	800	12 M26G1100/5	≤ 0.3 %	114	148
GB1250	1250	1000	1125	900	12 M33G1250/5	≤ 0.3 %	160	188
GB1400	1400	1120	1260	1008	12 M33G1400/5	≤ 0.3 %	160	188
GB1700	1700	1360	1530	1224	16M33G1700/5	≤ 0.3 %	175	400
GB1900	1900	1520	1710	1368	16M33G1900/5	≤ 0.3 %	175	400

## 12.5 MAN DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption	Oil Capacity	Water Capacity
	Stand By		Prime					
	kVA	kW	kVA	kW		(% fuel)	lt.	lt.
GM510	510	408	463	370	D2676 LE 223	74,75	22	58
GM630	630	504	572	457,6	D2840 LE 203	87,40	22	65
GM700	700	560	636	508,8	D2840 LE 213	104,65	32	80
GM730	730	584	663	530,4	D2842 LE 203	100,05	32	80
GM810	810	648	736	588,8	D2842 LE 213	118,45	32	75
GM1000	1000	800	910	728	D2862 LE 223	150,65	63	70

## 12.6 VOLVO DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GV94	94	75	85	68	TAD530GE	20,65	13	20
GV110	110	88	100	80	TAD531GE	24,40	13	20
GV145	145	116	130	104	TAD532GE EDC4	31,29	13	20
GV165	165	132	150	120	TAD731GE	36,10	20	24
GV200	200	160	180	144	TAD732GE EDC4	42,92	20	24
GV220	220	176	200	160	TAD733GE EDC4	48,36	20	24
GV275	275	220	250	200	TAD734GE	57,10	34	34
GV330	330	264	300	240	TAD1341GE	70,81	36	44
GV385	385	308	350	280	TAD1342GE	74,84	63	44
GV415	415	332	375	300	TAD1343GE	80,60	36	44
GV450	450	360	400	320	TAD1344GE	86,87	36	44
GV500	500	400	450	360	TAD1345GE	98,73	36	44
GV550	550	440	500	400	TAD1641GE	111,38	48	60
GV630	630	504	570	456	TAD1642GE	126,34	48	60
GV700	700	560	630	504	TAD1643GE	140,35	48	128

## 12.7 FPT DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GI33	33	26,4	30	24	S8000 AM1	8,10	8,8	9
GI55	55	44	50	40	N45 AM2	14,60	12,8	18,5
GI66	66	53	60	48	N45 SM1A	15,00	12,8	18,5
GI82	82	65,6	74	59,2	N45 SM2A	19,00	12,8	18,5
GI94	94	72,5	85	68	N45 SM3	21,20	12,8	18,5
GI110	110	88	100	80	N45 TM2A	24,40	12,8	18,5
GI132	132	105,6	120	96	N45 TM3	30,40	12,8	18,5
GI145	145	116	130	104	N67 SM1	32,00	17,2	40,5
GI185	185	148	165	132	N67 TM4	42,20	17,2	25,5
GI220	220	176	200	160	N67 TM7	49,40	17,2	25,5
GI275	275	220	250	200	C87 TE3	58,20	28	43
GI330	330	264	300	240	C87 TE4	73,10	28	43
GI385	385	308	347	278	C13 TE2A	77,90	35	67
GI440	440	352	400	320	C13 TE3A	77,90	35	67
GI550	550	440	500	400	CR13 TE7W	112,6	32	38,1
GI660	660	528	600	480	C16 TE1W	132	32	52,5



## 12.8 DEUTZ DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GD50	50	40	45	36	226-4D	10,2	9,75	20
GD75	75	60	68	54,4	226T-4D	14,7	9,75	20
GD100	110	88	100	80	226T-6D	21,4	14	20
GD132	150	120	135	108	226TA-6D	28,3	14	20
GD145	165	132	150	120	226TA-6D5	31,1	14	20

## 12.9 TÜMOSAN DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GT33	33	26,4	30	24	3DN-29T-D48C	9,5	8	4,45
GT44	44	35,2	40	32	3DT-29T-D55C	10,5	8	4,45
GT55	55	44	50	40	3DT-31T-075C	21	8	5,68
GT66	66	52,8	60	48	4DT 39 T 085 C	21	8	5,68
GT77	77	61,6	70	56	4DT 39 T 095 C	21	8	5,68
GT88	88	70,4	80	64	4DT 41 T 105 C	21	8	5,68
GT110	110	88	100	80	4DT 41 T 115 C	21	14	5,68

## 12.10 KUBOTA DIESEL GENERATOR OIL and WATER CAPACITY

Model	Power / CosQ 0,8				Engine Model	Fuel Consumption (% fuel)	Oil Capacity lt.	Water Capacity lt.
	Stand By		Prime					
	kVA	kW	kVA	kW				
GK8	8	6,4	7	7	D905-E2BG	1,96	5,1	3
GK11	11	8,8	10	9,5	D1105-E2BG	2,45	5,1	3,5
GK13	13	10,4	12	11,9	V1505-E2-BG	3,23	6	3,5
GK17	17	13,6	15	14	D1703-E2BG	3,51	5,6	4
GK22	22	17,6	20	20	V2003-T-E2BG	5,6	7,6	5,2
GK25	25	20	22,5	23	V2003-T-E2BG	5,6	7,6	5,2
GK33	33	26,4	30	30	V3300-E2-BG2	7,15	13,2	7,8
GK40	40	32	36	38	V3300-T-E2-BG2	8,61	13,2	9

### 13. CUSTOMER RESPONSIBILITY

Dear Generator set operator.

Please take care to the following order to prevent the generator set warranty to become invalid before the termination of the warranty period and to ensure trouble-free operation of the warranty period and to ensure trouble-free operation of the generator set with a long life.

1. Maintenance and repair works will not be covered by the warranty certificate. If the invoice or delivery certificate of the generating set is not submitted.
2. The warranty of the generator set will become invalid in case of any intervention of any person other than authorized services or by prior written approval from power generation on the generator set for any reason.
3. Control and maintenance works indicated in the periodical maintenance schedule and the operating manual must be carried out completely and timely the failures due to incomplete or untimely maintenance are not covered by the warranty.
4. Generator set should be installed as indicated in the installation manual otherwise, the problems which are likely to occur will not be covered by the warranty.
5. Customer is responsible for the failures which are likely to occur in case that the diesel oil used contains dirt or water.
6. The oil type indicated in the maintenance manual should be used in the engine otherwise, the failures which are likely to occur will not be covered by the warranty.
7. Batteries will not be covered by the warranty if they are subjected to breakage, excessive acid fill or hardening by leaving uncharged.
8. Don't over crank the generator set , if the generator is not started at the first attempt , wait 10 second and then try to start the engine again , the cranking mustn't be done more than 3 times ,and cranking time have to be less than 10 seconds ,otherwise starter gear could be broken or starter could be burn up. These conditions are not covered warranty.
9. Generator sets, never start or stop the diesel engine when the generating set is under load. Engine should be started and stopped after load is disconnected and the generating set is at idle condition. Otherwise, the valves can be seized, the voltage regulator, transformer and diodes can be broken down. These conditions are not covered warranty.
10. Our company does not take the responsibility of the damages on the mains supply contactor of the automatic generator sets due to over current, low or high voltage.
11. Never remove the battery terminals while the generating set is in use. Even a moment of disconnection can cause damage on the electronic closing relay of the charge alternator and on the electronic engine speed control circuit these conditions are not covered by the warranty.
12. Failures due to overload and unbalanced load in excess of the generating set power (such as alternator and contactor failures) are not covered by the warranty.
13. When the manually operated generating set is started up, it should be warmed by operating at idle for 5 minutes . When stopping the diesel engine, it should be unloaded and then continued to be operated for cooling for 5 min-utes before stopping. Otherwise problems which are likely to occur will not be covered by the warranty.
14. Never run the Genset for a long time under the 30% of prime power , the problems which are likely to occur will not be covered by the warranty.
15. Use only original spare parts . The problems which are likely to occur will not be covered by the warranty.
16. The first starts of the Gen.Sets have to be done by Authorized Services, otherwise Gen.set warranty will be invalid.
17. Any project or additional equipments couldn't be done or installed to the Gen.Set within the warranty period. If those plans (synchronizations , additional control panel ,panel , transfer panel etc,) are done without notifying the Authorized services , Gen. Set won't be covered by warranty.
18. Warranty period is 1 year or 1000 hour which ever comes first, beginning from the shipment date.

### 13.1 Customer Responsibility

1. The First Start is only valid for the location where the Gen.Set is installed ,if the location of the Gen.Set is going to be changed , the Gen.Set has to be controlled and tested by Authorized services again. Warranty of the generator set will become invalid if the first start and controls are done by any person other than authorized services .The customer will bear the cost of Second Start.
2. Control and maintenance works indicated in the periodical maintenance schedule and the operating manual must be carried out completely and timely by Authorized services for a fee. The maintenance schedule and Manuals are given to the customer with the Gen.Set. if these Manual and schedules are lost, customer has to have a new one.
3. Other than manufacturing defect , Customer will bear the fee of all maintenance, troubleshooting and problems
4. If the Gen.Sets won't be started more than 2 Months, These Gen.Sets have to be stored as mentioned in the Manuals. The necessary information and help can be provided from Authorized services.
5. The conservation(storage) of the Gen.Set have to be done by Authorized services, If the Gen.Set is in warranty.
6. If the customer wants service guy work overtime, customer has to bear the cost of overtime pay.
7. Customer has to bear the cost of operations, installations and structures such as access doors, barriers, walls, railings, floors, ceiling or the likes , rental cranes or the likes of cranes, built ramps or the likes, trailers or protective structures.
8. Customer have the right of asking and investigating the service guy authorization, it is also a customer duty.
9. Customer has to keep the Warranty Certificate and the First Start documentation to have warranty service, for this reason, these documentation should be kept into Generator Room within easy reach.
10. Gen.Set room dimensions have to be according to norms, Adequate ventilation and exhaust outlet have to be provided by customer.
11. Mains contactors are chosen according to Generator sets nominal power, is not responsible for the failures which is caused by over current drawn by mains.
12. Main's lower and upper limits are determined so as to Gen.Sets and customer's plant will work properly. Changing the mains voltage limits if requested by the customer, the customer is responsible for all faults resulting from this change, this change can be made by writing a report on the customer undertakes.

## 14. THE PERIODIC MAINTENANCE

### 14.1 DAILY CONTROLS (Before Starting)

The water level of the radiator is checked. Filled if needed. Do not fill the radiator up to top, fill it 2, 2.5 cm less than the top surface. Leave space for the evaporation. Before winter comes, control the antifreeze.;

The oil level is checked. The level must be between two lines on the oil level gauge stick. If needed add oil from the tap on the engine. After 15 minutes passes, the oil level is measured again. The oil level is checked again from the control panel while the engine is running. (The oil lamp lights when the oil is below the advised level.). The oil level must be in advised level.

The fuel in the tank is checked.

### 14.2 First Maintenance (50 Work-Hour)

Repeat the daily controls. Replace the fuel filter.

Warning! Do not forget to replace the fuel filter. Otherwise the fuel pump can be damaged. The oil, air and if exists the turbo filters are replaced.

Control the electrolytic level of the battery, add pure water if needed. Do not add acid or derivatives of acid. The added water must be 1 cm over the plates, do not fill it fully.

### 14.3 Six Monthly or "250 Work-Hour" Maintenance

- Repeat the entire operations that are done in first maintenance.
- Replace the oil.
- Replace the oil filter.
- Replace the air filter.
- Check up the drive belt tension. Adjust it if needed.
- Check up the fuel and oil leakage.

### 14.4 Yearly or "750 Work-Hour" Maintenance

- Repeat the entire operations that are done in 250 work hour maintenance.
- Check up the cap screws and the nut caps on the cylinder head, screw if needed.
- Drain the entire cooling water and add new water with new antifreeze.
- The engine is started and the oil pressure is checked.
- The alternator and starter motor connections are checked.
- All indicators on the panel are checked.
- The injectors are demounted, cleaned with gas oil and after checked it is mounted again.

### 14.5 Maintenance in Every "1250" Work-Hour

- The maintenance of 750 work-hour is repeated.
- Injector and valve settings are checked and adjusted.
- Check the starter motor and charge alternator.
- Check the assembly cap screws and nut caps, screw if needed.
- Maintenance in Every "2500" Work-Hour

### 14.6 The maintenance of 2500 work-hour is repeated

- Cooling water is renewed with antifreeze. Leakage and connection controls are made. Radiator core is cleaned.

**WARNING!!!** All our products are covered by one year or 1000 work-hour warranty (whichever comes first), providing that the generators are installed, maintained in accordance with the USER MANUAL and any repair or maintenance is just carried by our firm or authorized services, in case the material, labor and production flaws.

1. The products of Generator are guaranteed for one year or 1000 work hour (whichever comes first) starting from the date of delivery.
2. The product is under guarantee with its entire parts.
3. If the product fails within the guarantee period, the time that passes during the repair is added to the guarantee period. The repair period of the product is 30 days. This period starts as soon as the fail is received by the service station, producer, distributor, dealer or importer.
4. If within the guarantee period the product is determined to be defective (at the date of original purchase) due to improper materials or workmanship, without charge for labor or parts, repair or replace the product or its defective parts subject to the terms and limitations specified below.
5. Within the guarantee period IF
  - The product repeats the same fail more than 2 times or repeats the different fails more than 4 times or becomes unusable,
  - The period of repair is expired,
  - It is reported/confirmed by the producer, supplier, service station, dealer placed.
6. If the product is used contrary to the rules in USER MANUAL, the warranty becomes invalid.
7. It can be applied to the Ministry of Industry and Commerce, General Directorate of Consumer Protection for any question about the warranty terms.



The Date of Commercial Invoice.....

The Company Name of the Buyer.....

Tel.....

Engine Brand.....

Engine Model.....

Endine Serial No.....

Alternator Brand.....

Alternator Model.....

Alternator Serial No.....

Engine Oil Volume.....

Cabin.....

***! The following part will be signed and stamped by authorized service after the maintenance has been carried.***

MAINTANENCE INFORMATION	MAINTENANCE SIGN & STAMP
<p><b>Firm Name :</b> .....</p> <p><b>Individual Name :</b> .....</p> <p><b>Date :</b> ..... <b>Work Hour:</b> .....</p> <p><b>Note :</b> .....</p>	

MAINTANENCE INFORMATION	MAINTENANCE SIGN & STAMP
<p><b>Firm Name :</b> .....</p> <p><b>Individual Name :</b> .....</p> <p><b>Date :</b> ..... <b>Work Hour:</b> .....</p> <p><b>Note :</b> .....</p>	

MAINTANENCE INFORMATION	MAINTENANCE SIGN & STAMP
<p><b>Firm Name :</b> .....</p> <p><b>Individual Name :</b> .....</p> <p><b>Date :</b> ..... <b>Work Hour:</b> .....</p> <p><b>Note :</b> .....</p>	

