

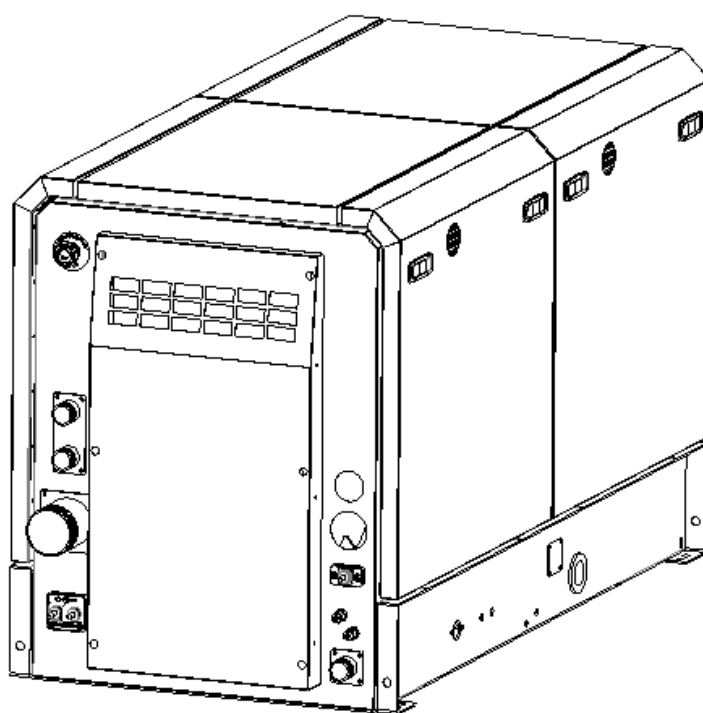
Operation Manual



Generator Set

Models

MN 305	TG 309
MG 307	TG 313
MG 311	TG 314
MG 312	TG 320
MG 316	TG 323
MG 318	TG 330
MG 324	TG 343



PLEASE READ AND KEEP THIS MANUAL CAREFULLY.

Product identification information

Model :

Serial No :

Albosan Mak.San.Tic. Ltd.Şti

Maltepe Mah.Hastane Yolu sokak 1.Baltaş San.

Sitesi No:10/3 Zeytinburnu / İSTANBUL

Telephone : + 90 212 612 25 00

Web : <http://www.albosan.com.tr>

E-mail : info@albosan.com.tr

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1.SAFETY PRECAUTIONS

Always read the MAINTENANCE – OPERATION AND USER’S MANUAL carefully before operating the generator set. The generator set that you have purchased may operate safely and reach its performance when the proper operating conditions specified in the manufacturer’s instructions are provided; the generator set is operated and maintained under these conditions.

GENERAL DECLARATION

It is the responsibility of purchaser/installer/owner of the generator set to provide conformity of the machine with the relevant legislation and instructions, to take all health and safety precautions, and to protect the generator set before commissioning the generator set.

Following cautionary symbols and inscriptions are used in this manual to warn and protect the users of the generator and service personnel against potential dangers of the generator set. Please read carefully until the end of the manual.

⚠ DANGER : *This warning describes dangers that may cause serious personal injuries or death.*

⚠ WARNING : *This warning describes dangers that may cause serious personal injuries or death or against operating conditions that is required in safety precautions.*

⚠ CAUTION : *This warning describes dangers that may cause serious personal injuries or equipment damages or against operating conditions that is required in safety precautions.*

ENGINE EXHAUST IS LETHAL

Never sleep inside of the vessel while the generator has been operating unless your vessel is equipped with proper carbon monoxide detectors.

Generator Exhaust kit (exhaust muffler, exhaust gas-sea water separator, exhaust hose, clamps) shall be installed according to the manufacturer’s instructions by authorized personnel.

Check for exhaust gas leaks in the first operation or every eight hours of operation. All passengers and personnel shall be moved to open air areas of the vessel when a gas leak is detected, and an ambulance shall be called when it is necessary. Operate the generator set after the repair of the exhaust gas leak.

GENERATOR VOLTAGE IS LETHAL

All power, control cables and connecting elements that will be connected externally to the generator shall be connected by a trained and experienced technician according to the current legislation and manufacturer’s instructions. The power generator current and main coastal (dock) power current mustn’t and prevented short circuit when both using at the same time. It may cause danger. Feedback to main coastal (dock) supply may cause damage on the vessel equipment and electric shocks that may result as serious personal injuries or death. Always be careful when intervening on any electrical equipment of the generator set. Take off any jewelry; ensure that your clothes and shoes are dry. Stand on a wooden or rubber platform and use insulated electric repair tools during your work.

DIESEL FUEL IS FLAMMABLE

Do not turn the electrical switches on/off and smoke in inadequately ventilated areas where fuel vapors may be available. Keep far away any equipment that generate flames, sparks and arcs and all other flammable sources from these areas.

MOVING PARTS MAY CAUSE SERIOUS INJURIES OR DEATH

Do not wear loose clothes and take off your jewelry if you need to work near moving parts. Wear the clothes that are suitable for the operating conditions if possible. Keep away from all moving parts (fan, belt, pulley etc.) in your work.

BATTERY GAS IS EXPLOSIVE

Always wear safety goggles while working on the batteries. Battery acid has extreme corrosive effect so be very careful. Do not smoke while you are working. Keep far away any equipment that generate flames, sparks and arcs and all other flammable sources from these areas.

Always disconnect the negative (-) battery cable at first, and re-connect the negative (-) battery cable most recently for reducing any arcs while you are opening connections of the battery cables.

DENSE FUEL VAPOR IN CLOSED AREAS MAY CAUSE DIESEL ENGINE OVERSPEED RUNNING

Always perform necessary checks before starting to operate the generator. Never operate your generator when there is a fuel seepage, gobbing, leak or dense fuel vapor in closed areas. Dense fuel vapor inside of closed areas may cause diesel engine to overspeed running, to stop roughly and late. **So explosions, fires and damages that may occur may cause serious injuries, and even lethal accidents.**

GENERAL PRECAUTIONS

- Keep the children away from the generator set.
- Never use startup liquids that provide ignition or explosion.
- Do not step on the generator while entering to or exiting from generator room. These parts may be bent or broken thus may cause electric shock, fuel leak, refrigerating liquid or exhaust gas leakage.
- Remove the battery connection cables from lead terminals to prevent undesirable sudden motor start while you are working on the generator set.
- Let the engine cool down definitely before opening the Engine Coolant Heat Exchanger filling water cap. Engine Coolant Heat Exchanger under excessive temperature and pressure may cause to serious scalds by spraying hot vapors.
- Keep the generator set, cabin bottom flange and its area clean. Oiled fabric may be ignited.
- Check all connection elements and ensure that they are not loose.
- Do not work on the generator when you are physically or mentally tired or you have used drugs or alcohol.
- Only authorized service personnel may intervene with the adjustments that shall be performed while the generator set is operated. These adjustments are required training and experience.

Excessively hot, moving and electrically driven parts may cause serious injuries, and even lethal accidents.

- Antifreeze (ethylene glycol) used in the engine coolant has poisonous properties on humans and animals. Destroy leakages and wastes of antifreeze spread over the area during filling or draining operations at stated properly the laws and environmental regulations on poisonous waste.
- Keep handy multi-class ABC extinguishers to respond against generator fires. Class A fires are caused by ordinary combustible material like wood and rags; Class B fires are caused by quickly flammable and combustible liquid and gas fuels; Class C fires are caused by energized electrical equipments. (ref. NFPA No.10).

2.Introduction

ABOUT THIS MANUAL

This manual is operating, utilization and maintenance for generator models listed on the front cover. All users who have purchased these products shall carefully read and understand this manual and follow all instructions and safety precautions specified in this manual. This manual includes information on some operation and maintenance features of the generator sets, how to obtain services from authorized service shops when required and conformity with some legislation and regulations. Operation, Maintenance and Troubleshooting Manual includes instructions required for the installation and operating of the generator set. User is responsible to ensure that the maintenance of the generator set is performed by authorized service personnel according to the PERIODICAL MAINTENANCE CHART (Page 5-1, Table 2) as specified in the manual.

Keep this manual near the generator to refer to it when required.

⚠ WARNING : This generator set is not a life support system. It may be stopped abruptly without any warning. Children, persons with physical and mental disabilities and pets may be affected in this case with serious personal injuries or lethal accidents. If the usage of generator set is critical, you shall have authorized personnel accompanying the operation, use additional spare power supply and suitable alarm systems, and have all emergency precautions taken.

PRODUCT IDENTIFICATION LABEL

Important information on your generator set is contained in the product identification label. Please have your generator serial number and generator set model on the product identification label with you in written form before contacting ALBOSAN MAKİNA SANAYİ TİCARET LTD.ŞTİ. for parts, service and product information. Product identification label is placed on the point specified in Figure 1. Please check it.

⚠ WARNING : Using non-genuine parts on the generator set may cause material damage on your vessel and equipment, and the damages thus occurred may cause serious injuries, and even lethal accidents. Technical service personnel who will perform the maintenance and repair operations of the generator set must have the required trainings for electrical and mechanical services, and shall be certified and authorized by the manufacturer.

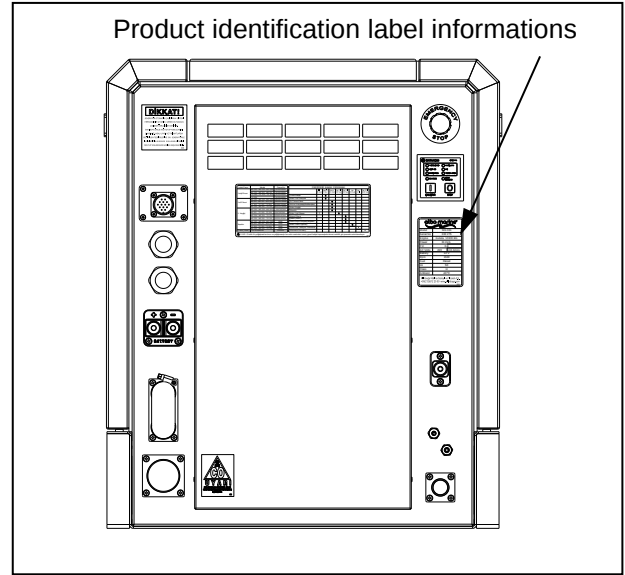


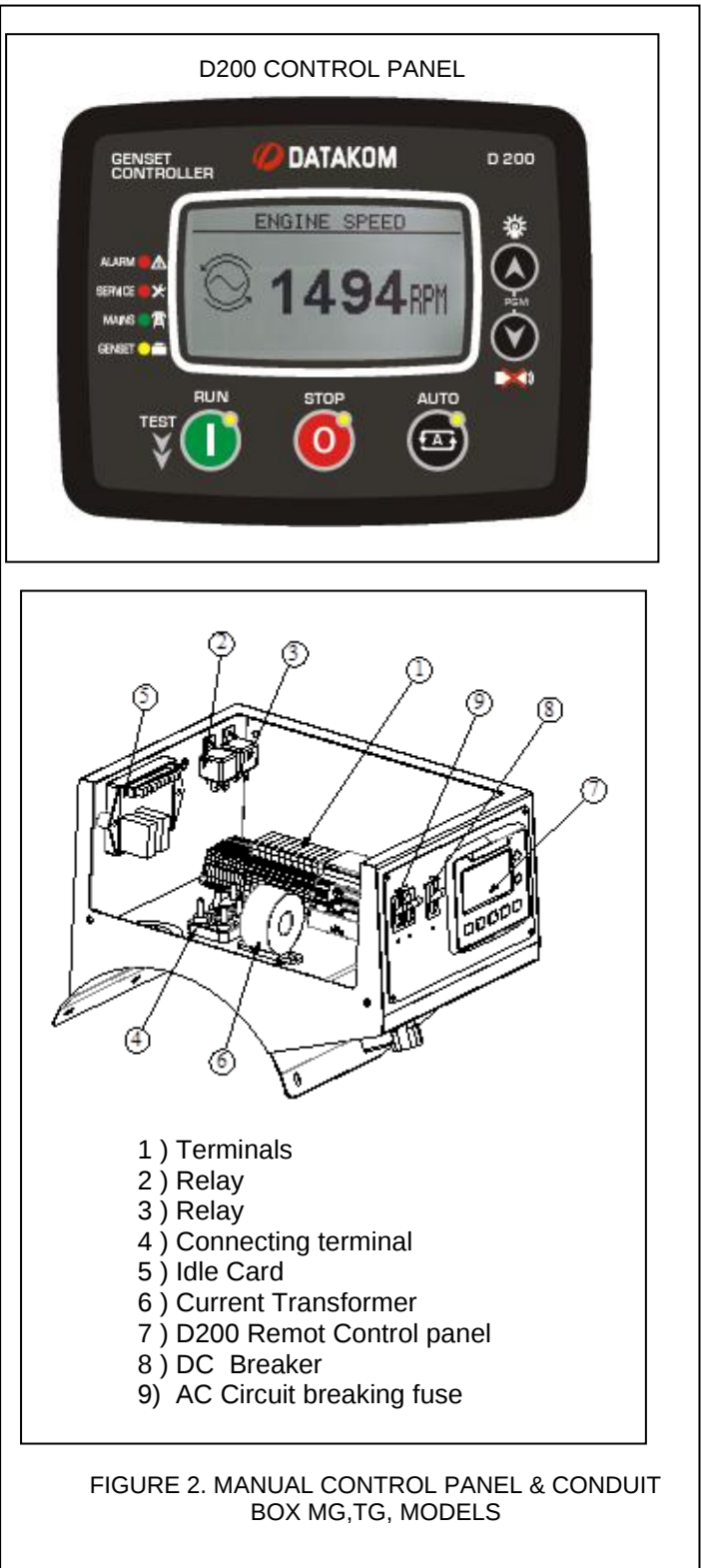
FIGURE 1. POSITION OF THE PRODUCT IDENTIFICATION LABEL

TECHNICAL SERVICES

Important information for your generator set is stated on the product identification label. Please keep serial numbers of your engine-alternator-generator on the product identification label, model of generator set, purchase invoice date and detailed description of your concern-fault-problem with you in written form before contacting for informing about your concern. Contact ALBOSAN MAKİNA SANAYİ TİCARET LTD.ŞTİ. (www.albomarine.com) for part, service and product information using the following phone number: +90 (212) 612 25 00 pbx.

3.Control Systems

Before use, make sure to perform all necessary maintenance and checks. D200 electronic module generator is a microprocessor controlled digital display device that allows both manual and remote control and command. In automatic mode, the device controls the generator set according to the start-stop command (signal) coming from Remote Start (REMOTE START). While the generator is running, it monitors the protections and fault inputs within the device. In case of an error condition, the engine is stopped and the error information is listed as recorded. It is controlled with sensitive keys on the front panel of the device. RUN, AUTO and STOP buttons are determined in the working environment. Other buttons change the changes on the screen, silence the horn and perform lamp test. Error conditions are operated in 3 different systems as ALARM, LOAD SHEDDING and WARNING. The measured values have separately programmed alarm and warning limits. The module is collected with the date-time that initiated more than 400 events and the measurement values at the time of the event. Event records include all generator parameter measurements at the time of the event.



D200 CONTROLLER

Before installation:

- Read the user manual carefully, determine the correct connection diagram.
- Remove all connectors and mounting brackets from the unit, then pass the unit through the mounting opening.
- Put mounting brackets and tighten. Do not tighten too much, this can brake the enclosure.
- Make electrical connections with plugs removed from sockets, then place plugs to their sockets.
- Be sure that adequate cooling is provided.
- Be sure that the temperature of the environment will not exceed the maximum operating temperature in any case.

Below conditions may damage the device:

- Incorrect connections.
- Incorrect power supply voltage.
- Voltage at measuring terminals beyond specified range.
- Voltage applied to digital inputs over specified range.
- Current at measuring terminals beyond specified range.
- Overload or short circuit at relay outputs
- Connecting or removing data terminals when the unit is powered-up.
- High voltage applied to communication ports.
- Ground potential differences at non-isolated communication ports.
- Excessive vibration, direct installation on vibrating parts.



Current Transformers must be used for current measurement.

No direct connection allowed.

Below conditions may cause abnormal operation:

- Power supply voltage below minimum acceptable level.
- Power supply frequency out of specified limits
- Phase order of voltage inputs not correct.
- Current transformers not matching related phases.
- Current transformer polarity incorrect.
- Missing grounding.

D 200 CONTROL PANEL



When the engine hours **OR** the time limit is over, the **SERVICE REQUEST** led (red) will start to flash and the service request output function will be active. The service request can also create a fault condition of any level following parameter setting.

The service request output function may be assigned to any digital output using **Relay Definition** program parameters. Also relays on an extension module may be assigned to this function.



To turn off the **SERVICE REQUEST** led, and reset the service period, press together the **ALARM MUTE** and **LAMP TEST** keys for 5 seconds.

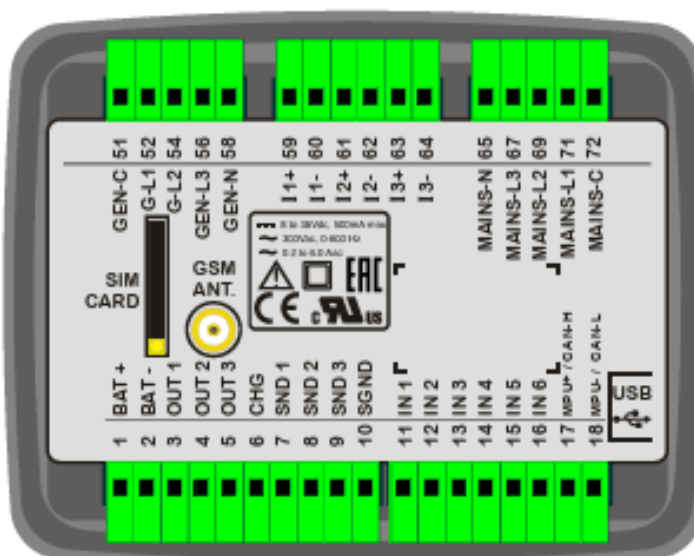


FIGURE 3. ALBOMARINE D200
ELECTRONIC CONTROL PANEL

4.Operation

FUEL SPECIFICATIONS

⚠WARNING : *Diesel fuel is a flammable substance. As a result of uncontrolled ignition or combustion of the fuel may cause material damages, and the damages thus occurred may cause serious injuries, and even lethal accidents. Do not smoke near fuel tanks or fuel combustion equipment or any area that shares the ventilation system with this equipment. Keep flames, sparks, pilot lights, electrical arcs, and any other igniters like switches operated electrically away from these flammable sources and keep a multi-class ABC extinguisher in a close place where you can reach easily during all maintenance and repair work.*

Use diesel engine fuels with the specified specifications conforming to EN 590 or ASTM D975 standards for high efficient usage of the generator set and long engine service life.

Use diesel fuels suitable for using at heavy duty and industrial type diesel engines at high quality NO:2-D S500(LSD) or have the characteristics of S15(ULSD) middle distilled with low volatility at normal temperatures (above -10°C/14°F) for getting high efficiency from engine.

Use diesel fuels suitable for using at automotive and light duty type diesel engines at high quality NO:1-D S500(LSD) or have the characteristics of S15(ULSD) light distilled with high volatility at normal temperatures (below -10°C/14°F) for getting high efficiency from engine.

LSD (LOW SULFUR DIESEL) Diesel fuel with low sulfur grade; diesel fuel that contains sulfur amount lower than 500 ppm or lower than 0.05% of its total weight.

ULSD (ULTRA LOW SULFUR DIESEL) Diesel fuel with low sulfur grade; diesel fuel that contains sulfur amount lower than 15 ppm or lower than 0.0015% of its total weight. Cetane number of the diesel fuel shall not be lower than 45 and sulfur content shall not exceed 0.5% (in total weight). Replace the fuel immediately and ensure that fuel filter is replaced in case of noticed if a fuel not conforming to these standards is used.

Oil lubrication specification shall exceed maximum load level of 3100 gram as measured by ASTM D6078 or shall exceed a maximum diameter of 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

Note: Ultra Low Sulfur Diesel (ULSD) fuel with lubrication specifications conforming with ASTM D975 standard level is suitable to be used in this engine.

Note: B5 Bio-Diesel fuel conforming with the industrial standards and quality is suitable to be used in this engine.

ENGINE COOLANT

Use high quality ethylene glycol (antifreeze) solution. Antifreeze usage protects the engine against freezing, boiling, corrosion, rusting, cavitation and abrasion. Antifreeze content that will allow operation of engine with high efficiency in ideal operating temperatures shall be formulated with rust inhibitors and coolant stabilizers. Engine coolant mixture is recommended as 50% to 50% distilled water and ethylene glycol (antifreeze) mixture. This mixture is recommended to prevent the engine from freezing when external environment temperature is down to - 34°F (-37°C).

Use distilled fresh water with a low amount of minerals and abrasive chemicals for the coolant mixture.

⚠WARNING : *Ethylene Glycol (antifreeze) is accepted in class of poisonous waste materials. If needed destroy in conformity with the local and legal regulations for dangerous materials.*

ENGINE OIL

Use at high quality engine oils. Make selections proper the following specifications with the diesel engine lubrications oils. You can obtain high performance from your engine in this way. You can increase the service life of your engine and lower your operating costs with regular maintenances and engine oils with the correct specifications.

Engine oil performance standards are determined by some organizations and these standards are also accepted by the engine manufacturers. Use engine oils conforming to API (American Petroleum Institution) Service Category CI-4 specifications minimum or better in your engine. Also, look for SAE (Society of Automotive Engineers) viscosity grade. Refer to Figure 5 to select viscosity grade according to ambient temperatures. Multi-grade oils like SAE 15W-40 is recommended for using all year long.

BATTERY ASSEMBLY

Operate your generator set with battery with proper current & powers. Operating safe and long service life of your starter motor and generator set depends on selecting a suitable battery assembly capacity and performing regular maintenances of your battery assembly. See MAINTENANCE OF THE BATTERY AND BATTERY CONNECTIONS (Page 5-3)

FIRE EXTINGUISHING INLET (FOR GENERATORS WITH CABIN)

In case of a fire:

- DO NOT open the noise isolation covers of the generator set.
- Stop operating of the generator if it is possible. If possible, cover all spaces that can take air inside that around voice isolation cabin. Certainly turn off all other running engines and devices, too. Put in all of nozzle of fire extinguisher to label on placed generator and interfere the fire by spraying all of fire extinguisher. Use the fire extinguisher by passing from marked point on fire extinguishing warning label that placed generator sets with cabin when it is necessary. (Figure 6)

⚠ WARNING : *Check whether the output hose of the extinguisher to be used in a fire is matching the marked hole in advance.*

Extinguisher shall be gas type. Use multi-class ABC extinguishers to respond against generator fires. Class A fires are caused by ordinary combustible material like wood and rags; Class B fires are caused by quickly flammable and combustible liquid and gas fuels; Class C fires are caused by energized electrical equipment. (ref. NFPA No.10).

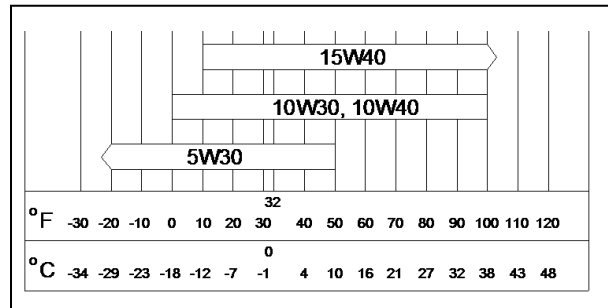


FIGURE 5. OIL VISCOSITY LEVEL AND AMBIENT TEMPERATURE

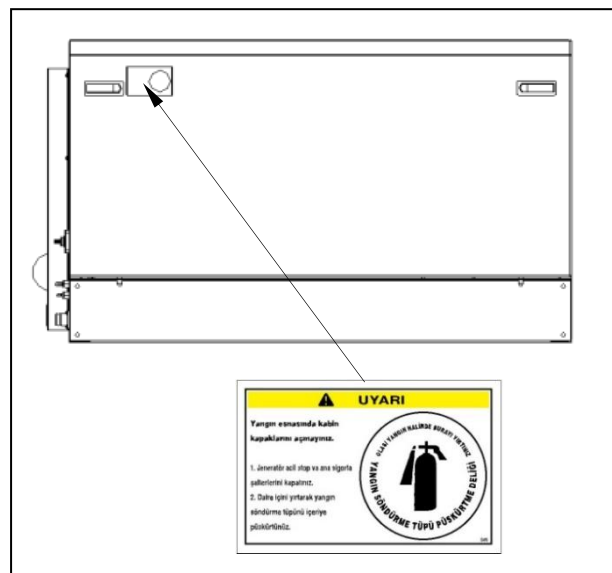


FIGURE 6. FIRE EXTINGUISHING INLET

PRE-OPERATION CHECKS

⚠ WARNING : Exhaust gas is lethal. The exhaust of all engines contains carbon monoxide (CO); this odorless, colorless and poisonous gas cause unconsciousness and death in a short time.

The symptoms of carbon monoxide (CO) poisoning are given below:

- Dizziness
- Headache
- Nausea
- Weakness and sleepiness
- Vomiting
- Losing consciousness

IMMEDIATELY GET INTO OPEN AIR IF YOU ENCOUNTER ANY OF THESE SYMPTOMS. Ask for medical attention if the symptoms are continued. Stay in open air until you get medical attention.

Always check the exhaust system visually and manually before any work. Inspect and check entire exhaust system for leaks every time you operate the generator and every eight hours of operation. Do not operate the generator set until the leak is repaired. Installation of the exhaust system shall always be performed according to the instructions of the manufacturer.

Check the generator set as specified in GENERAL MAINTENANCE (page 5-1) section before daily operation and after every eight hours of operation.

1. Ensure that all carbon monoxide (CO) detectors on your vessel are in operating condition.
2. Check if there are any swimmers on the sea who can be subject to the exhaust and warn them.
3. Close the switches of all electrical loads.

PREPARATION OF THE FUEL SYSTEM FOR USING

Fuel system shall be prepared for operation after the fuel filter is changed or fuel of generator system is out. Remove the lead terminals after turn off your generator to prepare your fuel system. While you are opening terminals of the battery cables to decrease any arcs, always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly.

OPERATING THE GENERATOR SET

Generator set may operate or stop by electronic control panel.

Operating the Generator Set By the D200 Control Panel

- 1- Bring the control switch on panel placed on the generator set to MANUAL position, press on 2 – 3 seconds start switch for sending starting signal and so generator will be running. (Page 3-1, Figure 2)
- 2- For a longer service life, wait for 2 to 3 minutes the heating of the engine before connecting to the A/C and other high electrical loads.
- 3- Check for any engine coolant, fuel and exhaust leaks. Immediately stop the generator set if there is any leak. Repair the leakages immediately in a proper way. Do not operate your generator before repairing the leaks that may occur on connection points, hoses and pipes.
- 4- Fault lamp will be burn on the panel if the generator set cannot be operated. See the Troubleshooting section, and perform necessary maintenance and repairs. Contact ALBOSAN MAKİNA SANAYİ TİCARET LTD.ŞTİ (www.albosan.com.tr) for consulting with the authorized service personnel on the resolution using the following phone number: +90(212) 612 25 00 pbx.

Stopping the Generator Set

Always turn off all electrical loads before stopping the generator. Generator shall be operated for 2 minutes with no load, then turn the control switch to STOP position, display status lamps of the generator set will be burn out and engine will be stop.

Stopping the Generator Set

Turn off all electrical loads before stopping the generator. Generator set shall be operated for 2 minutes with no load, then press the “STOP” button on the Electronic Control Panel. Engine will stop 5 seconds later.

EMERGENCY STOP BUTTON

When your generator set with cabinet on your vessel shall be turned off in an emergency conditions, press the “Emergency Push Button” to stop the generators with cabinets. (Figure 7) For models without cabinets, turn the AC CIRCUIT BREAKER on the left side of the control panel to OFF position. After performing all necessary repairs, turn the emergency stop switch to “ON” position to allow operation of the generator set.

LOADING THE GENERATOR SET

Considering that you will use the power generated by your generator to supply for the electrical loads of the equipment in your vessel, check the electrical loads of your equipment in the sample table below. (Table 1)

Equipment in your vessel shall be precisely evaluated. If the total used electrical load determined, you shall select min. 5–10% more of this value as the generator output considering the remaining part as a safety share.

If the electrical load on your vessel exceeds the generator power, AC CIRCUIT BREAKER FUSE on the generator is turned “OFF”. To resolve the faults or negative conditions caused by overloading, it may be necessary to turn off some equipment that is supplied by the generator. After performing this operation while your generator set is turned off, turn the AC CIRCUIT BREAKER FUSE “ON” to operate your generator again.

The sum of the power values (kW) of the equipment supplied by the generator on your vessel specified on the product labels or the sum of the values obtained by the multiplication of the current (A) values and voltage (V) values shall not exceed 80-90% of the generator power. After starting you generator, it would be wise that you activate the engines, air conditioners or equipment with higher power first, and then the equipment with lower powers respectively.

Another important point in generator selection is that the sum of the instantaneous current load values of the equipment that will be operated in your vessel shall not exceed the current values that your generator may generate.

Generator set is nominal in standard pressure, humidity and temperature conditions (Ref. ISO 3046). Both low pressure and high ambient temperature decreases the engine power. It would be necessary to operate the generator with lower loads in these conditions.

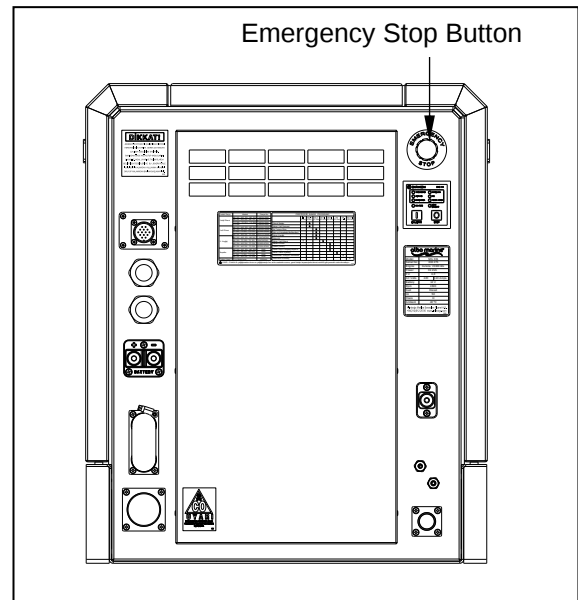


FIGURE 7. EMERGENCY STOP BUTTON

Device	Load (watts)
Air Conditioner	1400-2000
Battery Charger	Up to 3000
DC Inverter	300-700
Refrigerator	600-1000
Microwave Oven	1000-1500
Toaster	1000-1500
Electric Heater	350-1000
Kettle	1000-1500
Iron	500-1200
Hair Drier	800-1500
Coffee Machine	550-750
TV	200-600
Radio	50-200
Hand Drill	250-750
Vacuum Cleaner	200-500
Electric Blanket	50-200
Lamp	75-100
Deep Freezer	400-1000

TABLE 1. ELECTRIC LOADS OF THE DEVICES

NO-LOAD OPERATION

Minimize the no-load idle operation time of the generator as much as possible. Fuel may not ignite efficiently during the initial start as the engine is cold. This may cause excessive smoke in the exhaust. Load value that the generator may operate most efficiently is between 25% and 75%.

CIRCUIT BREAKER FUSES

When the AC or DC circuit breaker fuses turned "OFF" for any reason, its reasons shall be examined in detail. The reasons of the fault shall be resolved by authorized personnel. Possible reasons include:

Circuit breaker may have used a load current very much above its capacity. In this case, review the load values and decrease the load.

Capacity of the circuit breaker fuse low, review your current capacities by the load values used and choose a circuit breaker with a suitable capacity. Your electrical equipment shall be used and maintained properly. Proper grounding shall be provided to prevent any short circuit due to grounding.

⚠ WARNING : Short circuits in the electrical equipment may cause fires or electric shock that may cause serious personal injuries or death. Electrical equipment and systems shall be properly grounded and maintained to be protected from short circuits.

CONNECTING TO THE COASTAL POWER

Using the power generated by the generator at the same time with coastal (dock) power or any electric power source from a fixed point shall be prevented as the encounter of these powers will cause danger. To prevent encounter of the generator power of your sea vessel and coastal power an approved changeover switch shall be available in the electrical installation of the vessel.

⚠ WARNING : Feedback to coastal (dock) supply may cause damage on the vessel equipment and electric shocks that may result as serious personal injuries or death. To prevent encounter of the generator power of your sea vessel and coastal power an approved changeover switch shall be available in the electrical installation of the vessel

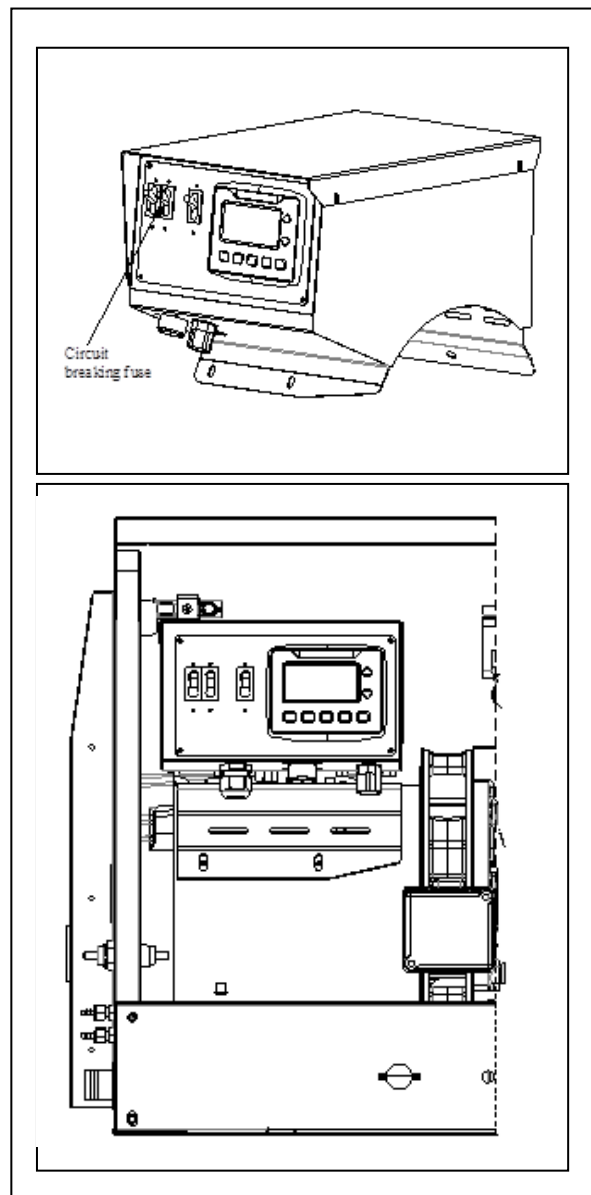


FIGURE 8. CIRCUIT BREAKER FUSES

OPERATING AGAINST FREEZING DANGER

When your vessel or generator set will not be used for a long time (Page 5-10), drain the waters in Engine Coolant Exchanger, siphon kit and muffler before these waters are frozen by the cold water as frozen water may damage siphon kit, muffler and condensers on Engine Coolant Exchanger.

MAINTENANCE OF A NEW OR OVERHAULED ENGINE

Avoid using your generator in no-load condition as much as possible. Replace the engine oil and oil filter after first 50 hours of operation. (Page 5-3)

STAND BY OPERATION OF THE GENERATOR SET

Operate your generator set with a load rate of 25 to 75% for 1 hour per month. Prefer long operations in long period against frequent short operations. Regular operation of the generator set removes the humidification in the engine, lubricates the engine, removes deposited particles in the fuel system and prevents oxidation in electrical systems. As a result, engines operated regularly may operate more efficiently and may have a longer service life.

Storing conditions for the generator set

1. First, replace the oil in the oil pan and oil filter with engine oil with proper specifications to protect the engine. Place a label indicating the viscosity of the protective oil you use and oil replacement date on the engine in a visible position. (Page 4-2)
2. Operate the engine for a short time. This fill the lubrication ducts with new protective oil. This is required for providing long term protection conditions.
3. Check the Engine coolant level, and add coolant with proper antifreeze mixture or replace all coolant when required.

⚠ WARNING: Engine Coolant that is under pressure when the engine is just stopped. It may cause serious injuries when the pressure cap is released. Wait until the engine is cooled adequately before releasing the pressure cap.

4. Drain the coolant in Engine Coolant Exchanger, siphon kit and muffler if the generator will have freezing temperatures.
5. Turn off all fuses in the generator set.
6. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to decrease any arcs when you are disconnecting the battery cables. Disconnect the battery cables entirely and store the battery as per the recommendations of the manufacturer. (Page 5-3)
7. Release the PTO clutch, if it is equipped.
8. Clean the components that may get rusty, and lightly lubricate them.

Check List Of the Generator Delivered By The Service

1. Check the oil label on the generator set. Replace your engine oil with engine oil that has a suitable viscosity grade for the required temperatures if your engine oil is not suitable for the usage area and conditions. See ENGINE OIL RECOMMENDATIONS. (Page 4-2)
2. Check the battery assembly connections again. Connect the cables ensuring that the negative (-) battery cable is connected last. See MAINTENANCE OF THE BATTERY AND BATTERY CONNECTIONS. (Page 5-3)
3. Replace the sea water pump internal gear of the generator set returned from the service, if the gear is used longer than a year. (Page 5-9)
4. Perform the required maintenance, perform pre-operation checks and prepare the fuel system. (Page 5-1)
5. Operate the generator set for a short time at idle.
6. Turn the circuit breaker fuse of the generator set "ON" and operate the generator by gradually increasing the load.

5. Periodical Maintenance

It is possible to obtain best performance and efficiency that will allow it operates for a long time from your generator set if the periodical maintenances are performed regularly. Technician carrying out the periodical maintenance shall have adequate training, information and competency on this subject. Use this manual as a preliminary guide for periodical maintenance. Following the chart showing the repairs and times of these repairs that shall be performed in periodical maintenances will increase the operating performance and efficiency of the generator.

It is mandatory that all repairs and maintenance works for the generator set is performed by authorized service technician as in written form in the warranty period and conditions specified by Albosan Mak. San. Tic. Ltd.Şti. since purchasing date

Generator sets that cannot provide these conditions shall be considered out of warranty cover.

Keep the written records of all maintenance work performed by authorized personnel to ensure that the maintenance work of the generator set is performed regularly and to ensure follow-up in warranty requests.

Maintenance, replacement or repair of generator diesel engine emission control devices and systems used out of warranty cover may be performed by any engine repair organization or personnel. Albosan Mak. San. Tic. Ltd.Şti. is not responsible for any negative conditions and damages occurred in this case.

PERIODICAL MAINTENANCE CHART									
	First 50 Hours	Every day / 8 Hours	Every Month / 100 Hours	Every Year / 200 Hours	Every Year / 500 Hours	Every 500 Hours	Every 2 Years	Every 5 Years / 2000 Hours	Page
General Inspection		●							5-2
Check Engine Oil Level		●							5-3
Drain Water From Fuel Filter			●						5-4
Inspect Battery and Battery Connections			●						5-2
Check V-Belt Tension			●						5-20
Inspect Siphon Break			●						5-10
Change Engine Oil and Oil Filter	●			●					5-3
Replace Fuel Filters					●				5-4
Inspect Zinc Anode					●				5-10
Replace Raw Water Impeller					●				5-19
Adjust Engine Valve Lash						●			-
Replace Coolant,Pressure Cap & Thermostat							●		5-9
Inspect Generator Bearing								●	-
1. Check the oil level in the system, coolant level, diesel fuel system, exhaust system, electric cables, battery and its connections. 2. Follow the battery manufacturer's usage instructions. 3. Check for oil and water leaks, worn components, and loose bolts, worn, torn or cracked parts in the system.									

TABLE 2. PERIODICAL MAINTENANCE CHART

⚠ WARNING : Inadvertent or remote operation of the engine during maintenance and repair work may cause personal injuries or death. Therefore, disconnect battery negative (-) cable to prevent inadvertent operation during repair and maintenance work on the generator set.

GENERAL MAINTENANCE

Always check usage and operation conditions of the generator set every eight hours before starting your generator set for the first time and during its operation.

Oil Level

Always check engine oil level every eight hours before starting your generator set and during its operation (Page 5-3).

Exhaust System

Check for leakages and looseness on all exhaust system drain hose and retaining clamp areas. Replace the damaged parts of the exhaust hose. Tighten loosened clamps on the connection points. Always check all carbon monoxide (CO) detectors. Make sure that the detectors are operating properly.

⚠ WARNING : **EXHAUST GAS IS LETHAL! Do not operate the generator until the exhaust leakages are repaired.**

Fuel System

Check for leakages and looseness on all fuel pipes, fuel filters, and fuel return system pipes and retaining clamp areas. Ensure that the pipes in the fuel system do not rub against the other moving parts in the engine. Cracks and damages on the fuel pipes may cause fuel leakages. These fuel pipes shall be replaced immediately. Do not operate your generator before completing repair of the areas with fuel leakages. Temporarily repair the fuel hoses as per USCG TYPE A1 or ISO7840-A1 standards.

⚠ WARNING : **Fuel leakages may cause fires. Repair the leakages immediately. Do not operate the generator if this causes fuel leaks.**

⚠ DANGER : **Do not smoke in inadequately ventilated areas where fuel vapors may have and do not turn the electrical switches in these areas on/off. Take any equipment that generate flames, sparks and arcs and all other flammable sources away from these areas.**

Engine Coolant Level

Check the coolant level inside the Engine Coolant Expansion tank and re-fill the expansion tank with appropriate coolant up to the "FULL" level when the engine is cold. Engine Coolant Expansion tank is designed to keep coolant level inside the engine fixed during operation. Lack of coolant inside the engine cannot be resolved by filling this tank. If the Engine Coolant Expansion tank is empty, check if there is any leakage in the engine or the connection points. To fill the shortage of coolant inside the cooling system, add coolant of the proper mixture up to the thermostat cover level on the Engine coolant heat exchanger.(Page 5-10). Use water-antifreeze mixture with the specified specifications and ratio (50% Antifreeze 50% Water) when removing the lack of coolant inside the cooling system (Page 4-1).

Sea Water System

Clean the sea water filter if required. Be sure that sea water inlet valve is open before starting the generator set. Check and replace the leaking or damaged hoses.

General mechanical system check

Observe if there is any mechanical damage in the generator set by general inspections. Check whether there are abnormal noises while the generator set is operated. Check whether the bolts of the generator set are not loose. Check whether the inlet and outlet connection points of the generator set is not blocked. Always keep the generator set area clean. Monitor operating condition of the generator set using the digital display of the electronic remote control panel that is used in applicable models after starting the generator set.

MAINTENANCE OF THE BATTERY AND BATTERY CONNECTIONS

⚠ WARNING : Stop the generator before starting any work on the battery. Ventilate the area and around the area where the batteries are placed in proper conditions. Always wear safety goggles. Battery acid is very corrosive, be very careful. Do not smoke while you are working.

Take any equipment that generate flames, sparks and arcs and all other flammable sources away from these areas. Explosions, fires and damages that may occur due to this may cause serious injuries, and even lethal accidents. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to decrease any arcs when you are disconnecting the battery cables.

Follow the battery manufacturer's instructions first for the maintenance of batteries. (Page 5-1) Check whether the battery connection points are loose and check for any oxidation. Loose, worn and oxidized connections cause high electrical resistance that leads to rough running of the engine. Before any operation, always:

1. Keep the battery and connection points clean, dry and tight.
2. Always disconnect battery terminals on the ends of battery cables using a proper wrench.
3. Make certain which terminal is (+) and which is (-) before making the battery connections, always disconnect the negative (-) battery cable first, and re-connect the negative (-) battery cable last.

CHECKING ENGINE OIL LEVEL

⚠ WARNING : Engine oil contact may cause intoxication. Avoid direct contact with engine oil and inhale vapors in hot conditions. Use gloves while you are working. Wash any parts of your body that had contact with engine oil.

⚠ WARNING : Low oil level may cause serious engine damage. And excessive oil may cause oil consumption. Always check oil level before starting the engine. Check the oil level in the engine with the dipstick about 10 minutes after stopping the generator. Add oil or drain oil according to the required level.

REPLACEMENT OF ENGINE OIL AND FILTER

Refer to the periodical maintenance chart for regular engine oil replacement. (Page 5-1) Operate the generator set until it reaches the proper operating temperature. Stop the generator and remove the battery negative (-) terminal.

⚠ WARNING : *Inadvertent or remote operation of the engine may cause personal injuries or death. Always disconnect battery terminals before working on the engine. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to reduce any arcs when you are disconnecting the battery cables.*

2. Select a container suitable for the capacity of the oil and open the manual oil pump (Page 5-5, Page 5-6, Page 5-7, Page 5-8) valve, and then drain the oil by moving the pump up and down manually.
3. Close the pump valve. Separate old oil filter with a filter wrench, and clean the filter installation surface.
4. Apply a thin coat of oil to the gasket on the new filter and fill the new filter with some oil so that it can reach engine parts more quickly.
5. Fill with engine oil of a suitable type and amount for the engine. See ENGINE OIL RECOMMENDATIONS (Page 4-2). Check the oil level, and add or drain oil as required. Operate the engine for a few minutes, turn the engine off, and check for proper oil level again.
6. Dispose used oil and oil filter as per the local environmental legislation.

REPLACEMENT OF FUEL FILTER

⚠ WARNING : Diesel fuel is a flammable substance. Uncontrolled ignition or combustion of the fuel may cause material damage, and the damages thus occurred may cause serious injuries, and even lethal accidents. Do not smoke near fuel tanks or fuel combustion equipment or any area that shares the ventilation system with this equipment. Keep flames, sparks, pilot lights, electrical arcs, and any other igniters like switches operated electrically away from these flammable sources and keep a multi-class ABC extinguisher in a close place where you can reach easily during all maintenance and repair work.

Prevent the fuel system from ingress of dirt, water and other foreign materials.

Cleaning the water and residues:

Generator set may have a fuel filter with water-fuel separator. Check the fuel filters with water-fuel separator for water build-up. If the fuel quality is low and condensation is inevitable, drain water and residues more times than it is scheduled. Dispose water and residues as per the local environmental legislation.

Replacing Fuel Filters:

Refer to the periodical maintenance chart for regular fuel filter replacement. (Page 5-1). Replace fuel filters if the engine does not provide required power after the necessary checks.
(Page 5-5, Page 5-6, Page 5-7)

1. Stop the generator and remove the battery negative (-) terminal.
2. Always close the fuel rails supplying the engine.

 WARNING : *Inadvertent or remote operation of the engine may cause personal injuries or death. Always disconnect battery terminals before working on the engine. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to decrease any arcs when you are disconnecting the battery cables.*

3. After removing the old filter on the engine with a filter removal wrench, dispose the filter as per the local environmental legislation.
4. Clean the contact surface on the filter fitting on the engine. Apply a thin coat of oil to the gasket on the new filter and install the new filter gasket manually without damaging it. Tighten the required clearances with the filter wrench.
5. Prepare the engine to fill the new filter for 30 seconds minimum. Operate the generator set and check for leaks. Tighten the filter a little more if it is necessary.

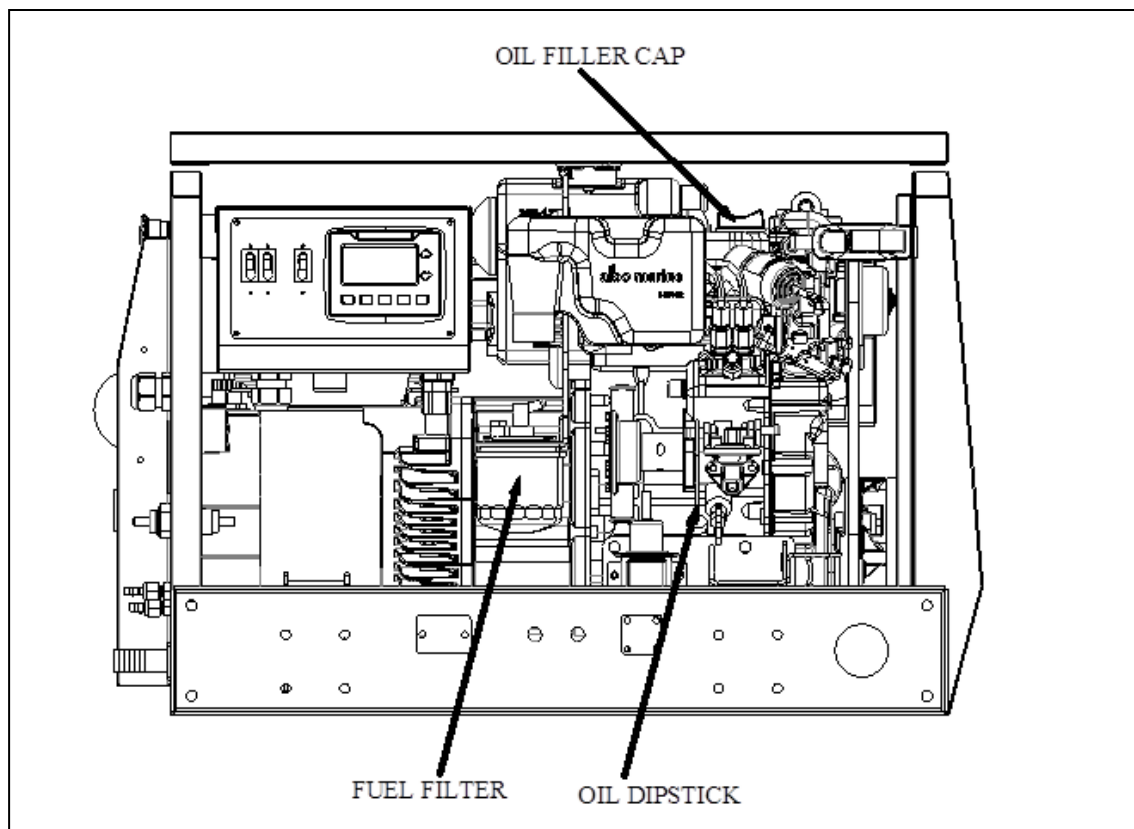


FIGURE 9. FUEL FILTER OIL FILTER AND SERVICE POINTS - MN 305

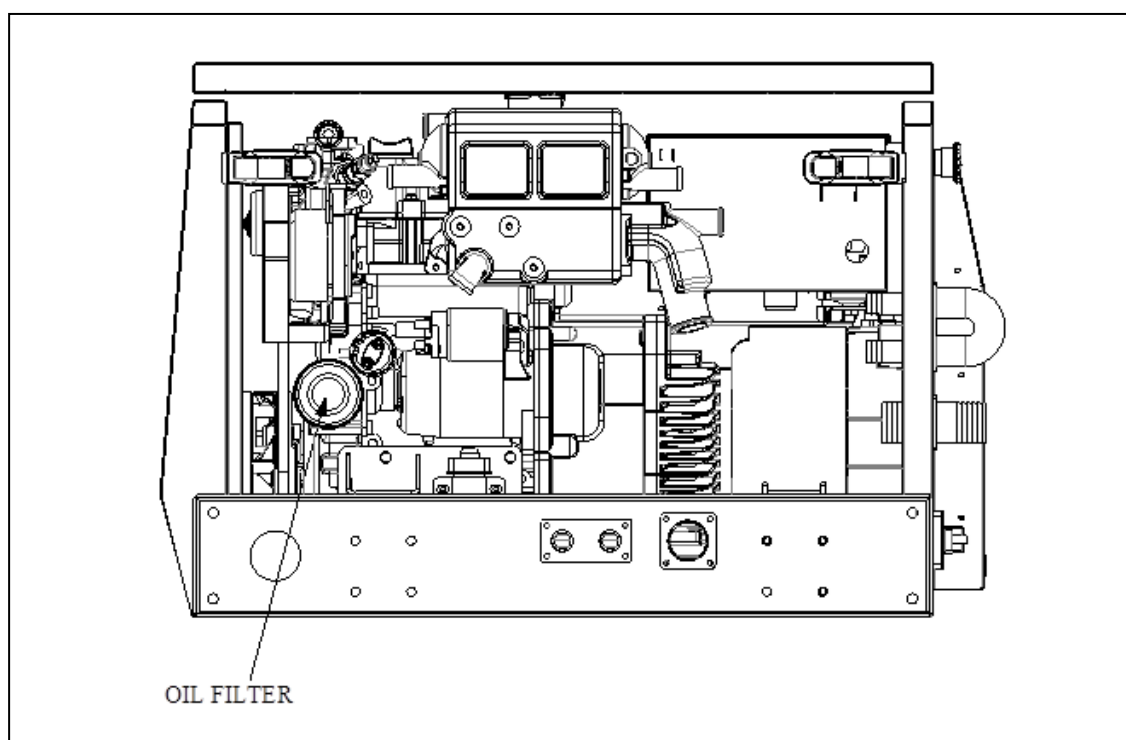


FIGURE 10. FUEL FILTER OIL FILTER AND SERVICE POINTS - MN 305,

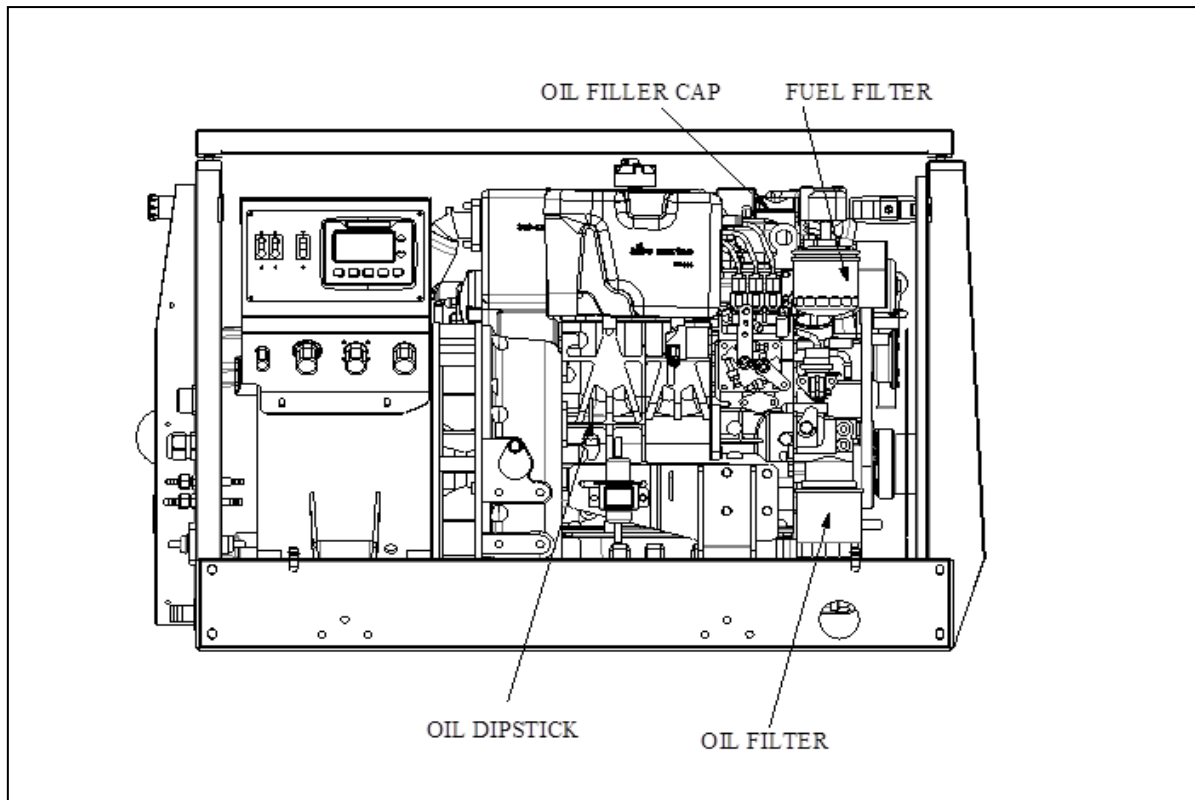


FIGURE 11. FUEL FILTER OIL FILTER AND SERVICE POINTS - MG 307,MG311, TG 309,TG313

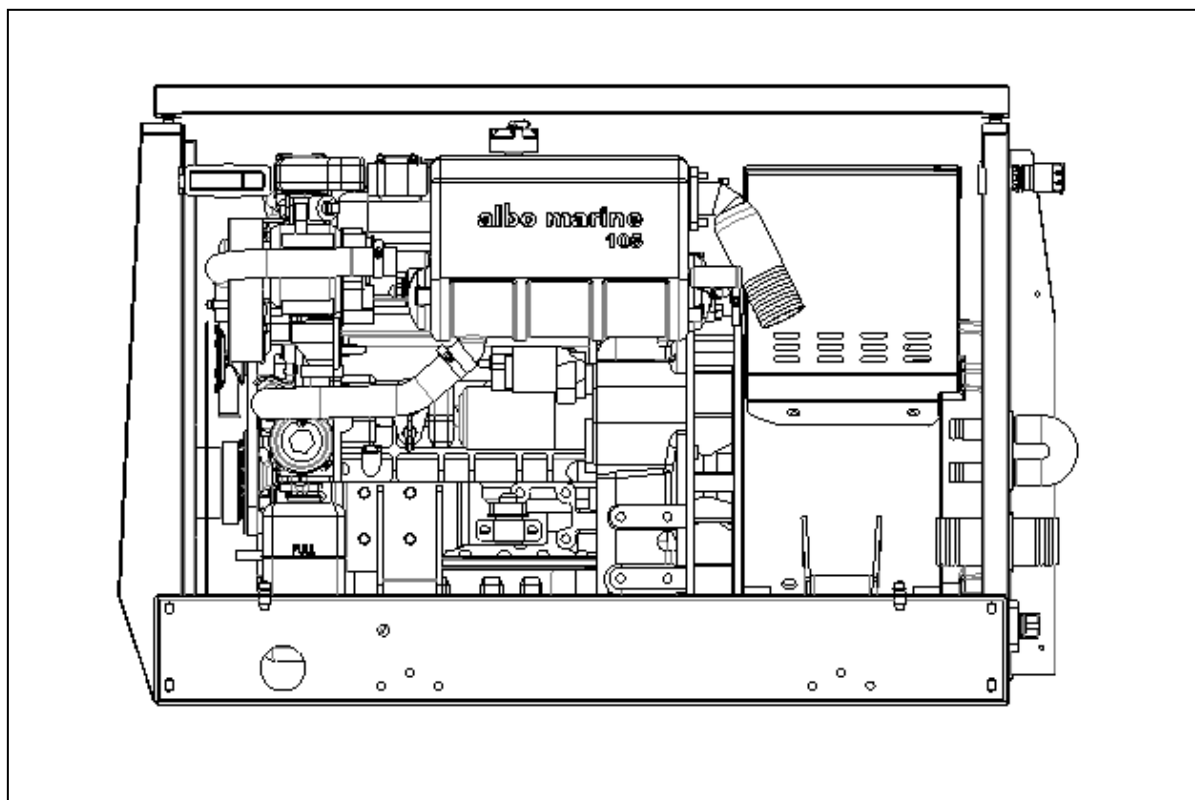


FIGURE 12. FUEL FILTER OIL FILTER AND SERVICE POINTS - MG 307,MG311,TG 309,TG313

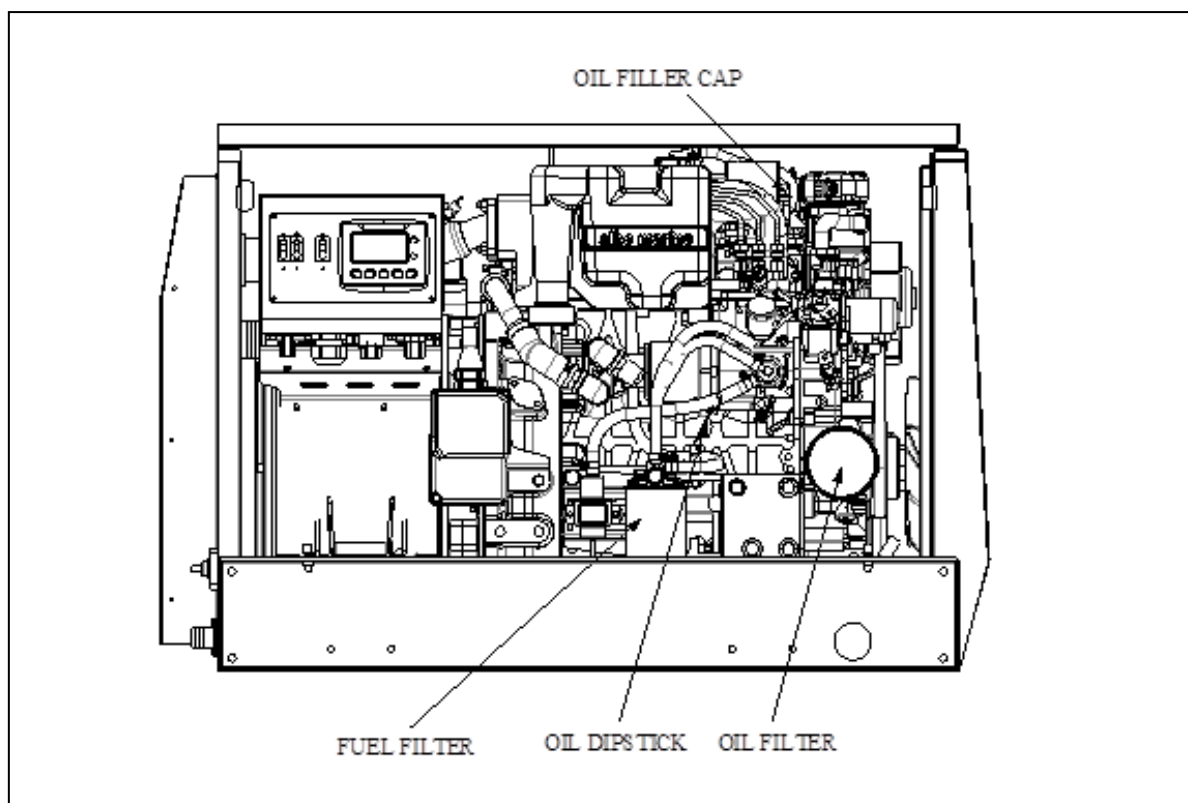


FIGURE 13. FUEL FILTER OIL FILTER AND SERVICE POINTS - MG 312, MG316, MG318, TG 314, TG320, TG323

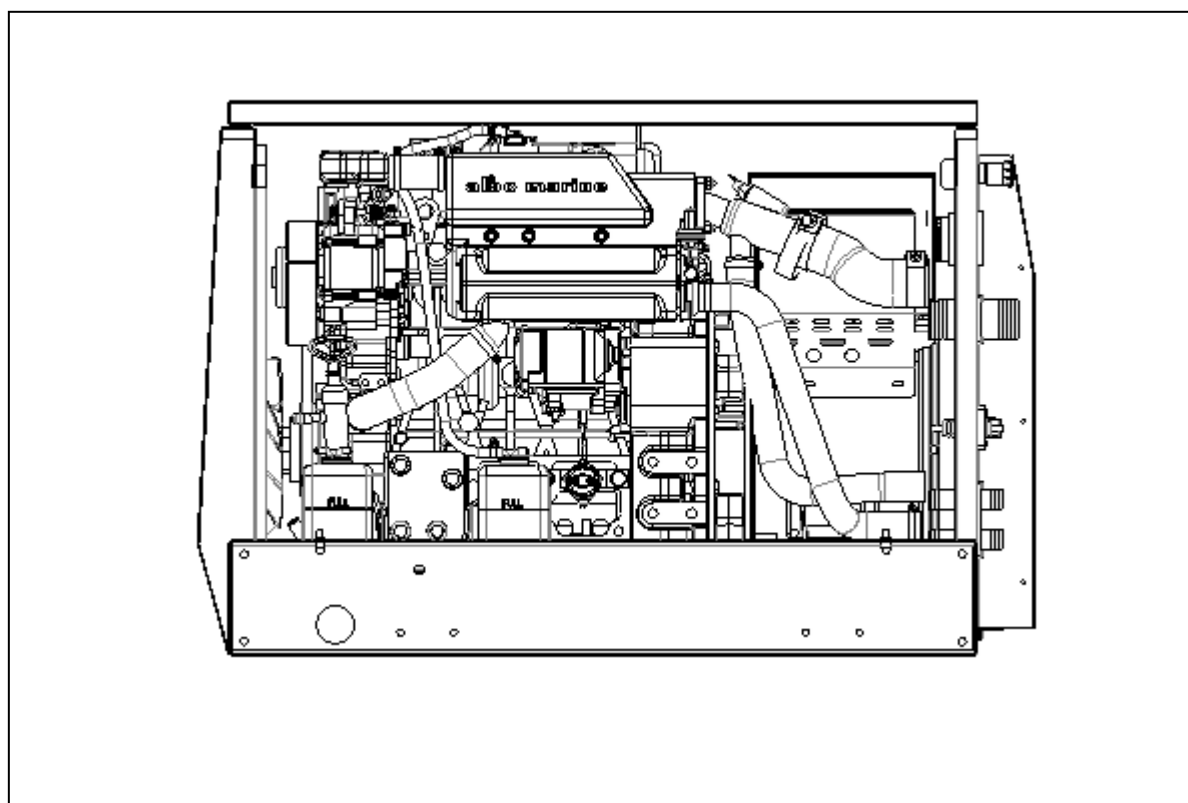


FIGURE 14. FUEL FILTER OIL FILTER AND SERVICE POINTS - MG 312, MG316, MG318, TG 314, TG320, TG323

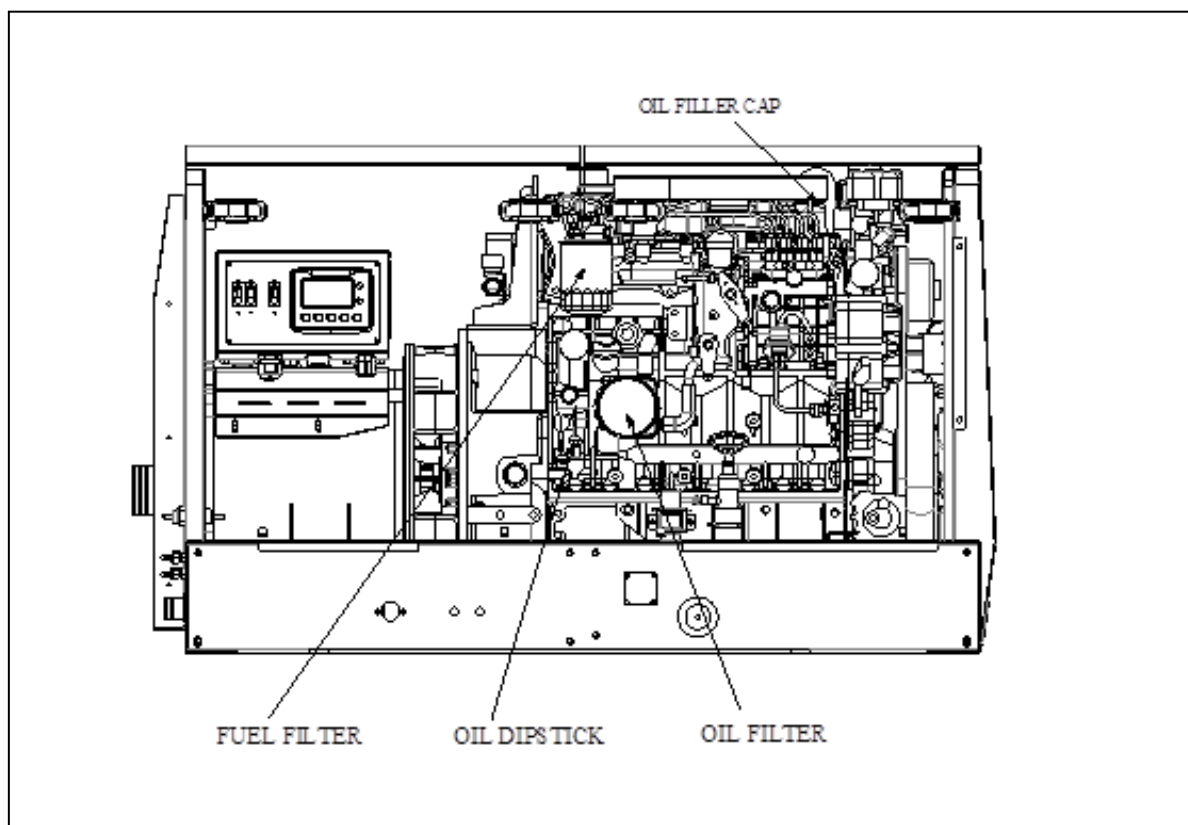


FIGURE 15. FUEL FILTER OIL FILTER AND SERVICE POINTS - MG 324, TG 330,TG343

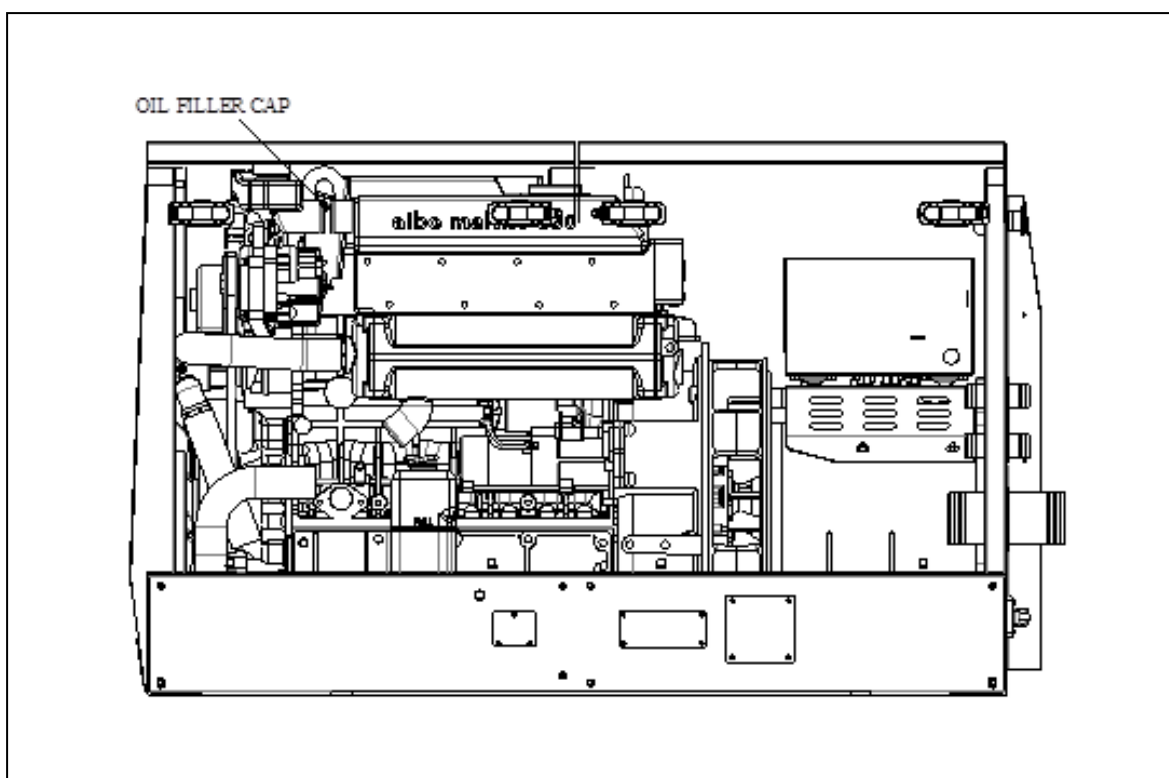


FIGURE 16. FUEL FILTER OIL FILTER AND SERVICE POINTS –MG324, TG330 , TG 343

MAINTENANCE OF ENGINE COOLING SYSTEM

Refer to the periodical maintenance chart. (Page 5-1 -Table 2). Perform necessary interventions in the intervals specified in the chart.

Reviewing the Cooling System

The body of the engine is cooled with a fluid containing antifreeze mixed with water in proper amounts inside a pressurized system closed to external conditions. (Page 5-11, Figure 16 and ff). This coolant is supplied to the suitable ducts inside the engine block by the circulation pump with a low temperature and takes the heat load in these areas which have a high temperature, and then enters the Engine Coolant Heat Exchanger area. Hot coolant circulating inside the engine and cold sea water taken via the gear pump from the sea meet here in the surfaces of coil pipes inside the exchanger. Heat is transferred from the hot section to the cold section without mixing the fluids, and thus the coolant circulating inside the engine is cooled. Heated sea water is discharged with the exhaust.

Recommended Coolant Mixture

Refer to the ENGINE COOLING section (Page 4-1) for recommendations.

Replenishing Normal Amount of Engine Coolant Loss

During the first operation of the generator set, check the coolant level inside the Engine Coolant Expansion tank and re-fill the expansion tank with appropriate coolant up to the "FULL" level when the engine is cold.

Engine Coolant Expansion tank is designed to keep coolant level inside the engine fixed during the operation. Lack of coolant inside the engine cannot be resolved by filling this tank. If the Engine Coolant Expansion tank is empty, check if there is any leakage in the engine or the connection points. To fill the shortage of coolant inside the cooling system, add coolant of the proper mixture up to the thermostat cover level on the Engine coolant heat exchanger. Use water-antifreeze mixture with the specified specifications and ratio when the lack of coolant inside the cooling system.

Thermostat

Replace the thermostat on the Engine Coolant heat exchanger every two years. Proper cooling system pressure of the thermostat (7 psi) is necessary for optimum engine cooling and minimum cooling loss.

Engine Coolant Hoses

Check the hoses that carry the coolant and fluids and replace any leaking or damaged hoses.

Draining and Cleaning the Cooling System

Prepare towels and draining containers to drain and clean the system, collect the coolant in a covered containers with a suitable capacity and dispose according to the legislation.

⚠ WARNING : *Filling a cold coolant to the hot engine may cause cracks on the manifold, body and block. Always follow manufacturer's instructions for this type of work.*

Refilling the Cooling System

Close the engine block and Engine Coolant Heat Exchanger drainage valves (Page 5-11, Figure 16 and ff) Fill the engine coolant with proper mixing ratio to the engine according to its capacity (Page 4-1). Fill the coolant slowly. Wait for air bubbles that may occur inside the engine to come out. Operate the engine to allow that the air bubbles that may occur inside the engine come out and continue to refilling the coolant after stopping the engine. Add engine coolant as required. Fill the expansion tank till the max. point coolant that may be required by the engine at final check.

⚠ CAUTION : *Low engine coolant level may cause serious engine damage. Make sure that the system is filled.*

Heat Exchanger (Condenser)

Engine coolant tank (cooler) and heat exchanger (condenser) has covers. (Page 5-11, Figure 16 and ff)

If the engine continues to stop, clean the heat exchanger pipes and covers. If there is a freezing danger, drain the heat exchanger when the generator set is not operated or stored. (Cold water may damage the water pipes in the heat exchanger.)

Zinc Anode

Apply the zinc anode with gear filling compound on zinc plug and drain the plugs (Page 5-1, Table 2) and remove the cover gasket if the old ones are torn.

Siphon Kit

Replace and clean the siphon kit in the intervals specified in Periodical maintenance chart (Page 5-1, Table 2). Install siphon kit 30 cm over the sea water level when the generator set is under the sea water level during the installation. Make sure that the free check-valve inside siphon kit is cleaning of dirt and residues and operativeness during periodic maintenances. Always check the water drained from the exhaust outlet after every operation of the generator set. Stop the generator if no water is coming out. Perform the necessary checks. Contact authorized service if this condition is continued.

⚠ WARNING : *If a siphon kit is not maintained regularly, this may cause water ingress to the engine, and generator set is taken out of warranty cover in this condition.*

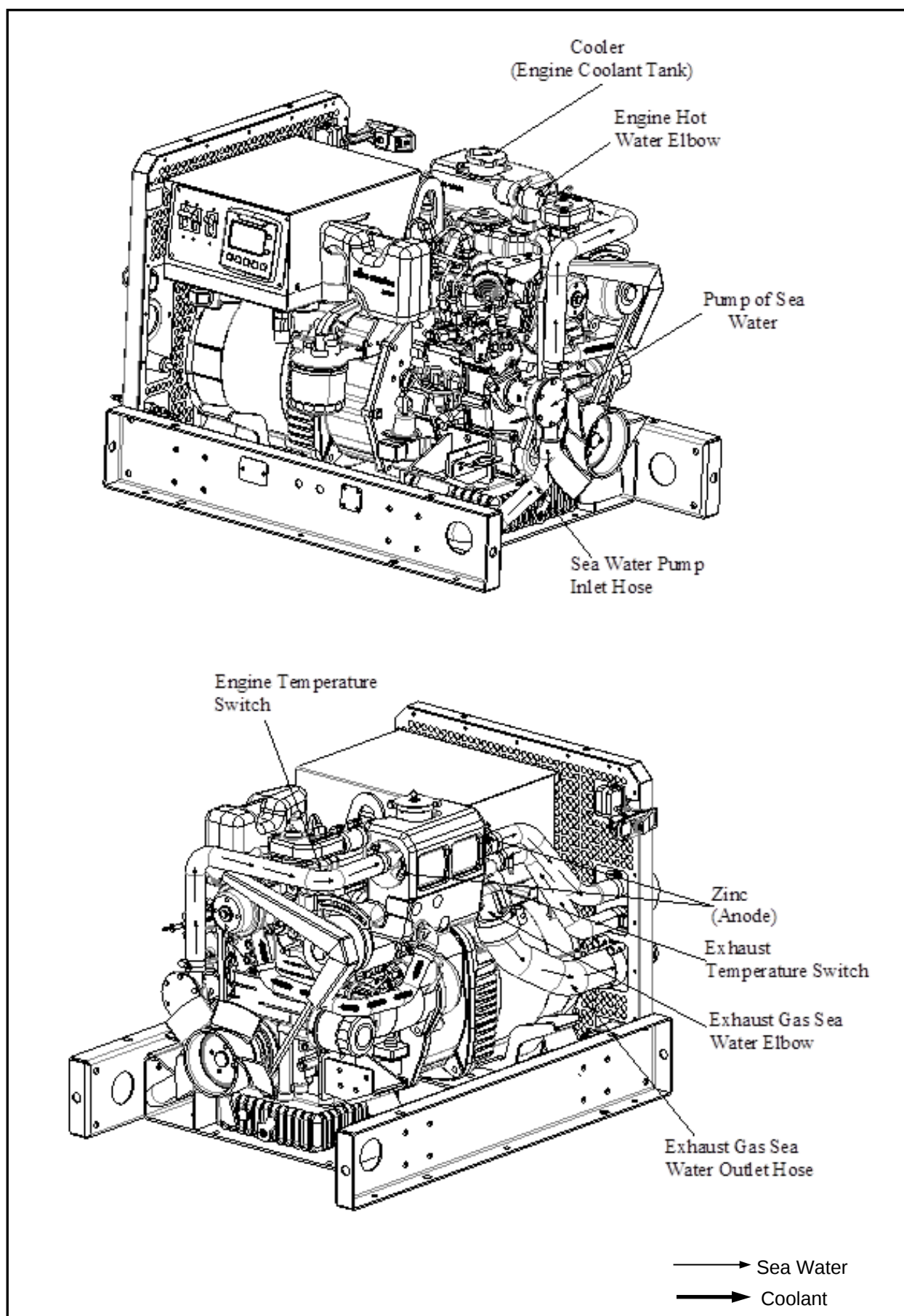


FIGURE 17. ENGINE COOLING SYSTEM - MN 305

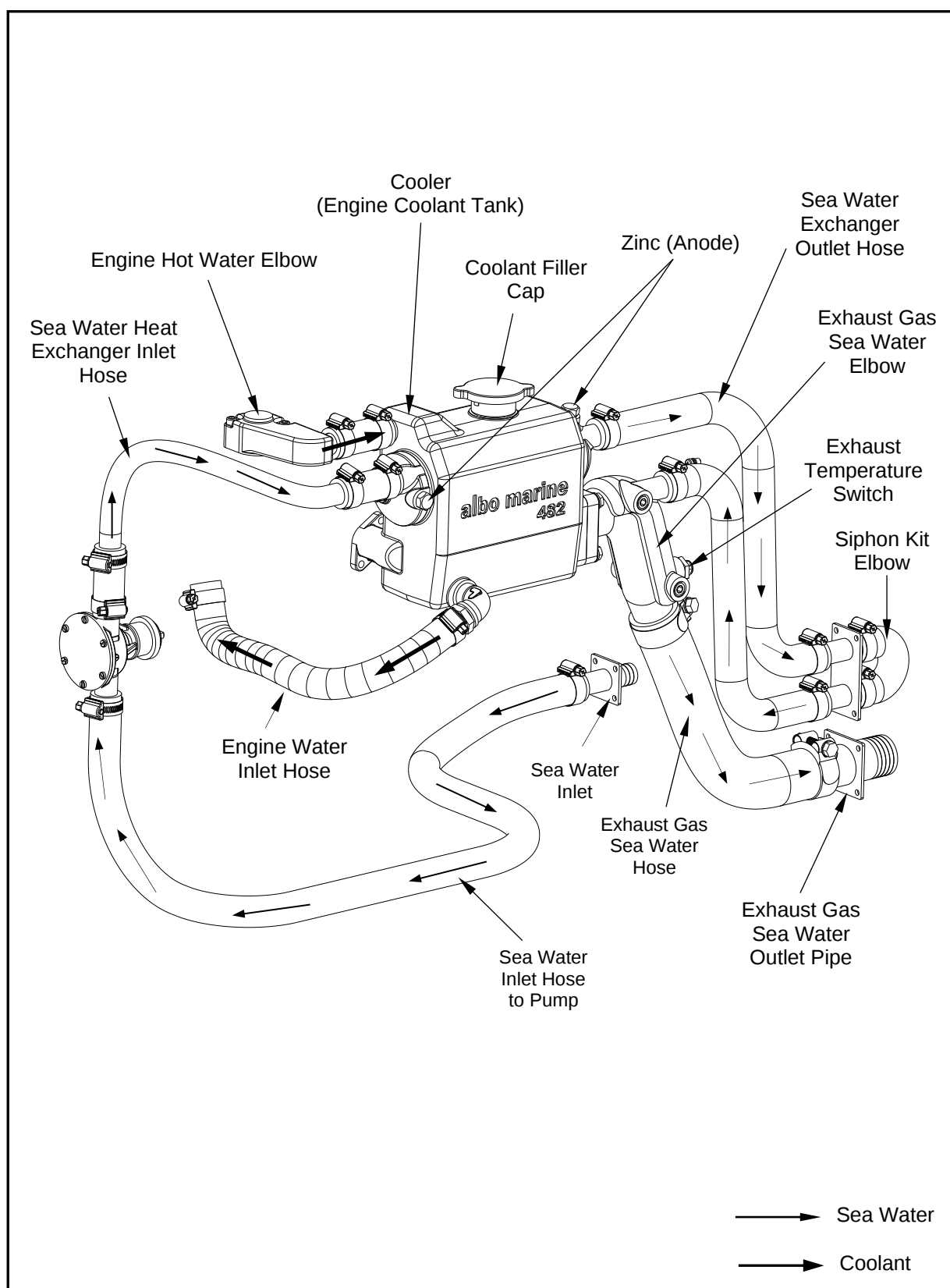


FIGURE 18. ENGINE COOLING SYSTEM (COOLER, SEA WATER PUMP, HOSES)
MN 305

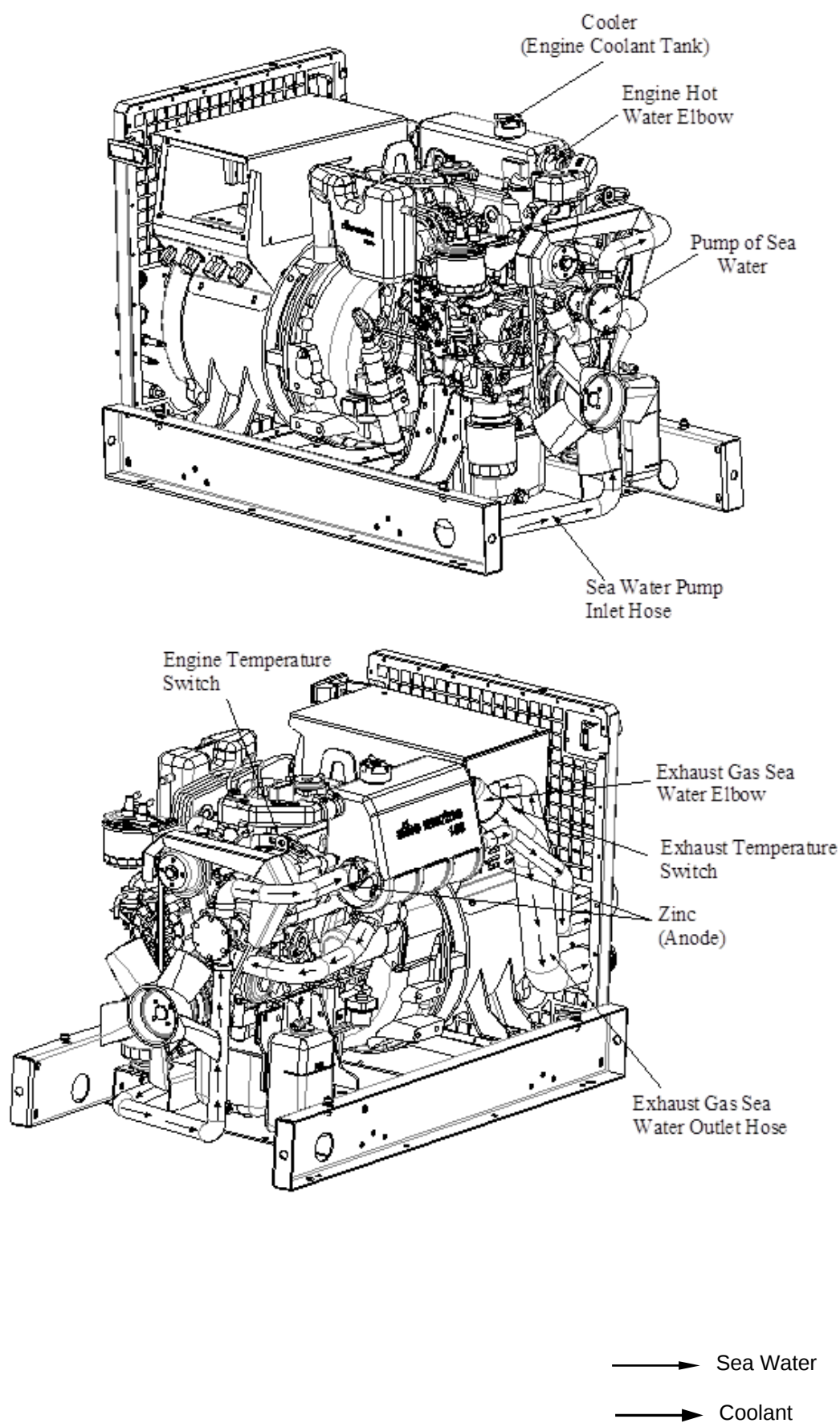


FIGURE 19. ENGINE COOLING SYSTEM - MG 307 , TG 309

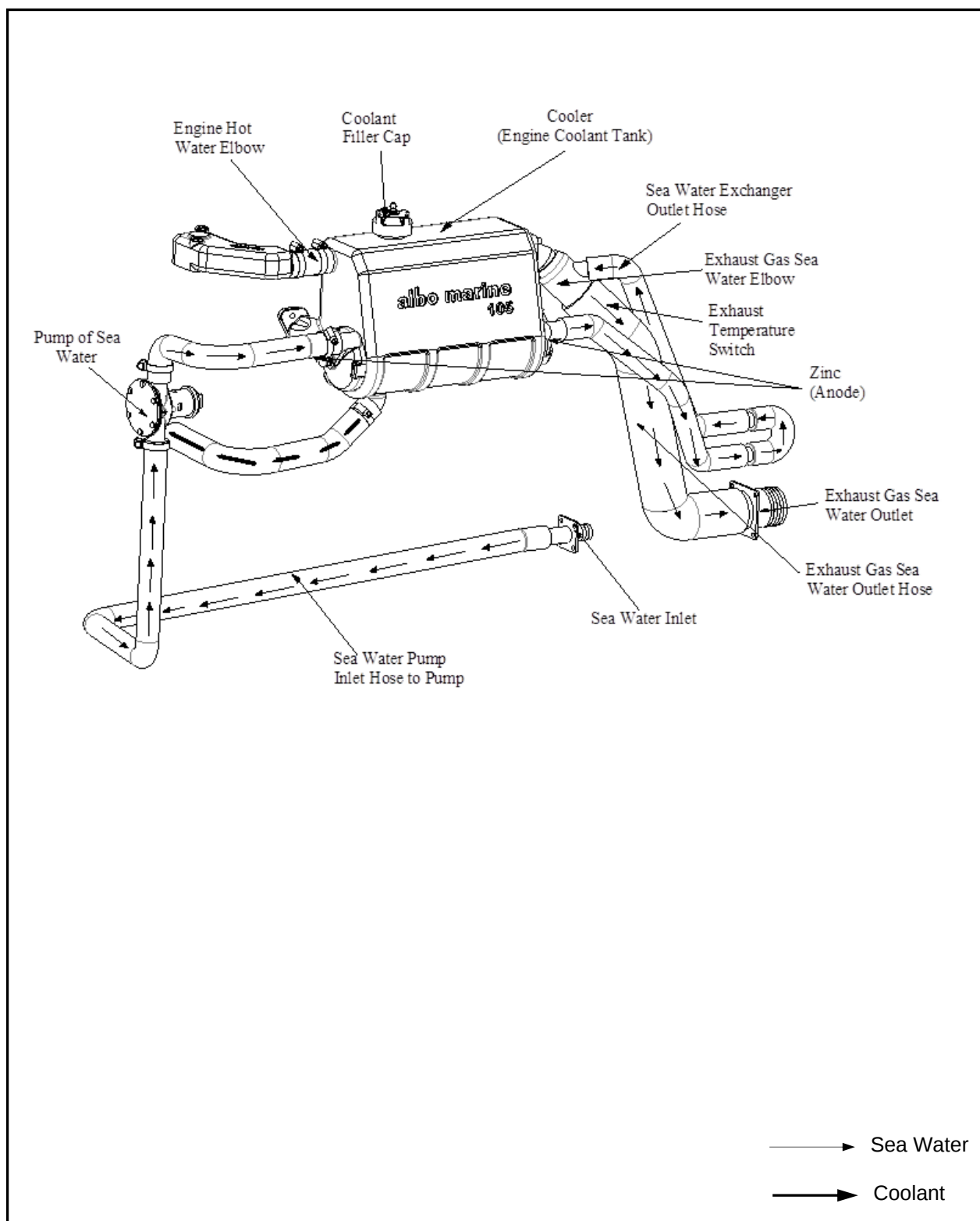


FIGURE 20. ENGINE COOLING SYSTEM (COOLER, SEA WATER PUMP, HOSES)
MG 307 , TG 309

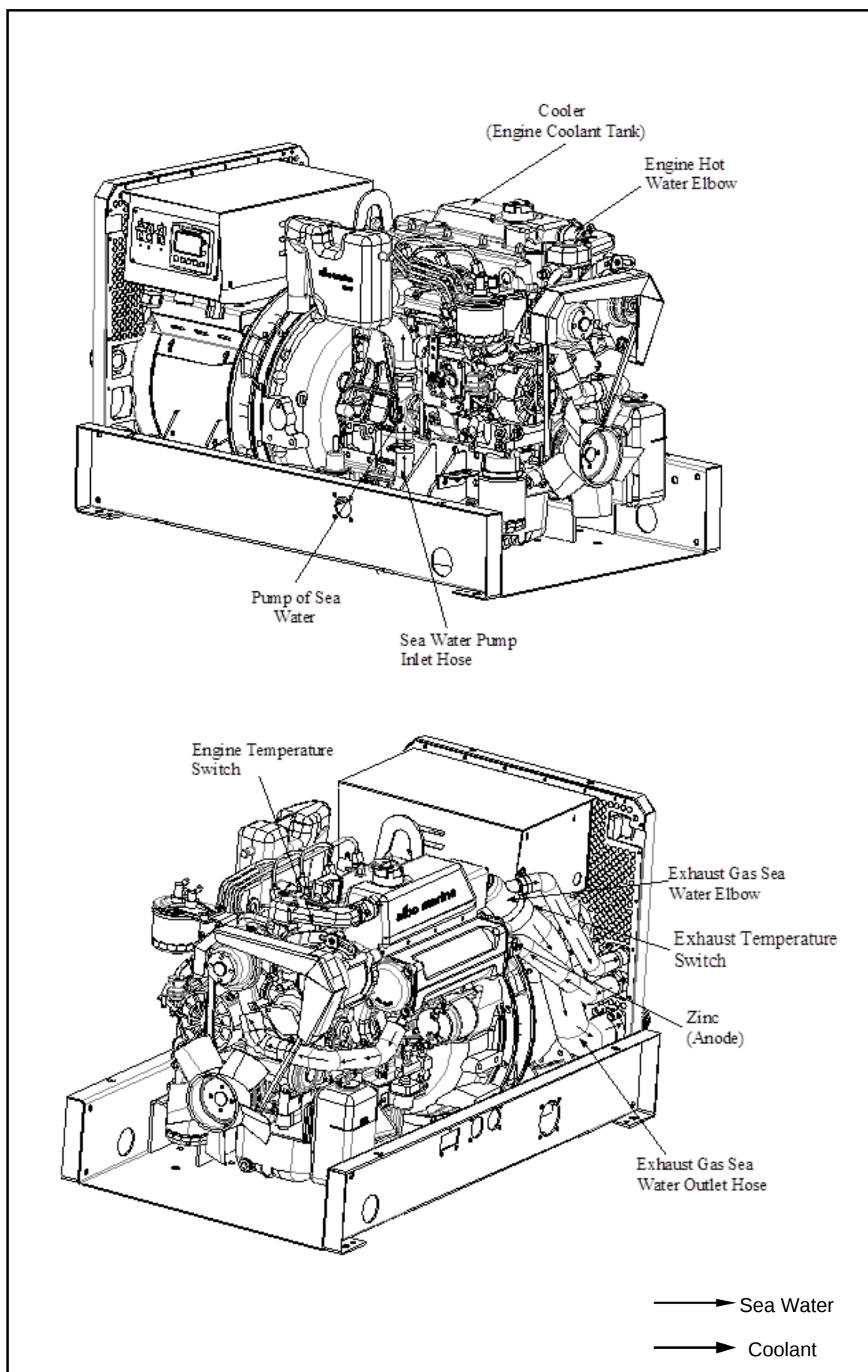


FIGURE 21. ENGINE COOLING SYSTEM - MG 311 , TG 313

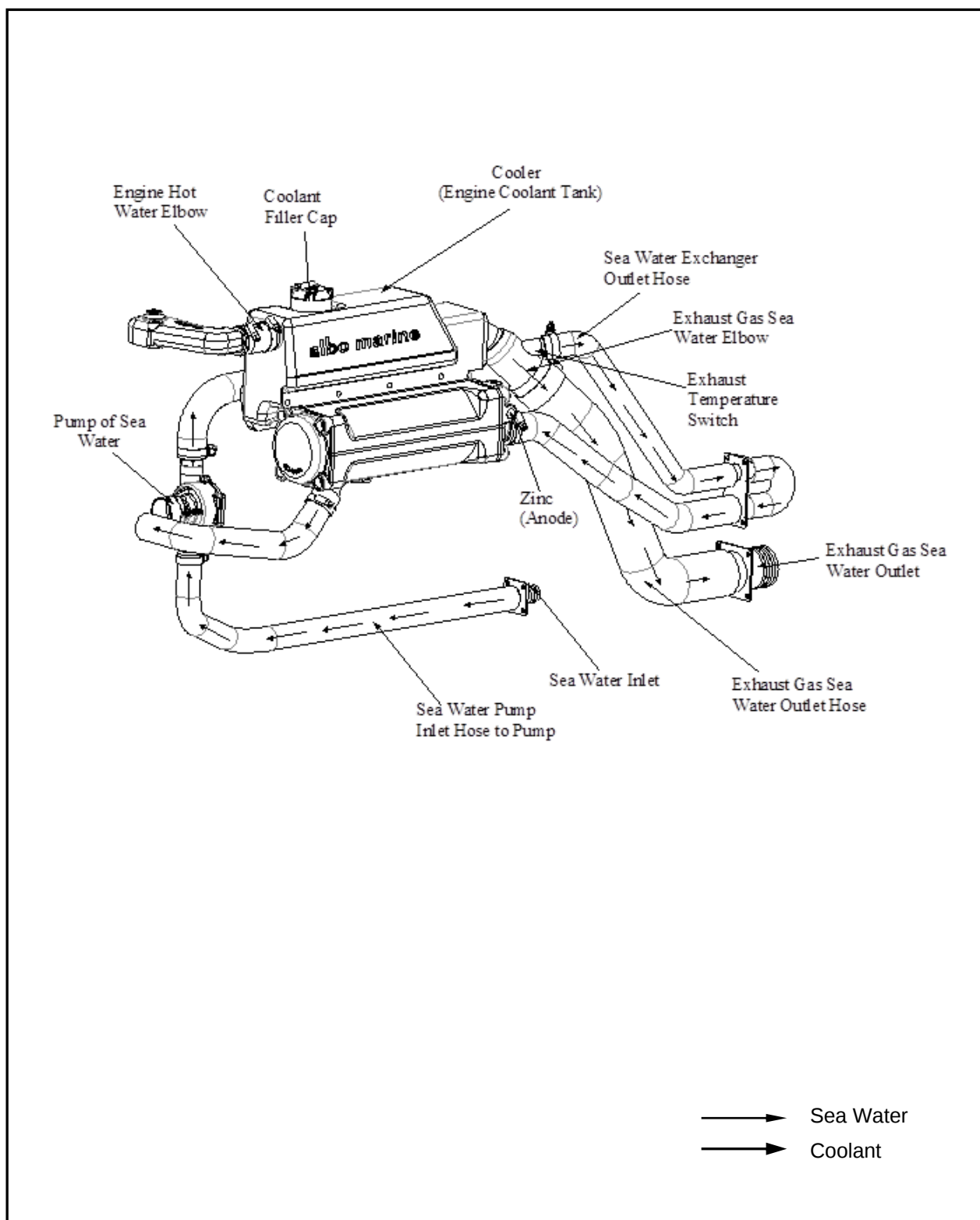


FIGURE 22. ENGINE COOLING SYSTEM (COOLER, SEA WATER PUMP, HOSES) MG 311 , TG 313

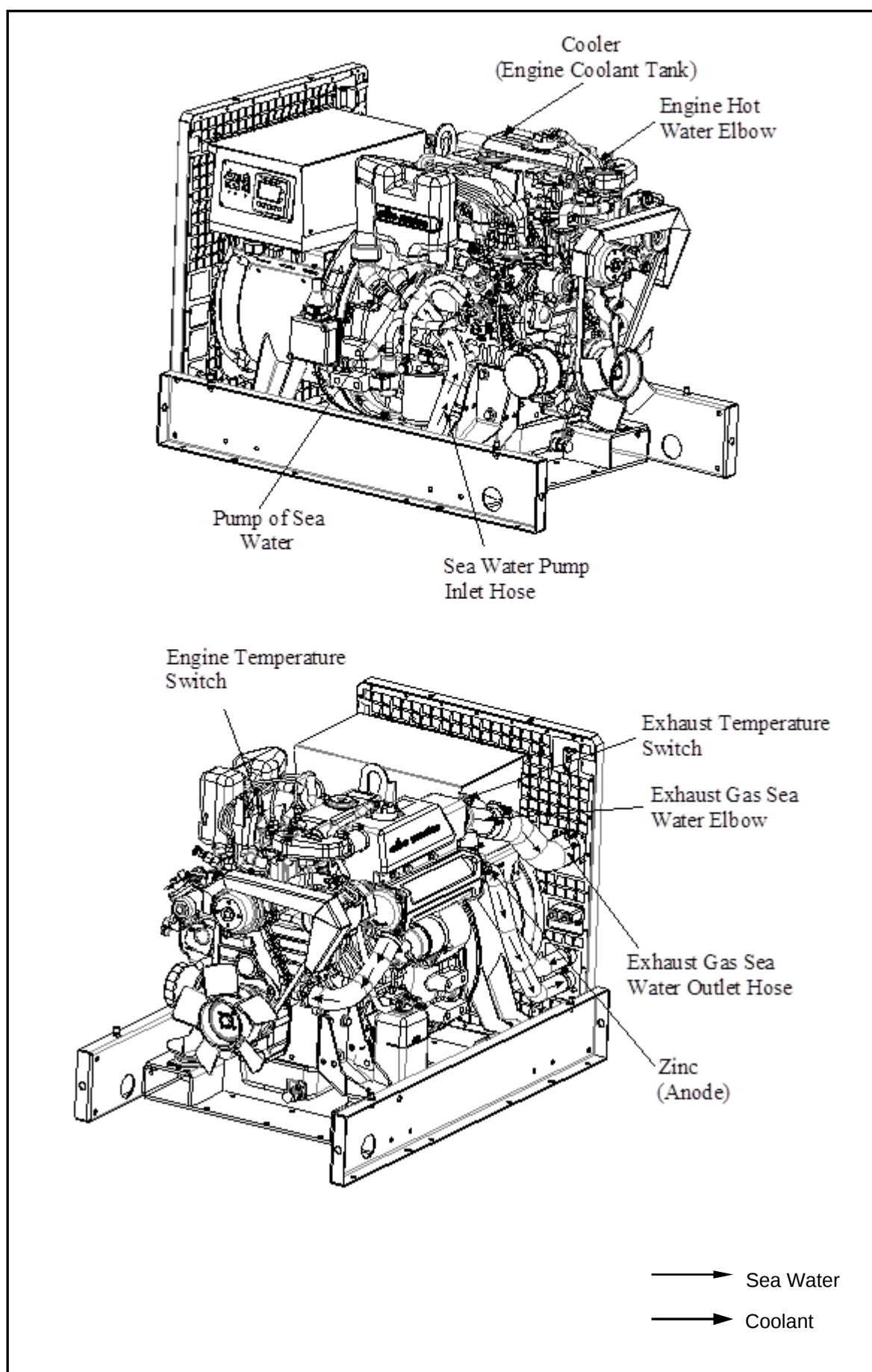


FIGURE 23. ENGINE COOLING SYSTEM - MG 312 , TG 314

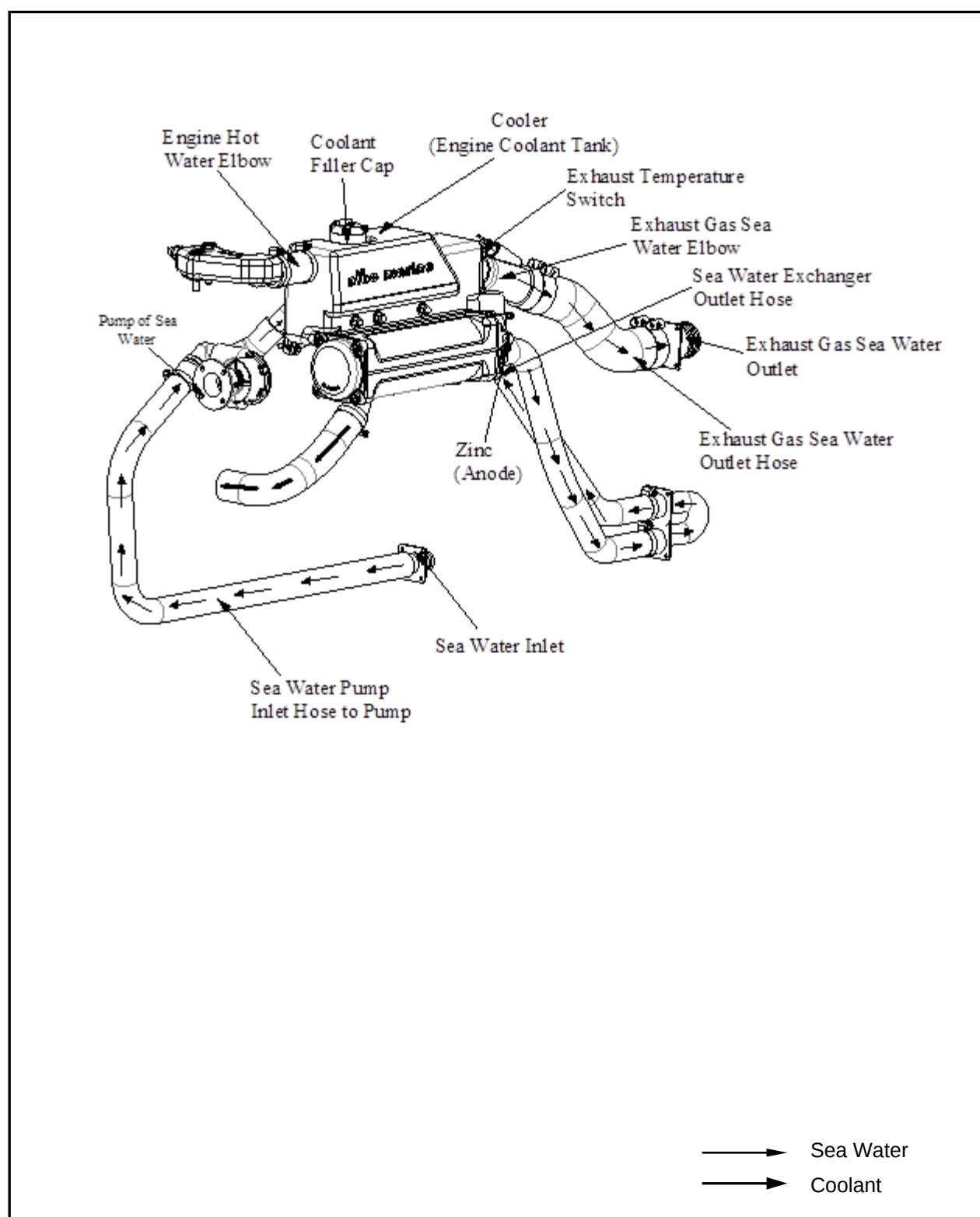


FIGURE 24. ENGINE COOLING SYSTEM (COOLER, SEA WATER PUMP, HOSES) MG 312 , TG 314

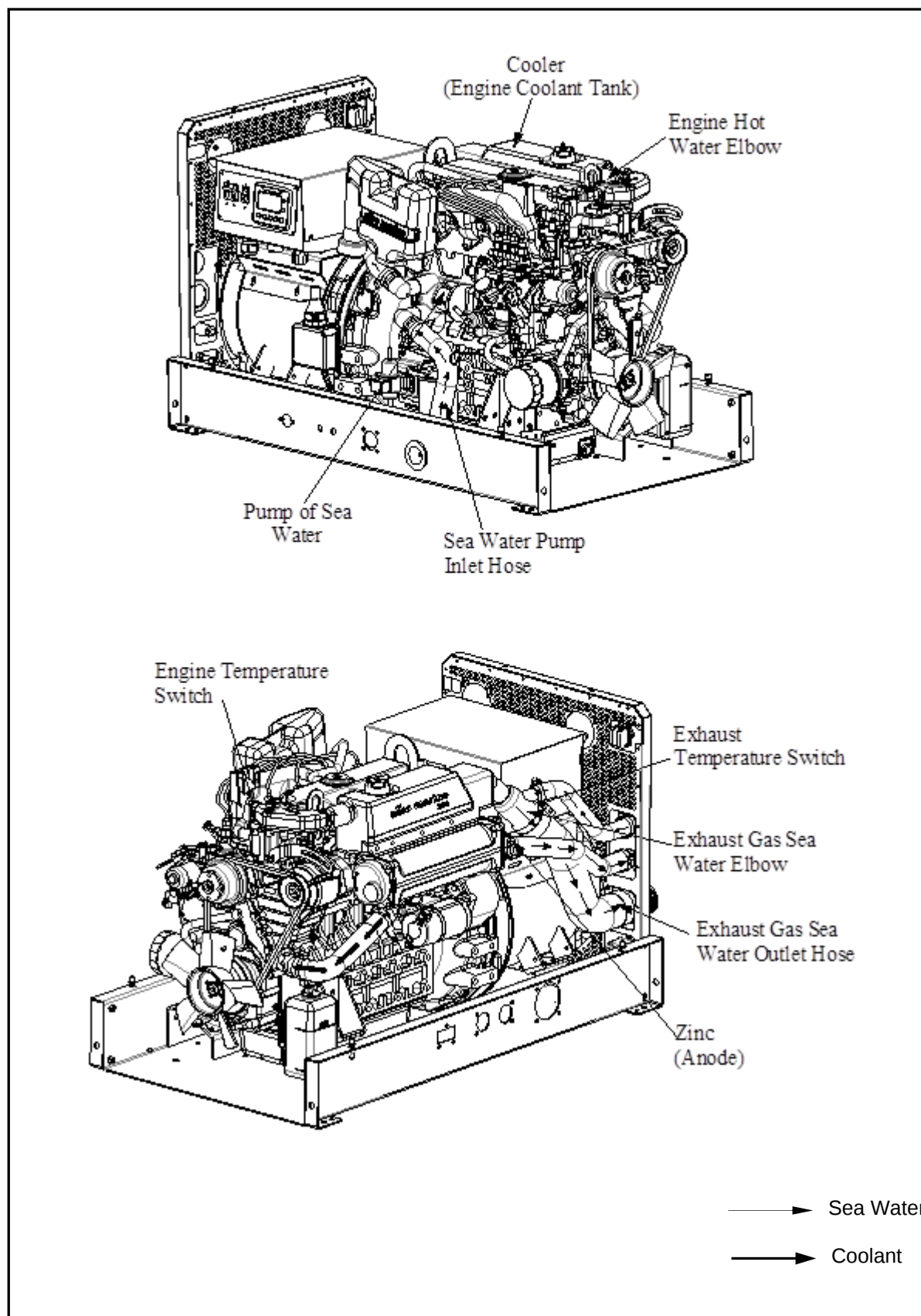


FIGURE 25. ENGINE COOLING - MG 316, MG 318, TG 320, TG 323

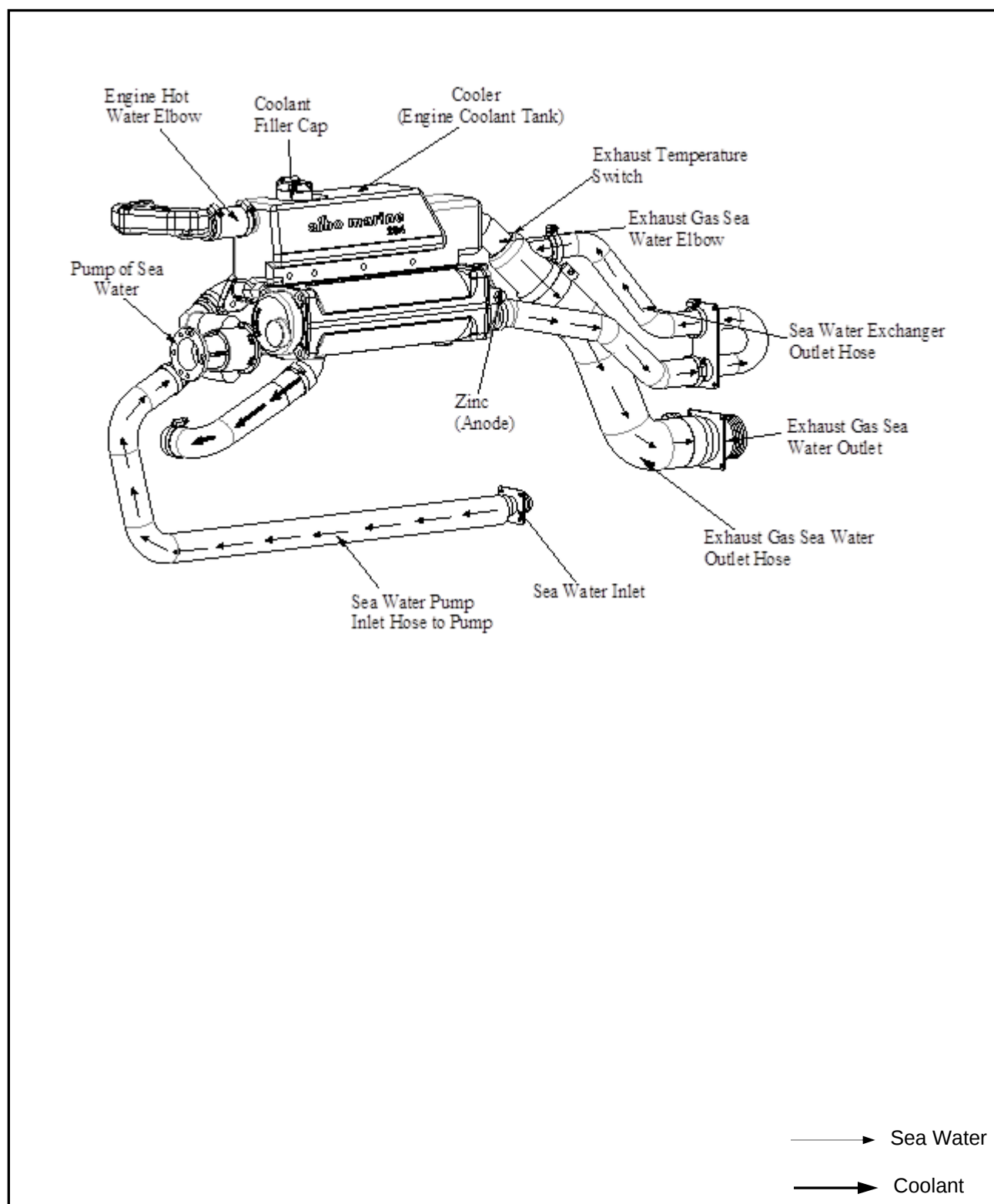


FIGURE 26. ENGINE COOLING SYSTEM (COOLER, SEA WATER PUMP, HOSES) MG 316, MG 318, TG 320 , TG 323

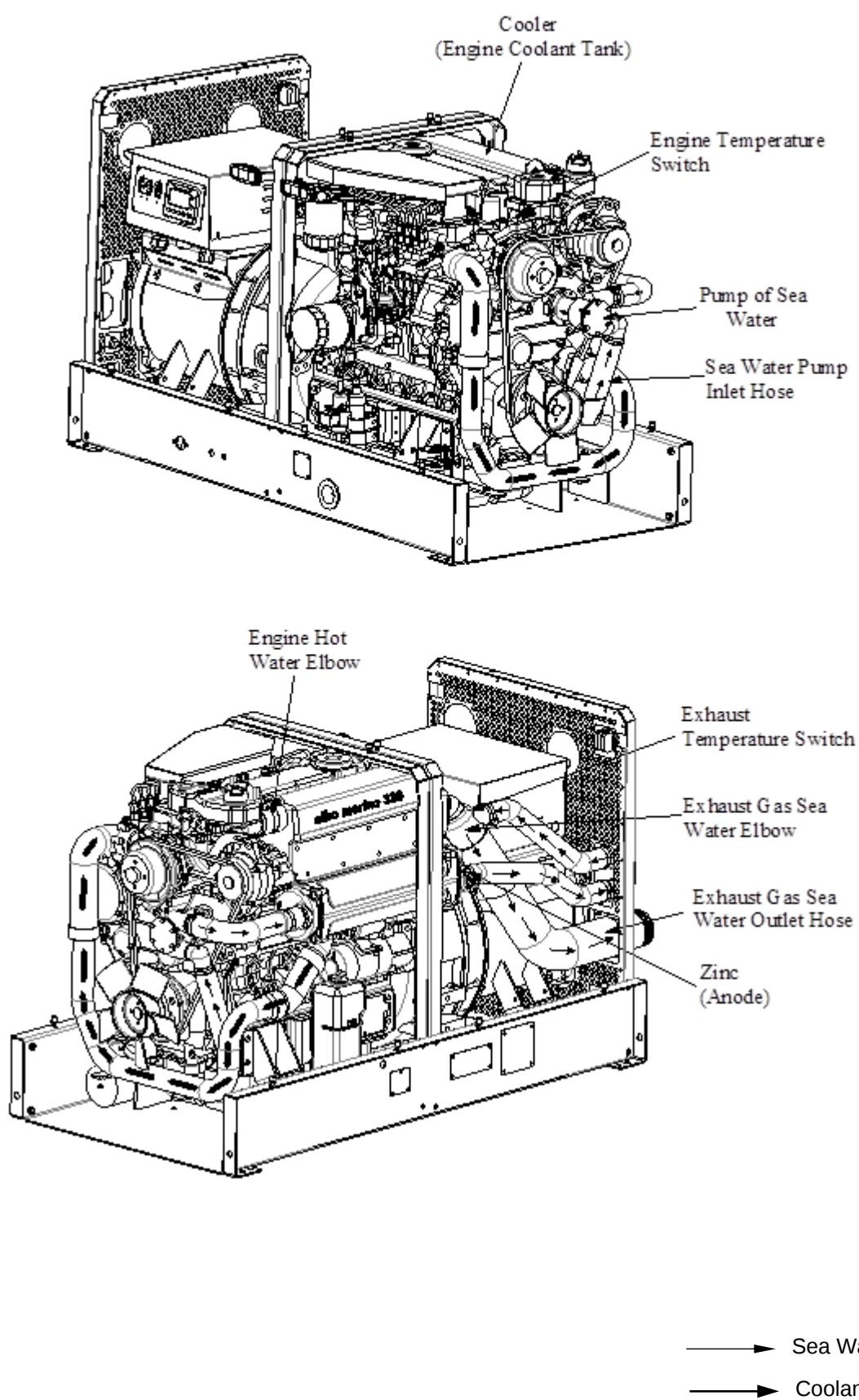


FIGURE 27. ENGINE COOLING SYSTEM - MG 324, TG 330

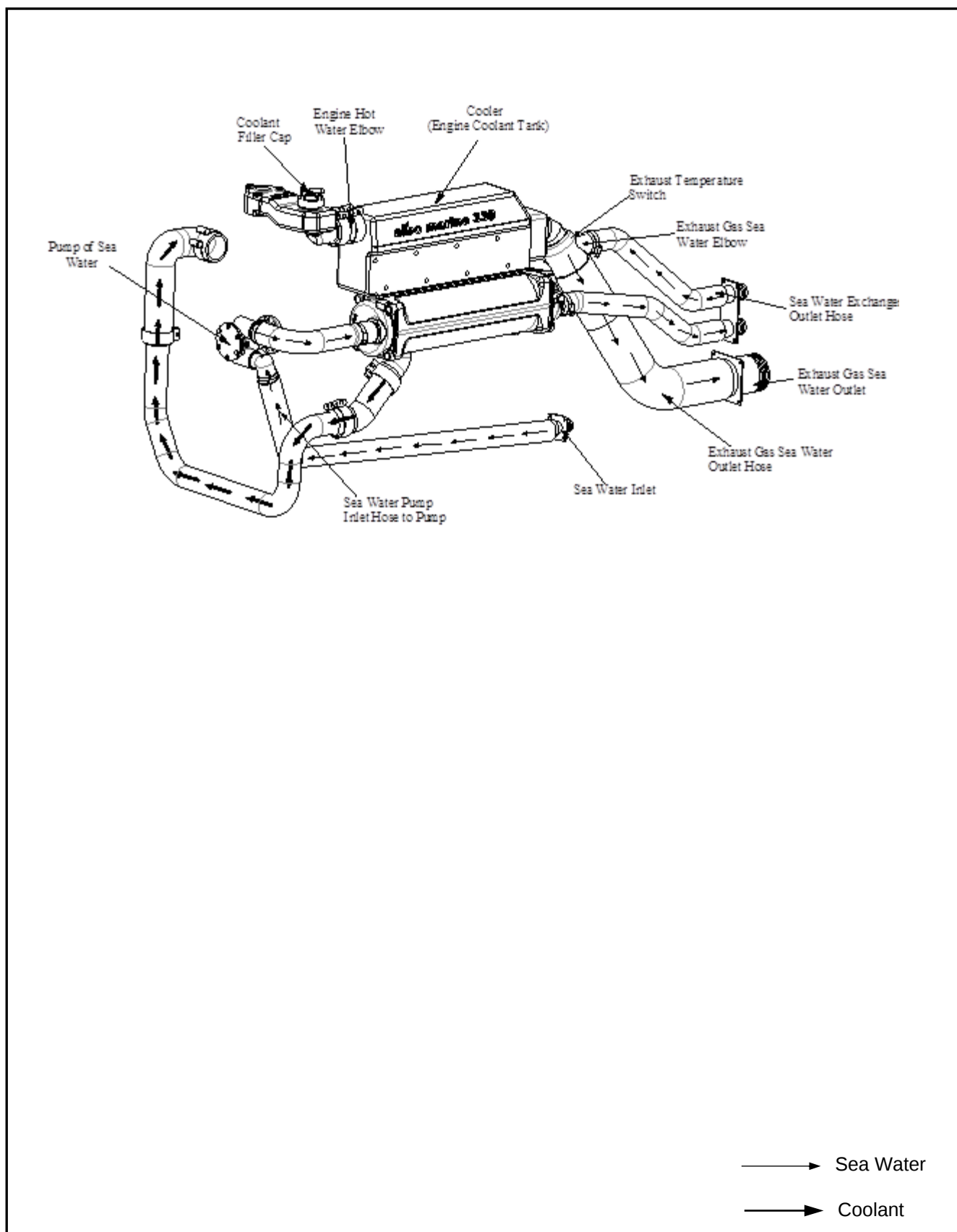


FIGURE 28. ENGINE COOLING SYSTEM (COOLER, SEA WATER PUMP, HOSES) MG 324, TG 330

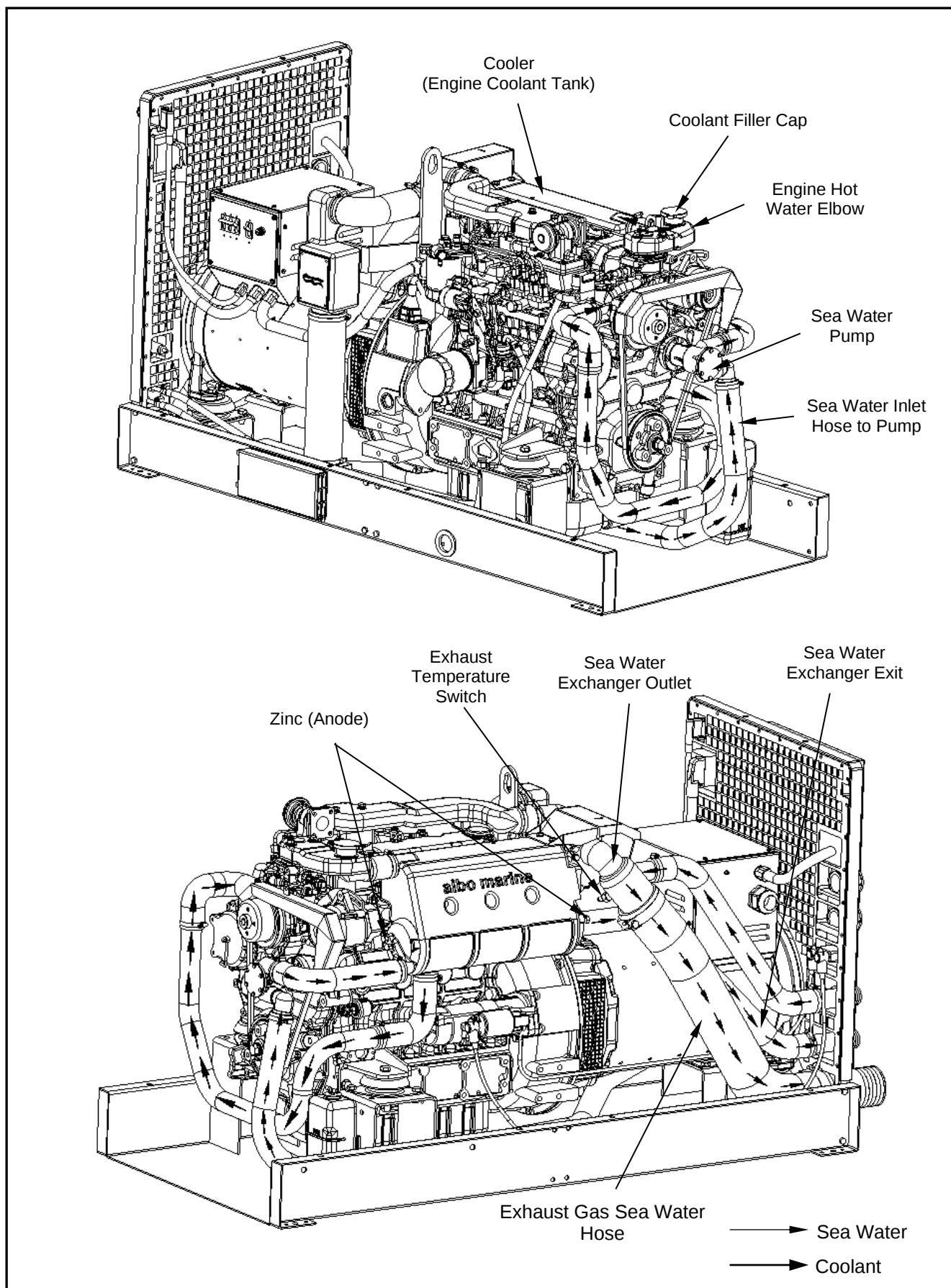


FIGURE 29. ENGINE COOLING SYSTEM (COOLER, SEA WATER PUMP, HOSES) TG 343

Replacement of Sea Water Pump Internal Gear

Replace and check the component in the intervals specified in periodical maintenance chart (Page 5-1) (Table 2). Replace and check the component according to the following instructions:

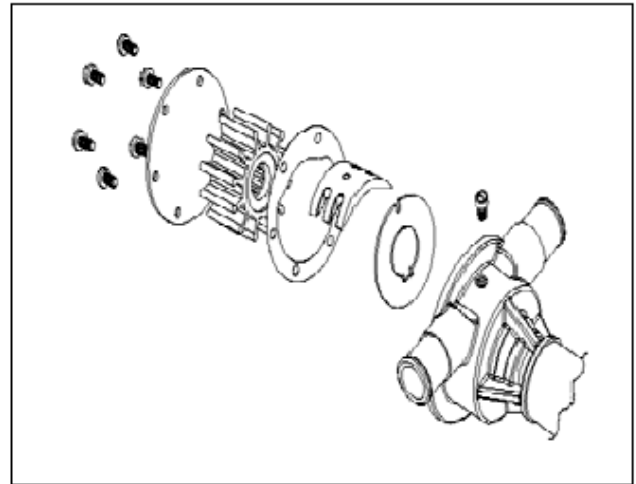
1. Close the sea water inlet and outlet valves.
2. Remove the battery negative (-) terminal to prevent operation of the engine.

⚠ WARNING : *Inadvertent or remote operation of the engine may cause personal injuries or death. Always disconnect battery terminals before working on the engine. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to decrease any arcs when you are disconnecting the battery cables.*

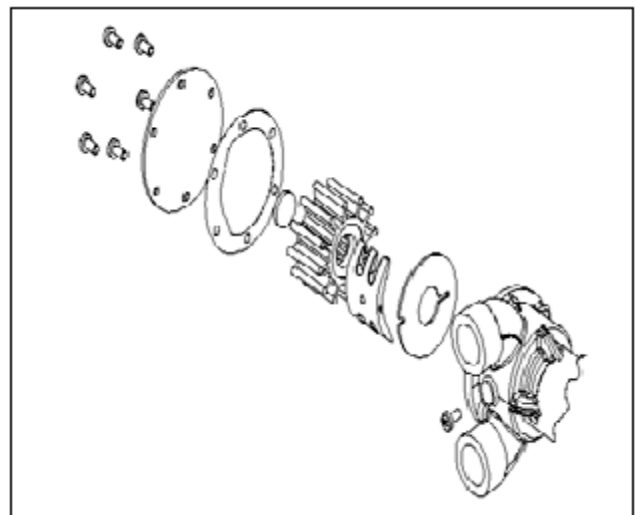
3. Loosen the screws on the end of the pump body depending on the structure to remove the pump body or internal gear cover (Figure 24.)
4. Remove the internal gear. A gear removal tool may be needed to pull the gear out of the shaft. Note: If the blades are broken, check and clean the parts remaining inside the Engine Coolant Heat Exchanger.
5. Install the new internal gear. Lubricate inside of the pump and internal gear with soapy water or silicone lubricant before operating the pump to provide ease of installation, first lubrication and better pump intake.

⚠ WARNING : *Do not lubricate the internal gear with grease, mineral oil or other petroleum products. Because, these chemicals may contain materials that may spoil the structure and form of the internal gear.*

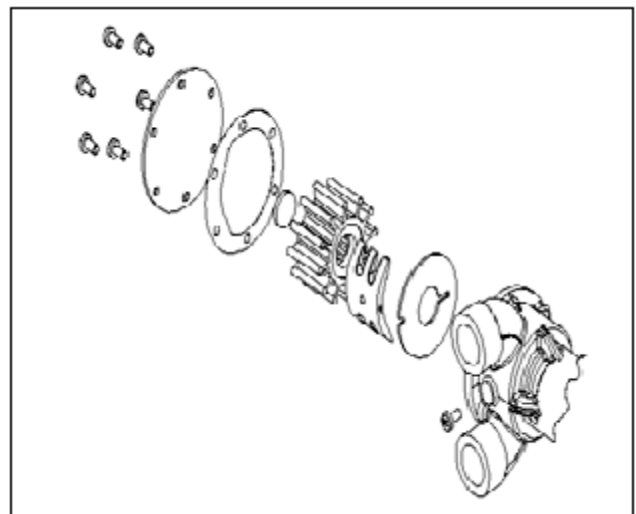
6. Close the pump body and cover tightly and properly with O-ring gasket.
7. Operate the installed pump internal gear after filling the pump completely with sea water. Never perform the first operation without water.
8. Open the sea water valve, connect battery terminal cables (negative (-) cable last) and operate the generator set. If there is no sea water flow, generator set shall be turned off in a few seconds. If it is turned off because of this, resolve the cause of the fault, (page 6-3) remove the blockage of your generator and operate the generator set again.



MN 305- MG 307 – TG 309



MG 311- MG 312 – TG 313- TG 314



MG 316 - MG 318 –TG320- TG 323- MG 324 -
TG 330 – TG 343

FIGURE 30. SEA WATER PUMPS

Adjustment of V-Belt Tension

Replace and check the component in the intervals specified in Periodical maintenance chart (Page 5-1) (Table 2). Replace and check the component according to the following instructions:

Engine V-belt drives the battery charging alternator and engine coolant circulation pump. (Figure 25). Adjust the tension of the belt as per the following instructions:

1. Remove the battery negative (-) terminal to prevent operation of the engine.

⚠WARNING : *Inadvertent or remote operation of the engine may cause personal injuries or death. Always disconnect battery terminals before working on the engine. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to decrease any arcs when you are disconnecting the battery cables.*

2. Remove V-belt protection covers or upper panel and battery charging alternator protection cover.
3. Loosen the alternator pivot bolt to perform the adjustment easier. Loosen the adjustment ring bolt on the upper part, and remove the slackness of the belt. Use original spare belt. Remove the slackness of the belt by tightening the battery charging alternator.
4. Remove the battery negative (-) terminal to prevent operation of the engine. Replace and check the component according to the following instructions:
5. Rotate the alternator a few times to stretch the V-belt. Adjust the belt tension properly by tightening the adjustment ring bolt and check the tension by applying ~10 kg load on the center of the longest part of the belt. The displacement (deflection) of the belt due to the load applied shall be between 8 and 10mm. Tighten the alternator pivot bolt and adjustment ring bolt when the V-belt tension is adjusted in the required level.

6. Tighten the adjustment bolts, install the belt guide and protection covers. Connect battery terminal cables (negative (-) cable last) and operate the generator set.

Engine V-belt drives the battery charging alternator and engine coolant circulation pump. Adjust the tension of the belt as per the following instructions:

⚠WARNING : *Inadvertent or remote operation of the engine may cause personal injuries or death. Always disconnect battery terminals before working on the engine. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to decrease any arcs when you are disconnecting the battery cables.*

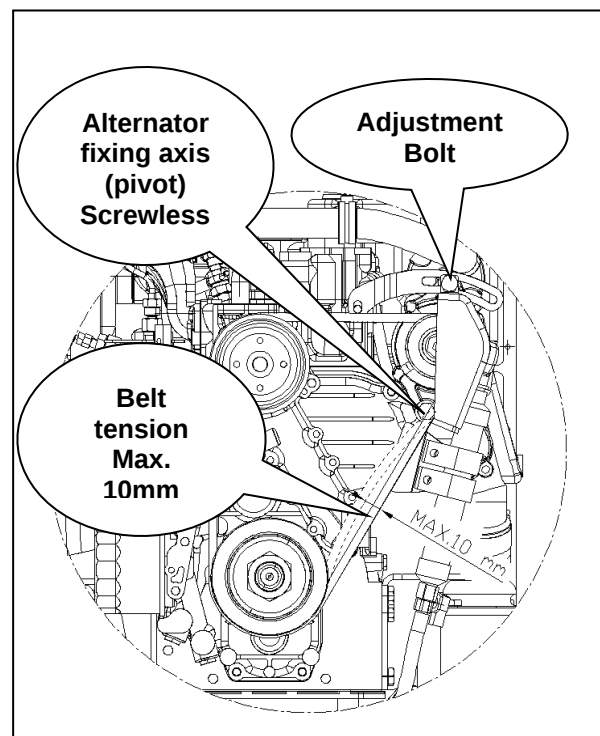


FIGURE 31. ADJUSTMENT OF V-BELT TENSION

Replacement of the Thermostat

Replace and check the component in the intervals specified in Periodical maintenance chart (Page 5-1, Table 2). Replace and check the component according to the following instructions (Figure 26):

1. Remove the battery negative (-) terminal to prevent operation of the engine, let the engine cool down and open all cabin covers of your generator.

⚠ WARNING : *Inadvertent or remote operation of the engine may cause personal injuries or death. Always disconnect battery terminals before working on the engine. Always disconnect the negative (-) battery cable first, and re-connect the negative (-) battery cable last to decrease any arcs when you are disconnecting the battery cables.*

⚠ WARNING : *Let the engine cool down before opening the Engine Coolant Heat Exchanger filler cap (thermostat). Engine Coolant Heat Exchanger under excessive temperature and pressure may spurt hot vapors and cause serious burns.*

2. Remove the hose clamp connected to the thermostat side with proper tools without damaging the components.
3. Remove the outer bolts of the part including the thermostat. Remove the thermostat with the sealing gasket.
4. Clean the sealing gasket surfaces on the connection points. Install new thermostat and gasket. Apply heat-resistant liquid gasket (Three Bond 1215 liquid gasket) or equivalent on appropriate surfaces of the gasket on the connection points. Tighten the bolts with proper torque so that the gasket and thermostat are not damaged.

1. Top-up the engine coolant (ethylene glycol – distilled water) lost during the maintenance and repair operation in a proper way. Check whether the thermostat cover is closed in a proper way. Connect the battery negative (-) terminal cable to allow the operation of the generator. Close the noise insulation covers of your generator before operating.

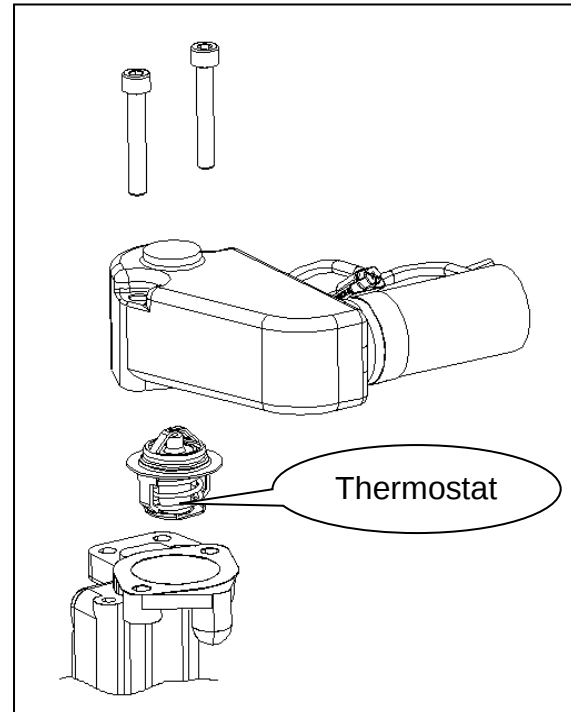


FIGURE 32 THERMOSTAT

6. Troubleshooting and Problem

Use the generator set control panel for troubleshooting any faults or problems. (Table 3) Always apply the following corrective and preventive measures while troubleshooting. Contact authorized service if you still cannot resolve the problem. (Page 2-1)

NOTE: *Many faults and problems on generator sets may be prevented by periodical maintenances. Most frequent problem is running out fuel, and thus the generator cannot be operated for this reason. Always check whether fuel is available properly to the generator set in all faults and problems first. Generally, generator sets and drive engines use the same main fuel tank in sea vessels. In these cases where the same main tank supply is used, fuel supply levels are arranged so that fuel supply of generator set is cut off first. Check whether you have adjusted the generator set fuel warning to a level before fully running out fuel; this will allow you receive the warning before fully running out fuel.*

Diagnosis with Electronic Control Panel

Because of malfunction, when the generator engine stopped, electronic remote control panel alarm status lamp will burn out. (Figure 3, 4)

Depending on the features of the electronic card module is used error source related with the section that is the source of the fault or problem may be displayed in written form or may be flashed a warning lamp. (Page 3-2, 3-3)

TROUBLESHOOTING AND GENERATOR SET FAULTS

⚠ WARNING : *At maintenance, repair and service workings of the generator sets involve dangers that may cause serious personal injuries or death. Always ensure that this work is performed by trained and experienced service staff authorized in written form by the manufacturer who are informed in the electrical and mechanical dangers. Always read and regard Safety Precautions before this work.*

⚠ WARNING : *Inadvertent or remote operation of the engine may cause personal injuries or death. Always disconnect battery terminals before working on the engine. Always disconnect the negative (-) battery cable firstly, and re-connect the negative (-) battery cable lastly to decrease any arcs when you are disconnecting the battery cables.*

TABLE 3. TROUBLESHOOTING AND GENERATOR SET FAULTS

Fault-Problem	Possible reasons	Remedies
Oil pressure lamp is turned on. Low oil pressure	• Not applicable engine oil level (it may be low or high)	✓ Check oil level. Ensure that it is in proper level.
	• There may be leaks in the lubrication system	✓ Repair the leaks properly.
Excessive heat lamp is turned on. Engine is overheated.	• Sea water inlet is clogged.	✓ Clean the blocked filters and pump inlets. Provide sea water intake in the required amount.
	• Inadequate engine coolant level.	✓ Check the engine coolant level from expansion tank and add coolant.
	• Cooling system pipes or hoses may be twisted, punched or leaking from connection points	✓ Check the connection points to repair properly and remove the leaks
	• V-belt driving the engine coolant circulation pump is slackened	✓ Adjust the V-belt slackness properly, adjust the belt sag to 6-8mm.
	• Engine coolant circulation pump is faulty	✓ Contact an authorized dealership.
	• Siphon kit is not working.	✓ Ensure that the siphon kit is drained and operates properly.
	• Sea Water Pump Internal Gear (Impeller) is faulty.	✓ Replace the internal gear with a new one.
	• Heat exchanger may be blocked and dirty	✓ Remove the heat exchanger and clean it properly.
	• There may be a blockage in the installation connection points on the body of the sea vessel	✓ Check for any blockage. Clean when required.
	• Thermostat may be faulty.	✓ Replace the thermostat.
	• There may be a blockage in engine cooling system ducts.	✓ Clean the ducts using proper cleaning methods.

TABLE 3. TROUBLESHOOTING AND GENERATOR SET FAULTS

Fault-Problem	Possible reasons	Remedies
Excessive heat lamp is turned on. Sea water flow is stopped.	• Sea water inlet is closed	✓ Open the sea water intake tap.
	• Sea water filter system is clogged	✓ Clean the filter system, and remove the blockage. Always fill the filter with water before operating
	• System pipes or hoses that shall be operating may be twisted, punched or leaking from connection points	✓ Check the connection points to repair properly and remove the leaks
	• Sea Water Pump Internal Gear is faulty	✓ Replace the internal gear with a new one.
	• There may be a blockage in the installation connection points on the body of the sea vessel	✓ Check for any blockage. Clean when required.
Charging Fault lamp is turned on. Batteries are not charged adequately	• Inadequate battery charge, loose contact in battery cables and connection points	✓ Clean the terminals. Check battery charge and cables. Tighten connections.
	• V-belt driving the battery charging alternator is slackened	✓ Adjust the V-belt slackness properly, adjust the belt sag to 6-8mm.
	• Interference with battery supplied devices may reduce the desired effect of the charge	✓ Perform necessary measurements. Disable the device when required.
Starting lamp is turned on. Engine cannot be started due to the incapability of the starter	• Alternator takes too much energy from the engine	✓ Turn the circuit breaking fuse to OFF position
	• Inadequate battery charge, loose contact in battery cables and connection points	✓ Clean the terminals. Check battery charge and cables. Tighten connections.
Starting lamp is turned on. High battery voltage	• Connection method to battery voltage is wrong	✓ Check the connections according to suitable voltage in the engine.
	• External battery charging unit is running	✓ Check the charge of back-up batteries while charging with an external device
Speed lamp is turned on. Generator is operating, it is not possible to take AC power from generator (No voltage generation)	• Circuit breaking fuse operating position is not proper.	✓ Bring the circuit breaking fuse to ON position
	• Circuit breaking fuse is faulty.	✓ Replace with new the circuit breaking fuse
	• Alternator is faulty	✓ Report authorized service

TABLE 3. TROUBLESHOOTING AND GENERATOR SET FAULTS (Continued)

Fault-Problem	Possible reasons	Remedies
Speed lamp is turned on. Excessive output voltage, Excessive output frequency	• Circuit breaking fuse error	✓ Check and replace the circuit breaking fuse
	• There may be a fault on the fuel system	✓ Repair fuel leaks in the fuel system and remove air bubbles remaining in the system.
	• There may be air inside the fuel system	✓ Bleed the air of fuel system properly.
	• Voltage adjustment regulator is faulty	✓ Correct the adjustments
	• Alternator is faulty	✓ Contact an authorized dealership.
Speed lamp is turned on. Excessively low output voltage, Excessively low output frequency	• PTO takes too much energy from the engine	✓ Disable the PTO.
	• Excessive electrical load	✓ Turn off the devices with high resistance (electrical loads like spot lights, heaters, big A/Cs, water heaters etc.)
	• There may be a fault on the fuel system	✓ Repair fuel leaks in the fuel system and remove air bubbles remaining in the system.
	• There may be air inside the fuel system	✓ Bleed the air of fuel system properly.
	• Fuel quality may be improper	✓ Use fuel with quality conforming with the specifications specified by engine manufacturer
	• Engine operating air is inadequate	✓ Provide air required for the ignition of the engine
	• Voltage adjustment regulator is faulty	✓ Correct the adjustments
	• Alternator is faulty	✓ Contact an authorized dealership.
Speed lamp is turned on. Engine is not operating with adequate speed.	• PTO takes too much energy from the engine	✓ Disable the PTO.
	• Electrical charge in startup is too much.	✓ Reduce electrical load.
	• Inadequate battery charge, loose contact in battery cables and connection points	✓ Clean the terminals. Check battery charge and cables. Tighten connections.
	• Improper oil for the operating conditions may be used	✓ Use proper oil for the operating conditions.

TABLE 3. TROUBLESHOOTING AND GENERATOR SET FAULTS (Continued)

Fault-Problem	Possible reasons	Remedies
Speed alarm lamp is turned on. Engine is stopped by itself	• Leakage in fuel system	✓ Repair fuel leaks in the fuel system and remove air bubbles remaining in the system.
	• Leakage in cooling system	✓ Check the connection points to repair properly and remove the leaks Add coolant to proper level
	• Leakage in lubrication system	✓ Check the connection points to repair properly and remove the leaks
There is no response form electronic remote control panel module	• Remote operation control switch on the generator is "OFF"	✓ Turn the Remote operation control switch "ON"
	• Emergency stop button or DC protection switch is turned off	✓ Turn the emergency stop button or DC protection switch "ON"
	• Inadequate battery charge, loose contact in battery cables and connection points	✓ Clean the terminals. Check battery charge and cables. Tighten connections.
AC circuit breaking fuse (is passing to off position)	• Excessive load	✓ Short circuit in the electrical installation of the vessel. Check the electrical installation
	• Circuit breaker is faulty.	✓ Replace with a new one.
Engine is not running	• PTO takes too much energy from the engine	✓ Disable the PTO.
	• Inadequate fuel in fuel tank	✓ Check whether there is enough fuel to operate the generator in the main fuel tank.
	• There may inadequate fuel supply	✓ Check for any blockage in fuel rails and check the valves.
	• There may be air inside the fuel system	✓ Bleed the air of fuel system properly.
	• Inadequate battery charge, loose contact in battery cables and connection points	✓ Clean the terminals. Check battery charge and cables. Tighten connections.
	• Engine operating air is inadequate	✓ Provide air required for the ignition of the engine
	• Engine exhaust system may be blocked	✓ Remove the blockages properly.
	• There may be air or fuel leakages in the engine.	✓ Repair properly.
	• Fuel filter may be blocked or faulty	✓ Replace the fuel filter
	• Fuel quality may be improper	✓ Use fuel with quality conforming with the specifications specified by engine manufacturer
	• Improper oil for the operating conditions may be used	✓ Use proper oil for the operating conditions.

TABLE 3. TROUBLESHOOTING AND GENERATOR SET FAULTS (Continued)

Fault-Problem	Possible reasons	Remedies
Carbon monoxide detector gives a warning signal	• There may be excessive carbon monoxide build-up inside the vessel	✓ Immediately take everyone to open air. Ensure proper ventilation. Seek medical assistance when required
Engine does not stop	• Stop solenoid is not operating	✓ Stop the engine by cutting the fuel off. Contact an authorized dealership.