



TDJ SERIES DIESEL GENERATOR

**TESCOM DIESEL GENERATOR
OPERATION AND MAINTENANCE**

MISSION

It is our main duty to contribute to the development of our country by applying modern management systems and producing quality products and services.

VISION

With our experience in uninterruptible power supply, which is our field of expertise, we aim to provide a modern, reliable service to our customers and to be a pioneer, leader and respected world company in the sector.

First, thank you for choosing our company and product.

Tescom Generator continues to work in its modern facilities based on providing safe and high-quality products and services in CE norms with ISO 9001 Quality Management System. Your generator set undergoes quality control and tests from every stage of manufacturing to assembly and delivery, it is produced by respecting the environment with ISO 14001 Environmental Management System and ISO 45001.

Our documents have been carefully prepared with the knowledge obtained in the light of the experience gained in academic education and afterwards. Along with your generator set, the Maintenance and Operation Book, including the danger, warning and protection methods, the Diesel Engine Maintenance and Operation Book and the Alternator Maintenance and Operation Book have been delivered to you.

Before using your generator set, we strongly ask you to carefully read, understand and maintain all the documents for the safety of life and property of you and others.

By making a Periodic Maintenance Agreement, you can ensure that the controls and maintenance are complete and economical at regular intervals, and you can get service from your product with no problems.

We will continue to provide uninterrupted service to you with our technical service teams that are on duty 24 hours a day, 7 days a week. Please let us know your wishes and suggestions to contribute to our product and service quality.



TS ISO 8528-5 CERTIFICATE



ISO 9001 QUALITY MANAGEMENT SYSTEM CERTIFICATE



ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE



OHS AS 18001 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM



ISO 27001 Information Security Management System



Certificate ISO 10002 Customer Satisfaction



EAC EURASIA CUSTOMS UNION CERTIFICATE



CERTIFICATE OF CONFORMITY TO THE EUROPEAN UNION DIRECTIVE

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1. SAFETY MEASURES

1.1 General

The generator set must be installed, used and safety precautions must be complied with in accordance with the Maintenance and Operation Manual, the Diesel Engine Maintenance and Operation Manual and the Alternator Maintenance and Operation Manual. The generator set will serve safely only in this way.

The responsibility for the safe operation of the generator set belongs to the persons who install, use, and maintain the generator set. When safety precautions are followed, the risk of accidents will be reduced.

The generator set should be used by people who are trained or authorized in this field and who have read and understood the Maintenance and Operation Manual. Failure to comply with the rules, instructions, methods, and safety measures in this manual can increase the likelihood of breakdowns, accidents and injuries, and even result in death.

Pay attention to the labels and warnings on the generator set. Install and operate the generator set in full compliance with applicable standards, rules, and regulations.

Before performing maintenance, repair, or adjustment, turn the generator set OFF and isolate it from the interference of others.

Do not operate the generator set unless it is safe. In unsafe situations, immediately attach a danger warning to the generator set, remove the battery pole heads, disconnect all cable connections, and put them out of operation to prevent harm to other people.

During the operation, maintenance and periodic controls of the generator, the necessary safety equipment should be used.

This manual and its annexes are a whole. Safety measures are specified in the relevant chapters in the manual. Please consult Tescom Generator for any issues that are not understood.



1.2. Lifting and Handling

1.2.1. Sling Lift

Use the lifting eyes to lift the generator set.

Be sure to check the lifting joints or connection points before lifting for welding cracks, breaks, bends, cracks filled with rust or parts of poor quality, loose bolts, and nuts.

Make sure that all lifting equipment and support materials can perform work and can withstand a weight of at least 10% more than the gross weight of the generator set (the weight of snow, ice, mud or other stacked parts and equipment)

Make sure that the lifting hook or locks have a functional safety latch and are properly fastened.

Use guide ropes or equivalents to prevent the machine from rotating and dangling when lifted without of contact with the ground.

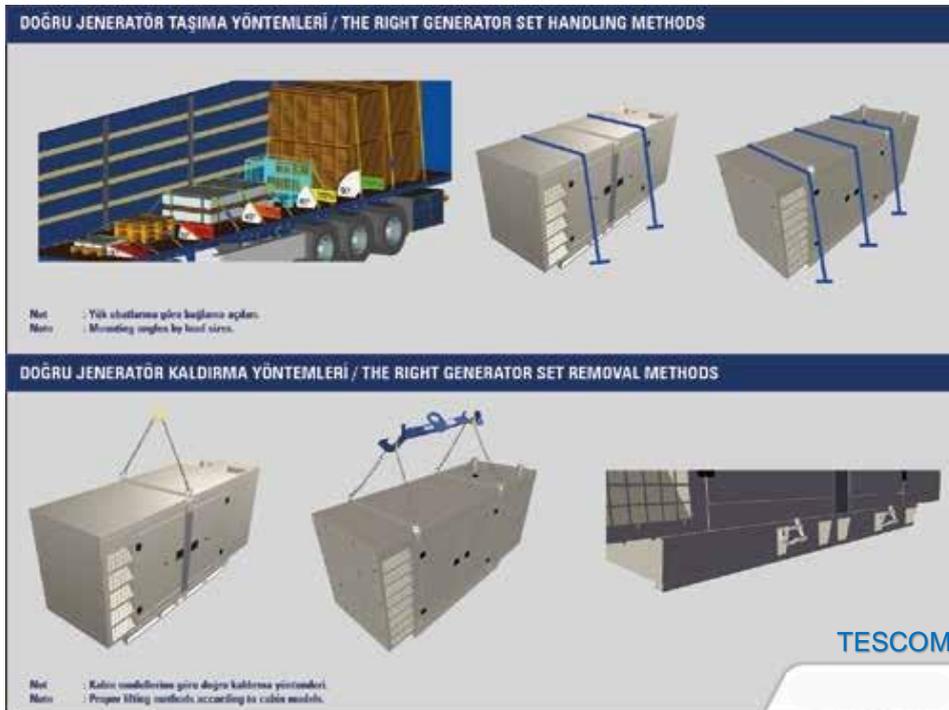
Do not attempt to lift the generator set under strong winds.

When the generator set is suspended, remove people under and around the generator.

When the generator set is suspended, always keep the lifting device operator in place and ready.

Place the generator set on flat surfaces that allow 10% more than its gross weight and have a capacity to withstand and where there is no danger of slipping.

Make sure all personnel are outside the generator set before closing and locking the doors.



1.2.2. Forklift Lift

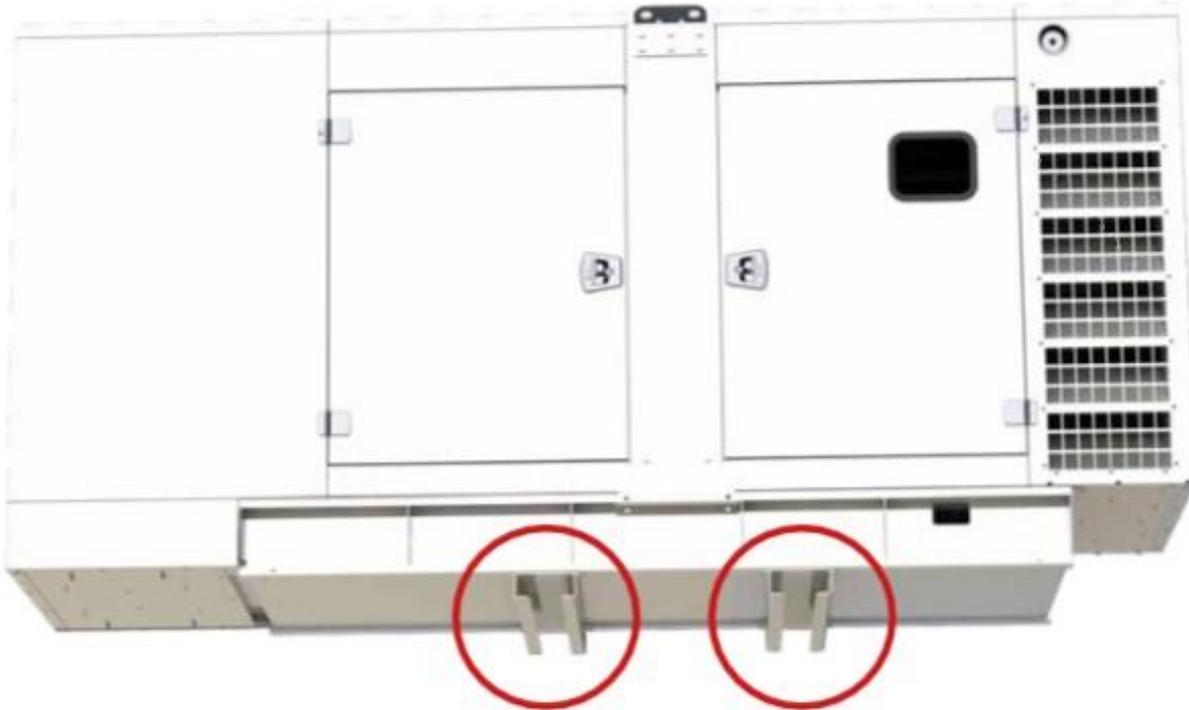
Lifting, lowering, and transporting the generator with a forklift should be performed by authorized persons with a forklift license. The maintenance of the forklift to be used must be carried out in accordance with the manufacturer's standards.

In terms of safety, the capacity of the forklift to be used must be suitable for the weight of generator.

Forklift forks must be kept at ground level to allow forklift forks to enter the generator forklift pockets. In the meantime, the forklift should be brought as close to the generator as possible, and the forklift forks should be raised 20cm from the ground to lift the generator from its frame. During the transportation of the generator to its place, the forklift forks should be taken backwards to ensure stable transportation.

When placing the generator, the forks should be placed in a straight position and slowly dropped to the floor and the forklift forks should be removed from the forklift pockets to end the process.

** Forklift carrying pockets are not available in standard products, they are offered as a sales option.



1.3. Moving Parts

Keep your body, especially hands, arms, hair, and clothing away from propellers, belts, pulleys, and other moving and rotating parts.

Do not attempt to operate the generator set with the fan and other protectors removed.

In case of working around the generator set or facing moving parts, wear well-fitting clothes and tie back long hair.

Keep the access doors closed except when you are inspecting, maintaining, repairing, adjusting, servicing, or starting or stopping the generator set.

Ensure that all personnel are at a certain safety distance from the set during the operation of the generator set or at times outside the service.

To minimize the possibility of slipping or falling, keep hands, feet, floors, walking areas clean by removing oil, water, antifreeze, or other liquids.

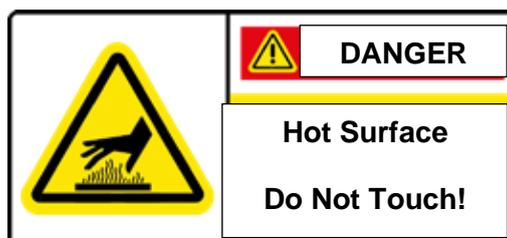


1.4. Hot Surfaces, Sharp Edges and Corners

Avoid body contact with hot oil, hot coolant, hot surfaces, sharp edges, and corners. Protect all parts of the body from hot exhaust pipes and gases.

Wear protective clothing such as gloves, boots and helmets when working in, outside and around the generator set.

Keep the first aid book handy. In case of injury, seek medical help urgently. Do not neglect minor cuts and injuries.



1.5. Fire and Explosion

Refuel from a fuel tank designed for the intended purpose or from a service station in accordance with the usage and norms.

In case of accumulation of fuel, oil, battery electrolyte or coolant formations on the ground, collect and dispose of them properly, avoid skin contact.

Turn off the generator set and let it cool down before adding fuel, checking the electrolyte level of the batteries, or oil change. Keep sparks, flames, and other sources of ignition away. Do not smoke around the generator and do not allow smoking.

Do not allow the formation of fuel oil film on the generator set on the frame or in the cabin, if any. Wipe off contaminated surfaces using a liquid industrial cleaner. Do not use flammable chemicals for cleaning.

Close or disconnect from the battery charger before connecting or disconnecting the battery.

Before starting repair or maintenance of the battery or its surroundings, disconnect the battery negative (-) pole. To prevent others from reconnecting in any way, hang a danger warning on the battery connection.

Keep electrical wiring, battery terminals and other terminals in good condition. Replace cracked, cut, worn cables, insulation in poor condition, or old, discolored, or rusted terminals with new ones.

Be sure to ground the bodies of conductive objects exposed to electric current, such as electrical materials and terminals, to prevent them from arcing and posing an ignition source.

Do not attempt to weld or repair damaged fuel tanks or pipes in any way, replace them with a new one. If any leakage in the fuel system is noticed, do not start the generator set and eliminate the leakage.

It should be remembered that the exhaust gas, exhaust manifold and outlet temperature are approximately 550°C, hot surfaces should be isolated, these areas should not be approached before making sure that the system has cooled down and contact of flammable materials with these areas should be prevented.

Before starting welding operations, remove materials that may be damaged by the heat or potentially burned. Keep oilcloth parts, chemical waste, leaves, garbage or other flammables away from the generator set.

Keep fully loaded fire extinguishers nearby during service or operation of the generator set.

Do not allow leaves and branches to come into contact with the hot exhaust system of the generator set used in woodland and forestland.

Do not attempt to install or operate generator sets in places that are in the hazard class.



1.6. Toxic and Irritant Substances

Operate the generator set only in open or well-ventilated areas.

If the machine is to be operated indoors, dispose of engine exhaust gases into the external environment.

Make sure that the exhaust gas outlet points are not placed in areas where there are personnel, in places where there is a danger of going to these areas, or near the air suction ducts.

The fuels, oils, coolants, and battery electrolytes used in the generator set are of industrial type. Necessary precautions should be taken to prevent accidental ingestion and/or contact with the skin. In case of penetration into the body, urgently seek medical assistance. In case of contact with skin, wash the area of contact with soap and water.

During the maintenance of the batteries, wear an acid-proof apron and wear face protection or glasses. If the electrolyte is spilled on the skin or clothing, urgently clean it with plenty of water.

1.7. Environmental Protection

Generator sets have a number of components that can pose a risk to the environment. The main ones are lubricating oil, diesel, gasoline, exhaust gas, battery, etc.

There may be a number of local rules, regulations or restrictions regarding the use of mobile or stationary generator sets and the disposal of materials that may pose the risk mentioned above.

It is the end user's duty to comply with the laws and regulations determined by local authorities on the protection of the environment.

Disposal of waste

Ensure that engine lubricating oils are not spilled into the environment during storage or change.

Collect the used engine oils in a safe place and deliver them to the authorized companies or institutions.

Collect the replaced oil filter, fuel filter, etc. parts in a safe place and deliver them to the authorized company or institutions.

Do not throw new or expired batteries in the trash, deliver them to the authorized company or institutions. Use fire-resistant tanks to keep and collect waste.

Prevent fuel from being spilled or spread into the environment.

Please note that emitted exhaust gas emission values must comply with local rules and take precautions if necessary.



1.8. Electricity

Wiring of the generator set should only be performed by trained and authorized qualified electricians.

Ensure that the electrical energized parts of the generator set do not come into contact with the body directly or with any non-insulated conductive object.

Make sure that the generator set is grounded in accordance with the applicable regulations before making, disassembling, and starting all cable connections.

Do not attempt to start, connect, or disconnect from generator sets that are in water or on a wet floor.

Before making or disconnecting the generator set's electrical connections, stop the motor, disconnect the battery charger supply and the battery connection. Remove the ungrounded conductor connections on the load side and leave them outside.

Prevent indirect contact of any part of the body with the moving parts of the electrical system on the generator set, either directly or through any hand tool or other conductive object. During the adjustment and repair of the generator set electrical system, provide dry base fitting, and stay on insulated surfaces.

Replace the generator set electrical connection terminal housing as quickly as possible when the connections are made or disassembled. Otherwise, do not operate the generator set.

When the generator set is out of service, lock and close all access doors. Keep towing vehicle or equipment carriers at least 3 meters away from cables connected to the generator set and buried power cables.

Carry out repairs in clean, dry, well-lit and well-ventilated areas.

Connect the generator set only to receivers that comply with electrical characteristics and are within the specified power capacity limit. Make electrical connections with conductors that comply with the norms and are within the current carrying capacity limit.

1.8.1. First Aid in Electric Shocks

DO NOT TOUCH THE VICTIM WITH YOUR BARE HANDS until the power is turned off AND **TURN OFF THE POWER IMMEDIATELY**. If this is not possible, protect yourself with the help of dry and insulating objects and pull the victim away from the conductor completely.

1. Call the nearest medical institution and seek medical help.
2. Put the patient on his face, lay him down with his head facing one side and his forehead on his hands.
3. Remove objects such as DENTURE, TOBACCO, CHEWING GUM from the patient's mouth. Press firmly between the shoulders with the help of the palm of your hand, make sure that the TONGUE is standing FREELY.
4. Kneel with one knee at the patient's bedside and the other foot at the patient's elbow level.
5. Place the palms of your hands on the shoulder blades of the patient's shoulder.
6. Push forward with your arms in a vertical position. Pressure must be light and without applying force.
(10–15 kg is a sufficient amount). Stay this way for about 2.5 seconds.

A



B



7. Release the pressure with your hands by sliding the patient's shoulders over their elbows (approximately 1 sec) Following this, holding the patient by the elbows, gently lift the patient's arms and shoulders, while simultaneously stretching back and pushing (approx. 2.5 sec.). (See C) Lower the patient's arms (see D) and bring your hands back so that they rest on the patient's shoulder blade.



8. Repeat the steps so that each complete respiration lasts seven seconds.
 9. While artificial respiration is being maintained, another person should help with,
- Loosening the patient's clothes,
 - Keeping the patient warm.

10. If the patient's breathing stops, continue to do artificial respiration. A period of four hours or more may be needed.

DO NOT GIVE LIQUID UNTIL THE PATIENT REGAINS CONSCIOUSNESS.

2. GENERAL DEFINITIONS

2.1. Generator Label

The generator set and its sub-components are indicated by the generator label on the generator set. The labels on the diesel engine and alternator contain engine and alternator information. The generator serial number is specially created for each generator and is required for warranty applications and spare parts orders.

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|---|----------|-------------|-------------|--|------|--|--|
|  | | | | <small>TITLE : TESCOM ELEKTRONİK SANAYİ ve TİCARET A.Ş HEAD OFFICE ADDRESS :Dudullu Organize Sanayi Bölgesi 2.Cadde No:7 Zemin Kat Ümraniye / İSTANBUL TEL / TELEFAKS :0850 277 88 77 / 0216 527 28 18 İZMİR Regional Directorate (Factory and Overseas Sales Office) ADDRESS : 10009 sk. No:1, Ulukent Sanayi Sitesi 35660 Menemen – İZMİR TEL / TELEFAKS :0232 833 36 00 pbx / 0232 833 37 87 WEB: http://www.tescom-ups.com e-mail:</small> | | | |
| MODEL | TDJ220BA | SERIAL NO | B2022220001 | | | | |
| PRIME KVA | 200 | STANDBY KVA | 220 | | | | |
| PRIME A. | 288 | STANDBY A. | 318 | | | | |
| VOLTS | 400 | Hz | 50 | Cosφ | 0.8 | | |
| | | | | R.P.M. | 1500 | | |
| | | | | PHASE | 3 | | |
|      | | | | | | | |

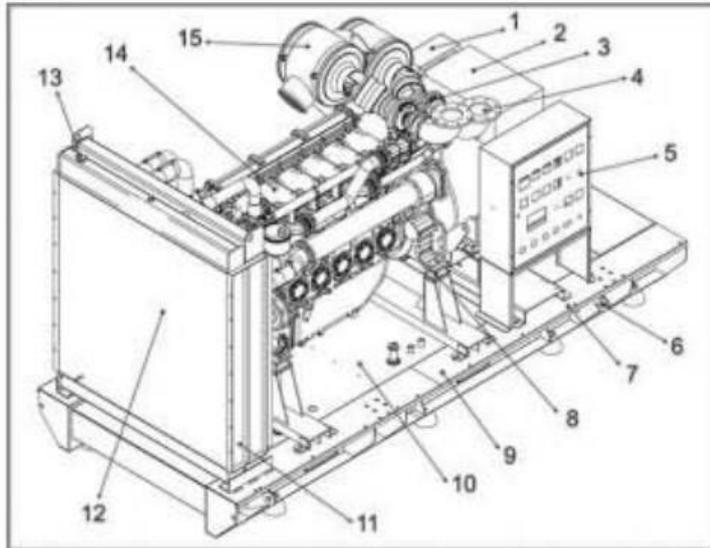
2.2. Generator Set

Tescom Generator manufactures all its products in accordance with international ISO8528 standards, with high quality.

Each set has its own label, and it is placed on the set.

On this label, the serial numbers and main characteristics of the generator set are defined.

The main components of the generator set are shown in the figure below.



- 1-Connection Box
- 2-Alternator
- 3-Turbo Charger
- 4-Exhaust Outlet
- 5-Control Board
- 6-Lifting Eye
- 7-Grounding Point
- 8-Vibration Isolators
- 9-Frame
- 10-Fuel Tank
- 11-Radiator
- 12-Cooling Fan
- 13-Radiator Cover
- 14-Diesel Engine
- 15-Air Filter

2.3 Diesel Engine

The latest technology product direct injection industrial type diesel engines in accordance with ISO3046 standards, designed for generator set, with low fuel consumption, with mechanical or electronic type governor mounted on the fuel pump that provides precise speed adjustment and regulation, oil, air or water cooled depending on the type of diesel cooling, oil, fuel and air filter system designed according to severe operating conditions, which ensures long-lasting or high-performance operation of diesel, with necessary limit and level sensors for diesel protection, 4-stroke, are used.

The diesel engine is supplied with all the equipment necessary for its safe operation.

2.4 Alternator

Alternators manufactured in accordance with IEC 60034-1; CEI 2-3; BS 4999-5000, VDE 0530; NF 51-100,111; OVE M-10; NEMA MG1.22 standards and CE norms, it has the latest technology, high efficiency, maintenance-free bearing system, brushless self-alerting, voltage regulator system that provides precise voltage adjustment and regulation, has passed the test stages, designed to provide trouble-free operation, ease of maintenance and long service life, are used.



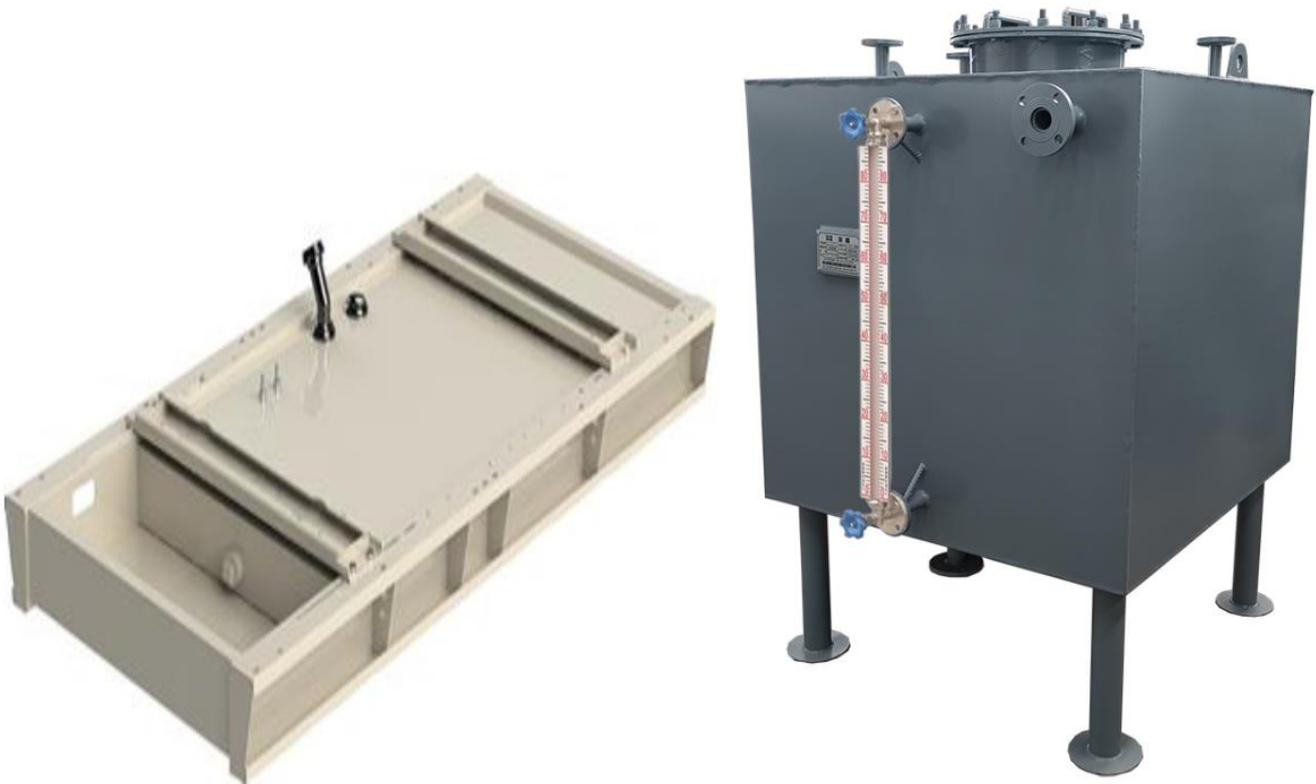
2.5 Fuel Tank

In Tescom Generator sets, depending on model preference, Tescom can offer an in-frame daily fuel tank or an external pedestal type fuel tank. In larger power sets, an external pedestal type fuel tank is provided. Fuel tanks can be manufactured from plate steel sheet or other suitable materials in accordance with the relevant standards.

Tescom fuel tanks mainly include:

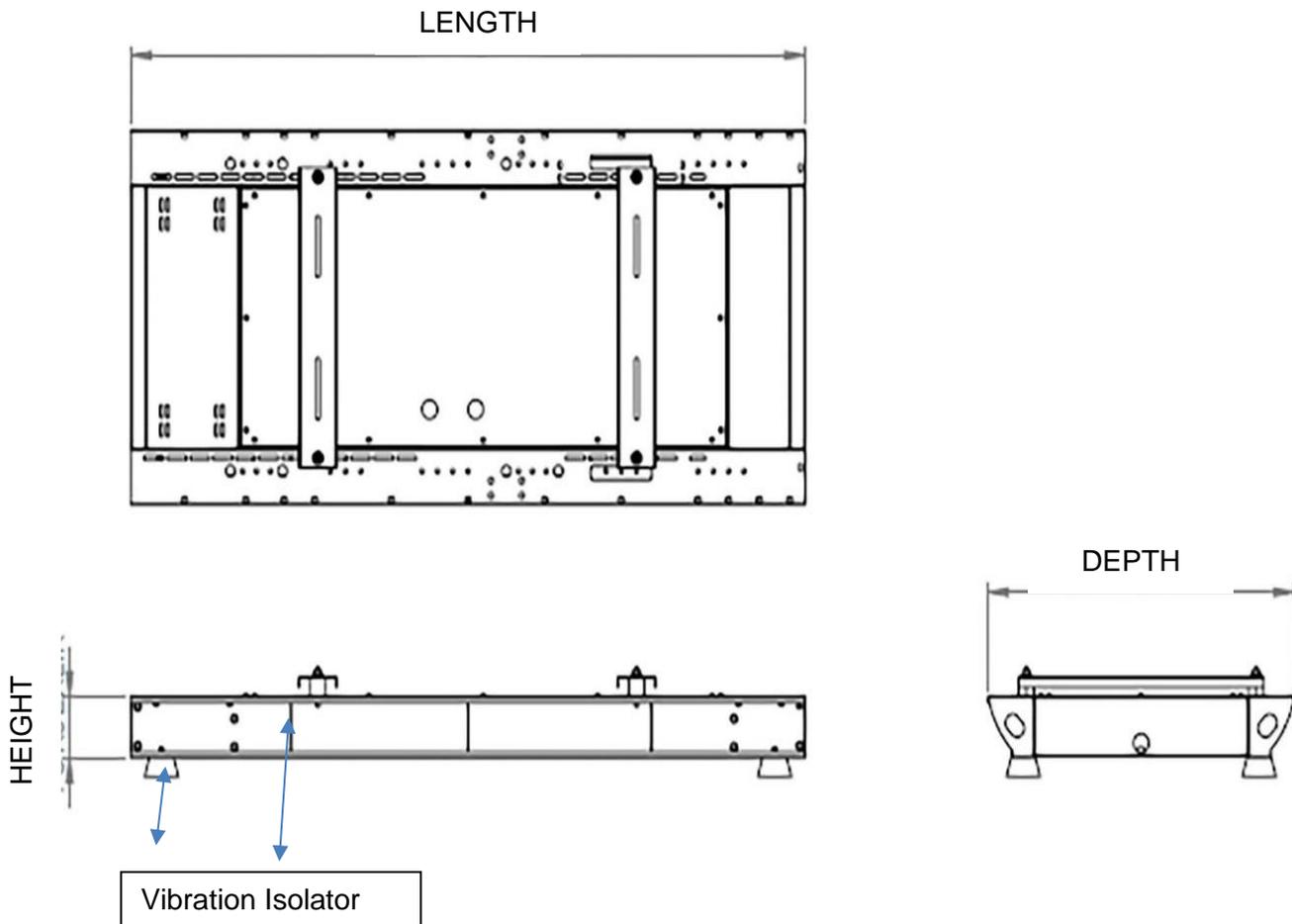
- Fuel filler point and cap
- Tank ventilation
- Fuel outlet valve
- Fuel return connection
- Tank drain plug
- Sediment, etc. accumulation part
- Fuel level transparent gauge
- Floating level contact (Optional)
- Automatic filling (Optional)

It is recommended to install a pre-fuel filter or water separator filter on the fuel supply line between the tank and the engine.



2.6 Frame

Tescom Generator manufactures its own frame for all generator sets based on international standards. Frames are designed and manufactured from plate sheet or profile content to show high resistance to vibrations and stresses.

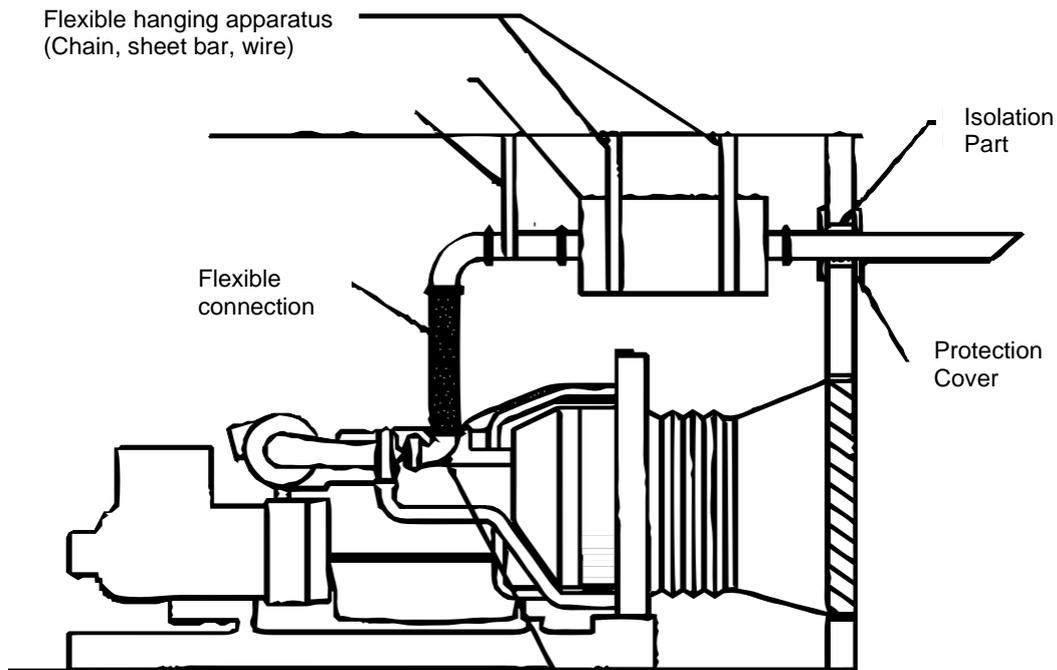


2.7 Vibration Isolator

The generator sets from Tescom are equipped with vibration insulators designed to reduce the vibration transmitted from the rotating mass to the foundation. The vibration isolators are specially selected and are installed between the engine and alternator leg and the frame. Alternatively, in large models, vibration isolators are installed between the mainframe and the ground.

2.8 Exhaust System and Muffler

The exhaust system is installed to reduce the noise emanating from the exhaust manifold of the engine and to direct toxic exhaust gases to the appropriate areas. The exhaust system consists of flexible compensator, steel pipe, elbow, muffler and mounting materials that absorb vibrations and expansions. Details are in the "Installation" section.



2.9 Control Systems

Various systems have been developed for safe and healthy service of the generator set, protection of the system against failures and load transfers.

Control systems are manufactured in various types depending on customer demands and installation requirements. These are mainly Manual, Automatic, Redundant and Parallel operating systems. All control systems are mounted in steel boxes equipped with a locked door for easy access and service.

Technical information about the control system of your generator set can be found in the "4. Control Systems" section and in the "Additional Booklet".

3. INSTALLATION

3.1. Location Selection

Choosing a suitable location for the generator set is the most important stage of the installation process. Please observe all the warnings in the Maintenance and Operation Manual to ensure a safe installation. Please call our company for information when necessary.

Install the generator set in enclosed places where it will not be exposed to factors such as rain, snow, hail, flood water, excessive moisture, direct sunlight, freezing and excessively high temperatures, dust, soil, sand, or harmful substances that can be carried by wind.

Install the generator set in clean, dry, well-lit, airy, not excessively hot and where they will not be exposed to pollutants, corrosive or conductive dusts carried by wind, lint, fumes, oil vapor, engine exhaust fumes or pollutants.

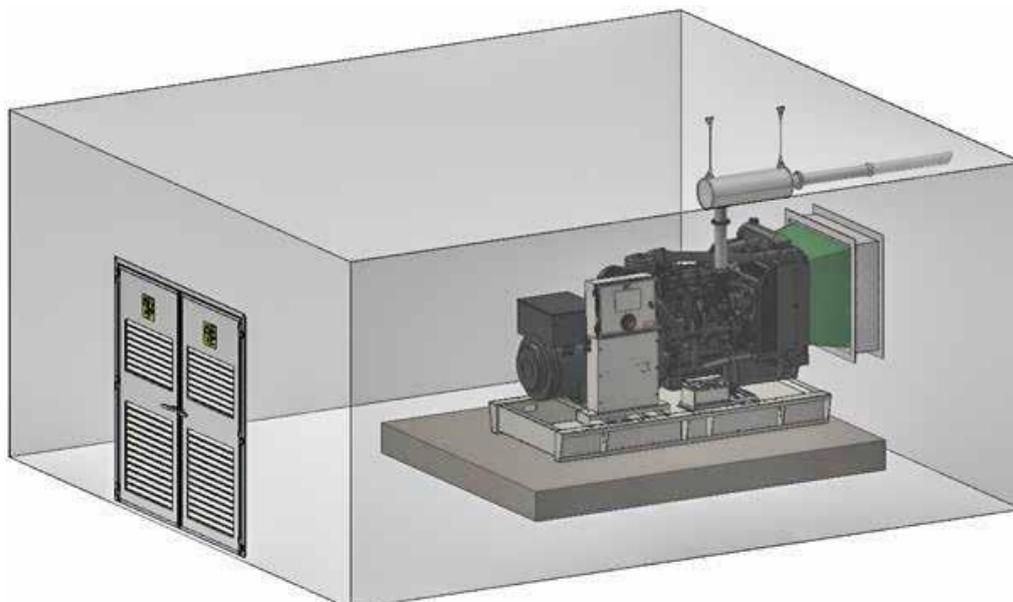
Leave enough distance to easily move around the generator set to facilitate maintenance control operations. In some cases, it may be necessary to remove the main components such as the engine, alternator, frame, radiator. The place must be clean, dry and have a good drainage system.

If possible, place generator sets out of the reach of unauthorized persons or take measures to prevent interference.

Place generator sets out of the reach of the effects of motor vehicles or construction machinery. If possible, make appropriate protective barriers.

Do not install or use the generator set in an environment that is likely to pose a danger in any way. If the installation is in an open area, protect the generator set against outdoor weather conditions. (Optional protective cabinets can be used.)

The doors must be large enough to allow the generator set and main equipment to come out. Air inlet and outlet vents can usually be made movable or portable to create an access point.



3.2. Floor and Platform

The generator set can be placed on floors such as platforms, soil, buildings, steel construction. The total weight of the generator set must not exceed the load carrying limit allowed by the floor.

It is useful to prepare the floor in the form of a concrete platform reinforced with iron. A sufficiently sized platform that conforms to the dimensions of the generator set provides the necessary support to reduce the displacement and vibration of the machine as much as possible. Usually this should be between 150-200 mm thick and at least equal to the dimensions of the generator set.

If desired, the platform can be made in such a way as to isolate the rest of the floor from vibration.

If the generator set is to be installed in a place where there is a risk of flooding, dampness, etc. (for example, the boiler room), the platform should be made at a height of at least 300 mm above the floor. Thus, a safe and dry floor is provided for the Generator set and the people who will provide service and operate.

The platform of each machine is recommended to be located on the main foundation or embankment floor, regardless of other foundations, concrete structures, walls or platforms for operation.

3.3. Vibration

The generator set is designed to transmit minimal vibration to the floor. Vibration isolators are installed between the engine and alternator and the main frame. In generator sets of larger capacities, vibration isolators are located under the main frame.

It is necessary to pay special attention to vibration isolation in the generator rooms located on the roofs and floors of high-rise buildings. Generally, spring-type vibration insulators are needed. It must be absolutely certain that the structures can carry the generator set, fuel tanks and equipment.

Secure the generator sets firmly on the floor or their platform with iron connection bolts or equivalents and prevent them from moving so that there are no incidents that may harm the electrical connections, fuel storage system, exhaust system, environment and living things.

3.4. Cooling and Ventilation

The heat emitted by the engine can cause a temperature change so high that it affects the performance of the generator set or service personnel.

Place it in a room or area with sufficient ventilation to remove the heat emitted from the alternator, the engine and the engine coolant in the radiator from the system by means of a propellant fan mounted between the engine and the radiator.

The air coming into the generator should be clean and as cool as possible. This greatly affects engine life and performance. Normally this air can be supplied from the area surrounding the installation zone, but in some cases, the conditions of the space where the machine is located may require channeling air from the outside or from another room.

Ventilation windows should be opened behind the alternator for the ingress of cold air and directly to the front of the radiator for the pulse of hot air.

Make sure that the hot air is precisely evacuated from the room by a flexible connection placed between the radiator and the duct.

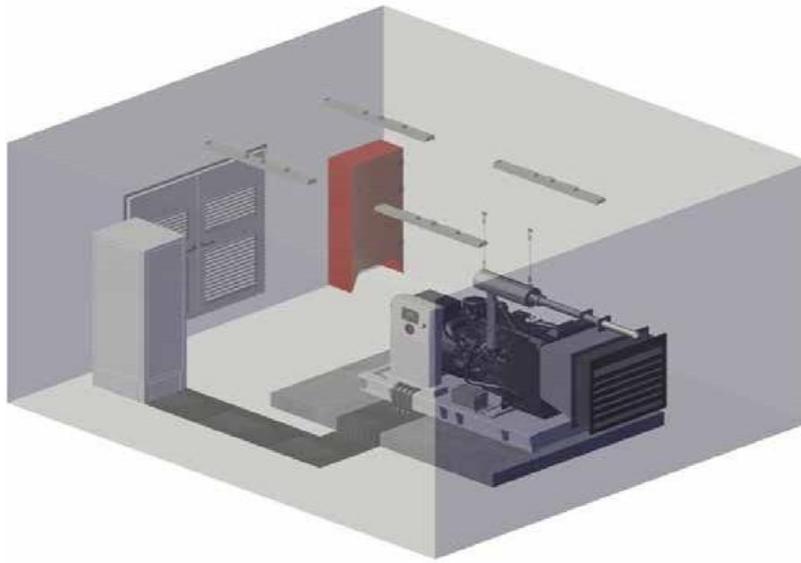
By calculating the dimensions of the ventilation windows, it must be ensured that the cooling air intake is sufficient.

Windows should be at least as much as the radiator cooler core area. However, if possible, air intake should be made from an area of 150% of the radiator area.

Shutters should be made on the windows for protection of air openings. They can be of stationary or mobile type. The movable types can be opened automatically when the generator set is running. Windows with portable shutters that are opened by hand are acceptable in some cases. However, this is not accepted for automatic standby generators.



This layout drawing shows a typical generator set setup. The drawing only serves as a guide. All the details of each unit should be calculated, and the installation should be designed as required by your placement area.



3.5. Exhaust System

When designing the exhaust system, the main goal should be not to create back pressure. Excessive back pressure in the exhaust system reduces engine power and increases operating temperature.

Where elbows must be used in the exhaust system, keep the elbow radius to 150% of the pipe inner radius. Since most exhaust system designs are made according to the physical characteristics of the building or room in which they are located, the shortest and with the least turning path should be chosen so that the exhaust pipes do not increase the back pressure.

Make sure that all pipes are optimally supported and away from high vibration points. Since the exhaust pipes emit heat, it is recommended to position all pipes at least 250 mm away from flammable materials. Wrapping the exhaust pipes with high temperature insulators or installing suitable insulation parts will also help prevent hazards.

A rain shield that moves with exhaust pressure should be made for use in vertical outlet exhaust pipes.

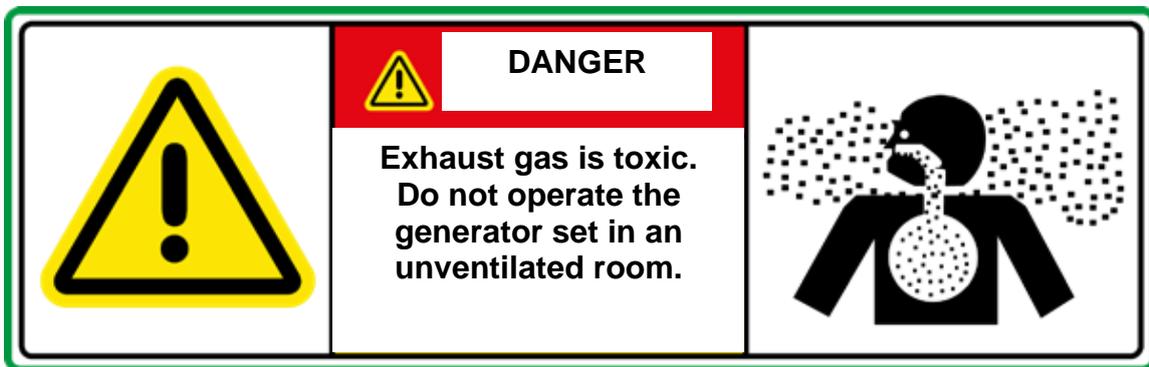
There must be a water drainage hole at the lowest point of any horizontal or vertical exhaust extension pipe. Thus, the water cannot reach either the muffler or the engine.

You can reduce the sound level in the exhaust pipe by positioning the muffler as close as possible to the engine. In the event that exhaust gas is transported over long distances, another muffler can be installed at the outlet. Each machine must have its own exhaust system. More than one generator set should not be connected to the same pipe, as exhaust gas, smoke soot and condensates can cause permanent damage to the non-operating machine.

The exhaust system must be combined through a flexible connection to the engine exhaust outlet.

Inhaling exhaust gases is a possible danger of death. Exhaust systems must be installed correctly to prevent the accumulation of exhaust gases. In addition, prolonged exposure to engine exhaust noise can damage hearing. A generator set should never be operated with an exhaust system that has not been fully installed. All personnel in the immediate vicinity of the generator set should use ear protectors.

The exit points of the exhaust system to the external environment should be chosen in such a way as not to cause toxic exhaust fumes to be drawn into the fresh air ducts. These exit points cannot be opened to enclosed spaces, corridors, air ducts, especially in areas where there are living beings. When choosing exit points, attention should be paid to the direction of constant winds blowing.



3.6. Fuel System

The main purpose of the fuel system is to provide clean and uninterrupted fuel to the engine. Make sure the fuel system design is performed correctly and that the correct materials are used. It is recommended to install a pre-fuel filter or water separator filter on the fuel line between the fuel tank and the engine.

During the design of the fuel system, the following points should be considered:

- Use of appropriate materials
- At least 300mm distance between fuel inlet and outlet points on the tank
- Use of black steel, suitable plastic or copper pipe
- Not to use galvanized or unsuitable pipes
- Not to place cloth, etc. in the tank fuel filling mouth to filter the fuel, not to paint the inner surface of the tank
- Not to use unsuitable hoses

Clean fuel should be used for safe operation and longer engine life.

If the fuel pressure value exceeds the limits given by the manufacturer due to the location of the main fuel tank, an appropriate system can be installed, and an auxiliary fuel tank can be mounted.

The fuel level, on average, is recommended to be no higher than 4 meters above the level of the fuel supply pump and not lower than 3 meters.

No valves, check valves, etc. should be installed on the fuel return line from the engine to the tank.

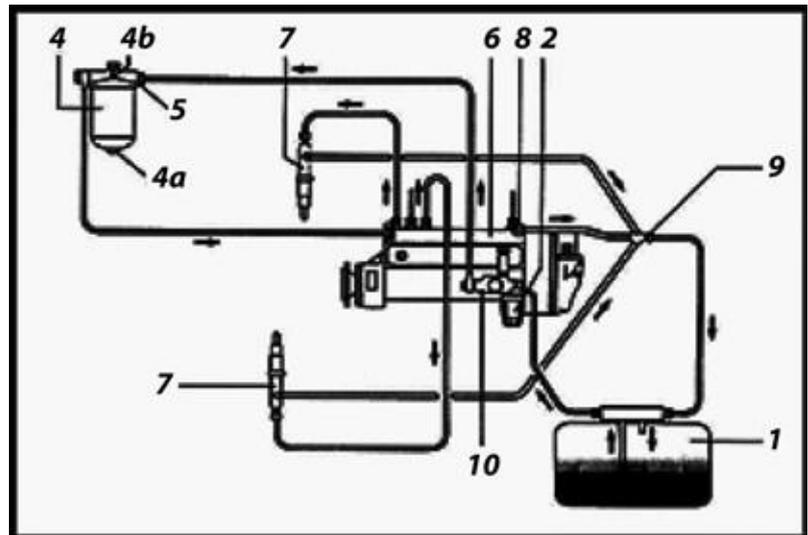
The fuel inlet temperature value determined by the manufacturer must be considered when designing the fuel tank.

Increasing fuel temperature has effects on fluidity, density, and combustion quality, resulting in negative effects on engine performance and exhaust emissions.

The fuel supplied to the engine must not contain air bubbles. For this reason, fuel lines must be designed in such a way that there is no air intake.

If the fuel tank is on a mobile generator set, panels should be designed to reduce the fluctuation of fuel in the tank.

1. Fuel tank
2. Strainer
3. Fuel filter element
4. Fuel filter housing
- 4.a. Water drain valve
- 4.b. Air intake hose
5. Fuel pipe fittings
6. Fuel injection pump
7. Injector
8. Fuel pressure safety valve
9. Fuel return line
10. Fuel supply pump



3.6.1. Storage of Diesel Fuel

The most preferred method of fuel supply is fuel storage. The fuel tank can be placed under or on top of ground.

There should be an air supply on the main tank both to evacuate the air pressure caused by tank filling and to prevent the vacuum that occurs in the tank as fuel is depleted. At the lowest point of the tank, a drain valve must be added to drain the water that will accumulate as a result of condensation.

Embedding the tank below the icing line ensures that seasonal effects are avoided.

Another case that needs to be considered when placing the main tank is the difference in height between the main tank and the auxiliary tank (daily tank). The vertical lifting capacity of the standard electric pump is 5m. Do not place the fuel tank at heights exceeding the pump lifting capacity. In addition, do not ignore the possibility of excessive horizontal distances and pressure drop caused by the elbows. The fuel distribution line that delivers fuel to the engine and the fuel return line that transports more fuel back to the tank must not be smaller than the inlets on the engine. These lines need to be increased in size to ensure adequate flow at long-term operation or low ambient temperatures.

Fuel lines can be made of steel pipe or any petroleum compatible material. Do not use galvanized pipes. The tank overflow pipe should also be of the same material and one size larger.

The fuel return line must return to the tank at the top and must not contain any shut-off valves. This line should be designed with a minimum number of elbows and bents to prevent air locking inside the system. Fuel must not be taken from a point lower than 50 mm below the bottom of the tank.

Flexible pipes should be used at the inlet points to the generator set to avoid damage from the vibration of the generator.



3.7. Electrical Connections

Only trained qualified electricians should be authorized to connect the electrical installation or carry out repair operations.

All electrical connections must be made in accordance with the schemes provided by Tescom Generator.

In order to operate the generator, set, all connections must be made in full compliance with applicable international, national and local standards, rules, regulations, requirements including grounding and soil defects. Cables must comply with the voltage value used. It should be selected in accordance with the table values, ambient temperature, withdrawal method so that it can carry the current that will flow through it.

Electrical connections to the generator set must be made with a flexible cable in order to prevent vibration from damaging the conductors, alternator or circuit breaker elements.

If it is not convenient to use a completely flexible cable, then a junction box can be placed near the generator via a flexible connection.

All connections must be checked very carefully. It should be checked that the phase rotation direction is appropriate in installation. This is vital on the automatic transfer switchboard or if the generators are to run in parallel.

The control panel can be made in such a way that it can be placed on the wall.

The cables connecting the generator set to the load distribution board must be protected by circuit breaker, fuse, or other means to disconnect the generator set in the event of any overload or short circuit.

During the planning of the distribution system, it is important to ensure that a balanced load is connected to the generator set. If the load on one phase is excessively greater than the other two phases, overheating in these alternator windings causes interphase imbalance and possible damage to the delicate 3-phase installation connected to the system.

Make sure that the calculated amount of current that the generator set can provide does not exceed any phase current drawn. If a generator set is to be connected to an existing installation, it may be necessary to reorganize the electrical system.

The power factor ($\cos \phi$) of the connected load must be determined. Power factors below 0.8 overload the generator. The generator set will operate safely at a power factor of 0.8.

In order to bring the power factor to the appropriate values, automatic power factor correction equipment can be installed if necessary. However, it is necessary to pay attention that the system does not switch to the capacitive value. Otherwise, this will result in voltage instabilities at the generator output and cause harmful excessive voltages.

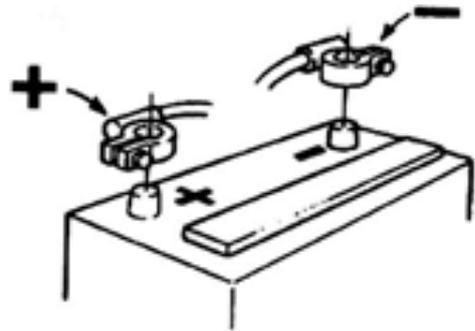
3.7.1. Starter Batteries

The electrical resistance on the starter circuit has a significant impact on the operation of the diesel engine. Therefore, batteries should be placed as close as possible to the generator set, making sure that the connections are correct and not loose. (Batteries should be accessible for ease of service)

Maintenance must be carried out meticulously, as the batteries must be in perfect condition to be able to operate the generator always set. The battery charging system and battery maintenance are described in the relevant sections.

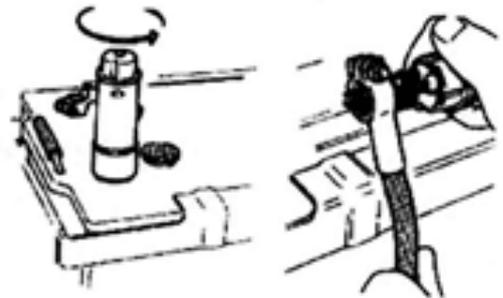
Connecting and Disassembling

First connect the battery (+) pole head. Then connect the battery (-) terminal. Start the disassembly process from the battery (-) pole head. Then separate the (+) pole connection.



Cleanup

Keep the batteries clean and dry. Dirt and oxidation at the battery or connection terminals cause the battery voltage to drop and discharge. During maintenance remove and clean the pole heads. Use a wire brush for oxidation.



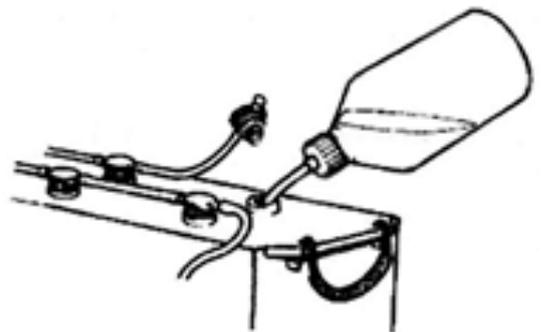
NOTE: See the instruction manuals for special maintenance methods of maintenance-free or dry-type batteries.



CAUTION

The batteries must be kept constantly on float charge by the rectifier.

The batteries of the generators stored for too long must be disassembled and charged. Otherwise, the plates of the battery may be damaged, and the battery may become unusable.



3.8. Sound Control

Tescom Generator has proven itself with its quality and experience in sound insulation of generator sets, where reducing noise pollution is of great importance today.

Your generator set can be equipped with equipment that reduces sound emissions. Some of these are sound insulation cabins, insulations, super exhaust mufflers, acoustic shutter windows and hoods.

The requirements of each environment vary greatly, and we recommend that you contact us for sensitive installations.

Sound emissions (without sound insulation) in diesel generator sets are between 100 dB and 110 dB at a distance of 1m. The lowest economically accessible sound pressure level is between 65 dB and 75 dB at a distance of 1 m. In hospitals, schools, residential areas, offices, etc., sound insulation is much more important.

Being in environments with sound pressure of more than 85 dB for a long time can lead to hearing problems. Wear ear protection where the generator set is running.

Tescom Generator sets are manufactured in accordance with EU 2000-14-EC Noise norms applicable under 500 kVA.



3.9. Fire Precautions

In the installation of a generator set, the following points should be taken into account:

Inside the room, there should be an easy escape route for operating personnel during any fire.

For fire fighting, a recommended fire extinguisher or fire extinguishing system should be provided in accordance with the Fire Regulations and standards according to the place of the generator and the building.

Weight-driven fire valves mounted on the engine, working via fusible links, should be placed on the fuel lines.

The room should be free from accumulated garbage that can create a fire and should be kept clean.

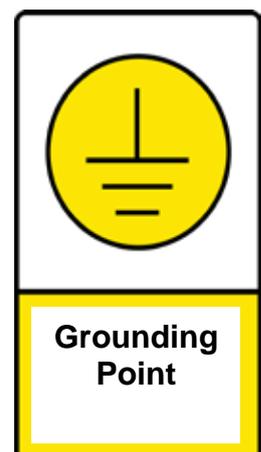


3.10. GROUNDING

In electrical installations, joining of inactive sections and parts connected to them with a conductor with ground with the help of an electrode is called grounding. In order to ensure the continuity of the electrical system and secure human life, the parts under electrical voltage are insulated in electrical systems. However, it is inevitable that these parts will always deteriorate for various reasons, and errors will occur in the form of puncture against the ground.

In this case, the surfaces with which the conductor comes into contact are exposed to potential electricity leakage. The potential electricity generated against the ground does not create a potential if all conductive parts are connected to each other and effectively grounded, and in case of any living being contact, the risk of flowing from the living being to the ground is eliminated.

Perform grounding in accordance with applicable national and local standards, rules, regulations or other regulations. The grounding resistance should be below 20 Ohms. Values above 15 mA and 50 V contact voltage are dangerous to human health. The grounding plate or rod should be at a distance of at least 20 meters from each other if more than one grounding plate for different purposes is buried. Due to the connection of the alternator frame to the generator frame, the entire mass of the generator set has the same potential.



4. CONTROL SYSTEMS

4.1. Introduction

Tescom uses generator control units with microprocessors that can be programmed as standard in their sets, which can monitor and protect all measurement values and alarm messages.

Control systems allow the generator set to be started, stopped, monitoring of various values, and protected. It provides flexible use in changing conditions with the help of programmable parameters.

Control boards are manufactured from A1 quality steel sheet and coated with electrostatic powder paint against rust. In addition to the standard TJM (Manual), TJA (Automatic) and TJPS (Synchronization) control panels, it also manufactures sets suitable for various working scenarios in accordance with the demands of its customers and the operating conditions.

Only "manual" and "automatic" control panels will be mentioned in this section. Detailed information about the control devices is available in the control device document sent with the generator.

4.2. Manual and Automatic Control Device

Automatic Control Panels are used in applications where the generator is kept as a backup to the mains energy and ensure that the generator is activated when the mains energy is cut off. Manual Control Panels allow the generator to be operated and stopped manually where mains energy is not available. TJ509-T control devices are used as standard for both applications.

Mains monitoring, command and control operations are carried out by the TJ509-T generator control unit with programmable microprocessor. The modes of operation are selected by pressing the desired button from the front panel. Changing the position while the generator is running will cause the generator to behave appropriately in that position. For example, if the RUN position is switched to, the mains and generator contactors, contactor selector buttons can be controlled manually.

STOP: When this position is selected, the generator does not start, and the mains pulls the contactor if the mains phases are within programmed limits. When the Stop button is pressed while the generator is operating, the generator contactor opens, and the generator turns off after the programmed cool-down time. In this process, when the Stop button is pressed a second time, the cooling operation is canceled, and the engine is stopped immediately.

AUTO: It is used for automatic transfer of the generator and the mains. If at least one of the mains phases goes out of limits, the mains release the contactor. At the end of the standby time, the engine starts up to the programmed number. Waited until the standby time between each starting. When the generator starts, the starting is immediately interrupted.

When all the generator phase voltages come between the limits, first waited until the engine heating time, then the generator contactor time and the generator contactor is energized.

When all the network phases are within the limits, waited for the network standby time. Then the generator releases the contactor, and the mains pulls the contactor. If the cooling time is given, the generator works for as long as the cooling time. At the end of time, the power of the fuel relay output is cut off and the diesel engine is stopped. The device is ready to activate the generator in the event of a new mains outage.

If the weekly work schedule prevents the generator from starting, the AUTO mode light will flash and work equivalent to the STOP position will be performed.

TEST: It is used to test the generator when there is mains or to keep the generator in an emergency backup position. Everything works as in the AUTO position. However, as long as the mains exists, the generator does not pull the contactor, if the network is interrupted, the mains releases the contactor and the generator pulls the contactor (if emergency backup is selected). When the mains is back on, the load is transferred back to the mains, but the generator continues to operate. To stop the generator, switch to AUTO or STOP position.

RUN: It is used to operate the generator in manual position with or without load. When this position is selected, the generator starts to operate and waits without load. Network or generator contactor buttons are selected to pick up the load by the generator or transfer it to the mains.

The D-300 is a low-cost generator control device ready for remote monitoring.



D-300 Generator Control Device

4.3 Features of Datakom D-300 control card

- Diesel and gas generator support
- 400Hz generator support
- Event log with 400xmeasurement value
- All parameters can be changed from the front panel
- 3-level program password
- 128x64 pixel graphic LCD
- Installing language
- Current-voltage waveform
- Current-voltage harmonic analysis
- 6 Amp / 250V SC / JK outputs
- 8 programmed digital inputs
- 6 programmed digital outputs
- 3 programmed analog inputs
- CANBUS-J1939 & MPU input
- 3 programmed service alarms
- Multiple automated test programs
- Weekly work programs
- Dual generator support, equal aging
- Fine speed adjustment (some ECUs)
- Automatic fuel pump control
- Protections cancellation feature
- Overpower protection
- Reverse power protection
- Overcurrent IDMT protection
- Load shedding, dummy load
- Multiple load shedding programs
- Current instability protection
- Voltage instability protection
- Fuel filling and fuel theft alarms
- Battery-assisted real-time clock
- Idle speed control
- Battery charging operation
- Battle mode support
- Multiple nominal requirement definitions
- Contactor+motor switch driver
- Modem diagnostics page
- Parameter setting via USB, RS-232 and GPRS
- Free configuration software
- Control via SMS feature
- Ready for centralized monitoring
- Mobile generator support
- Automatic GSM geolocation
- GPS connection (RS232)
- Uploading software via USB
- IP65 protection (with gasket)

Measurements

Mains and generator FN - FF voltages
Mains and generator frequency
Mains and generator phase currents
Mains and generator neutral currents
Mains and generator phase and total, kW, kVA, kVAr, cos Motor speed
Battery voltage

Communication

4-band GPRS modem (optional)
USB Device
RS-232 (2400-57600baudJ1939-CANBUS)
Geolocation via GSM
GPS connection (RS-232)
Centralized monitoring sending SMS message via the Internet
Sending E-Mail
Free software: Rainbow Plus Modbus RTU

Functions

ATS device
AMF device
Remote starting device
Manual starting device
Motor Controller
Remote monitoring panel

Technical Features

DC Supply Voltage: 9.0 - 33.0 V-DC.

DC Power Consumption:

250 mA-DC typical @12V-DC 125
mA-DC typical @24V-DC 500 mA-
DC max. @12V-DC
250 mA-DC max. @24V-DC

Alternator voltage: 0 - 330 V-AC (F-N), 0 - 570V F-F

Alternator frequency: 0-500 Hz.

Mains voltage : 0 - 330 V-AC (F-N) , 0 - 570V F-F

Network frequency: 0-500 Hz.

Current inputs: from current transformers. /5A.

CT Range: 5/5A - 5000/5A

VT Range: 0.1/1 – 6500.0 / 1

kW Range: 0.1kW - 65000 kW

Sensitivity:

| | |
|------------------------|--------------|
| Voltage: | %0.5+1digit |
| Current: | %0.5+1 digit |
| Frequency: | %0.5+1 digit |
| Power(kW,kVAr): | %1.0+2 digit |
| Power factor: | %0.5 +1digit |

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

Analog input range: 0-5000 ohms.

Mains and generator contactor outputs: 16Amp@250V

DC Outputs: mosfet semiconductor shielded outputs, 1Amp@28V-DC

Voltage drops during starting: Withstands 0V for 100ms.

Magnetic pickup voltage: 0.5 - 30V-RMS.

Magnetic pickup frequency: 10 ... 10000 Hz.

Charge alternator excitation : 100mA @12VDC, 200mA @24VDC

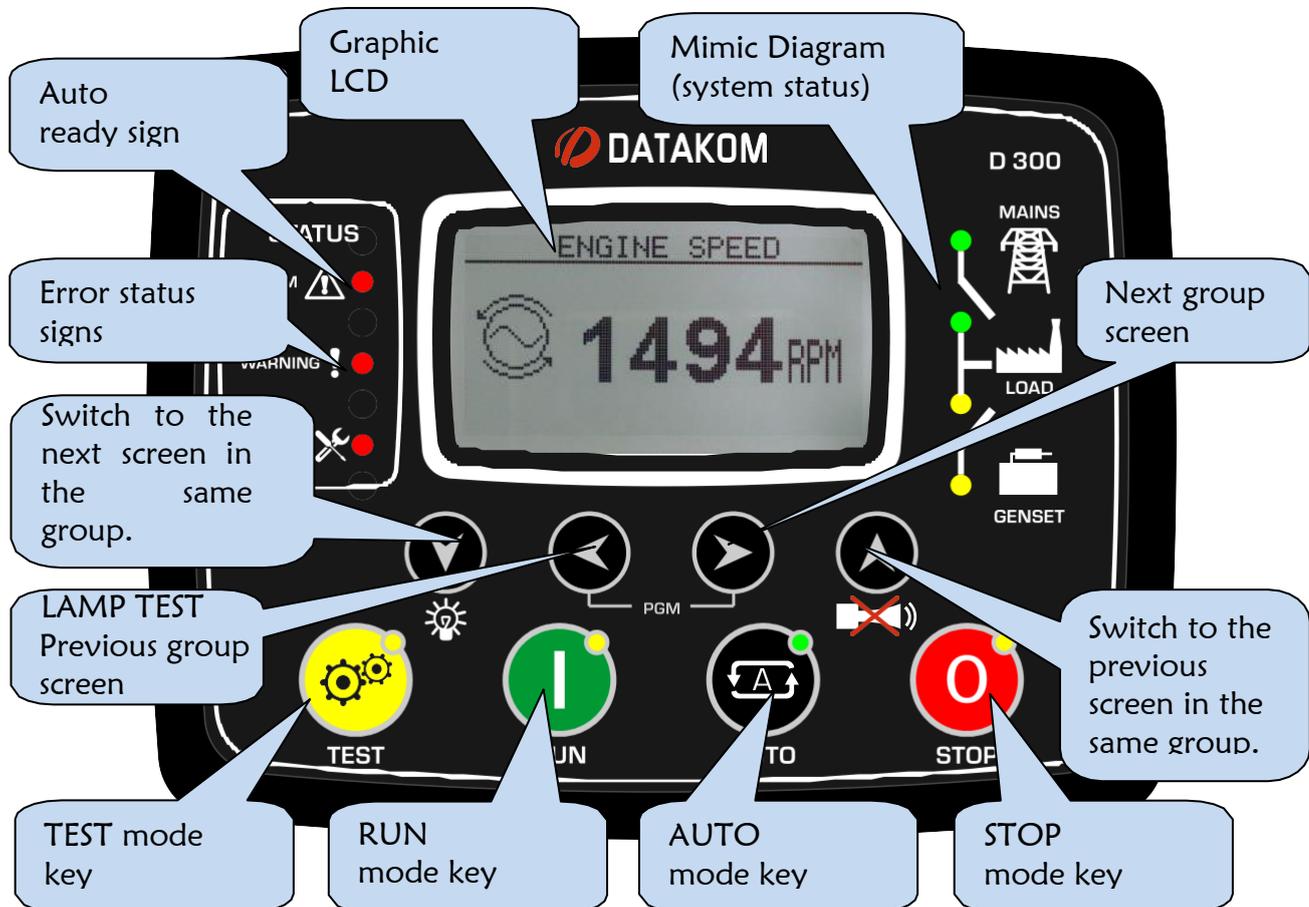
USB Device: USB 2.0 full speed
RS-232 Port: adjustable data transfer rate
Operating ambient temperature: -20°C ...+70°C

Storage ambient temperature: -40°C ... 80°C
Maximum relative humidity: 95% non-condensing.
IP Protection Class: IP54 from the front panel, IP30 from the back panel.
Dimensions : 172 x 134 x 47mm (WxHxD)

Mounting Opening Dimensions: 151 x 111 mm minimum.
Weight: 300 g (approx.)
Box material: Heat-resistant, fireproof, ROHS compliant ABS/PC
Mounting: With the help of plastic brackets are fastened at the edges.
The device complies with the following European Union directives
 -2006/95/EC (low voltage)
 -2004/108/EC (electromagnetic compatibility)
Reference norms: EN 61010 (safety requests) EN 61326 (EMC requests)
UL Compliance: UL 6200, Controls for Stationary Engine Driven Assemblies
 (Certificate Number - 20140725-E314374)
CSA Compliance: CAN/CSA C22.2 No. 14-2005 – Industrial Control Equipment

Connections
 3 phases 4 wires, star & delta
 3 phases 3 wires, 2 Current Transformer
 2 phases 3 wires
 1 phase 2 wires

4.4 Use of Datakom D-300 Control Card



If the engine operating time or duration exceeds the set values, the **SERVICE TIME** led flashes and the **service time** output function is activated. The level of the alarm that will occur when the service time arrives for the device can be set from the program parameters.

The service time output function can be given to any output using the **Relay Definitions** program parameter. This function can also be set on the external relay module.

4.5 Key Functions

| KEY | FUNCTION |
|---|--|
|  | Switching to TEST mode. The generator starts and takes the load. |
|  | Switching to RUN mode. The generator starts and waits without taking the load. |
|  | Switching to AUTO mode. If necessary, the generator starts and takes the load. |
|  | Switching to OFF mode. The generator stops. |
|  | Switching to the next screen in the same group LAMP TEST key. |
|  | Switching to the previous screen group. |
|  | Switching to the next screen group. |
|  | Switching to the previous screen in the same group The ALARM RELAY is reset. |
|  | If these two keys are pressed for 5 seconds, PROGRAMMING mode is entered. |
|  | Restoring Factory Settings. See RESTORING FACTORY SETTINGS. |
|  | If these two keys are pressed for 5 seconds at the same time, the service time counters are reset. For detailed information, please refer to the SERVICE TIME ALARM section. |

4.6 Device Screen Switches

The device measures a huge number of electrical and motor parameters. The display of these parameters is organized in PARAMETER GROUPS and their subheadings.

It is done by switching between different screen groups and using  and  keys.

Each time  key is pressed, the next parameter group screen is displayed. The screen after the last parameter group is the first parameter group screen.

Each time  key is pressed, the next parameter group screen is displayed. The screen before the first parameter group is the last parameter group screen.

Switches within the same screen group are made using  and  keys.

Each time  key is pressed, the next parameter screen within the same group is displayed. After the last parameter is displayed switched to the first parameter screen.

Each time  key is pressed, the previous parameter screen within the same group is displayed.

After the first parameter is displayed switched to the last parameter screen.

The following is a list of parameter groups:

Generator Parameters: Generator voltages, currents, kW, kVA, kVAr, pf etc...

Engine Parameters: Analog sensor measurements, engine speed, battery voltage, engine clock, etc...

J1939 Parameters: If parameter J1939 is activated, this screen opens. The device is able to display a long list of parameters read from the electronic engine. For more information, please refer to the J1939 CANBUS Communication section.

Mains Parameters: Mains voltages, currents, kW, kVA, kVAr, pf etc... Current transformers must be on the load side to display mains currents and power parameters. Otherwise, the mains current and power parameters cannot be displayed.

Sync Screen: The graphical synchronoscope screen is displayed. The synchronoscope screen is updated 10 times per second.

Oscilloscope Screen: In this screen group, the waveforms of voltages and currents can be displayed like an oscilloscope. All Phase-neutral and Phase-Phase voltages and phase currents are shown. Thanks to this feature, waveform distortions and harmonic distortions can be monitored visually.

Graphical Harmonic Analysis Results: In this screen group, voltage and current harmonics are displayed. All Phase-neutral and Phase-Phase voltages and phase currents are shown. Thanks to this feature, the harmonics formed by complex loads can be monitored. The screen resolution only allows the display of harmonics above 2%. Please use the Digital Harmonic Analysis Display to see all harmonic levels.

Numerical Harmonic Analysis Results: In this screen group, voltage and current harmonics are shown with 0.1% resolution. All Phase-neutral and Phase-Phase voltages and phase currents are shown. Thanks to this feature, the harmonics formed by complex loads can be monitored.

Alarm Screen: All alarms that occur on the device are shown in this screen group. Each alarm is shown on a single screen. If there is no alarm to display, "END OF ALARM LIST" will be written.

GSM Modem Parameters: Signal strength, counters, connection status, IP addresses, etc...

Ethernet Parameters: Ethernet connection status, counters, IP addresses, etc...

Status & Counter Groups: In this group, there are different parameter groups such as generator status, service counters, date-time, software version.

4.7 Led Lamps



STATUS LEDs:

ALARM: If an alarm or load shedding occurs, this led will light up.

WARNING: This led lights up if a warning condition occurs.

SERVICE TIME: If one of the service counters expires, this led will light up.

MODE LEDs: The LED lights up when one of the modes is selected on the device or remotely

MAINS and GENERATOR LEDs:

MAINS EXISTST: If the mains phase voltages and frequency are between the limits, this LED lights up. If the mains phase sequence control is activated from the program parameters, the phase sequence must also be correct. If one of the digital inputs is set to Remote Run, this will reflect the status of the led input.

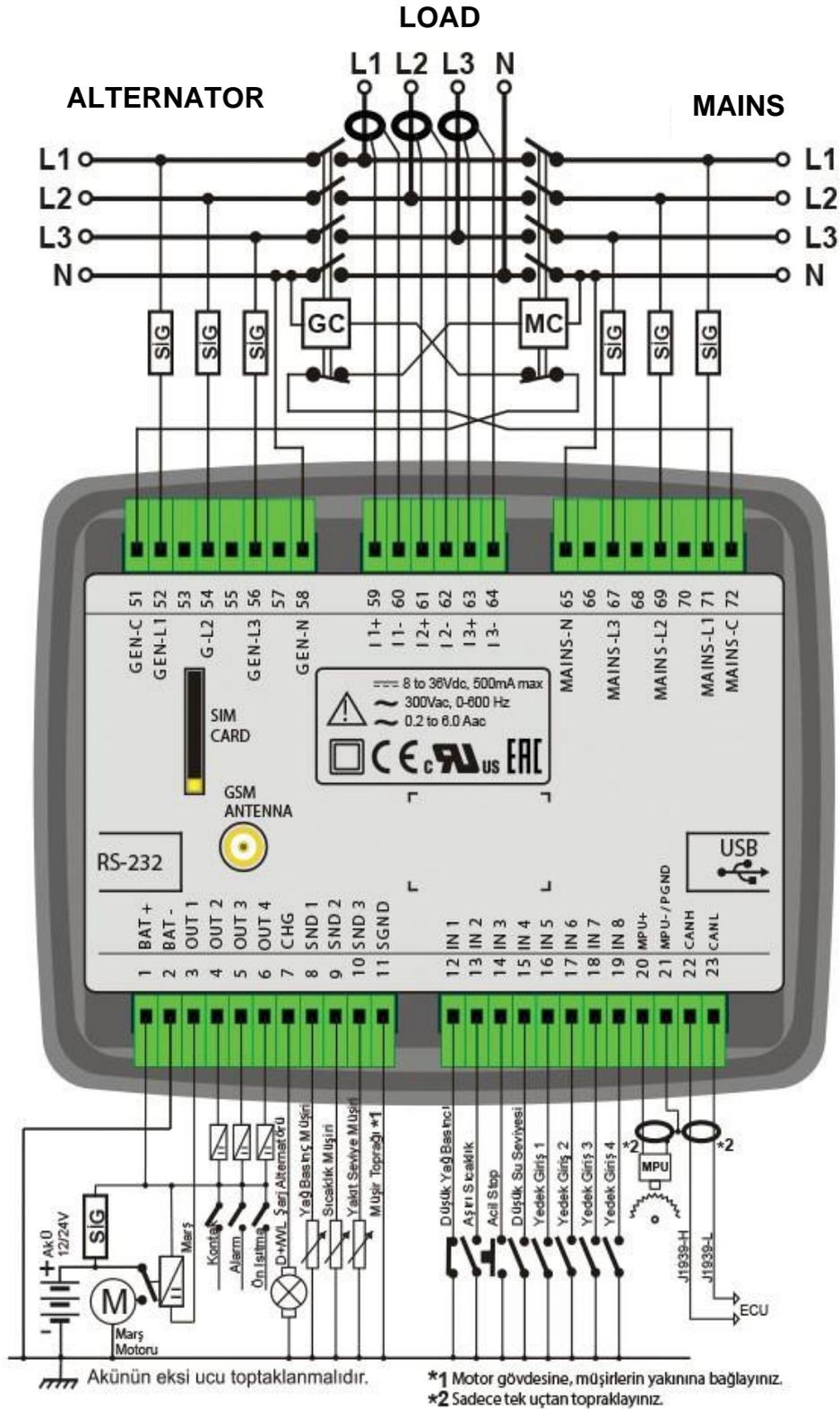
If a Mains Simulation signal is applied to the device, the mains is assumed to exist. If the Switch to Operating Mode entry is applied to the device, the mains is assumed to not exist.

MAINS CONTACTOR: This led lights up when the mains contactor is energized.

GENERATOR CONTACTOR: This led lights up when the generator contactor is energized.

GENERATOR ACTIVATED: If the generator phase voltages and frequency are between the limits, this led lights up. If the generator phase sequence control is activated, the phase order must also be correct.

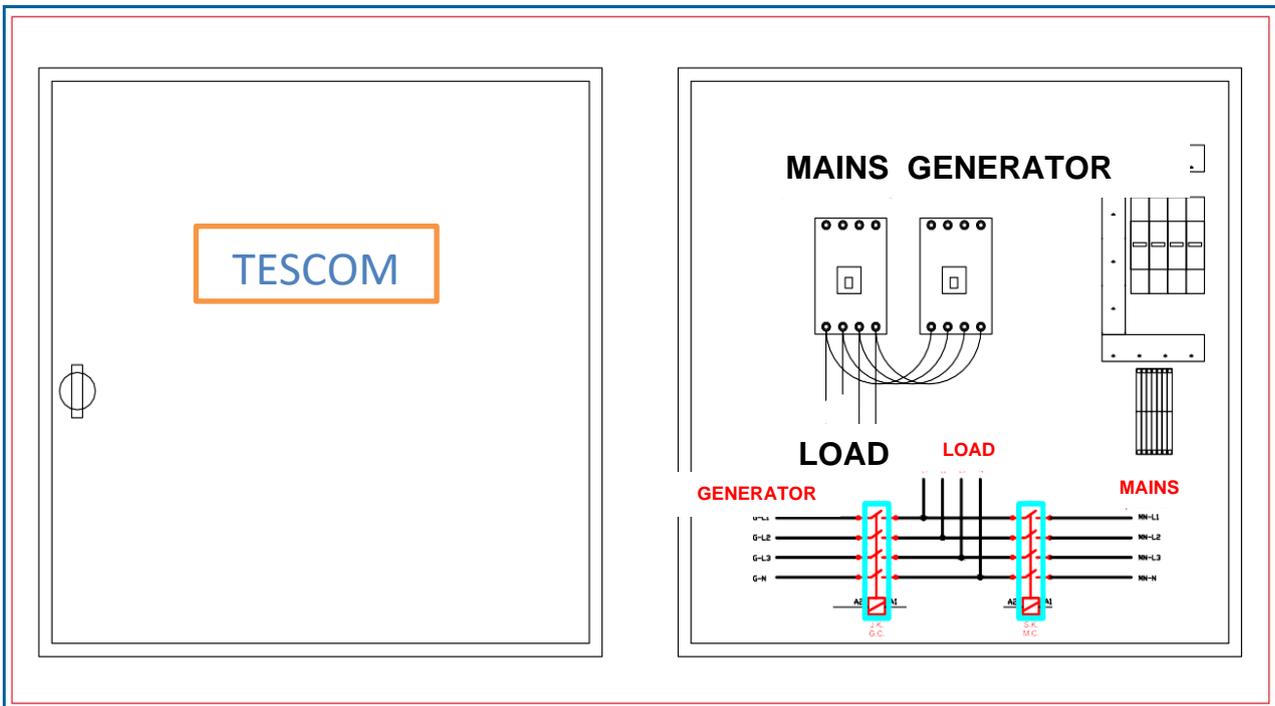
4.8 Datakom D-300 Control Card Connection Diagram



4.9 Systems with Contactors

Systems with contactors consist of 2 contactors that can meet the standby power of the generator and mains supply and auxiliary equipment. Electrical locking is standard in the system and mechanical locking is optional. Within the transfer system, generator body heater and fuse and equipment for battery charging are available and ready for use in the connecting terminal. The connection of the system with the automatic generator system consists of a compatible and simple terminal group. There are F-N supply output for generator charging and body heater, 3x F+N mains references for generator control system to follow the mains, 2 input terminals for generator and mains contactors control on this terminal group.

Tescom transfer systems with contactors are available in 10kVA – 550kVA 400V models Chint,ABB,LG 4P.

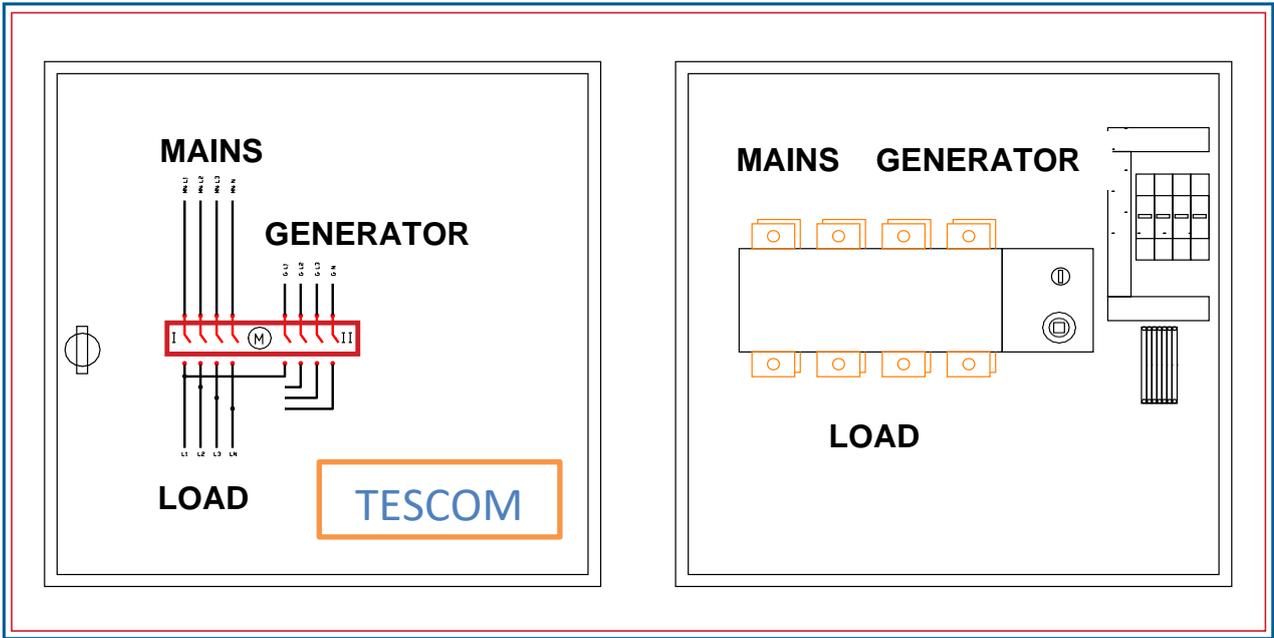


Wall Mounted / Transfer Switchboard with Contactor

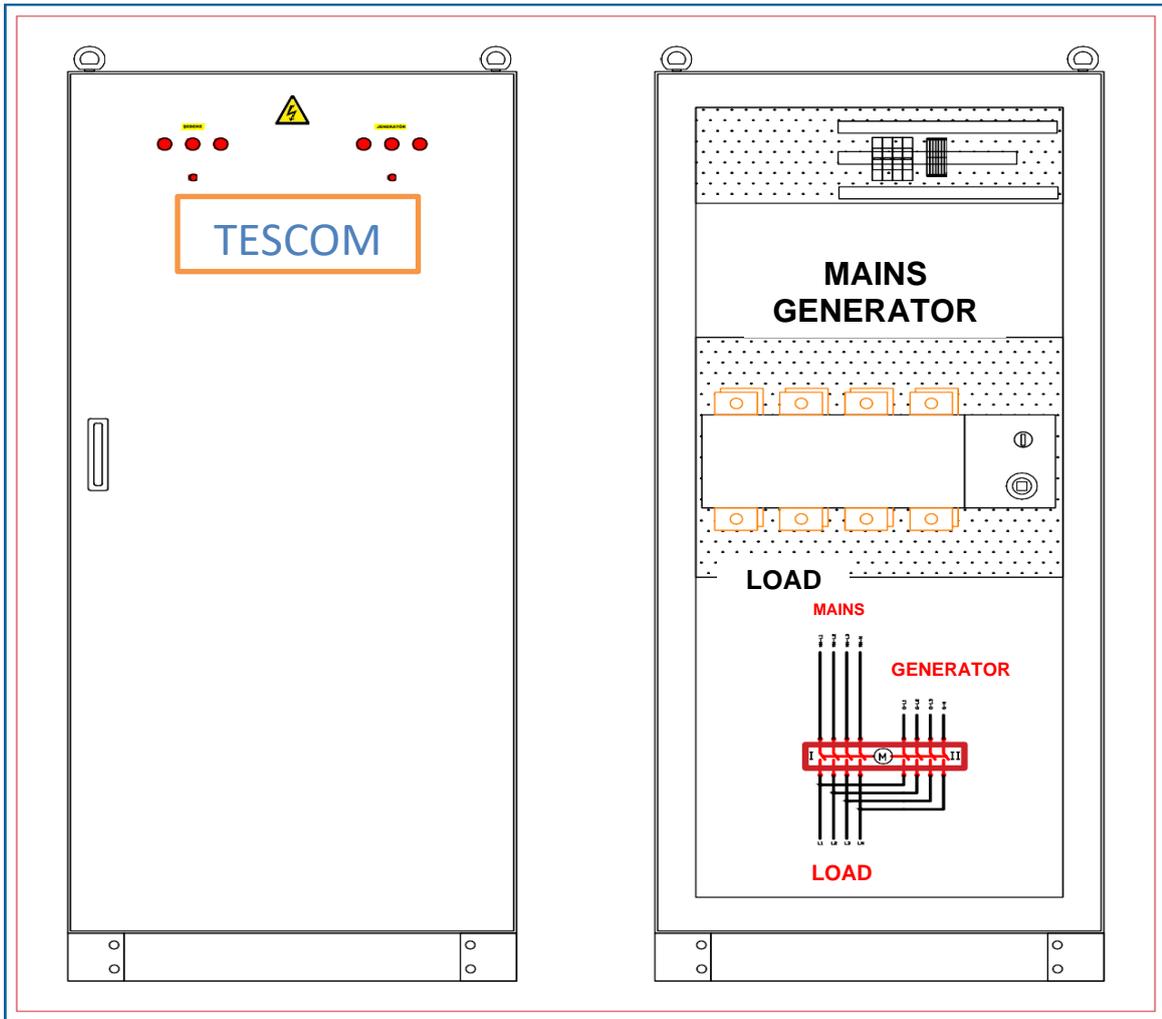
4.10 Systems with Inverter Switch

Systems with inverter switch consist of 1 inverter switch that can meet the standby power of the generator and mains supply and auxiliary equipment. Electrical and mechanical locking is standard in the system. Within the transfer system, generator body heater and fuse and equipment for battery charging are available and ready for use in the connecting terminal. The connection of the system with the automatic generator system consists of a compatible and simple terminal block. There are F-N supply output for generator charging and body heater, 3x F+N mains references for generator control system to follow the mains, 2 input terminals for switch generator and mains selection on this terminal group.

Tescom transfer systems with inverter switch can be produced as Landi,ABB,SOCOMEK 4P brands in 60kVA – 900kVA 400V models and ABB brand in 10kVA-1700kVA 400V models with 3 and 4 pole options.



Wall Mounted / Transfer Switchboard with Inverter Switch

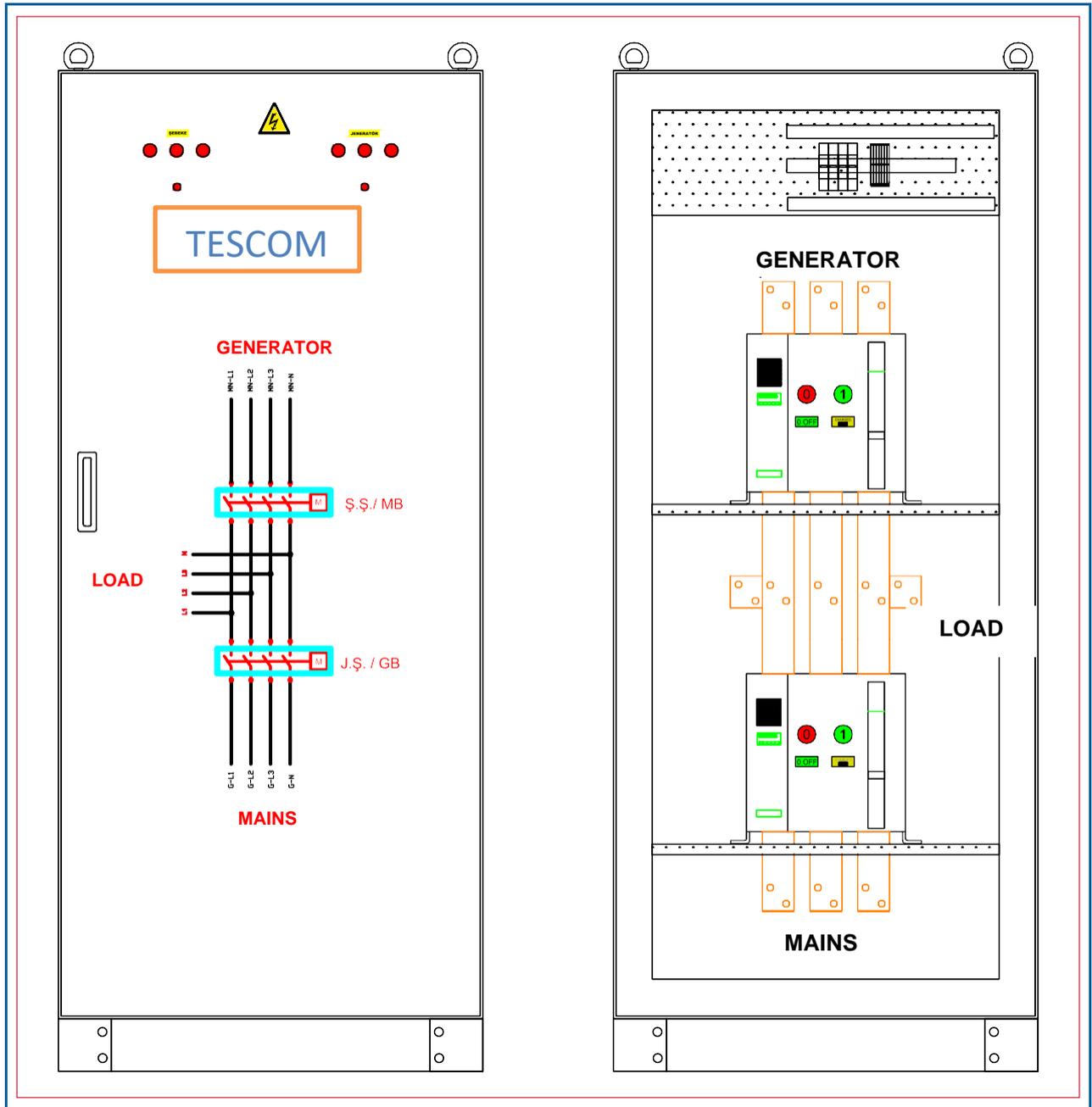


Standing Type / Transfer Switchboard with Inverter Switch

4.11 Systems with Motor Switches (ACB)

Systems with motor switch consist of 1 motor switch that can meet the standby power of the generator and mains supply and auxiliary equipment. Electrical locking is standard in the system and mechanical locking is optional. Within the transfer system, generator body heater and fuse and equipment for battery charging are available and ready for use in the connecting terminal. The connection of the system with the automatic generator system consists of a compatible and simple terminal group. There are F-N supply output for generator charging and body heater, 3x F+N mains references for generator control system to follow the mains, 2 input terminals for generator and mains generator motor switch control on this terminal group.

Tescom transfer systems with motor switch can be produced as ABB & LG/LS brands in 350kVA-2500kVA 400V models with 3 and 4 pole options.



Standing Type / Transfer Switchboard with Motor Switch

4.12 Basic Procedures to Be Performed Before Operation

Before starting the generator set, be sure to observe the safety measures described in the Maintenance Operation Manual. Make sure that the installation is performed completely.

Make sure that the electrical connections are made in accordance with technical rules and schemes.

The following procedure should be used every time the generator set is started. The person to use the generator set must have been trained for this operation.

1. Inspect the generator set (engine and alternator) broadly manually and visually. Do not operate if there are any leaks, fractures, breaks, cracks, etc.
2. The generator set should be placed on a flat and appropriate floor. It should be protected from precipitation, dust, etc. effects.
3. Check that windows or ducts for suction of fresh air and pulse of hot air are not closed or clogged.
4. Check that the exhaust outlet is not closed or clogged.
5. Check the quality and level of the engine oil and fill it if necessary.
6. Check the coolant level and antifreeze rate and fill it if necessary. Antifreeze rate should be adjusted according to the coldest conditions of the region.
7. Check the fuel tank and fuel level and add fuel if necessary.
8. Batteries can be of the maintenance-free type or lead acid type. If it is lead acid type, check the electrolyte level and charge it. If it is a maintenance-free type, clean and charge.
9. Check the air filter for excessive pollution or clogging and replace it if necessary.
10. Any object or living thing near the generator may interfere with the generator's operation or cause injury. Check this issue and warn.
11. Ensure that the power output switch is OFF.
12. Ensure that the fuses are in OFF position.
13. Make the battery pole cable connections.
14. Using the fuel hand feed pump, completely drain the air from the fuel system and fuel filter. See DIESEL ENGINE SERVICE-MAINTENANCE MANUAL for details.
15. Bring the fuses to ON position.
16. Check that the Emergency Stop Button is in on position.
17. Start the generator manually via the control unit.
18. Check for abnormal noise and vibrations.
19. Check for leaks of water, oil, fuel, etc.
20. Monitor the temperature and oil pressure indicators.
21. Check the voltage and frequency values.
22. Check the generator and mains phase rotation directions. If it is not in the same direction as the mains, stop the generator and change the generator phases.
23. If all values are normal, you can start the generator on load. Do not use the generator set outside the capacity indicated on the label.



- Before starting the generator set observe the safety measures described in the Maintenance Operation Manual.
- Make sure that the installation is performed completely.
- The correct grounding of the generator for both stationary and mobile sets prevent the possibility of death or injury in the event of an electrical failure.
- Since the battery system is negatively grounded, the negative (-) connection must be disconnected first and connected last when connecting.
- When the safety stop button is pressed, the generator does not operate in automatic or manual position.
- Turn on the safety stop button by turning it counterclockwise.
- The quality of engine oil, fuel and antifreeze must be of characteristics required by the manufacturer.
- Never start or stop your generator set when the power output switch ON position.
- Maintenance and controls of the generator set according to daily, weekly, yearly and working hours should be carefully monitored.

4.13 Battery Charger

The battery charger is designed to ensure that the starter batteries remain constantly charged, even if the generator does not operate for a long time.

The generator is supplied with mains energy when stopped. It is available as standard in automatic control panels.

Charging speed depends on the current capacity (Ah) of the battery, its condition and existing charge condition. The initial charging current will decrease as the battery starts to charge.

Do not operate the battery charger in environments not protected from rain or snow. Ensure that the mains supply is connected correctly and make its grounding correctly.

Turn off the battery charger before disassembling the battery and ensure that there are no sparks or fire. Heavy smoke in the vicinity can cause the battery to explode.

The battery charger must be used appropriately by following the instructions, must not overcharge and must not damage the batteries. If the temperature of a lead-acid battery rises to 52°C, the battery will be damaged. Especially in tropical countries, attention should be paid to charge the batteries, the charging environment should be cool and shaded.

Together with mains-powered battery chargers, there's a battery charging alternator on the diesel engine to charge the batteries.

Check the pulley and V-belts that turn the charging alternator. Replace it if it is deformed, adjust its tension if it is loose.

Check that the charging alternator, warning and supply cable connections are correct and sound.

5.MAINTENANCE

5.1. General

Implementing a good maintenance program is the most important factor for long operating and economic life of your generator set. At the same time, your generator set will be ready for service at any time and risk of failure can be minimized.

Carry out the maintenance and controls based on the General Maintenance Schedule.

All generator service record forms, model, and serial numbers label, drawing and connection diagrams, spare parts lists, Service and Maintenance Schedule and a copy of this manual should be kept. These records will be a reference to the services and can help diagnose a future problem.

Maintenance and repairs should only be carried out by authorized and trained personnel.



- If the generator set is large enough to fit one person inside, notify other personnel before performing maintenance and adjustments, and secure the access doors against anyone closing or locking them.
- Stop the engine before changing or adding fuel, oil, coolant, battery electrolyte.
- Before starting repairs and adjustments, disconnect the battery charger and disconnect the battery negative (-) connection to prevent the generator from running. To prevent others from reconnecting in any way, hang a danger warning on the battery connection.
- Adjust only when the generator set is turned off. Adjust if needed, then restart the generator to check the adjustments. Only specialized technical service personnel can adjust at the time of operation.

5.2. Diesel Engine Maintenance

See Diesel Engine Maintenance and Operation Manual.

5.3. Alternator Maintenance

Maintenance and inspections must be carried out by authorized personnel when the alternator is not running and by taking safety precautions. The frequency of maintenance and controls should be adjusted according to ambient conditions and operating situation.

In general, 500 working hours or 1 year after the first run and after; vibration, knocking, abnormal noise, the strength of cable terminals and connections, the tightness of bolts and nuts should be checked. It should be examined for a mechanical defect in the cooling fan or body.

Alternator bearing beds can be used for 20,000 hours under normal conditions. Bad or incorrect grease, extremely hot environment, vibration shortens bearing life. Recommended grease refreshing period is 4,000 working hours.

MOBIL OIL: MOBILUX 3, SHELL: ALVANIA 3, AGIP: GR MW 3, ESSO: BEACON 3 greases can be used.

The bearing temperature during operation should not exceed 60°C. If there is a suspicion of wear on the bearing, the operating temperature should be measured and checked. If the temperature reaches 80°C during operation check the accouplement. If the accouplement is normal and the bearing color changes to blue, the bearing must be replaced.

When a bearing is dismantled, it must necessarily be replaced with the same and a new one, the old one should not be used. The process is easier if the bed is heated to 80°C for the installation of the new bearing.

Check the mechanical connections and decentering between the alternator coupling and the engine flywheel. Check the tightness of the connection bolts. If removed, use LOCTITE - Type 242 freezing liquid to tighten it again.

Alternators are mostly single bed, so be very careful when lifting and transporting them. Only when the alternator is lifted can the rotor come out and fall. Be sure to fix the rotor before this process.

It is useful to perform a stator winding insulation test against the ground before restarting the alternators that have not been used for a long time. AVR cable connections must be disconnected before this process. If a value below 5 MegaOhm is measured, the alternator must be cleaned, dried, and measured again. The cleaning process should be carried out with electrosol, which is the coil cleaning fluid, and after this volatile liquid dries, light compressed air should be blown.

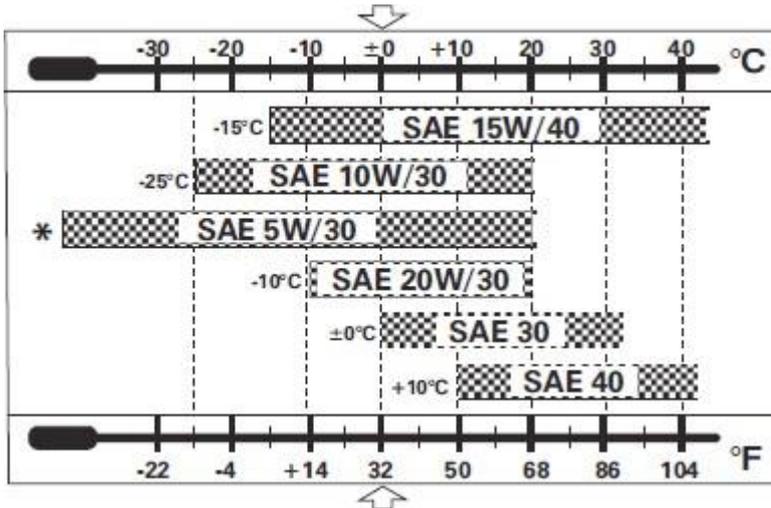


- Alternators contain hazardous rotating parts and the risk of electric shock.

5.4. Lubrication System

For your diesel engine to work properly, the lubricating oil must be changed at specified intervals. Use oils prescribed by the engine manufacturer, otherwise your engine may be damaged. The properties of the oils that need to be used are specified in the "Engine Maintenance and Operation" manual provided with the generator.

Use engine oils from manufacturers of high quality and approved quality in accordance with API service norms for the engine. Use oil suitable for the ambient temperature. Sometimes falling below, the temperature limit affects the cold start ability, but does not damage the engine. But the engine should not be operated for a long time.



Oil norms that can be used according to the ambient temperature are shown in the figure on the left.

5.5. Coolant

Coolant is obtained by mixing water and additives in certain proportions and protects the cooling system of the engine from freezing and corrosion.

If there is a risk of freezing, use a mixture of 50% antifreeze (glycol) and 50% clean and pure water. This mixture protects your engine from freezing up to -40° C. This mixture should be used throughout the year.

At least 40% antifreeze should be used for corrosion protection to be effective.

The freezing point of the coolant in the engine can be reduced to -56°C. Further increasing the amount of antifreeze disrupts the protection against freezing.

Before putting the water and antifreeze into the engine, prepare the mixture in a separate place and mix thoroughly. See the Engine Maintenance and Instruction Manual for antifreeze standards suitable for the engine used.



- It is hazardous to drink antifreeze or a mixture

5.6. Fuel

For reliable and environmentally friendly operation, fuels that comply with the fuel specification recommended below should be used.

The fuel temperature should not be above 40°C.

| | | | |
|-------------|-------------|-------------|--------------|
| * EN590 | | * ASTM D975 | NO 1-D, 2-D |
| * JIS K2204 | TYPE 1,2,3 | * ISO 8217 | DMX-CLASS |
| * DIN 51601 | DIESEL FUEL | * BS 2869 | CLASS-A1, A2 |

NOTE: The properties of the fuel that need to be used are specified in the "Engine Maintenance and Operation" manual provided with the generator.

Sulfur Rate: It must comply with the norms in the country. If the rate exceeds 0.5%, the frequency of oil change should be increased.

| Fuel Sulphur Content (%) | Engine Oil Change Interval |
|--------------------------|----------------------------|
| <0.5 | Normal |
| 0.5 - 1.0 | As often as 0.75 |
| <1.0 | As often as 0.50 |

5.7. Battery Maintenance

The batteries used in generator sets are of different types. Tescom uses maintenance-free type batteries in its generators.

They are completely closed and do not require addition of pure water.

The discharge time is very long as its internal resistance is very low (5 milliohms).

It does not emit gas, as it works entirely by oxygen recycling. It is equipped with special low pressure safety valves.

It has a wide operating temperature (approx. -20 °C to 60 °C).

The electrical energy used is created by the chemical reactions that take place inside the cells. This reaction is reversible, and the battery can be charged and discharged repeatedly.

The batteries can be continuously charged for approximately 4 years. Then they are replaced.

Another type of battery that is widely used is lead acid type batteries, which consist of a group of cells or plates with positive and negative electrodes immersed in electrolytes (sulfuric acid).

Check the density of the battery fluid with battery hydrometer. At the nominal temperature (at 15°C), the reading in each cell should be about 1.27.

The most convenient water to use when preparing electrolytes is distilled water. This is also the right one for the water to be added to the battery daily.

Clean the top of the battery to avoid contamination and remove the covers. Add distilled water up to 5-10 mm above the plates. Reinsert and tighten the covers. Dry the top of the battery. Check the operating temperature values of the battery you are using (approx. -5 °C to 50 °C). At improper temperatures, the battery fluid may freeze or boil. For this reason, it becomes unoperable.



- Batteries emit flammable gas. Do not smoke, create sparks or open flames near the batteries.
- Always handle the batteries carefully and wash your hands after contact to protect them from possible acidic burns.
- Wear appropriate protective clothing.
- Do not allow unauthorized personnel to be in the battery charging area.
- Check the charging systems together with the batteries.

5.8. Radiator Maintenance

The radiator supplied with your engine is designed and manufactured to be operated smoothly for years under industrial conditions when maintained. A general information about radiator maintenance methods will be provided.



- Radiator cooling water normally runs under pressure and is very hot.
- Do not work on the radiator until it cools down and do not disassemble the hoses.
- Do not work on the radiator while the fan is running and do not remove the protector.
- Corrosion in the radiator is the primary cause of failures. Always make sure that there are no leaks in the radiator hose connections.
- The radiator must be fully filled. Partially filling the radiator will cause corrosion to spread faster. For a generator that is not running, either completely empty the radiator or make sure that the radiator is protected.

It is only necessary to fill the radiator with distilled or natural soft water, or to add appropriate corrosion inhibitors to a certain amount of water. The radiator, which is placed in dusty and dirty environments, can become clogged from dirt, engine vapors, moisture, various particles, etc. and cannot perform its task; this contamination reduces radiator performance.

- Low-pressure steam should be used for regular cleaning of the deposits formed. For more stiff deposits, the radiator can be immersed in alkaline solution for up to 20 minutes and then washed with hot water.

5.9. OPERATION AT LOW LOAD

It is inconvenient to operate the generator set at low loads as well as operating it above the category (ESP/PRP/COP) and capacity specified in the label values.

Especially when operating generators in large powers, more attention should be paid to this situation. For generator sets of ESP and PRP category, the minimum allowable load amount is 30% of the full power. For COP, it is 25%.

Running generator sets without or at low load should be avoided or minimized. If the weekly test run has to be done without load, this test should be limited to 10 minutes.

It is recommended to run the engine for 30 minutes or more at a load of 60% or more, having run for 1 hour at a load of 30% or less.

Every year, it is recommended that the generator set be run at 75% load for 4 hours to burn carbon deposits in the exhaust system. The load level should be gradually increased over the course of four hours, starting from zero.

At regular intervals, it should be monitored for oil leakage, exhaust manifold and muffler should be disassembled, checked for carbon accumulation, and cleaned.

If sufficient load cannot be provided for the generator set, it is recommended to prevent negative effects by connecting a spare load (load bank).

Maintenance periods of generator sets operating at low load should be carried out in shorter periods than the time specified in the schedule. Oil and fuel filters are recommended to be replaced every six months. Fuel injectors and turbochargers should be checked every two years.

Symptoms and problems that may arise when an operation below the specified minimum load limits occurs:

- Oil leakage in the exhaust and air suction system as a result of long-time operation without load or low load;
- Since the temperature inside the cylinders will remain lower than normal, the fuel coming to the cylinder will not burn completely.
- Unburned fuel and oil vapor condensates in the exhaust system.
- Turbocharged oil seals cannot operate efficiently at low loads, causing oil to travel with air to the suction and exhaust manifolds.

As a result, oil leaks appear in the exhaust and air suction manifolds. It causes oil dripping from the exhaust manifold joints in an unsightly manner.

This is especially the case with standby (ESP) generators where the weekly test run is performed without load. It causes accumulation of carbon in the cylinder heads and exhaust manifold,

Unburned fuel, oil vapor and soot deposits contaminate the exhaust valves and slots in the cylinder heads, piston rings, exhaust manifold and injector nozzles, resulting in a decrease in engine performance.

It also clogs the exhaust muffler and pipes, resulting in a decrease in performance. In the following stages, this can cause serious damage to the engine.

Abrasive Damage

Low exhaust gas temperature causes sulfuric acid condensation in the exhaust system and causes corrosive damage to the engine. It causes deterioration in the characteristics of the lubricating oil.

Due to the decrease in combustion performance, unburned fuel mixes with oil in the cylinder, which leads to a deterioration in the characteristics of the oil in the crankcase.

The oil whose characteristics deteriorates will cause premature wear of the rotating parts and bearings.

From wear, primarily the turbocharger bearings operating at very high speed will be affected, which may cause oil leakage and damage.

The result of such operation is an oil consumption above the normal value.

White Smoke

Unburned fuel is disposed from the exhaust in the form of white smoke.

5.10. Long-Term Storage

Putting the generator set out of use for a long time or storing it in a place has a negative effect on the engine, alternator and equipment, and operating in this way causes damage to the parts. This procedure should be applied for generator sets that will not be operated for more than 3 months. For storage of less than 3 months, it is sufficient to store the generator set in a dry place in a protective packaging and run it for a short time at least once every 15 days. The procedures mentioned below should be carried out by a competent technician, observing the safety rules. Before starting the standby operation, start the generator set until it reaches the nominal operating temperature (about 75°C) and check it for any malfunctions. This process must be performed in order to avoid a problem at the time of recommissioning.

Storage For Up To 3- 6 Months

- Change the engine oil and replace the oil filter
- Check the cooling water level and antifreeze ratio. If it does not contain sufficient antifreeze, drain the cooling water from the entire system and the water filter.
- Replace the fuel filter. Drain water and sediment from the fuel tank and fill the fuel to the maximum level
- Stop your generator after testing it
- Disconnect the battery cables. Clean the battery and keep under constant charge
- Clean the generator completely with a damp cloth. Do not use pressure water

- Check electrical connections and terminals
- Spray moisture remover on the electrical system and its elements
- Spray protective oil on the air suction line
- Loosen the V-belts
- Close the air inlet and exhaust outlet
- Pack the generator and place a warning label on it
- Store the generator in a dry place with no dust, wind, sun, precipitation, no temperature change.

Storage for More Than 6 Months (Up to 2 Years)

- Drain the engine oil
- Fill the diesel engine protective oil (JIS K2246 NP10) to the maximum level of the dipstick
- Immerse the fuel suction and return line in a container with a mixture of 1/3 protective oil (JIS K2246 NP9) and 2/3 diesel oil
- Run the engine until it consumes 2 liters of this mixture and stop
- Drain the fuel system and connect the suction and return lines to their normal positions
- Empty and clean the fuel tank
- Drain the protective oil from the engine and filter
- Spray protective oil on the air suction manifold
- Spray protective oil on the turbocharge compressor side
- Remove the cylinder rocker heads, spray protective oil on valves, valve springs, valve gauges, cylinder heads and pianos and close them again
- Close the air inlet and exhaust outlet
- Loosen the V-belts
- Disconnect the battery cables. Clean the battery and keep under constant charge
- Clean the generator completely with a damp cloth. Do not use pressure water
- Check electrical connections and terminals
- Spray moisture remover on the electrical system and its elements
- Pack the generator and place a warning label on it
- Store the generator in a dry place with no dust, wind, sun, precipitation, no temperature change

Post-Storage Commissioning Process

- Open the generator packaging, remove the covers from the air inlet and exhaust outlet
- Check the generator set manually and visually
- Make sure that the generator installation complies with the rules and the procedures to be performed before operation are completed.
- Replace the engine oil and oil filter
- Clean the fuel tank and refuel (for storage longer than 6 months)
- Replace the fuel filter
- Clean the air filter, replace it if necessary
- Check and stretch the V-belt and pulleys
- Lubricate the bearings by removing the turbo lubrication pipe. Meanwhile, turn the turbo rotor by hand
- Check valve clearance distances, adjust if necessary (for storage longer than 6 months)
- Remove the cylinder rocker caps and lubricate the valves, valve springs, valve gauges, cylinder heads and pianos and close them again
- Check all hoses and pipes, tighten clamps and screws
- If there are any removed screws or plugs, install them
- Check the coolant level and antifreeze ratio. If it is emptied before storage, fill it with a new 50% antifreeze 50% water mixture
- If moisture is observed in the storage environment, the stator winding insulation test should be performed before starting the alternator. AVR cable connections must be disconnected before this process. If a value below 5 MegaOhm is measured, the alternator must be cleaned, dried and measured again.
- Manually turn the motor 2-3 turns before starting
- Check that the batteries are fully charged

- Make battery connections
- Turn the generator shortly with the starter motor by deactivating the fuel solenoid end
- Start the generator unloaded until the engine warms up
- Check for excessive vibration, sound, oil-fuel-water leakage
- Start the generator under load and check again

5.11. General Maintenance Schedule

| Tescom® | Working Hours (periodically) | | | | | | Time | | |
|---|------------------------------|----------|-----------------------------|-----------|-----------|------------|------------|------------|-----------------|
| | Daily | Start up | (50 hours / first 2 months) | 200 Hours | 400 Hours | 1000 Hours | 2000 Hours | Every year | Every two years |
| DIESEL GENERATOR SET | | | | | | | | | |
| GENERAL MAINTENANCE SCHEDULE | | | | | | | | | |
| ENGINE LUBRICATION SYSTEM | | | | | | | | | |
| Check Oil Level | X | X | | X | | | | | |
| Change Oil | | | X | X | | | | X | |
| Replace Oil Filter | | | X | X | | | | X | |
| Check for Oil Leakage | X | X | | | | | | X | |
| Engine Cooling System | | | | | | | | | |
| Check Block Water Heater | | X | X | X | | | | | |
| Check for Coolant Leakage | X | X | | | | | | X | |
| Check Coolant Level | X | X | | X | | | | | |
| Check Antifreeze/Water Ratio | | X | | X | | | | X | |
| Check Radiator Cleanliness | | | | X | | | | X | |
| Change Coolant | | | | | | X | | | X |
| Check Hose and Connection Clamps | | | | X | | | | X | |
| AIR SUCTION & EXHAUST SYSTEM | | | | | | | | | |
| Check for Air System Leakage (Hose, Clamp, etc.) | | X | | X | | | | X | |
| Check Turbo Charge | | | | | X | X | | | X |
| Clean or Replace the Air Filter | | | | | X | | | | X |
| Check for Exhaust System Leakage (Pipe, Spiral, etc.) | | X | | X | | | | X | |
| Check Exhaust Smoke Color | | X | | X | | | | X | |
| FUEL SYSTEM | | | | | | | | | |
| Check Fuel Level | X | | | | | | | | |
| Replace Fuel Filter | | | X | X | | | | X | |
| Check for Fuel Leakage | X | | | | | | | X | |
| Drain Water from the Fuel – Water Separator Filter | | | X | X | | | | X | |
| Clean the Fuel Tank | | | | | X | | | X | |
| Check Injectors | | | | | | X | | | X |
| ELECTRICAL SYSTEM | | | | | | | | | |
| Check Battery Charge Status | | X | X | X | | | | X | |
| Clean Battery and Pole Heads | | | X | X | | | | X | |
| Check Battery Charger and Charger Alternator | | X | X | X | | | | X | |
| Check Oil Pressure, Water Temperature etc Indicators | | X | X | X | | | | X | |
| Check AVR and Governor Card Settings | | X | X | X | | | | X | |
| Check Cable Connections and Transfer Board | | X | X | X | | | | X | |
| Check Gen. Control Unit and Operating Functions | | X | X | X | | | | X | |
| OTHER | | | | | | | | | |
| Check Belt Tensions | | X | | X | | | | X | |
| Check Fan Blades | | | | X | | | | X | |
| Check Mounting Bolts and Nuts | | X | | | | X | | X | |
| Check Compression Pressure (If Necessary) | | | | | | | X | | |
| Check Valve Clearance Settings | | | | | | X | | | X |
| Check Vibration Wedges | | X | | | | X | | X | |
| Do General Cleaning of the Generator | X | | X | X | | | | X | |
| Check for Abnormal Sound During Operation | X | X | X | X | | | | X | |
| Crankcase Ventilation Line Check and Cleaning | | | | X | | | | X | |



This chart contains basic controls. For detailed maintenance issues of the engine and alternator, be sure to review the "Engine and Alternator Maintenance Manuals". Test your Generator Set once a week at load for 15 minutes. For the continuation of the warranty period, make sure to have the first general maintenance at the end of 50 hours or 6 months. Increase the frequency of maintenance periods according to the ambient conditions, oil-fuel quality and working order.

6. TROUBLESHOOTING

6.1. General

- These inspections and procedures should be carried out by trained and authorized persons and the right equipment should be used.
- Do not change any settings or parts without knowledge.
- This table is further detailed in the Engine and Alternator Maintenance Manuals.
- If you cannot get a result with this table, please call Tescom authorized services.

| PROBLEM | POSSIBLE CAUSES | SOLUTION |
|---|---|-------------------------------------|
| Engine Turns Slowly But Does Not Start | Batteries discharged | Charge/replace |
| | Starter motor is malfunctioning | Repair / replace |
| | Oil is not suitable | Replace it with suitable oil |
| | No fuel | Fill |
| | There is air in the fuel system | Deair |
| | Fuel solenoid does not operate | Repair / replace |
| | Fuel hand pump is malfunctioning | Repair / Replace |
| | Compression pressure is insufficient | Take measurements / Engine Overhaul |
| | Control unit is malfunctioning | Adjust / replace |
| | Problem with the control board | Adjust / replace |
| | Problem with the control board | |
| | Problem with electrical connections | Repair |
| Engine | Batteries discharged | Charge/replace |
| | Starter motor is malfunctioning | Repair / replace |
| | Starter relay is malfunctioning | Replace |
| | Control unit is malfunctioning | Adjust / replace |
| | The emergency stop button is pressed | Bring to Normal pos. |
| | Generator in the off position | Bring to Normal pos. |
| | No fuel | Fill |
| | There is a problem with the fuel system | Repair / replace |
| | There is air in the fuel system | Deair |
| | Fuel is not suitable | Use the right fuel |
| | Air suction is clogged | Open the throttle |
| | Compression pressure is insufficient | Take measurements / Engine overhaul |
| | Environment is too cold | Check the environment / motor |
| | Problem with electrical connections | |
| | | |
| Generator Does Not Stop | Fuses are blown | Repair |
| | Stop solenoid is malfunctioning | Adjust / replace |
| | Generator is performing cooling work | |

| PROBLEM | POSSIBLE CAUSES | SOLUTION |
|--|---|-----------------------------------|
| Engine overheats | Hva Filter is Clogged | Replace |
| | Injector is malfunctioning | Adjust / Replace |
| | Injectors are of wrong type | Replace |
| | Insufficient fresh air intake | Optimize |
| | Hot air pulse is insufficient | Optimize |
| | Improper roller shutter/hood | Optimize |
| | Radiator is excessively dirty or clogged | Clean/Replace |
| | Intercooler is clogged | Clean/Replace |
| | Cooling water is lacking | Fill |
| | Cooling fan is not working properly | Repair |
| | Straps removed or loosened | Adjust/Replace |
| | There is excess lubricating oil | Replace |
| | Water hoses are clogged | Check/Repair |
| | Water pump is malfunctioning | Repair/Replace |
| | Engine thermostat is malfunctioning | Check/Replace |
| | There is a leak in the cooling system (water-air) | Repair/Replace |
| Overload | Reduce load | |
| There is excessive exhaust gas back pressure | Optimize | |
| Lubricating Oil Pressure is Very High | Lubricating oil characteristics are not suitable | Replace |
| | Sensor is malfunctioning | Replace |
| | Indicator is malfunctioning | Replace |
| Exhaust Gas Outlet in Blue Color | Lubricating oil characteristics are not suitable | Replace it with suitable oil |
| | There is excess lubricating oil | Replace |
| | No-load/low-load operation | Load over 30% |
| | Excessive oil consumption | Check/Engine overhaul |
| | Compression pressure is insufficient | Take measurements/Engine overhaul |
| Engine mechanical failure (piston ring etc.) | Engine overhaul | |
| Exhaust Gas Outlet in White Color | There is a malfunction in cold start system | Check/Replace |
| | Engine is too cold | Heat the Environment/Engine |
| | Engine thermostat is malfunctioning (temperature does not increase) | Check/Replace |
| | Fuel is not suitable | Replace |
| | Fuel injection pump is malfunctioning | Adjust/Repair/Replace |
| Injectors are malfunctioning | Adjust/Replace | |
| Exhaust Gas Outlet in Black Color | Overload | Reduce load |
| | Fuel is not suitable | Replace |
| | Valve clearances are unadjusted | Adjust |
| | Injectors are malfunctioning | Adjust/Replace |
| | Fuel hand pump is malfunctioning | Repair/Replace |
| | Fuel injection pump is malfunctioning | Adjust/Repair/Replace |
| | Compression pressure is insufficient | Take measurements/Engine overhaul |
| | Air Filter is Clogged | Replace |
| | Insufficient fresh air intake | Optimize |
| | Charging air is not cooled | Check/Repair |
| Oil Consumption Is Too Much | There is excess lubricating oil | Replace |
| | Use of low viscosity motor oil | Replace it with suitable oil |
| | Oil leakage | Repair |
| | No-load/low-load operation | Load over 30% |
| | Engine mechanical failure (piston, ring, etc.) | Take measurements/Engine overhaul |
| | Oil cooler is malfunctioning | Repair/Replace |
| There is problem with Cylinder Head | Repair / Replace | |

| PROBLEM | POSSIBLE CAUSES | SOLUTION |
|--|---|-----------------------------------|
| Fuel consumption is too much | Fuel leakage | Repair |
| | Fuel hand pump is malfunctioning | Repair/Replace |
| | Fuel is not suitable | Replace |
| | Compression pressure is insufficient | Take measurements/Engine overhaul |
| | Charging air is not cooled | Check/Repair |
| | Air Filter is Clogged | Replace |
| | Injectors are malfunctioning | Adjust/Replace |
| Loss of motor output power | Use of high viscosity oil | Replace it with suitable oil |
| | Fuel is not suitable | Replace |
| | Air Filter is Clogged | Replace |
| | Engine is too cold | Heat the Environment/Engine |
| | Insufficient fuel | Make it sufficient |
| | Fuel filter is clogged | Replace |
| | Insufficient fresh air intake | Optimize |
| | Hot air pulse is insufficient | Optimize |
| | Fuel hand pump is malfunctioning | Repair/Replace |
| | Fuel injection pump is malfunctioning | Adjust/Repair/Replace |
| | Injectors are malfunctioning | Adjust/Replace |
| | Overload | Reduce load |
| | Turbocharger is malfunctioning | Repair/Replace |
| | Charging air is not cooled | Check/Repair |
| Compression pressure is insufficient | Take measurements/Engine overhaul | |
| The generator does not produce voltage (No-load voltage is less than 10% of the nominal voltage) | Connections are loose | Check/Repair |
| | Rotary diodes or suppressor are malfunctioning | Check/Replace |
| | Warning circuit is short-circuited or interrupted | Check/Repair |
| | Insufficient remanence voltage | Apply external warning |
| Alternator does not generate voltage (No-load voltage is less than 20-30% of the nominal voltage Voltage is insensitive to the rotation of the AVR potentiometer) | Fuse (on AVR line) exploded | Replace |
| | AVR is malfunctioning | Check/Adjust/Replace |
| | Disconnection at warning stator | Check/Repair |
| | Warning stator is connected incorrectly | Check |
| Voltage at a rate of 50-70% of nominal value | Speed is lower than nominal | Check Motor Speed |
| | Voltage potentiometer not set | Adjust |
| | Fuse exploded | Replace |
| | AVR is malfunctioning | Check/Adjust/Replace |
| | Over-warning limitation | Set AMP pot |
| Output voltage is too high | Voltage pot. not set | Set voltage (V) pot |
| | Capacitive load | Remove capacitor load |
| | AVR is malfunctioning | Check/Adjust/Replace |
| Unstable output voltage | Motor speed is variable | Adjust engine speed |
| | Stability pot is not set | Set STAB pot |
| | AVR is malfunctioning | Check/Adjust/Change |

Engine does not start at the first starter, then it does not run the starter, and THERE IS OIL PRESSURE! message displays:

-Oil pressure closes the sender too late, when the ignition is closed, the starter will be run. If desired, the oil pressure sender may be replaced.

The engine starts when the mains is disconnected, but the device subsequently gives a STARTING error and the engine stops:

-Generator phase voltage does not arrive to the device. Measure the voltage between the generator L1 phase and the generator neutral ends while the engine is running. Generator phase fuse may have been blown or turned off, there may be a connection error. If everything is done, turn off all the fuses on the switchgear, then turn them all on, starting with the DC supply fuse, and test again.

The device shuts off the starter late:

-Alternator voltage rises late and generator's remanence voltage is below 20 volts. Device shuts off the starter with the generator frequency and needs at least 20 volts to be able to read the frequency. If the problem is definitely wanted to be solved, the only way is to add a relay. The coil of this relay will be between the BATTERY (-) and the D+ (lamp) end of the charging alternator. The starting output of the device must be passed in series through the normally closed contact of this relay. Thus, when the charging alternator generates voltage, the starter is interrupted.

The device does not work at all:

Measure the DC voltage between BATTERY+ and BATTERY- terminal blocks on the back of the device. If there is voltage, turn off all the fuses on the switchgear, then turn them all on, starting with the DC supply fuse, and test again.

Unable to enter programming position:

Disconnect the BATTERY(-) from **PROGRAM LOCK** end. After the process is finished, redo this connection to prevent unauthorized program changes.

Some program parameters do not appear on the screen:

These programs are in the factory settings group and cannot be changed by the user.

AUTO light is flashing, the generator does not work even though the mains is cut off:

You are on a weekly work schedule **OFF** time. Please check the date and time setting of the device and **weekly work schedule** parameters.

The generator works but does not enter the load:

Make sure that the generator LED is constantly flashing yellow. If necessary, adjust the generator voltage and frequency values.

Make sure digital output number 8 is set to "**Generator Contactor**". Check "**Generator Contactor Time**" parameter without programming.

Make sure that any of the digital input functions are not set to "**Prevent Generator Load Reception**".

WE WISH YOU ENJOY YOUR TESCO M GENERATOR.

Contact

As the TESCOM family, we work passionately to provide our customers with their needs and meet their wishes.

TESCOM employees are always ready to answer your questions and you can easily reach us 24/7.

You can call the phone numbers below, email or fill out the contact form.

Once your request has been forwarded to us, we will contact you as soon as possible.



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