ALIMAR GENERATOR

OPERATING MANUAL

alimar®
JENERATÖR

Dear Customer,

Thank you for choosing our product.

Thanks to its years of experience in the sector, Alimar Generator manufactures efficient, reliable and high quality generators.

In the light of our long years of experience, your generator was manufactured in our factory located in Balıkesir Organized Industrial Zone in accordance with ISO 9001 Quality Management Systems, ISO 14001 Environmental Management Systems and OHSAS 18001 Occupational Health and Safety Management System and CE norms and by fulfilling the requirements set out in TS ISO 8528-4, TS ISO 8528-5 and TS ISO 8528-8 standards.

This manual describes the operating, inspection and maintenance procedures for Alimar Generators. Before using your generator, please read these procedures carefully and follow these instructions during operation.

Please do not operate, maintain or repair your generator without taking general safety precautions. By following the instructions set out in this manual, you will avoid serious accidents with potentially serious consequences.

Periodical inspections and maintenance of your generator by authorized service centers will allow you to use your generator for extended periods of time.

If you wish to contribute to our product and service quality, please e-mail your suggestions to **info@alimar.com.tr** and report maintenance and malfunction-related issues to **ssh@alimar.com.tr** or contact us at 444 54 59.

Contents

1. Introduction

Safety Information

The warnings and safety precautions related to potential hazards that may occur in the genset are provided in this operating manual and on the genset. Failure to observe the warnings in these operating instructions and to comply with the safety precautions may result in material damage, serious personal injury or even death.

Potential hazards can be prevented by anticipating them in advance and taking precautions. Also, children and unauthorized persons should not be allowed to approach the genset.

The following methods are intended to identify potential hazards:

- "Danger" and "Warning" labels on the genset
- The following warning indications in the user manual as classified below;

DANGER

Refers to situations of potential danger that, if not avoided, could result in death or serious injury.

WARNING

Refers to potentially hazardous conditions that, if not avoided, could result in serious injury or damage.

Make sure that all danger and warning labels are clearly legible. In case of any problems in the legibility of the label, please contact the manufacturer for replacement of the label.

Please note that the manufacturer cannot predict and provide warnings about all possible hazards associated with the device. If tools, accessories or working techniques not specifically recommended by the manufacturer are to be used, then the general safety precautions must be observed and consideration must be given as to whether the work will cause damage to the genset and its surroundings.

To avoid accidents, please do not perform any procedures other than those described in this manual nor use the device for purposes other than those authorized.

The contents of this manual are subject to change without prior notice owing to the further development of the device.

SAFETY

For engine-related safety precautions, please refer to the safety instructions section of the respective engine manual.

2. Safety and Health

Overview

! ***Please read the operating manual carefully.***

To ensure optimum performance and safe operation of the genset, read the operating manual carefully before use. Improper use may result in death or serious injury.

! ***Never start the generator if there is an unsafe condition.***

- If you identify an unsafe condition related to the generator malfunction, please contact our authorized services or sales department.
- Never start the generator in an unsafe condition. By disconnecting the "-" pole of the battery, you may prevent the generator from starting until the unfavorable situation is corrected.
- Operating the generator without eliminating the unusual condition may result in a major malfunction and/or a serious accident.
- Find out where the Emergency Stop Button is positioned. Emergency Shutdown Buttons should only be used in case of emergency.

! ***Leak Precautions***

- During maintenance or repair of the generator, care must be taken to prevent the fluids inside the generator from leaking. To prevent the risk of leakage, you should make the necessary containers and cleaning agents ready before opening the parts containing liquids.
- Improper disposal of wastes causes enormous damage to the environment. All residual chemical liquids should be disposed of in accordance with the relevant regulations. When disposing of liquids, you should use leak-proof containers. The chemical liquid wastes must not be poured on the ground, down drains or into water sources.

! ***Avoid standing or leaning on parts that cannot support your weight.***

Never stand or lean on parts that cannot support your weight. Always use a ladder during assembly/disassembly. Failure to do so may result in material damage and injury.

! ***Do not operate the genset in a wet or humid environment.***

Operating the generator in a wet or damp environment may result in electric shock. Keep the genset away from damp, rainy and snowy conditions. Never operate the device with wet or damp hands.

! ***Battery electrolyte contains acid.***

- The battery fluid contains electrolyzed acid and can cause injury. Avoid contact of battery fluid with skin and eyes.

- Always wash your hands after touching the battery and connection terminals. Wearing gloves is recommended.
- Wear protective goggles when handling the battery.

! ***Prolonged exposure to more than 85 dB of noise can lead to hearing loss.***

- At 7 meters distance, noise levels in generators are 100-110 dB for those without sound insulation and 70-80 dB for those with sound insulation.
- To reduce the noise level of the genset, various equipment such as custom sound insulation cabinets, special exhaust silencers, etc. can be used.

When lifting and transporting the genset, use the lifting lugs on the frame.

- The lifting lugs on the genset frame are specially designed for easy handling of the genset. Improper lifting and handling may result in serious personal injury or material damage.
- You may use a hoist or forklift of suitable capacity to lift the generator. In case a hoist is used for lifting, ropes and chains of suitable length and lifting capacity must be used. For enclosed generators, care should be taken to use silk ropes/cloth ropes.
- Do not lift the generator using the engine or alternator lifting eyes.
- Do not lift the generator using the lifting eyes on the enclosure. Use them only for lifting the empty enclosure.

! ***Ensure that the generator's electrical wiring is connected by trained and authorized personnel.***

- The electrical wiring of the generator must be made by trained and authorized personnel as per the cable section table recommended in this operating manual.
- The generator's electrical cables and connections must be isolated. Failure to do so may result in electric shock.
- The generator must be started after making sure that the genset ground connection is made. Failure to do so may result in electric shock.
- Never touch the output terminals when the device is in operation, as this may cause electric shock. In cases where you need to touch the output terminals for power connections, make sure that the device is not in operation.
- Make sure that the power cables are not damaged. Damaged power cords may result in electric shock.
- Electrical connections must be made as per the relevant standards. Attention should be paid to grounding.

! ***Check the circuit breaker before starting the generator.***

Before starting the generator, please check the circuit breaker and make sure that it is OFF (in the on position). Failure to do so may result in electric shock.

! ***Protect your body and garments from Moving Parts.***

- Make sure that no one is near the engine or its rotating parts before starting the generator.

- Loose clothing, long hair and hanging accessories can get caught in the moving and rotating parts of the engine. And this may cause serious injuries.
- Make sure that the protective casings are closed except during maintenance.

Check for potential hazards before starting the device.

- Before starting the genset, check the control panel for warning alarms. Do not start the generator if there is a fault alarm.
- Operate the genset as described in this manual.

The exhaust gas produced by the generator is hazardous to health. Run the genset outdoors or in well-ventilated areas and, if operating indoors, make sure that exhaust gases are exhausted to the outside.

! ***Fire and Explosion Hazard***

- Generators use fuels and oils that are easily ignitable. Do not get close to the generator with flammable materials.
- A fire that starts in a generator is classified as BC and ABC type fire.
- Therefore, a BC and ABC powder type fire extinguisher should be available around the genset.
- Refuel the generator in a well-ventilated area with the engine shut off. Immediately stop the generator if you notice fuel leaking from the engine fuel tank or fuel system.
- No flammable materials should be deposited in the areas where your generator is located. Any spilled liquids should be cleaned up immediately.
- All electrical cables must be neatly and tightly connected. In case of loose and frayed cables, you should contact an authorized service center. Sparks and arcs may lead to fire.
- If lubricating oil and fuel spray onto hot surfaces, this may cause a fire. Always check the oil and fuel pipes for leaks. Tighten all connections using the recommended torque.
- Never bend high pressure pipes. Avoid using damaged or bent oil and fuel pipes and hoses.
- Batteries give off flammable vapors. Always ensure that batteries placed indoors are well ventilated.
- Avoid smoking while checking the battery electrolyte level.
- Frozen batteries may lead to an explosion. Always properly warm up frozen batteries before starting them.

! ***Hot Surface Hazard***

The exhaust pipes and muffler get hot during the operation of the generator and remain hot for a while after the engine is stopped. Avoid touching the exhaust pipes and muffler when they are hot.

! ***Toxic Substances***

Fuels, oils and coolants used in the genset contain acids and heavy metals. Their contact with skin or eyes or ingestion can cause serious injury. In case of skin contact, wash the affected area with soap and water. In case of ingestion, seek medical advice immediately.

! ***Do not open the radiator cap until after the engine has cooled down.***

- The coolant is hot and under pressure when the engine is running. All hoses to the radiator and heater contain hot water. The hot water turns into steam when the pressure is reduced.
- Allow the engine to cool down before draining the coolant. Serious injury may occur upon contact with hot water or steam.
- Check the coolant level after the engine is stopped and once the filler cap is cool enough to be opened with bare hands.
- Remove the radiator cap slowly due to the risk of high pressure.
- Drain the coolant through the drain pipe or coolant drain valves.
- Avoid the discharge of used coolant into the environment, sewage and/or storm water lines.

Other Labels on the Genset

Refueling Point

- Refuel the generator where you see the refueling label.
- Drain the fuel using the drain plugs on the fuel tank.

Oil Replenishment Point

- Replenish the generator oil from the section where you see the oil replenishment label.
- Drain the oil using oil drain valves.
- Avoid the discharge of used engine oil into the environment, sewage and/or storm water lines.

Oil Level Dipstick

- Check the oil level of the genset using the oil level dipstick. Complete if missing.
- Never add oil and fuel while the generator is running.
- Avoid operating the heater and generator when the cooling system is empty or lacking coolant.

General Information about Generator

- Inhaling the exhaust gas produced by the engine is hazardous to human health. Therefore, the genset should not be started indoors without an exhaust outlet.
- Replace the oil and fuel filter at regular periods as recommended in the operating manuals of diesel engines. Failure to replace the oil and fuel filter on time will cause damage to diesel engines and result in your generator being out of warranty.

Safety Instructions for Electricity

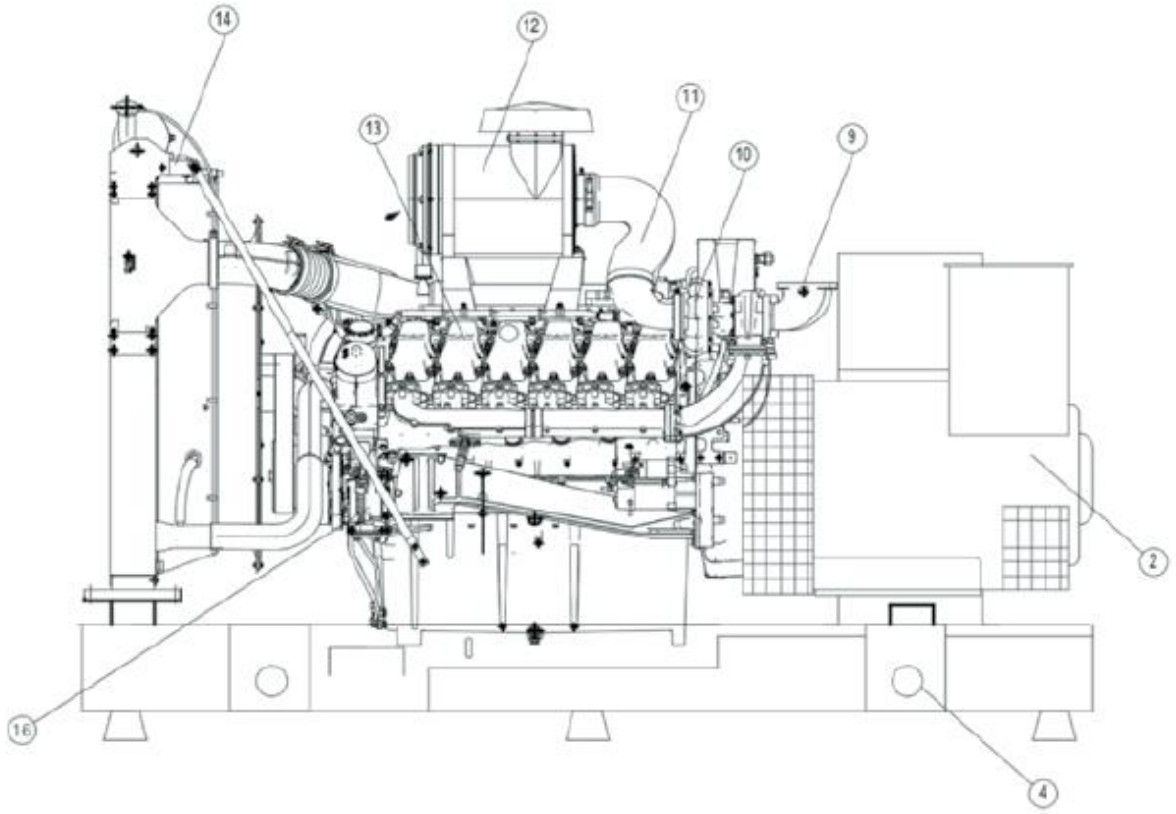
Careful attention should be paid to the following issues related to the electrical system in the generator set:

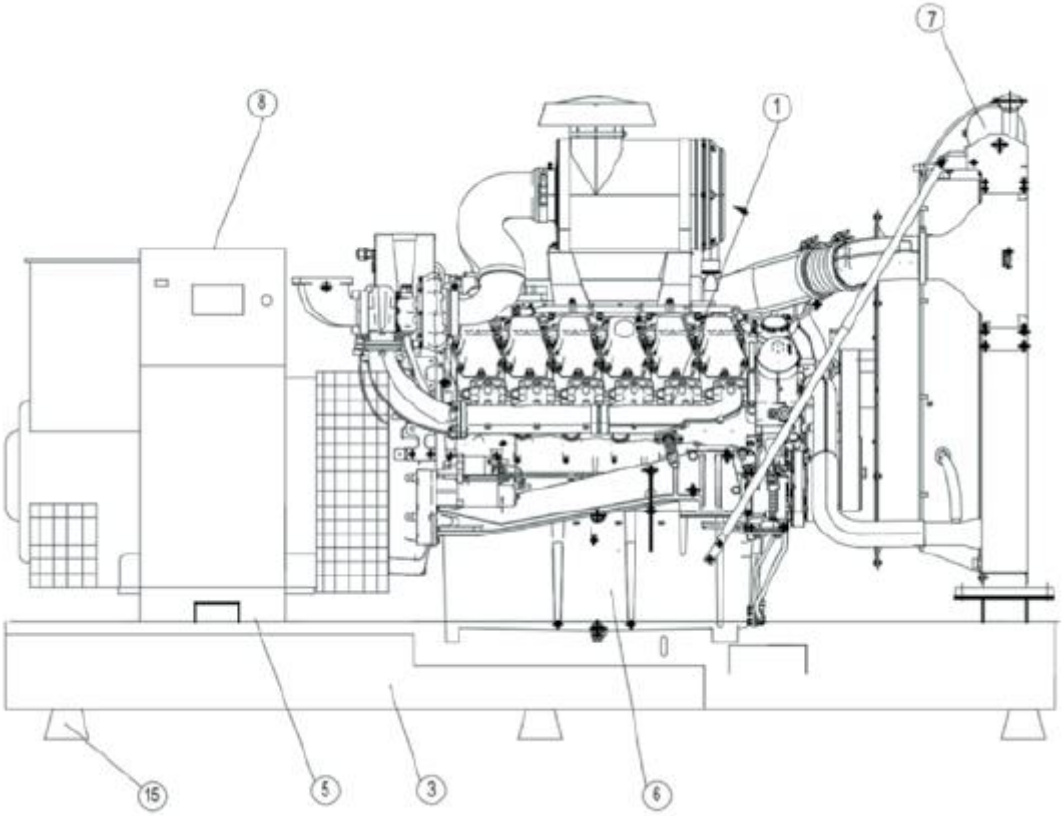
a) The electrical equipment (including connection lines and plug connections) must be free of faults.
b) The genset must not be connected to any other power generation line. In specific cases where a redundant connection to existing electrical systems is required, such connection should only be carried out by the authorized personnel.
c) The protection against electric shock is connected to circuit breakers compatible with the generator set. In cases where it is necessary to replace current breakers, a current breaker with the same rated values and performance conditions must be selected.
d) Only hard rubber covered flexible cables (as per IEC 60245-4) or equivalent must be used due to high mechanical stresses.
e) Where extension lines or mobile distribution networks are used, the total cable length should not exceed 60 meters for a cable section of 1.5mm² and 100 meters for a cable section of 2.5mm².

3. General Definitions

DESCRIPTIONS

1	Diesel Engine	**9**	Exhaust Pipe Outlet
2	Alternator	**10**	Turbocharger
3	Fuel Tank	**11**	Air Suction Pipe
4	Frame Lifting Plate	**12**	Air Filter
5	Cable Entry (with Moulded Case Circuit Breaker)	**13**	Engine Cylinders
6	Crankcase	**14**	Radiator
7	Expansion Tank	**15**	Rubber Chocks
8	Control Panel	**16**	Charge Alternator

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4. Storage, Lifting, Installation, Assembly

Storing the Generator

During long-term storage of the engine and the alternator, a number of side effects may occur. We should follow some protection methods during the storage of the generator in order to minimize such side effects. In cases beyond 1 month storage period, please request support from our authorized service centers.

Storing the Engine

In case of long-term storage, a procedure for engine protection, including engine cleaning and preservation fluids, can be followed for the engine. The rate of corrosion that may occur on the engine without proper protection procedures will depend on the climatic conditions in which the engine is stored.

Short-term Storage

This type of storage is intended for an engine storage period of 1 month to 6 months.

- Run the engine at high speed until the engine coolant reaches 70°C.
- Stop the engine.
- Disconnect the fuel filter and the fuel return line.
- Use a Daubert Chemilcal NoxRust NO: 518 or equivalent preservation oil.
- Fill one container with diesel oil and the other with preservation oil. Immerse both fuel hoses into the diesel tank.
- Start the engine.
- Transfer the fuel supply line from the container with diesel oil to the container with preservation oil while the engine is running.
- Remove the fuel return line from the diesel tank, stop the engine when the preservation oil flows out of the fuel return line.
- Connect the fuel filter and the fuel return line.
- Drain the preservation oil from the crankcase and oil filter.
- Insert the blind plugs. Until the engine is restarted, the crankcase may remain empty.
- Disconnect the fuel solenoid from the mains.
- Spray engine oil into the intake manifold. Seal all open areas of the engine with a tape to prevent moisture and dirt.
- Attach a warning label to the engine. The label should indicate the following.

There is no oil in the engine.

Do not start the engine.

- Store the engine in a dry area with a constant temperature.
- Rotate the motor 2-3 times every 3-4 weeks.

Remark: If the coolant contains antifreeze and rust inhibitor, there is no need to drain the cooling system.

Engine start-up following short-term storage

- Remove the tapes and warning labels on the engine.
- Fill the oil filters with clean 15w-40 oil and then pre-lubricate the oil system.
- Remove the preservation oil from inside the fuel system using clean diesel. Refill the fuel filters.
- Adjust the belt tension.

Long-term Storage

The long-term storage includes a period between 6 months and 12 months. At the end of 12 months of storage, the engine cooling system should be flushed using a suitable solvent or hot light mineral oil. And the following procedures should be repeated.

- Run the engine until the engine coolant reaches 70°C.
- Stop the engine.
- Drain the engine oil. Put the blind plugs in place. Use Shell 66202 or a suitable preservation oil. Fill the engine's crankcase dipstick to the high level mark.
- Disconnect the fuel filter and the fuel return line.
- Use a Daubert Chemilcal NoxRust No: 518 or equivalent preservation oil.
- Fill one container with diesel oil and the other with preservation oil. Immerse both fuel hoses into the diesel tank.
- Start the engine.
- Transfer the fuel supply line from the container with diesel oil to the container with preservation oil while the engine is running.
- Remove the fuel return line from the diesel tank, stop the engine when the preservation oil flows out of the fuel return line.
- Connect the fuel filter and the fuel return line.
- Drain the preservation oil from the crankcase, oil filter (in the air compressor in turbocharged engines). Insert the blind plugs.
- Remove the intake and exhaust manifolds. Spray preservation oil into the intake and exhaust ports, inside the manifold and on the cylinder heads.
- Spray preservation oil into the inlet port of the air compressor (on turbocharged engines).
- Apply anti-rust agent to all unpainted surfaces by brushing or spraying.
- Lift the rocker (depressor arm) cover. Spray preservation oil on the rockers, valve stems, springs, valve guides, cross heads (if equipped) and rocker arms. Seal the rocker cover.
- Seal all openings using a sealing paper to prevent ingress of dirt and moisture into the engine.
- Attach warning labels to the engine, like the one below:
  - The motor has been treated with a preservation oil.
  - Do not rotate the crankshaft.
  - The coolant has been drained.
  - Date of protective treatment.
  - Do not start the engine.

- Store the engine in a dry place with a constant temperature.

Engine start-up after long-term storage

- Remove all the tapes and warning labels on the engine.
- Flush the fuel system with clean diesel oil to remove the preservation oil from the fuel system.
- Flush the oil system with thin mineral oil by removing a blind plug attached to the oil line.

Remark: Rotate the motor 3 - 4 times while the motor is being flushed.

- Drain and flush the water system.
- Install a new oil filter, fuel filter and water filter on the engine. Fill the cooling system.
- Pre-lubricate the oil system.
- Adjust the belt tension.
- Adjust the valve and the injector.
- If necessary, check all connections for looseness and tighten them.

Start-up of engines that have been kept without preservation

- Check the fan belt.
- Perform pre-start checks.
- For turbo-charged engines, lubricate the turbocharger before start-up.
- Rotate the engine 3-4 times without using the starter.
- Remove the cylinder head covers.
- Crank the engine for 15 seconds (without letting the engine run) to make sure that all bearing surfaces are sufficiently lubricated. Allow 2 minutes, then crank the engine for another 15 seconds.
- Run the engine at idle for a while. Warm up the engine and then check all gauges before loading.
- When starting the engine for the first time after prolonged storage, check the entire engine for leaks.

Storing the Alternator

There may occur moisture in the windings during storage of the alternator. The generator should be stored in a dry place to reduce the build-up of such moisture. Warm up the ambient air if possible to keep the windings dry. Alternators that are not in use for extended periods of time must undergo insulation tests.

Storing the Battery

During storage, the battery should be fully charged once every 4 weeks.

Mounting

Supplying the space where the generator will operate with fresh air is important for the engine. If the hot air in the generator room cannot be exhausted outside, this may cause poor performance of the generator or overheating of the engine. Also, the engine exhaust pipes

cause an increase in the ambient temperature of the generator room. This makes it important that the room gets enough air circulation.

It is also important that there is sufficient amount of hot air coming out of the room as well as air entering the room. We recommend that the windows that allow fresh air into the room and those that allow hot air to escape should be at least 2 times the size of the radiator in the generator.

It is also advisable to install louvers to prevent the intake windows from being closed.

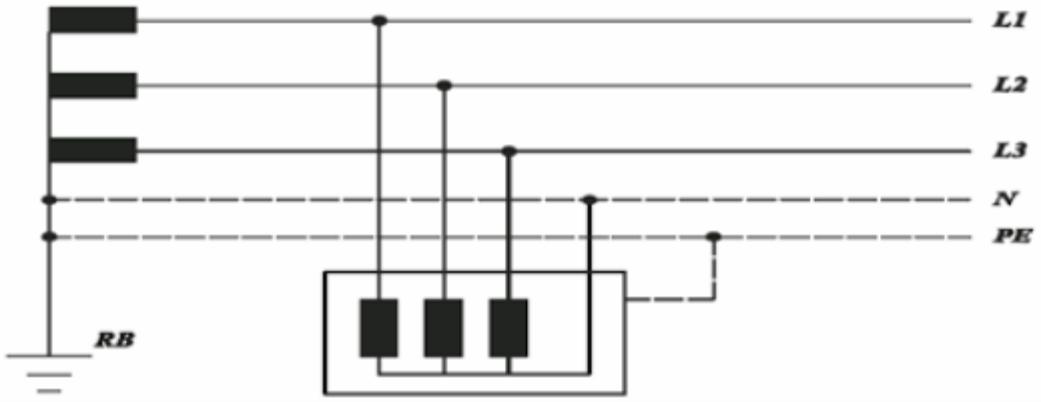
Grounding/Grounding Requirements

Failures and damages that may occur in the insulation system of electrical devices cause the metal parts of the devices that are not related to the energy system outside the main circuit to be under voltage. In some cases, as the voltage level reaches extreme values, the insulation is punctured due to the exposure of the device to puncture voltage, causing these insulating parts to be under voltage. Grounding is necessary to protect both human life and the equipment.

A proper grounding should be:

- Uninterrupted and continuous,
- Capable of carrying excess currents at the time of failure,
- Have low impedance capable of keeping the voltage drop at a limited level,
- Have a grounding resistance at a low value,
- Have a small soil resistivity.

There are various grounding techniques used in different parts of the world. Companies usually deploy TT, TN and IT techniques, choosing the one that suits them.



Today, the most widely used type of grid is the TN-type grid. In such grids, the star point of the grid is earthed. The casing and metal parts of the devices are connected to the protective conductor PE. PE is also connected to the earthed part at the star point.

In case of phase-to-earth contact, the voltage to earth of the PE or PEN protection lines and connected devices increases. The magnitude of these voltages can be kept below the permissible contact voltage by keeping the RB resistor less than 2 Ohms.

In the project design of the grounding system

- First, the location of the grounding system is determined.
- Necessary measurement procedures are performed to identify the soil resistivity.
- The type of electrode to be used in grounding is identified.
- Then, the system's short circuit current and the tripping time of the protection elements, which will be connected to the system, are identified.
- The grounding resistance is calculated.
- Then, the cross section of the grounding conductor is calculated.
- Whether the selected and calculated values are correct or not is checked.
- The step voltage and the contact potentials are calculated to check the suitability of the intended request.

All conductors and connection points are visually and manually inspected before commissioning. Resistance between neutral and earth

- Soil with low resistance <1 Ohm (ideal soil resistance)
- Soil with high resistance <5 Ohm (Max 20 Ohm)

The most crucial point to consider while grounding in the generator system is that the mains grounding and the grounding areas for the generator should be at least 20 m away from each other. This distance serves to prevent the earthing systems from being affected by each other.

In grounding systems using grounding rods, which are most commonly used, the lengths of the grounding rods and the distances between them are important. In grounding systems using more than one grounding rod, the distances of the rods should be at least the distance of two rods. In a grounding system using a 1.5 m long earthing rod, the distance between the other rod and the driven rod should be 3 meters.

The grounding cables must be capable of carrying the full load current. In particular, the generator casing must be earthed. To avoid ruptures due to vibration, a flexible earthing connection should be deployed.

Coolant

- In our radiators, we aim for maximum protection by using a mixture of water and antifreeze.
- Antifreeze refers to agents that are mixed into the radiator fluid to prevent the water from freezing at 0º C or at "-" degrees below 0º.
- The amount of antifreeze and water in the radiator should be well adjusted for engine protection.
- In coolant systems involving carbon steel pipes, the "pH" of the fluid is maintained high (between 8-9) to prevent corrosion of the metal parts.
- The reference values for coolant quality include: chlorides -40 mg/liter maximum, sulphates -100 mg/liter maximum, total hardness 170 mg/liter maximum, total solids 340 mg/liter maximum.
- Avoid operating the preheater when the radiator lacks fluid.

- Under pressure, coolant boils at temperatures higher than that of water. Do not open the radiator cap while the engine is running.
- Remove the radiator cap carefully after the diesel engine has cooled down.
- Under conditions prevailing in our country, the maximum protection is achieved with an antifreeze mixture of 33% to 50%.
- Frost resistance performance of pure antifreeze: Filling the radiator with antifreeze at 100% will not ensure protection and may damage the steel pipes.
- Filling the radiator only with mains water may lead to freezing of the cooling system below zero degrees Celsius, as well as calcification and clogging of the radiator cores.
- Besides preventing water from freezing, the additives in antifreeze also ensure protection against corrosion.

Renewing the Coolant

Never change the coolant while the engine is running. The system runs under pressure and the coolant is extremely hot. It may cause harm to you and the surrounding environment.

- Make sure that the application is on a flat surface.
- Remove the filler cap of the cooling system.
- To drain the engine, remove the drain plug from the side of the cylinder block. Make sure that the drain opening is not restricted.
- Open the drain cock or remove the drain plug at the bottom of the radiator to drain the radiator. If there is no radiator drain cock or drain plug on the radiator, disconnect the hose at the bottom of the radiator.
- Flush the coolant system with fresh water.
- Install the drain plugs and close the radiator drain cock. Fit the radiator hose if the radiator hose was previously removed.
- Fill up the system with an approved antifreeze mixture. Install the filler cap.
- Start the engine and check whether the coolant is leaking.

Diesel Fuel

It is essential to use fuel that is free of water and impurities. Any impurities in the fuel can cause damage to the fuel injection system. Any water in the fuel can cause rust and corrosion of parts in the fuel equipment. Please refer to the engine manual for the specifications of the fuel to be used.

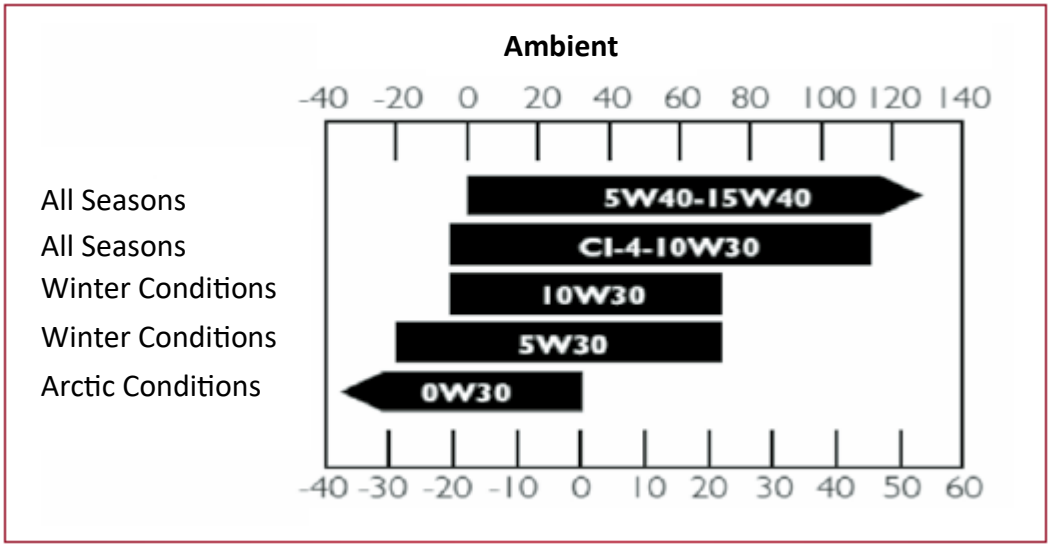
Lubrication

Lubricating oil

In diesel engines, the lubrication system is one of the most important parts of the engine. Proper maintenance extends the engine's service life and reduces operating costs.

In generators, high quality SAE 15W/40 heavy duty engine oil should be used as lubricating oil for engines operating at an ambient temperature above -15°C.

Minimum API oil quality level for generator engines: CF4 oil may be used where CH/CI-4 oils are not available, but the oil should be changed every 250 operating hours. The oil categories API CA, CB, CC, CD, CE are not recommended. Avoid using.



Unmaintained Battery

The accumulator's main functions on a generator are to supply the electric current required for the starter motor during the initial starting of the engine, to provide the necessary energy when the energy requirement cannot be met by the charging alternator, and to protect the electrical system by serving as a voltage regulator in the generator's auto electrical system.

Battery state of charge	Electrolyte density	Voltage
50%	1.20	12.24
25%	1.17	12.06
DISCHARGE	1.14	11.89

Automatic generator systems use buffer battery charger rectifiers to keep the battery charged continuously.

Partially charged batteries are unlikely to crank well in low ambient temperatures. This is because more power is needed to start the engine in cold temperatures than in normally hot conditions. Especially in winter, partially charged batteries are exposed to another danger. The specific gravity of the electrolyte will decrease during discharge and will approach the freezing temperature of water. This will put the electrolyte at risk of freezing.

Battery state of charge	Electrolyte density	Voltage
100%	1.28gr/cm	-70

75%	1.24gr/cm	-45
50%	1.20gr/cm	-25
25%	1.17gr/cm	-15
DISCHARGE	1.14gr/cm	-7,2

Replacing the Battery

- Turn the engine OFF. Remove all electrical charges.
- Switch off all battery chargers. Disconnect all battery chargers.
- The NEGATIVE "-" cable connects the NEGATIVE "-" battery terminal to the NEGATIVE "-" end connector on the starter motor. Disconnect the cable from the NEGATIVE "-" battery terminal.
- The POSITIVE "+" cable connects the POSITIVE "+" battery terminal to the POSITIVE "+" end connector on the starter motor. Disconnect the cable from the POSITIVE "+" battery terminal.
- Now you can replace the battery.

CABLE SECTION TABLE

Power (kVA)	Prime Current (A)	NYY-Cable Section (mm²) In Air
10	14.45	4x2.5
20	28.86	4x4
25	36.075	4x6
30	43.29	4x6
36	51.948	4x10
45	57.72	4x16
50	72.15	4x16
63	90.909	3x25+16
75	108.225	3x35+16
100	144.3	3x50+25
125	180.375	3x70+35
150	216.45	3x95+50
175	252.525	3x120+70
200	288.6	3x120+70

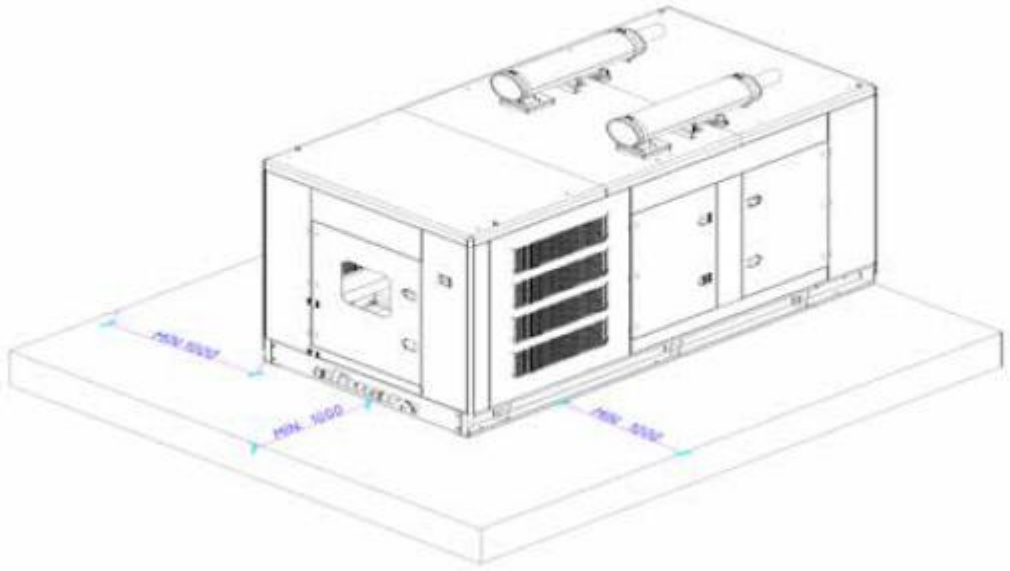
Power (kVA)	Prime Current (A)	NYY-Cable Section (mm²) In Air
225	324.625	3x150+70
250	360.75	3x185+95
275	396.825	2x(3x70+35)
300	432.9	3x240+120
325	468.975	2x(3x95+50)
350	505.05	2x(3x120+70)
375	541.125	2x(3x120+70)
400	577.20	2x(3x150+70)
425	613.275	2x(3x150+70)
450	649.35	2x(3x150+70)
475	685.425	2x(3x185+95)
500	721.5	2x(3x+185+95)
575	829.725	2x(3x240+120)
625	901.875	3x(3x150+70)
700	1010.1	3x(3x185+95)
750	1082.25	3x(3x185+95)
825	1190.475	4x(3x+150+95)
925	1334.775	4x(3x185+95)
1000	1443	4x(3x185+95)
1250	1803.72	5x(3x185+95)
1500	2164.5	5x(3x240+120)
1600	2308.8	6x(3x+240+120)
1750	2525.25	6x(3x+240+120)
2000	2886	8x(3x185+95)

Layout

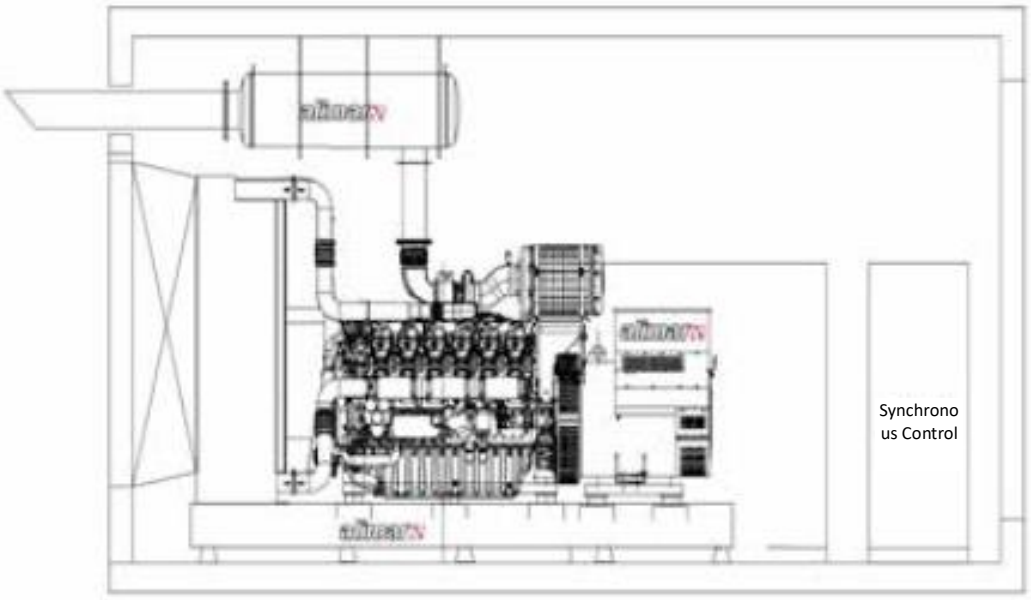
Installing the Generator

Room layout plan

- In confined spaces, it should be checked whether the generator can operate properly.
- It should also be checked whether the room is of a suitable size for the generator.
- The vent window area must be at least 1.5 times the radiator area.
- The generator should be provided with at least 1 meter of running space on the sides.
- You should install the generator set where it can be protected against corrosive materials as well as conductive materials such as exhaust fumes, vapors, oil mist, dust, lint, yarn, etc.
- The room entrance should be wide enough to allow the generator to enter the room for installation purposes and to be taken out when necessary, and the door should open outwards.
- The fire extinguishers should be easily visible and in places where they can be easily picked up to fight the fire.
- For multiple generator applications, multiple exhaust ducts should be used.
- The floor on which the generator will be positioned must be slope-free, flat (level) and strong enough to carry the generator's weight and the live load that the generator will produce.

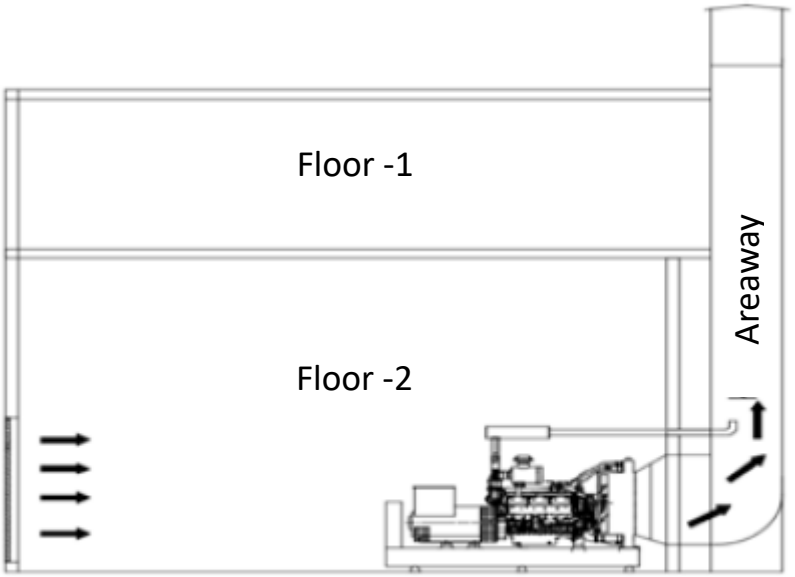


A simple room layout design for the generator



Basement layout plan

- The exhaust gas should be vented out of the ambient as soon as possible.
- The exhaust air released from the radiator must be prevented from returning by means of a bellows.



Rooftop Installation

This form of installation is only possible when a suitable space is not available on the ground floor or in the basement.

Advantages

- No air flow problem.
- Requires no costly duct work.
- No need to lay long exhaust pipes.
- No problems with exhaust fumes.
- Less noise problems.
- No problems such as limited space.

Disadvantages

- Roof structure may need reinforcement.
- There may be a need for a big crane.
- Plans may require permits.
- A longer cable installation is required.
- Only a limited amount of fuel can be stored.
- The generator set must be of enclosed type.

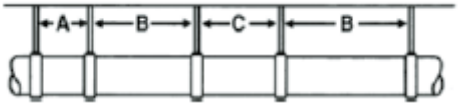
BASE STABILITY, VIBRATION

To ensure proper operation of the generator, vibration should be minimized.

The generator should be vibration-isolated in order to minimize the effect of the vibration of the generator on the piping required for the installation of the generator.

- Plumbing pipes
- Fuel piping
- Exhaust pipes

Improper use



Proper use

Therefore, when mounting suspended piping, care should be taken to ensure that the distances between the transport clamps are not even so that the installation does not resonate from the vibration and intensify its effect. Also, these clamps should be of spring or rubber type to prevent vibration.

Evenly spaced suspended pipes can resonate, especially with low frequency vibrations, causing the effect of the vibration to be transmitted over greater distances.

- The muffler housing must be securely mounted. It must be clamped tightly on the housing.
- The pipe and exhaust assembly in the exhaust system must be of ball bearing type. It should not resist the movements that occur during warming up and cooling down.
- All fasteners should be of a type that prevents transmission of vibration.
- The muffler and piping in the generator room should be heat insulated. The customer should be informed of this issue, with the necessary explanations on this requirement, and should not be provided with guidance.
- Mufflers of several different make or model groups cannot be combined. You may get technical support from the factory to combine silencers of the same make and model groups.
- The offtake of the muffler system must be designed in such a way that neither rain nor birds can ingress. As with enclosed groups, a flap or cap should be used for this purpose.
- Sideways offtake should not be preferred. If so, the offtake should be in such a way that people are not affected by the smoke.

Anti-vibration chocks

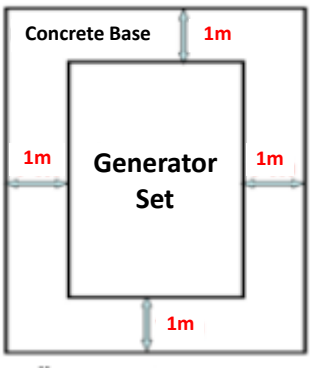
- As standard, all our gensets are equipped with anti-vibration chocks between the frame and the generator set.
- Also, if necessary, groups can be equipped with base chocks.
- No base chocks should be supplied in case of a concrete base.
- Alimar generator sets are manufactured as per ISO8528-9 vibration standard.
- To minimize the vibration transferred to the floor, your generator set is equipped with rubber dampers.

Floor Assembly

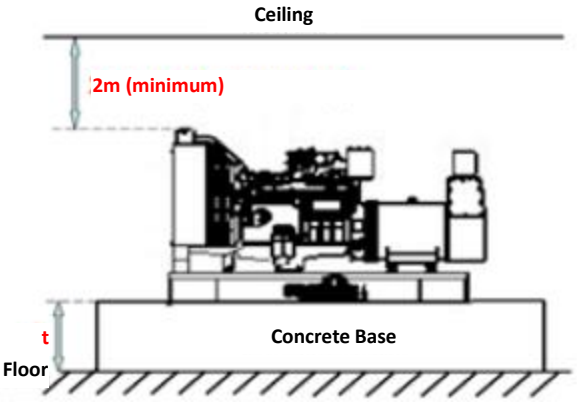
- Make sure that the surface on which the generator is to be mounted is leveled.
- The floor leveling should be performed by the customer.
- Where this is not possible, the generator should be supported underneath with block gages. The whole group should be leveled.
- The group must be anchored to the floor (unless a base chock is used).
- Never install the group on soil or poorly concreted surfaces outdoors.
- Failure to follow these practices, especially in groups with double bearing alternators, can lead to serious failures in a short time.
- Unleveled groups should not be started.

Placing the generator on concrete floor

- A space of at least 1 meter around the generator and at least 2 meters above the generator should be allowed for cooling, service and maintenance of the generator following operation.



Top View



Side View

Concrete Base

A preferred practice is to install the generator set on a concrete base. The concrete base must be engineered to support the weight of the generator set. Its height should be around 200-300 mm. For more details, ask a professional for advice.

The floor on which the generator is mounted must be resistant to static weight and to vibration caused by the operation of the engine.

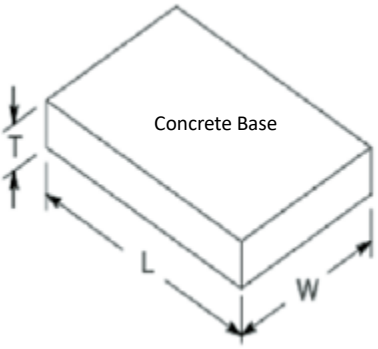
The concrete base should be designed by a civil engineer (customer)

Where there is the possibility of occasional ponding of water in the selected floorage, the concrete base height should be increased depending on the extent of the risk.

The concrete base should ideally be in a sandbox.

Concrete Thickness

$$T = \frac{W_T}{2403 \times L \times W}$$



Concrete's Load Carrying Capacity

$$SBL = \frac{TW}{W \times L}$$

T: Concrete thickness (m)

W_T: Wet weight of the generator set (m)
*2403: Density of the concrete (kg/m^3)
L: Length of concrete (m)
W: Width of concrete (m)

SBL: Load carrying capacity of concrete (kg/m^2)
TW: Total weight of the generator set and equipment (kg)
W: Width of concrete (m)
L: Length of concrete (m)

2403 kg/m³ : Aggregate properties of concrete are prescribed in TS 706 EN 12620 standard (normal aggregate, 2000-3000 kg/m3).

Aggregate: Materials used in concrete such as crushed stone, sand and gravel, making up approximately 60-80% of concrete.

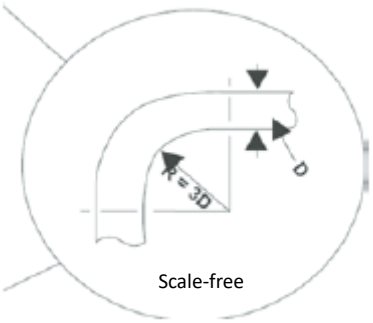
GENERATOR ROOM

Ventilation of the Generator Room

- To ensure healthy operation of the generator, the heat emitted to the ambient by the engine and alternator should be exhausted out of the room and the generator room should be ventilated.
- The air offtake and intake window's surface area must be at least 1.5 times the radiator's surface area.
- Depending on the wind direction, a wind barrier should be used.
- The distance to the barrier should be at least the width of the radiator.
- The air taken off should be prevented from escaping into the generator room, and there should be a sealed bellows attachment between the air takeoff window and the radiator frame.
- There should be no blockage in front of the air takeoff and intake window. An opening of sufficient width should be allowed.
- In cases where the air is taken in and off through an areaway, the areaway's size should not be smaller than that of the air takeoff. Areaway should be free of sharp corners or column-like architectural structures that would create resistance.
- The windows facing outwards should be equipped with shutters to prevent the generator from being affected by external weather conditions. The shutters should be of "L" profile. Under no circumstances should manual opening and closing systems be used.

- For remote systems, the "Total Air Requirement Table" should be used. In cases where necessary, the Engineering Department should be contacted.

INSTALLATION OF EXHAUST SYSTEM



- First, the route of the exhaust system should be determined.
- Whether the mounting wall is suitable for the clamps should be verified.
- The route should not pass through the walls of living spaces.
- If multiple elbows are to be used, the elbow diameter should be 50% larger than the pipe diameter.
- The exhaust should be supported by suspending it in a way to support the weight of the outlet elbow and the turbocharger.
- Attention should be paid to ensure that the exhaust outlet pipe and the fresh air inlet are not situated in the same place. Oxygen-poor air degrades the efficiency of the engine.
- For 90° bends in the exhaust pipe system, the turning radius should be 3 times the pipe diameter.

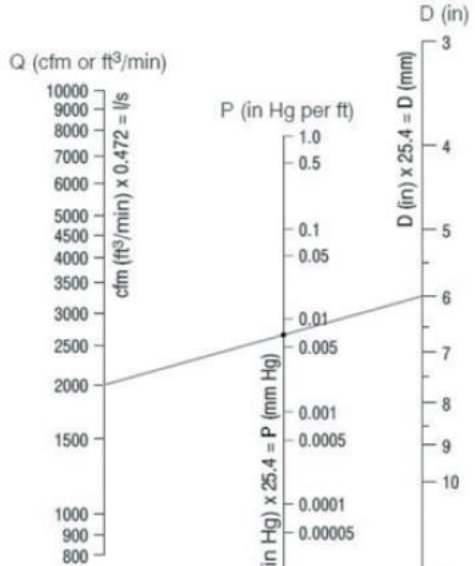
Exhaust outlet size mm (inch)		Recommendations on pipe size							
		6m (20ft)		6m to 12m (20 to 40ft)		12m to 18m (40 to 60ft)		18m to 24m (60 to 80ft)	
mm	(ins)	mm	(ins)	mm	(ins)	mm	(ins)	mm	(ins)
50	(2)	50	(2)	63	(2½)	76	(3)	76	(3)
76	(3)	76	(3)	89	(3½)	100	(4)	100	(4)
89	(3½)	89	(3½)	100	(4)	100	(4)	100	(4)
100	(4)	100	(4)	127	(5)	127	(5)	150	(6)
127	(5)	127	(5)	150	(6)	150	(6)	200	(8)
150	(6)	150	(6)	150	(6)	200	(8)	200	(8)
200	(8)	200	(8)	200	(8)	254	(10)	254	(10)
254	(10)	254	(10)	254	(10)	305	(12)	305	(12)
300	(12)	300	(12)	355	(14)	400	(16)	460	(18)

Remark: These sizes are intended for reference only. Technical specifications and custom silencer applications may result in variations in pipe sizes.

Exhaust back pressure

Adverse effects caused by high levels of exhaust back pressure;

— Excessive fuel consumption
— High exhaust temperature and related failures



— Reduced engine performance
— Shorter engine service life

$$P = \frac{L \, x \, S \, x \, Q^2}{5{,}184 \, x \, D^5}$$

P: Exhaust back pressure (psi)

L: Exhaust pipe length (m)

Q: Exhaust gas flow (m3/min.)

D: Exhaust pipe inner diameter (mm)

S: Specific exhaust gas weight (kg/m3)

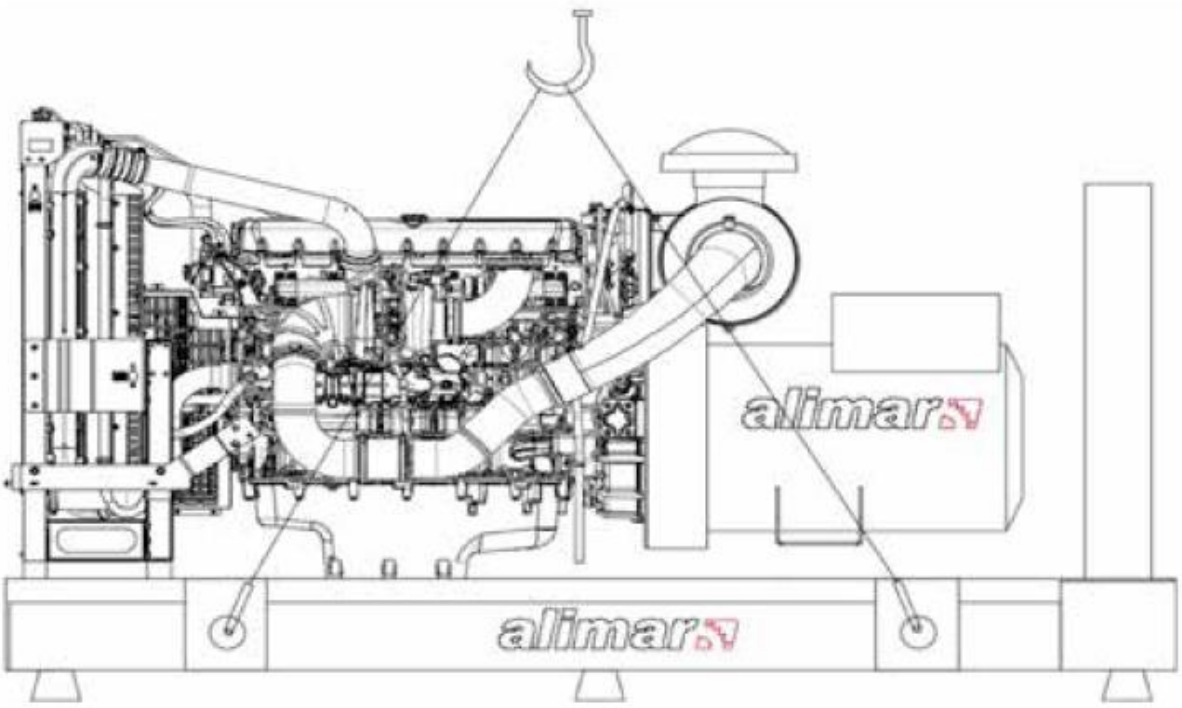
$$S\,(kg/m^3) = \frac{352.05}{\text{Exhaust Temperature} + 273.16^{\circ}C}$$

Lifting

Lifting / Handling the Generator

The generator frame is specially designed to ensure easy handling of the generator. Improper lifting of the generator may cause serious damage to components.

The generator can be lifted using a forklift truck, and can be cautiously pushed or towed by the frame. If requested by the customer, the frame can be equipped with forklift brackets, which are optional.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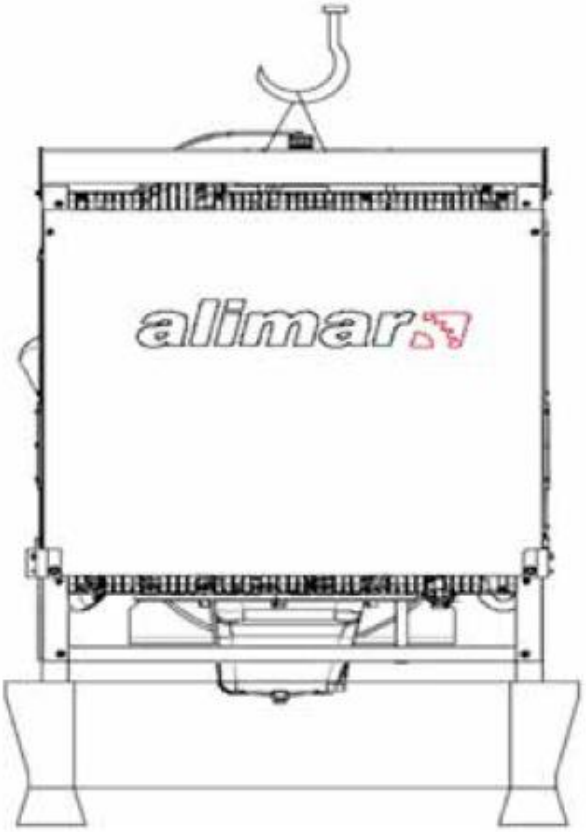
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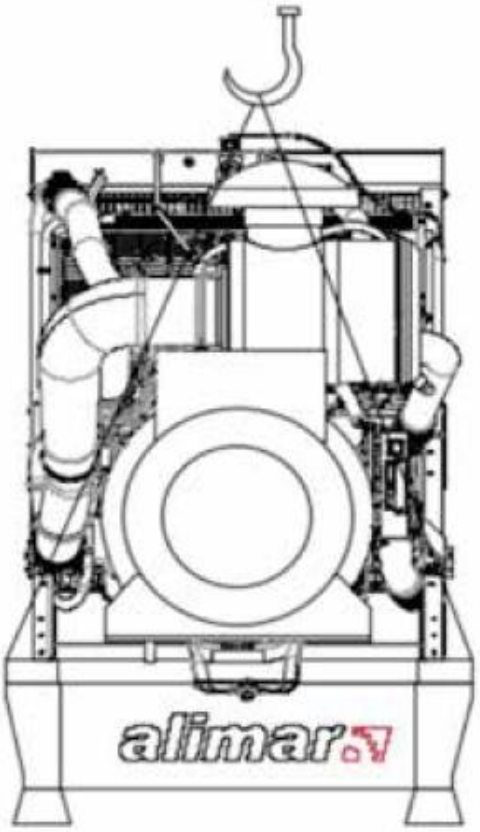
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Improper handling may damage parts of the generator and the generator may tip over due to loss of balance.

Transporting the generator

- In enclosed groups, the generator should be handled by the frame. During lifting, lifting lugs should not be used.
- The generator should be lifted using a lifting equipment that supports the weight of the generator.
- Keep personnel away from the generator when it is lifted for transportation.
- Use guide ropes to prevent the generator set from skidding when lifted from the ground.
- Ensure that the steel rope or chain to be used for lifting the genset does not cause any damage to the parts where it contacts the genset.
- Before lifting, check the connection points for cracked welds or loose nuts and bolts.
- Attention should be paid to use proper equipment for horizontal transportation.
- Check that the crane equipment does not damage the generator set.
- Never place the generator set hard on the floor. This may damage the vibration chocks.
- Do not place the generator set directly on the base chocks. Place base chocks once the group is in place, lifting it slightly.
- Avoid lifting/placing the generator under strong windy weather conditions.

Towing

Trailer mounted generator

Preparation steps for towing

Check all fasteners on the tow truck and the trailer mounted generator for loose nuts, bent metal, cracks, wear, etc.

Check the condition of all tires. Verify that all flash lamps and headlamps are in working order.

Important: When towing a trailer mounted generator, the trailer weight may adversely affect the maneuverability and braking distance.

- Observe all traffic rules, standards and other regulations when towing trailer mounted generators. These include the required equipment and speed limits, which are clearly specified in the regulations.
- Never allow personnel to climb on the generator while it is being towed.
- Ensure that no personnel stands on the towbar or between the mobile generator and the towing vehicle.
- Avoid sloping and soft terrain and any other obstacles such as potholes, stones, etc.
- When maneuvering backwards, make sure that the ground behind and under the mobile generator is free of debris.

Parking

- Park the trailer mounted generator on a dry surface that supports its weight. If the generator is to be parked on a slope, park the generator diagonally across the slope and use chocks to prevent it from sliding downward. Do not park the generator on a slope exceeding 15°.

Remark: The tires are subject to the warranty of the tire manufacturer.

5. Periodic Maintenance

PERIODIC MAINTENANCE

Disconnect the system breaker switch and the battery during servicing.

A) DAILY CHECKS:

1. Check the engine, alternator, control and transfer panels visually.
2. Check the oil, water and fuel circuits for leaks.
3. Check the engine lubricating oil level. Complete if missing.
4. Check the fuel level in the fuel tank. Complete if missing.
5. Check the water level in the radiator and expansion tank, if any. Complete if missing.
6. Check the battery, and add distilled water if necessary. Battery eyelids and gas outlets should be open.
7. Check the air filter if the generator group is operating in a dusty environment.

B) MAINTENANCE AFTER THE FIRST 50 HOURS OF OPERATION:

1. Replace the engine oil, oil filters and by-pass filter.
2. Check the fasteners on the engine. If loose, tighten them.
3. Check the condition of the air filter. Replace if necessary. Check the pipes and clamps.
4. Check the charge and electrolyte level of the battery.
5. Drain the contents of the fuel filter's water drain.

C) PERIODIC MAINTENANCE AT 250 HOURS OR 6 MONTHS OF OPERATION:

1. Repeat checks B.
2. Check the radiator fan belt for proper condition and tension.
3. Check the radiator cores. Clean if dirty.
4. Check the engine installation and connections, tighten if necessary.
5. Replace the engine's water filter, if fitted.

D) PERIODIC MAINTENANCE AT EVERY 500 HOURS OR 1 YEAR OF OPERATION:

1. Repeat checks B and C.
2. Drain the deposits from the fuel tank by unscrewing the fuel tank's deposit plug.
3. Check the oil, fuel and coolant pipes and clamps and replace if necessary.
4. Check the valves for proper adjustment. If necessary, adjust according to the engine manual or request service from an authorized dealer.

E) PERIODIC MAINTENANCE AT EVERY 1000 HOURS OR 2 YEARS OF OPERATION:

1. Repeat checks B, C and D.
2. Check the alternator.
3. Check the starter motor.
4. Replace the coolant with fresh one.
5. Check the fan blades.

6. Check and then clean the turbocharger bearings, blades and diffuser.
7. Check and then clean the contacts of the transfer panel switch.

— Run the generator for at least 10 minutes a week.
— Following the oil change, crank the engine 3 times for at least 10 seconds before starting the engine and ensure that the engine is lubricated. Then check the oil level again 10 minutes after the last cranking.
— Allow the engine to reach ambient temperature when adding coolant. Never add water to a hot engine.

The scheduled maintenance on the genset must be performed by authorized service centers or trained personnel. Unqualified personnel should refrain from performing any interventions other than cleaning. Take all necessary precautions before starting maintenance to prevent the generator from starting during maintenance.

6. Generator Startup and Panel

Checks and Operations Required Before Starting the Generator

- Make a thorough visual inspection of the generator and its equipment before starting the generator. Check whether there are any fractures, cracks, breaks, leaks or loose parts. In case of a fault, do not attempt to start the generator until the fault is corrected.
- Make sure that there are no foreign objects on the generator.
- Check the fuel level in the daily fuel tank. Refuel if in short supply.
- Check the oil in the engine. If lacking, add the recommended oil up to the maximum level.
- Unscrew the radiator cap and check the water level in the radiator. If not enough, add water. The water level should be 25-30mm below the water refilling neck.
- Use antifreeze taking into account the coldest weather conditions of the location where the generator will be used. A mixture of 50% antifreeze and 50% water will provide a suitable mixture in every region in Turkey. Refer to the related graph for extremely cold regions.
- Check the radiator's air outlet hood, remove anything that may obstruct the exhaust, check the air intake, offtake and exhaust gas outlets in general.
- Check the air filter's impurity indicator and replace the air filter if necessary.
- Always tighten loose battery terminals using a wrench and keep the terminals clean.
- Check if the circuit breaker output switches, if any, are in the OFF position.
- Verify that the emergency stop button is not pressed.

Procedures to follow after the generator starts

- Check if there is any unusual noise or vibration in the generator.
- Check the exhaust system for leaks.
- Check the fuel system for fuel leaks.
- Check the engine temperature and oil pressure on the panel. The oil pressure should be at its normal value within 8 to 12 seconds after the generator starts.
- Monitor the generator output voltage and frequency from the displays on the panel. Check if the voltage between phases is 400 V and the voltage between phase-neutral is 230 V. The output voltage is adjusted at the factory, so do not attempt to adjust the voltage settings.
- Check if the no-load frequency is at 51 to 52 Hz for generators with mechanical governors and at 50 Hz for models with electronic governors.
- Where there is no preheater, run the generator idle for 3 to 5 minutes to warm it up and then put it on load (manual models).

Loading for Manual Models

- Turn ON the Alternator Output Switch on the panel.
- Set the Load Switches (or fuses) on the distribution panel to ON position one by one. This prevents the generator from being suddenly loaded with full load. Failure to do

so may cause the engine to stall or the alternator winding insulation to degrade or even burn out.

- Before stopping the generator, turn the Alternator Output Switch OFF.
- Allow the engine to run without load for two minutes after unloading to allow the engine to cool down.
- Never start the genset in case of any fault before such fault is corrected.
- With the engine running, check for oil, fuel and/or water leaks.
- Avoid running the engine at low load (<30%) or no load for long periods.
- Distribute single-phase loads evenly on each phase (U, V, W).
- In Automatic Generators, the load will be switched on automatically.

Panel

Generator's control systems

The generator uses electronic control systems to control and monitor the generator operation. Depending on the needs of the generator, one of the standard control systems can be applied. The control panel allows starting and stopping the generator, monitoring its operation as well as the output voltage. In addition, it automatically stops the generator in case of low oil pressure, high engine temperature and various fault conditions.

Requirements for operation in automatic mode

- Press the AUTO button to turn the automatic transfer device on the front panel of the genset to Automatic mode.
- The generator is in standby mode when the mains voltage is within normal limits. Even when one of the mains phases is interrupted or if the mains voltage drops or rises excessively, the generator comes into operation within 14 to 15 seconds and starts to supply the installation. In cases where the mains voltage is restored or reaches within normal limits, the system starts to be fed from the mains within 1 minute. In such case, the generator's engine will run for another 2 minutes to cool down and then stop.

Automatic Controller

ALM 929

This device can be programmed using the buttons and LCD display on the control panel or by using PC interface software.

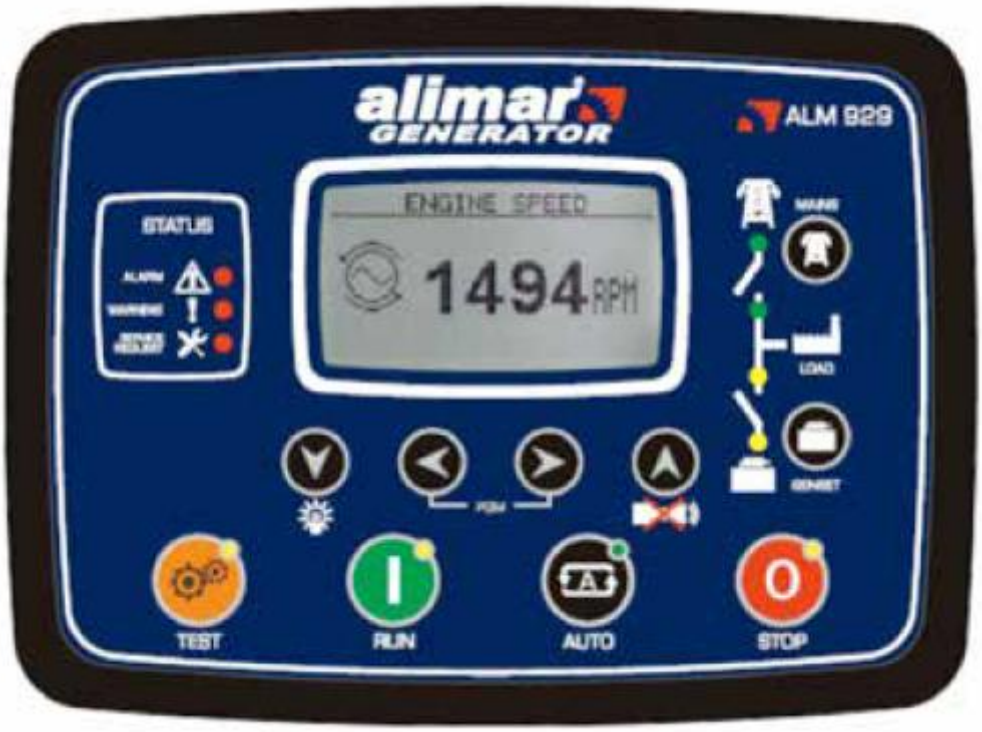
ALM - 929 is a multi-functional, reliable and cost-effective next generation generator controller with a wide range of communication capabilities.

The device meets the world's most stringent safety, vibration, EMC and environmental standards in the industrial category.

The software can be easily updated via the USB port.

The Windows-based computer software allows monitoring and programming via USB, RS - 485 and GPRS.

The software Rainbow Scada allows you to remotely monitor and control multiple generators from a single centralized location.



Specifications

- GSM – GPRS
- Built-in GPRS modem (optional)
- GSM – SMS
- E-mail
- Modbus
- USB Port
- RS – 485
- RS – 232
- J1939 – CANBUS

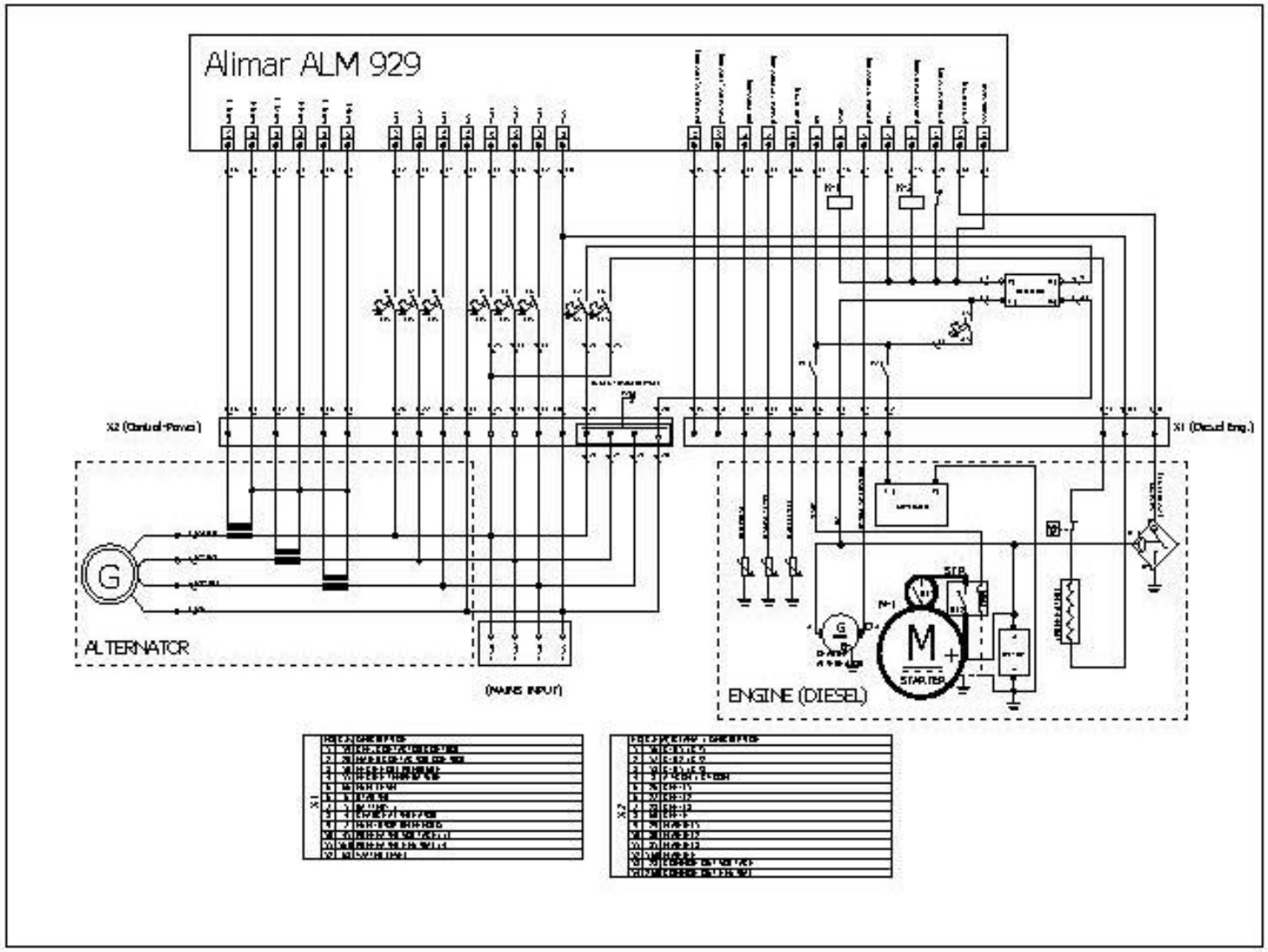
Functions

AMF device with seamless transition
ATS device with seamless transition
Remote actuation device
Manual actuation device
Motor controller
Remote monitoring & control
V & I waveform oscilloscope display

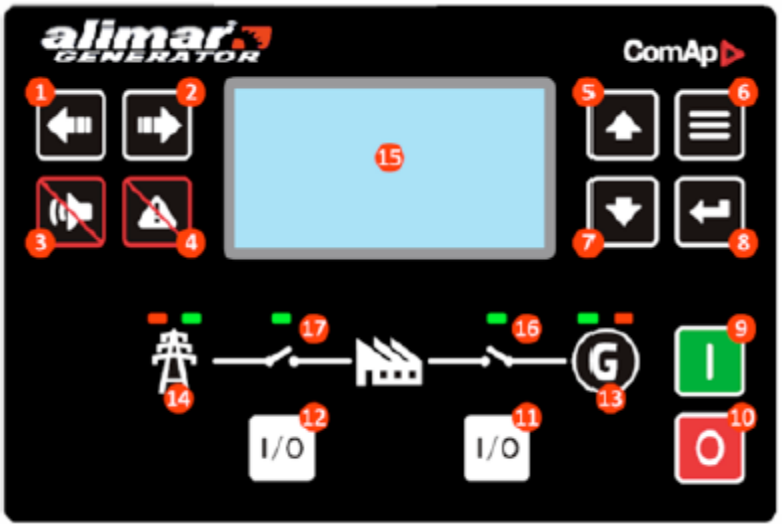
V & I harmonic analysis
Current transformer by generator or load

Key Functions

Key	Function
	Switch to TEST mode. The generator starts and takes the load.
	Switch to RUN mode. The generator starts and stands by without taking the load.
	Switch to AUTO mode. The generator starts and takes the load if necessary.
	Switch to OFF mode. The generator stops.
	Switch to the next screen in the same group. LAMP TEST key
	Switch to the previous screen group.
	Switch to the next screen group.
	Switch to the previous screen in the same group. The ALARM RELAY is reset.
	Manual check of the MAINS CONTACTOR in RUN mode.
	Manual check of the GENERATOR CONTACTOR in RUN mode.
	Holding down these two buttons for 5 seconds enables the PROGRAMMING mode.
	Reset to factory settings.
	Holding down these two buttons simultaneously for 5 seconds resets the service time counters.

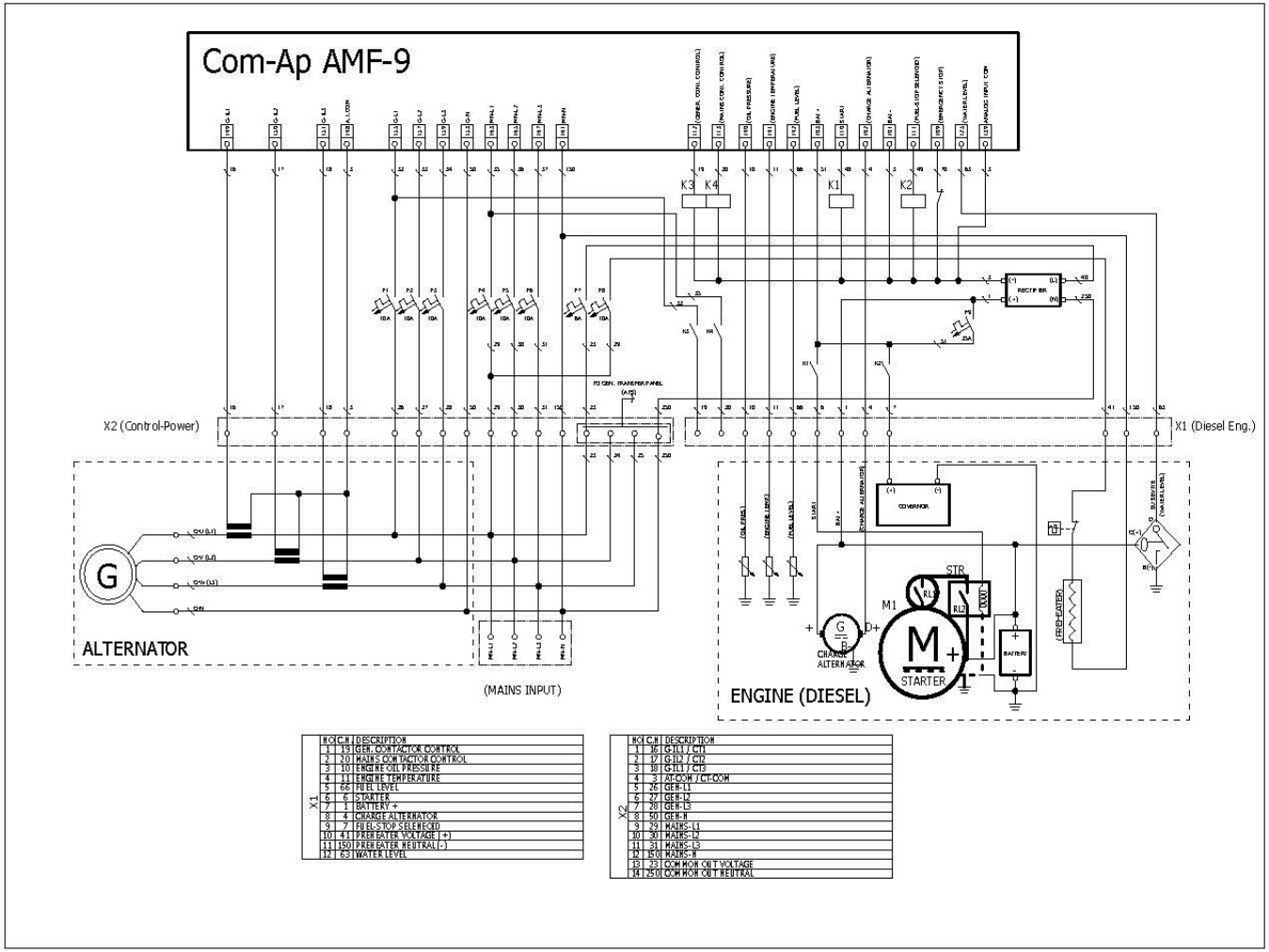

Alimar ALM 929
X2 (Control-Power)
X1 (Diesel Eng.)
G
ALTERNATOR
(MAINS INPUT)
M
STARTER
ENGINE (DIESEL)

ComAp – Alimar



Key	Function
	1. Allows you to move left on the screen or switch modes. If in the current display screen, you can switch between modes.
	2. Allows you to move right on the screen or switch modes. If in the current display screen, you can switch between modes.
	3. Horn Reset: Resets the horn when pressed.
	4. Error Code Reset: Deactivates the confirmation alarm and outputs when pressed.
	5. Up Key: Allows upward movement on the screen or increments the value.
	6. Page Key: Switches between screen pages.
	7. Down Key: Allows downward movement on the screen or decreases the value.
	8. Enter Key: Confirms the adjustment or switches to the previous page.
	9. Start Key: Use only in manual mode. Press this key to start the running procedure of the engine.
	10. Stop Key: Use only in manual mode. Switches the engine to cooling mode (runs for 120 seconds and stops) at the first press. When pressed for the second time, the engine immediately stops.

	11. GCB: Test mode only. Switches the generator contactor on or off.
	MCB 12: Test mode only. Switches the contactor of the mains generator on or off.
	13. Genset status indicator
	14. Mains status indicator
	15. Display: 132x63 pixel screen
	16. GCB ON: Generator contactor activated
	17. MCB ON: Generator contactor activated



X1	NO	C.N	DESCRIPTION
	1	19	GEN. CONTACTOR CONTROL
	2	20	MAINS CONTACTOR CONTROL
	3	10	ENGINE OIL PRESSURE
	4	11	ENGINE TEMPERATURE
	5	66	FUEL LEVEL
	6	6	STARTER
	7	1	BATTERY +
	8	4	CHARGE ALTERNATOR
	9	7	FUEL-STOP SELENOCID
	10	41	PREHEATER VOLTAGE (+)
	11	150	PREHEATER NEUTRAL (-)
	12	63	WATER LEVEL

X2	NO	C.N	DESCRIPTION
	1	16	G-LL1 / CT1
	2	17	G-LL2 / CT2
	3	18	G-LL1 / CT3
	4	3	AT-COM / CT-COM
	5	26	GEN-L1
	6	27	GEN-L2
	7	28	GEN-L3
	8	50	GEN-N
	9	29	MAINS-L1
	10	30	MAINS-L2
	11	31	MAINS-L3
	12	150	MAINS-N
	13	23	COM MON OUT VOLTAGE
	14	250	COM MON OUT NEUTRAL

Manual Operation

- Set the ignition switch from position "0" to position "1".
- Meanwhile, the manual controller's warning lamps will illuminate.
- Then press the "start" button once to start the engine. This will start the engine of the generator.
- Check to see whether the warning lamps on the panel are illuminated and whether the readings on the indicators are normal.
- Run the generator idle for 1 minute. During this time the generator will warm up.
- Meanwhile, the receivers (loads) in the installation must be in the off position.
- Switch the main switch to position "1".
- Set the inverter switch in the installation from "MAINS" to "GENERATOR" position.
- Switch on the receivers one by one.
- Check the phases' current and voltage using the commutator of the ammeter and voltmeter.
- When the mains is connected, set the inverted switch to the "MAINS" position.
- Run the generator idle for 1 minute to cool down the engine. Then press the stop button and wait for the engine to stop. Finally, set the ignition switch to the "0" position.

1.	On / Off Switch: Is used to switch the device on and off. When the switch is set to the "0" position, the device is off and consumes no power.
2.	Start Button: Is used to start the generator and to adjust the program

	parameters.
3.	Start LED: This LED allows to monitor the operation of the engine from the start until the engine is stopped.
4.	Stop Button: This LED is used to monitor when the engine is not running and/or stops.
5.	Stop LED: This LED indicates that the engine is not running and/or has stopped.
6.	Enter Button: When pressed for 5 seconds, the program menus are accessed. Each time the button is pressed briefly, the engine speed, alternator frequency and operating hours are displayed on the display (7).
7.	Value Display: This screen displays program parameters, measured values and fault codes.
8.	Failure to Start: If the engine still has not started after the number of starting attempts defined in parameter P10, this LED flashes and the panel trips. The fault is reset by setting the On/Off switch (1) to the "0" (off) position and back to the "1" (on) position.
9.	High Temperature Fault: This LED flashes and the panel trips when the oil pressure drops. The fault is reset by setting the On/Off switch (1) to the "0" (off) position and back to the "1" (on) position.
10.	Low Oil Pressure Fault: This LED flashes and the panel trips when the oil pressure drops. The fault is reset by setting the On/Off switch (1) to the "0" (off) position and back to the "1" (on) position.
11.	Generator Frequency and Speed: This LED is lit when the alternator frequency and engine speed are displayed in the value display (7). For accessing the values, the ENTER Button (6) is used.
12.	Engine Running Time: This LED illuminates when the engine operating hours are displayed in the value display (7). For accessing the values, the ENTER Button (6) is used. The engine running time is displayed on the screen with EA0M - 36.R, increasing in hours each time the engine starts.
13.	Speed Fault: The LED flashes and the panel trips when the alternator frequency and engine speed exceed the set limits. The fault is reset by setting the On/Off switch (1) to the "0" (off) position and back to the "1" (on) position.
14.	Charging Alternator Fault: Once the charging alternator voltage exceeds the set class values, the LED flashes and the panel trips. The fault is reset by setting the On/Off switch (1) to the "0" (off) position and back to the "1" (on) position.
15.	Generic Alarm: This LED flashes for all alarms other than those mentioned above. Scrolling over this LED with the ENTER button (6) displays the code of the alarm on the value display (7).

Maintenance of the Device

The device should be repaired by trained personnel. Disconnect the device from the power supply before accessing internal parts of the device.

Do not clean the device using hydrocarbon-containing solutions (such as Petroleum, Trichlorenthylene). Using such solutions to clean the device reduces the mechanical reliability of the device.

Clean the outer plastic part of the device with a cloth dampened with ethyl alcohol or water.

The device has an average lifetime of 10 years.

Things to Consider Before Starting Up

A balanced load distribution in phases is essential for trouble-free operation of your generator in both manually and automatically controlled generators. Keeping the load distribution between phases within the tolerance values of -/+ 15% is the responsibility of the user. Any failure due to inadequate and/or incomplete maintenance shall be out of the scope of the warranty.

7. Troubleshooting

FAULTS THAT MAY OCCUR IN MANUAL GENERATORS

a- The diesel engine doesn't crank:

- The battery may be discharged and not supplying the required voltage. If there are no problems with the battery voltage, check the battery terminals and tighten if loose. The battery terminals may be loose or oxidized. If the terminals are oxidized, clean them. Check the voltage level of the battery using a voltmeter. Charge if the battery voltage is low. Check the battery acid level. Complete if missing.
- The ignition switch may be faulty. Replace the ignition switch with a new one if there is no (+) DC voltage at the start terminal when the ignition switch is set to the start position even though there is (+) DC voltage at the battery terminal.
- The starter motor may be faulty. Check the starter motor (+ /) battery cables. Check whether a DC voltage is supplied to the start terminal (+) when the ignition key is set to the start position. Contact our after-sales service department for replacement of the starter motor if the starter motor still does not operate even though a DC voltage (+) is applied to the starter motor start terminal.

b- Diesel engine cranks but does not start:

- The diesel engine may be out of fuel. Purge the air from the fuel passages and refuel the diesel engine to start the engine.
- The fuel system of the diesel engine may have a blockage or air in it. Clean the diesel fuel system. After having unblocked the fuel lines, bleed the air from the fuel passages.
- The ignition switch may be faulty. Replace the ignition switch with a new one if there is no (+) DC voltage at the start terminal when the ignition switch is set to the start position even though there is (+) DC voltage at the battery terminal.

c- While supplying the load, the switch opens and cuts off the supply:

- The generator may be drawing excessive current. Check that the generator power is not drawn more than the rated current. Monitor the current in the load ammeters. Reduce the loads if the current is high.

FAULTS THAT MAY OCCUR IN AUTOMATIC GENERATORS

a- No supply from the mains even though the mains is available:

- The mains voltage may be out of the lower and upper limit range set by the parameters. Check the mains voltage at the automatic controller.

- There may be no 220 V AC voltage at the mains contactor coil end. Refer to the electrical controller connection diagram, power line and measuring circuit diagrams and check whether 220 V AC is supplied to the contactor coil.
- The mains contactor coil may be burnt out. The contactor's failure to draw although 220 V AC is supplied to the mains contactor indicates that the contactor coil is burnt out. Replace with a new one.
- The operation mode of the panel may not be automatic. Set the switch on the control panel to the automatic position.

b- The generator doesn't switch on when the mains go down:

- The battery may be discharged and not supplying the required voltage. If there are no problems with the battery voltage, check the battery terminals and tighten if loose. The battery terminals may be loose or oxidized. If the terminals are oxidized, clean them. Check the voltage level of the battery using a voltmeter. Charge if the battery voltage is low. Check the battery acid level. Complete if missing.
- The starter on the generator may be faulty. Check whether the starter motor is energized. The starter's failure to start the diesel even though the power is supplied indicates that the starter motor is faulty. Contact the authorized service center.
- The operation mode of the panel may not be automatic. Set the switch on the control panel to the automatic position.

c- When the mains is cut, the diesel engine cranks but does not start:

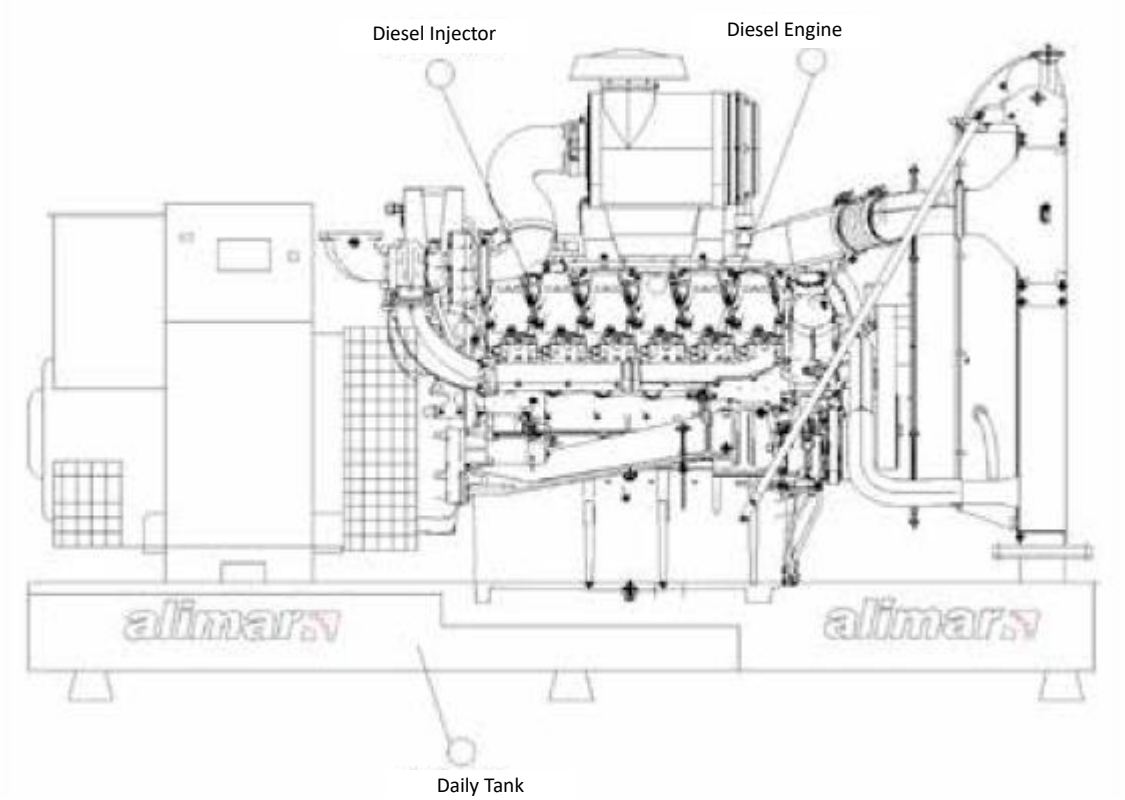
- The diesel engine may be out of fuel. Purge the air from the fuel passages and refuel the diesel engine to start the engine.
- The fuel system of the diesel engine may have a blockage or air in it. Clean the diesel fuel system. After having unblocked the fuel lines, bleed the air from the fuel passages.
- The ignition switch may be faulty. Replace the ignition switch with a new one if there is no (+) DC voltage at the start terminal when the ignition switch is set to the start position even though there is (+) DC voltage at the battery terminal.

d- The diesel engine is running but the generator fails to supply the load:

- The alternator voltage may be out of the rated values. Check the alternator voltage and verify that it is 400 V between phases and 231 V between phase-neutral.
- The alternator contactor coil may be burnt out. If the contactor fails to draw even though there is 220V AC voltage at the contactor coil terminals, the coil may be burnt out. Replace with a new one.

In cases where some of these predictable faults cannot be corrected using the recommended remedies, or if other faults or malfunctions arise, please contact the authorized service center.

Fuel and Fuel Tank

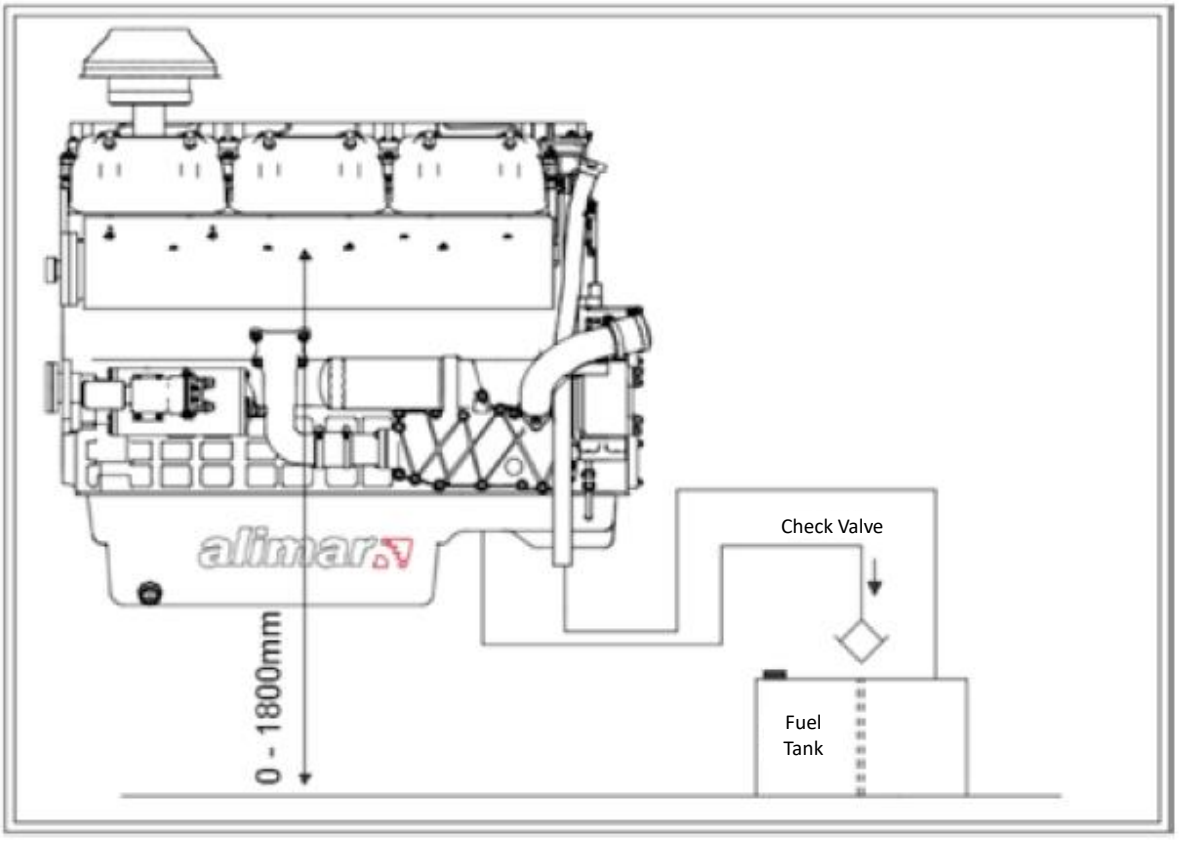


Generator Power Stand-By (kVA)	Maximum Fuel Pipe Length	Maximum Vertical Height	Maximum Number of Pipe Fittings	Recommended Pipe Diameter (inch)
0-800	6	0.9	6	1”
800-1500	6	0.9	6	1 ½”
1500-2200	6	0.9	6	2”

Table of Recommended Pipe Diameters for Fuel Installations

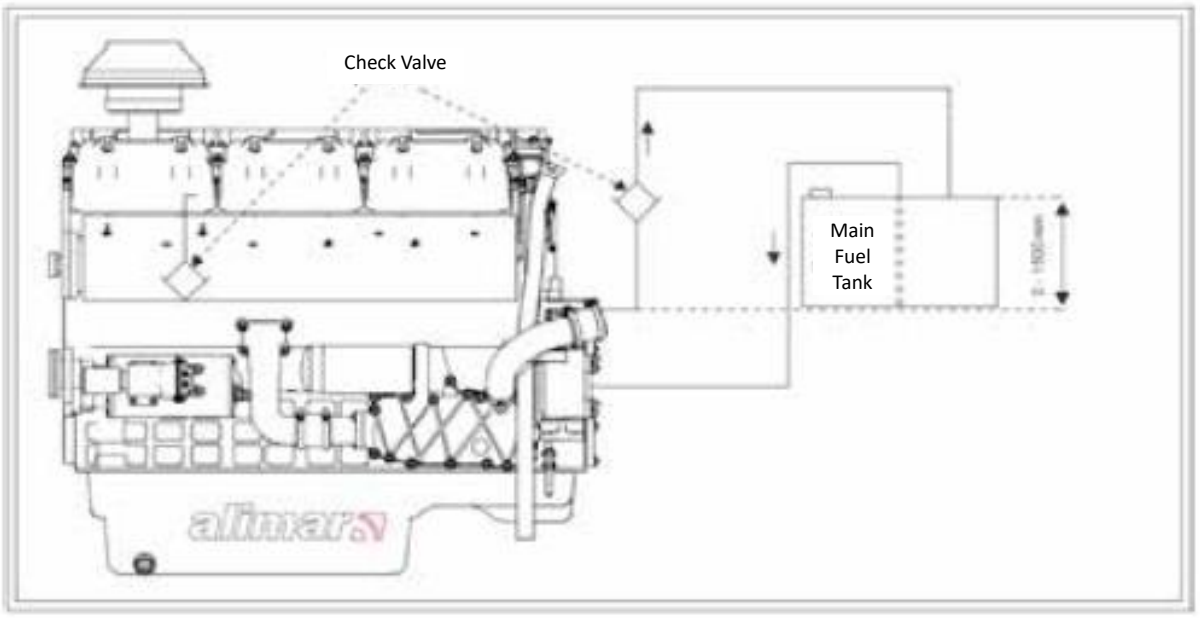
Fuel Tank Height

In the case where the height of the fuel tank is more than 2m above the center of the crankshaft, check valves are required. If the maximum fuel level does not exceed 2m above the center of the crankshaft, the minimum fuel level should be at least 15 cm above the fuel injection pump. If the fuel level exceeds 2m, the engine may be damaged. The fuel pump inlet will not be able to maintain proper fuel pressure if the fuel level is lower than 15cm. That is, the tank fuel level should not be above the injectors and not more than 180 cm below the fuel pump.

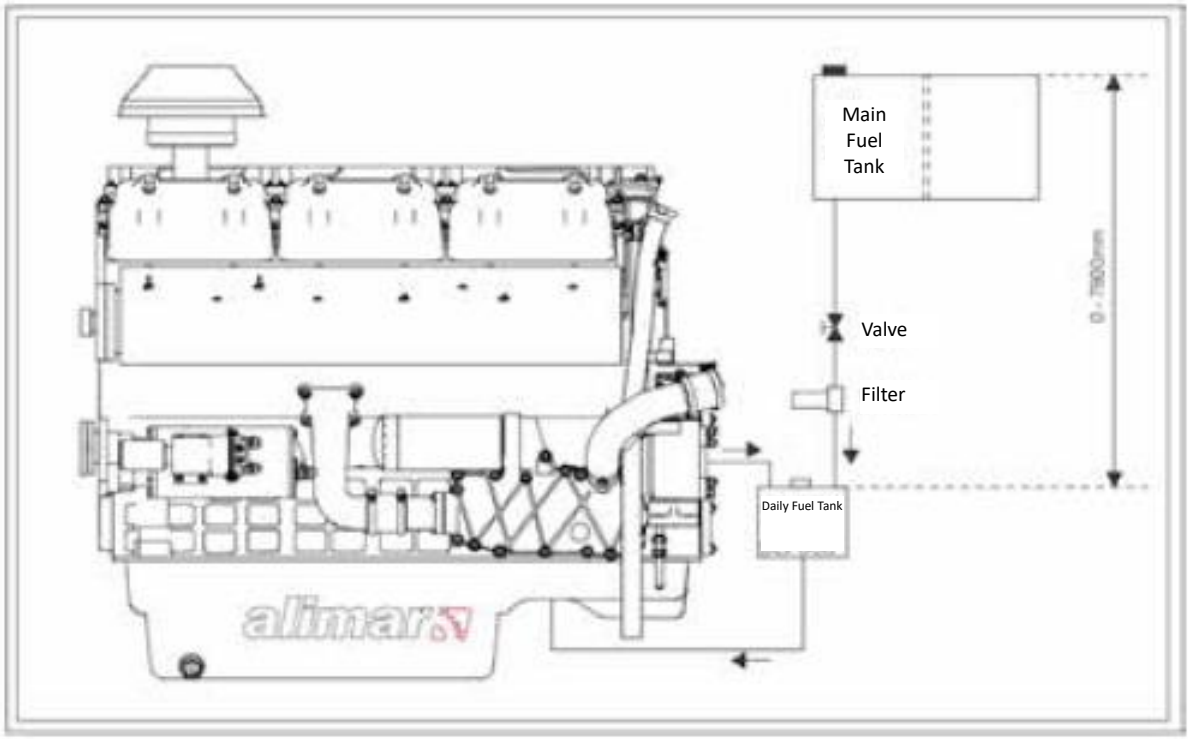


Typical fuel diagram with the fuel tank located downstream of the engine

If fuel tank is raised to a height of about 1.5m above the injectors, 2 check valves are additionally installed to protect the engine from hydraulic lockout as shown in the following figure. These valves have a protection capacity from 0 to 1.5m height. If the fuel tank is to be above 1.5m, a flotation tank is required.



Fuel tank and check valve connection positioned approximately 1500mm above the fuel return



Flotation tank used with elevated fuel tank

8. Quality Standards

9. Warranty Conditions / User's Obligations

1) The warranty period starts upon delivery (commissioning and start-up) of the genset and is 2 years or 1000 hours. The warranty period starts to run automatically for generators that are not commissioned within 6 months as of the invoice date.

2) The generator group, including all parts thereof, is covered by our Company's warranty.

3) In case of failure of the genset within the warranty period, the time spent in repair shall be added to the warranty period. The maximum repair time for the group is 20 working days. This period starts to run from the date of notification of the failure related to the generator group to the Alimar's regional or authorized service center or, in the absence thereof, to the respective distributor, dealer or representative office. The consumer may report the failure by phone, fax, e-mail and similar means. However, in cases of discrepancies, the burden of proof lies with the consumer. In cases where the generator failure is not resolved within 10 working days, Alimar shall be obliged to allocate another generator with similar features for the use of the consumer until the generator is repaired.

4) If the generator malfunctions during the warranty period due to defects in material and workmanship or assembly, the generator shall be repaired without any charge under the name of labor, part costs or any other name.

5) In the event that the product is found to be defective, the consumer may exercise one of the following rights under Article 11 of the Law No. 6502 on the Protection of Consumers:

a) Rescinding the contract,
b) Asking for a discount on the sale price,
c) Asking for free repair,
d) Requesting the replacement of the sold product with a defect-free equivalent.

6) If, in case the consumer exercises the right to free repair, the generator:

— Malfunctions once again within the Warranty period,
— Cannot be repaired within the maximum time required for its repair,
— Is found to be unrepairable according to the report issued by the authorized service center, dealer, manufacturer or importer;

The consumer may ask the seller to return the generator set free of charge, to reduce the price in proportion to the defect or, if possible, to replace the generator set with a defect-free equivalent. The seller cannot decline the consumer's request. The seller, manufacturer and importer shall be jointly and severally liable for the fulfillment of such request.

7) The consumer shall be entitled to resort to the Consumer Arbitration Committee or the Consumer Court in the place where the consumer has his/her place of residence or where the purchase took place in case of disputes arising out of the exercise of his/her rights under the warranty.

8) The consumer may apply to the General Directorate of Consumer Protection and Market Surveillance of the Ministry of Customs and Trade if the seller fails to provide this Warranty Certificate.

9) All maintenance services, inspections, spare parts and other services outside the scope of the warranty are subject to a charge.

Out-of-Warranty Conditions:

1. The purchased generator group shall be commissioned by Alimar Generator's authorized service centers, the user shall not commission the generator group himself/herself or have it commissioned by another service center. Otherwise, the generator group falls outside the scope of warranty. Such commissioning shall be valid only for the place where the operation is performed, and if the generator is to be used in a new place, the generator shall be commissioned again by Alimar Generator's authorized service centers. The second commissioning procedure shall be at the user's expense.

2. The user shall be obliged to have the periodic maintenance of the generator group carried out by Alimar Generator's authorized service centers on a regular and timely basis and in return for a fee. If any of these maintenance operations are neglected, the warranty will be void.

3. In case of malfunctions caused by the use of materials not approved by Alimar Generator, malfunctions caused by negligence, improper use, use at inappropriate power, improper positioning, storage under improper conditions and repair, maintenance or interventions made by unauthorized service centers and persons, the generator shall fall outside the scope of the warranty.

4. The damages and malfunctions caused by natural disasters, earthquakes, blizzards, landslides, fires, torrents, floods or mains electricity shall not be covered by the warranty.

5. The failures arising from the use of the generator group contrary to the instructions for use shall not be covered by the warranty.

6. The warranty shall be void if the labels of the genset are removed or altered.

10. Customer Service

If you wish to contribute to our product and service quality, please e-mail your suggestions to **info@alimar.com.tr** and report maintenance and malfunction-related issues to **ssh@alimar.com.tr** or contact us at **444 54 59**.

CERTIFICATE OF WARRANTY

MANUFACTURER, IMPORTER COMPANY

CENTER CONTACT INFORMATION	
Kazım Karabekir Caddesi Örnek Han No. 27/15-2 İskitler Altındağ/ANKARA	
Phone	Fax
0312 384 15 80	0312 342 17 51
WEB	www.alimar.com.tr
Manufacturer, Importer, Authoritative Approval / Date, Stamp, Signature	

Factory Contact Information	
Organize Sanayi Bölgesi 1. Cadde No. 18 Altıeylül/BALIKESİR	
Phone	Fax
0266 290 80 10	0266 246 54 68
e-mail	ssh@.alimar.com.tr

PRODUCT		
Type	**Generator**	
Brand	**ALIMAR GENERATOR**	
Serial No.		
Engine	Brand	
	Model	
	Serial No.	
Alternator	Brand	
	Model	
	Serial No.	
Delivery Date		
Delivery Location		
Max. Time To Repair	**20 Work Days** ***(Within the Turkey's Boundaries)***	
Warranty Time	**2 Years**	

SELLER	
Title	
Address	
Phone & Fax	
Invoice Date	Invoice No.
Authorized Approval	
Date, Stamp, Signature	

ALİMAR

Ankara Center
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