

# NANNI GENERATOR SET

## USER MANUAL

DGBXXT090049

Q1500 Series

The Nanni logo is rendered in a dark blue, stylized, lowercase font. The letters 'n', 'n', and 'i' feature a white vertical line on their left side, creating a distinctive graphic element. The 'n' is composed of a solid dark blue shape and a white-outlined shape. The 'i' has a solid dark blue dot above it.



## TRACKED CHANGES

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*Please note all changes and pages associated.  
For further clarity, please add a line in front of each change*

# Q00 TRACKED CHANGES

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## INTRODUCTION

Before starting the unit, make sure this manual is applicable to the model to be commissioned. Refer to the identification plate if you are not sure of the designation. If you do not have the correct manual, please contact your authorized Nanni dealer.

All information and specifications in this manual are based on the technical data available at the time of publication. Changes and updates may be made by Nanni without notice.

The illustrations serve as a general guide and may differ from the equipment in some details.

If any details of the equipment are not shown or described in this manual, or if you have any questions regarding the operation of any equipment, your authorized Nanni dealer will be pleased to inform you of the correct maintenance and operating procedures. Contact an authorized NANNI INDUSTRIES S.A.S. dealer for maintenance of your engine. A list of dealers is available on our website:

**[www.nannienergy.com](http://www.nannienergy.com)**

Read this manual carefully to learn how to properly operate and maintain your unit. Failure to do so could result in personal injury or property damage. This manual should be considered an integral part of the unit and should remain with the unit, even when it is sold.

The right and left sides are determined by standing at the drive end or flywheel (rear) of the motor and facing the front of the motor.

Record the motor serial numbers and option codes (if applicable). Your Nanni agent also needs these numbers when ordering parts. File the identification numbers in a secure place. Some engine accessories, such as air filters and some instruments, are optional. These accessories may be supplied by a third party. This manual only covers the engine and options available through the Nanni distribution network.

# S01 INTRODUCTION

## ABOUT THIS MANUAL

This manual contains important information, tips, suggestions and warnings. Please read it carefully and familiarize yourself with the engine before starting.

For your own safety and the longest life of the engine, follow the instructions and warnings contained in this manual and in any literature supplied with the boat. Ignoring them could damage the engine or cause injury to you or others.

Please make sure this manual is always in the boat. It must always be accessible to anyone using the engine, i.e., anyone renting, borrowing or buying the engine from you.



### NOTE!

**This manual is not intended to replace the service manual (workshop manual). On the following pages the reader will find numerous descriptions of the generator set, its operation and maintenance, as well as tips and guidelines for troubleshooting.**

**Specific and important maintenance repairs are described in the workshop manual.**

## CONTENTS & UPDATES

All information and specifications contained in this manual are based on technical data applicable at the time of publication. Changes and updates may be made by Nanni without notice.

The illustrations are intended as a general guide, and may vary from the equipment mounted in the engine in some details.

If any details of the equipment are not shown or described in this manual, or if you have any questions about the operation of any equipment, your authorized NANNI dealer will be happy to inform you of the correct maintenance and operating procedures.

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## SAFETY SIGNALS

### A SIGNAL WORD

#### **DANGER, WARNING, or CAUTION**

Is used in conjunction with the safety-alert symbol.

#### **DANGER**

Identifies the most serious hazard with lethal possible consequences.

#### **WARNING**

Identifies serious hazard with possible large injury consequences.

#### **CAUTION**

Identifies precautions to undertake which if not followed could lead to the above mentioned safety warnings. Damage to equipment could happen.

#### **NOTICE**

Is used for specific attention to sensitive actions on equipment. Other signals still applying.

#### **IMPORTANT**

Is a signal with a meaning of care to apply to equipment.

#### Safety Information

This symbol on the engine or in this manual is an alert to the potential for personal injury. Follow recommended precautions and safe operating practices.

#### Replacement Of Missing Or Damaged Safety Signs

Replace missing or damaged safety signs. There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this Operator Manual.

#### Read Safety Instruction

Carefully read all safety messages in this manual and on your genset safety signs.

Keep safety signs in good condition. Be sure new equipment components and repair parts include the current safety signs.

Replacement safety signs are available from your dealer. There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this Operator Manual.

Keep your equipment in proper working condition.



**DANGER !**



**WARNING !**



**CAUTION !**



**IMPORTANT !**



**NOTE !**

Please keep in mind that above safety labels have no degree of danger. Any irresponsible action could lead to a real danger situation.

Learn how to operate the equipment and how to use controls properly. Do not let anyone operate it without instruction.

Unauthorized modifications to the equipment may impair the function and/or safety and affect its life span



**If you do not understand any part of this document and need assistance, contact your NANNI representative.**

## ENGINE - GENSET SAFETY ICONS

Some stickers are fixed directly on the engine. They are intended to help you to quickly identify the location of certain components and avoid possible hazards when working on the engine.

Ensure that these stickers are always visible and replace them if torn or washed up.



**Refers to important informations and instructions to follow before handling the engine**



**Indicates possible electrical hazards.**



**Indicates hot parts entailing substantial risks of burns**



**Indicates an area containing pressurised fluids**



**Indicates hazardous rotating parts.**



**Stipulates that no flames or sparks should be created in the vicinity.**



**Indicates where to check the coolant level**



**Indicates where to check the engine oil level**



**Indicates the coolant drain orifice**



**Indicates the oil drain orifice**

## SAFETY PRECAUTIONS

## HOT EXHAUST PRECAUTIONS



Servicing machine or attachments with engine running can result in serious personal injury. Avoid exposure and skin contact with hot exhaust gases and components

Exhaust parts and streams become very hot during operation. Exhaust gases and components reach temperatures hot enough to burn people, ignite, or melt common materials.

## WORK IN VENTILATED AREA



Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

## WASTE DISPOSAL



Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used in engines include such items as oil, fuel, coolant, fluids filters and batteries.

Use leak-proof containers when draining fluids ; Do not pour waste into the sea, ground, down a drain, or into any other water source.

Contact your local environmental or recycling center, or your dealer for information on the proper way to recycle or dispose of waste.

## UNWANTED ENGINE START



Avoid possible injury or death from engine runaway. Do not start engine by shorting across the starter motor solenoid terminals posts. Engine will start if normal circuitry is bypassed. Start engine from operator's seat.

## SAFE MAINTENANCE PRACTICE



Understand service procedures before doing work. Keep work area clean and dry. Never lubricate, service, or adjust engine while it is running. Keep hands, feet, hair and clothing away from moving parts.

Fix damage immediately. Replace worn or broken parts. Remove any build up of grease, oil, or debris. On self-propelled equipment, disconnect battery ground (-) before making adjustments on electrical systems or welding.

## WORK IN CLEAN AREA



Clean work area and machine before starting a job. Make sure you have all necessary tools to do your job. Have the right parts on hand. Read all instructions thoroughly; do not attempt short-cuts

## PROTECTIVE CLOTHING



Wear close fitting clothing and safety equipment appropriate to the job. Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating the engine.

## SERVICE ENGINES SAFELY



Tie long hair behind your head. Do not wear a neck tie, scarf, loose clothing, or necklace when you work near moving parts. If these items were to get caught, severe injury could result. Remove rings and other jewellery to prevent electrical shorts and entanglement in moving parts.

## PROPER USE OF TOOLS



Use tools appropriate to the work. Makeshift tools and unfollowed procedures can create safety hazards. Do not use U.S. mechanical tools on metric fasteners (i.e. a 1/2 inch wrench on a 13 mm nut).

Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting manufacturer specifications..

## SUPPORT ENGINES PROPERLY



Always lower the attachment or implement to the base before you work on an engine. If the work requires that the engine be lifted, provide secure system. If left in a raised position, hydraulically supported device can settle or leak down.

Do not support engines on any kind of props that may crumble. Do not work under an engine that is solely supported by a jack. Follow recommended procedures in this manual.

## SAFE ILLUMINATED WORK AREA



Illuminate your work area adequately and safely. Use a portable safety light for working inside the engine room. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

## PROPER LIFTING EQUIPMENT



Lifting heavy components incorrectly can cause severe injury or equipment damage. Use expertise of staff holding relevant(s) legal capacity to operate heavy lifting equipment, with the know-how of using slings and chains.

## NOISE PROTECTION



Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises

## GENSET OUTPUT GENERATED POWER



Genset will deliver a sizeable amount of electrical power which can be lethal if not handled properly. Thus, any service, connection or repair on the alternator can only be done by a certified marine electrician

## GUARDS REQUIREMENTS



Rotating cooling system fans, belts, pulleys, and drives can cause serious injury. Keep all guards in place at all times during the engine operation. Wear close-fitting clothes.

Stop the engine and be sure that fans, belts, pulleys, and drives are stopped before making adjustments, connections, or cleaning near fans and their drive components.

## STAYING CLEAR OF ROTATING DRIVE LINES



Entanglement in rotating driveline can cause serious injury or death. Keep all shields in place at all times. Make sure rotating shields turn freely

Wear close-fitting clothing. Stop the engine and be sure that all rotating parts and drive lines are stopped before making adjustments, connections, or performing any type of service on engine or driven equipment.

## PAINT REMOVAL BEFORE HEATING



Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or in using a torch.

## Paint removal :

- Remove paint a minimum of 100 mm (4 in.) from area to be affected by heating. If paint cannot be removed, wear an approved respirator mask before heating or welding.
- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area.
- Allow fumes to disperse at least 15 minutes before welding or heating.
- Do not use a chlorinated solvent in areas where welding will take place.
- Do all work in an area that is well ventilated to carry toxic fumes and dust away.
- Dispose of paint and solvents properly.

## HIGH - PRESSURE FUEL SYSTEM OPENING RISK



High-pressure fluid remaining in fuel lines can cause serious injury. Do not disconnect or attempt repair of fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system.

Only technicians familiar with this type of system can perform repairs. Consult your engine representative.

## AVOID HIGH - PRESSURE FLUIDS



Inspect hydraulic hoses periodically – at least once per year – for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage. Replace worn or damaged hose assemblies immediately with approved replacement parts.

Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard.



## SAFE COOLING SYSTEM SERVICE



Explosive release of fluids from pressurized cooling system can cause serious burns. Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

## AVOID HEAT NEAR PRESSURIZED FLUID LINES



Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.

Pressurized lines can accidentally burst when heat goes beyond the immediate flame area.

Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source.

## WELDING NEAR ELECTRONIC CONTROL UNIT (ECU)



If welding is required around the engine, or in the engine room, ask first for a permission from the person in charge. Do not jump-start engine with arc welding equipment. Currents and voltages delivered are too high and may cause permanent damage. Direct welding onto the engine is forbidden.

1. Disconnect the negative (-) battery cable(s).
2. Disconnect the positive (+) battery cable(s).
3. Connect the positive and negative cables together. Do not attach to engine support frame.
4. Clear or move any wiring harness sections away from welding area.
5. Connect welder ground close to welding point and away from control units.
6. After welding, reverse Steps 1-5.

## STATIC ELECTRICITY RISK



The removal of sulphur and other compounds in Ultra-Low Sulphur Diesel (ULSD) fuel decreases its conductivity and increases its ability to store a static charge. Refineries may have treated the fuel with a static dissipating additive.

However, there are many factors reducing the effectiveness of the additive over time. Static charges can build up in ULSD fuel while it is flowing through fuel delivery systems. Static electricity discharge in presence combustible vapours could result in a fire or explosion.

Therefore, it is important to ensure that the entire system used to refuel your engine (fuel supply tank, transfer pump, transfer hose, nozzle, and others) is properly grounded and bonded.

Consult your fuel or fuel system supplier to ensure that the delivery system is in compliance with fuelling standards for proper grounding and bonding practices.

## HANDLE FUEL SAFELY - AVOID FIRES

Handle fuel with care: it is highly flammable. Do not refuel the engine while smoking or when near open flame or sparks. Always stop engine before refuelling.

Prevent fires by keeping engine room clean of accumulated trash, grease, and debris. Always clean up spilled fuel. Use only an approved fuel container for transporting flammable liquids.

Do not store fuel container where there is an open flame, spark, or pilot light such as within a water heater or other appliance.

## BE PREPARED FOR EMERGENCIES



Be prepared if a fire starts. Keep a first aid kit and fire extinguisher handy. Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



## HANDLE STARTING FLUID SAFELY (ETHER)



Starting fluid is highly flammable. Keep all sparks and flame away if using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location. Do not incinerate or puncture a starting fluid container. Do not use starting fluid on an engine equipped with glow plugs or an air intake heater.

**Never Use it on Genset**

## HANDLING BATTERIES SAFELY



If not handled properly, batteries are a potential source of hazards. Excess of gases in batteries may explode. Keep sparks and flames away from batteries. Never use a cigarette lighter to observe electrolyte level. Use a flashlight to do it.

Use a flashlight to do it. Never check battery charge in shorting posts with a metal part. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace grounded clamp last. Sulfuric acid in battery electrolyte is poisonous and strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

**Avoid hazards and acid burns in :**

- Filling batteries in a well-ventilated area
- Wearing eye protection and rubber gloves
- Avoiding use of air pressure to clean batteries
- Avoiding breathing fumes when electrolyte is
- Avoiding spilling or dripping electrolyte
- Using correct battery booster or charger procedure.

**If acid is spilled on skin or in eyes:**

- Flush skin with water
- Apply baking soda or lime to help neutralize the acid
- Flush eyes with water for 15-30 minutes.
- Get medical attention immediately.

**If acid is swallowed:**

- Do not induce vomiting
- Drink large amounts of water or milk, but do not exceed 2 L (2 qt.)
- Get medical attention immediately.

## PREVENT BATTERY EXPLOSIONS



Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode. Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer. Do not charge a frozen battery: it may explode. Warm up battery to 16°C (60°F) before doing it.



**Battery posts, terminals, and related accessories contain lead and lead compounds. Rinse hands after handling batteries.**

## FROST PROTECTION - WINTERIZATION

See Maintenance Section 08 - Raw Water System - Risk of icing conditions / Protection against frost.



**When the engine has been set for winterization, place "DO NOT OPERATE" labels onto taps, valves, parts of equipment which have been turned off. Place a large and visible reminder on the wheelhouse dashboard.**

## LIVE WITH SAFETY

Before returning engine to customer, make sure engine is functioning properly, especially the safety systems. Make sure that all guards and shields are in place.

## PREVENT ACCIDENTS



**When engine is OFF, always set the transmission lever to neutral position.**

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## FUELS

### STORING FUEL



#### **DANGER !**

**Fuels and some fluids on board ships are easily flammable. Handle fuels with care and respect all safety rules. Do not refuel the tank while the engine is running. Do not smoke during the filling process or in the engine compartment. Ventilate the engine compartment before starting. Wear protective gloves and eye protective glasses. Avoid synthetic clothing which can melt when ignited. Always keep a fire extinguisher nearby.**

If there is a very slow turnover of fuel in the fuel tank or supply tank, it may be necessary to add a fuel conditioner to prevent water condensation. Contact your NANNI dealer for proper service or maintenance recommendations.

### DIESEL FUEL

Consult your local fuel distributor for properties of the diesel fuel available in your area.

In general, diesel fuels are blended to satisfy the low temperature requirements of the geographical area in which they are marketed.

Diesel fuels specified to EN 590 or ASTM D975 are recommended. Renewable diesel fuel produced by hydro-treating animal fats and vegetable oils is basically identical to petroleum diesel fuel. Renewable diesel that meets EN 590, ASTM D975, or EN 15940 is acceptable for use at all percentage mixture levels..

#### Required Fuel Properties

In all cases, the fuel shall meet the following properties:

- **Cetane number of 40 minimum.** Cetane number greater than 47 is preferred, especially for temperatures below  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) or elevations above 1675 m (5500 ft.).
- **Cloud Point** should be below the expected lowest ambient temperature or Cold Filter Plugging Point (CFPP) should be a maximum  $10^{\circ}\text{C}$  ( $18^{\circ}\text{F}$ ) below the fuel cloud point.
- **Fuel lubricity** should pass a maximum scar diameter of 0.52 mm as measured by ASTM D6079 or ISO 12156-1. A maximum scar diameter of 0.45 mm is preferred.
- **Diesel fuel quality and sulfur content** must comply with all existing emissions regulations for the area in which the engine operates. DO NOT use diesel fuel with sulfur content greater than 10 000 mg/kg (10 000 ppm).

#### E-Diesel fuel

DO NOT use E-Diesel (Diesel fuel and ethanol blend).

Use of E-Diesel fuel in any NANNI engines may void the machine warranty



#### **CAUTION !**

**Avoid severe injury or death due to the fire and explosion risk from using E-Diesel fuel.**

#### Sulphur Content for Tier 3 and Stage III A Engines

- Use of diesel fuel with sulphur content less than 1000 mg/kg (1000 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content 1000–2000 mg/kg (1000–2000 ppm) REDUCES the oil and filter change interval.
- BEFORE using diesel fuel with sulfur content greater than 2000 mg/kg (2000 ppm), contact your NANNI

dealer.

## Sulphur Content for Tier 2 and Stage II Engines

- Use of diesel fuel with sulfur content less than 2000 mg/kg (2000 ppm) is **RECOMMENDED**.
- Use of diesel fuel with sulfur content 2000–5000 mg/kg (2000–5000 ppm) **REDUCES** the oil and filter change interval.<sup>1</sup>
- **BEFORE** using diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm), contact your NANNI dealer.

## Sulfur Content for Other Engines

- Use of diesel fuel with sulfur content less than 5000 mg/kg (5000 ppm) is **RECOMMENDED**.
- Use of diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm) **REDUCES** the oil and filter change interval.



## IMPORTANT!

**Do not mix used diesel engine oil or any other type of lubricating oil with diesel fuel.**

**Improper fuel additive usage may cause damage on fuel injection equipment of diesel engines.**

## LUBRICITY OF DIESEL FUEL

Most diesel fuels manufactured in the United States, Canada, and the European Union have adequate lubricity to ensure proper operation and durability of fuel injection system components. However, diesel fuels manufactured in some areas of the world may lack the necessary lubricity.



## IMPORTANT!

**Make sure the diesel fuel used in your machine demonstrates good lubricity characteristics.**

Fuel lubricity should pass a maximum scar diameter of 0.52 mm as measured by ASTM D6079 or ISO 12156-1.

A maximum scar diameter of 0.45 mm is preferred.

## HANDLING AND STORING DIESEL FUEL



### CAUTION !

**Reduce the risk of fire. Handle fuel carefully. DO NOT fill the fuel tank when engine is running. DO NOT smoke while you fill the fuel tank or service the fuel system.**

Fill the fuel tank at the end of each day's operation to prevent water condensation and freezing during cold weather.

Keep all storage tanks as full as practical to minimize condensation.

Ensure that all fuel tank caps and covers are installed properly to prevent moisture from entering. Monitor water content of the fuel regularly.

When using biodiesel fuel, the fuel filter may require more frequent replacement due to premature plugging.

Check engine oil level daily prior to starting engine. A rising oil level may indicate fuel dilution of the engine oil.



### IMPORTANT!

**The fuel tank is vented through the filler cap. If a new filler cap is required, always replace it with an original vented cap.**

When fuel is stored for an extended period or if there is a slow turnover of fuel, add a fuel conditioner to stabilize the fuel. Keeping the free water drained and treating the bulk fuel storage tank quarterly with a maintenance dose of a biocide will prevent microbial growth. Contact your fuel supplier or NANNI dealer for recommendations.

## RECOMMENDED FUEL

### Approved fuel

Diesel approved by NANNI Industries on the engines of the firm are as follows :

- EN 590 (Europe),
- ASTM D975 (U.S.A and territorial waters assimilated, particularly in the Caribbean and Pacific areas),
- BS 2869 Part 1 Class A1 (G.B),
- JIS KS2204 Fuel N°02 (Japan).

These regulations are in compliance with ISO 8217 DMX.

### European standard EN15940

Paraffin-based fuel that complies with European standard EN15940 can be used for all NANNI Kubota bases engines including EU Stage V.

The newly approved fuels are paraffin-based fuels that comply with European standard EN15940, including GTL (Gas to Liquid) and HVO (Hydrotreated Vegetable Oil).

Paraffinic fuels are produced from natural gas, coal, vegetable oil, animal, and vegetable fats, etc., and their main component is paraffin.

Fuels synthesized from vegetable oils and fats are called HVO, and fuels synthesized from natural gas are called GTL.



### IMPORTANT!

**When using these fuels, please comply with the various regulations in the area where it is used.**

EN15940 (Effect on engine)



### CAUTION !

1. **Paraffinic fuel is lower fuel density than diesel, so engine output may decrease.**
2. **Rubbers and elastomers used in engine parts, such as NBR, may harden and shrink more than diesel.**

## BIODIESEL FUEL

Biodiesel fuel is comprised of monoalkyl esters of long chain fatty acids derived from vegetable oils or animal fats. Biodiesel blends are biodiesel mixed with petroleum diesel fuel on a volume basis.

Environmental laws and regulations can encourage or prohibit the use of biofuels. Operators should consult with appropriate governmental authorities prior to using biofuels.



### IMPORTANT!

**Biodiesel is not recommended by NANNI.**

**Raw pressed vegetable oils are NOT acceptable for use as fuel in any concentration in NANNI engines. Their use could cause engine failure.**

## TESTING DIESEL FUEL

A fuel analysis program can help to monitor the quality of diesel fuel. The fuel analysis can provide critical data such as calculated cetane index, fuel type, sulphur content, water content, appearance, suitability for cold weather operations, bacteria, cloud point, acid number, particulate contamination, and whether the fuel meets EN590 or ASTM D975 or equivalent specification.

## MINIMIZING THE EFFECT OF COLD WEATHER ON DIESEL ENGINES

NANNI diesel engines are designed to operate effectively in cold weather.

However, for effective starting and cold-weather operation, a little extra care is necessary. The following information outlines steps that can minimize the effect that cold weather may have on starting and operation of your engine. See your NANNI dealer for additional information and local availability of cold-weather aids.

### Use Winter Grade Fuel

When temperatures fall below 0°C (32°F), winter grade fuel (No. 1-D in North America) is best suited for cold-weather operation. Winter grade fuel has a lower cloud point and a lower pour point.

Cloud point is the temperature at which wax begins to form in the fuel. This wax causes fuel filters to plug. Pour point is the lowest temperature at which movement of the fuel is observed.



### NOTE!

**On average, winter grade diesel fuel has a lower Btu (heat content) rating. Using winter grade fuel may reduce power and fuel efficiency, but should not cause any other engine performance effects. Check the grade of fuel being used before troubleshooting for low-power complaints in cold-weather operation.**

### Air Intake Heater

An air intake heater is an available equipment for some engines to aid cold weather starting.

### Ether

An ether port on the intake is available to aid cold weather starting.



### CAUTION !

**Ether is highly flammable and not recommended by NANNI. Do not use ether when starting an engine equipped with glow plugs or an air intake heater.**

### Coolant Heater

An engine block heater (coolant heater) is an available option to aid cold weather starting.

### Seasonal Viscosity Oil and Proper Coolant Concentration

Use seasonal grade viscosity engine oil based on the expected air temperature range between oil changes and a proper concentration of low silicate antifreeze as recommended. (See DIESEL ENGINE OIL and ENGINE COOLANT requirements in this section.)

### Biodiesel

Use B5 or lower blends at temperatures below 0°C (32°F). Use only winter grade petroleum diesel fuel at temperatures below -10°C (14°F).

### Winter-fronts

Use of fabric, cardboard, or solid winter-fronts is not recommended with any NANNI engine. Their use can result in excessive engine coolant, oil, and charge air temperatures. This can lead to reduced engine life, loss of power and poor fuel economy. Winter-fronts may also put abnormal stress on fan and fan drive components potentially causing premature failures.

If winter-fronts are used, they should never totally close off the grill frontal area. Approximately 25% area in the center of the grill should remain open at all times. At no time should the air blockage device be applied directly to the radiator core.



## DIESEL ENGINE COOLANTS

Failure to follow applicable coolant standards and drain intervals can result in severe engine damage that may not be covered under warranty. Warranties, including the emissions warranty, are not conditioned on the use of NANNI coolants, parts or service

### RECOMMENDED COOLANTS

Other ethylene glycol or propylene glycol base coolants may be used if they meet the following specification:

- Pre-mix coolant meeting ASTM D6210 requirements
- Are nitrite-free
- Coolant concentrate meeting ASTM D6210 requirements in a 40–60% mixture of concentrate with quality water

If coolant meeting one of these specifications is unavailable, use a coolant concentrate or pre-mix coolant that has a minimum of the following chemical and physical properties:

- Provides cylinder liner cavitation protection according
- Is formulated with a nitrite-free additive package
- Protects the cooling system metals (cast iron, aluminum alloys, and copper alloys such as brass) from corrosion

### WATER QUALITY

Water quality is important to the performance of the cooling system. Deionized or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

### COOLANT DRAIN INTERVALS

Drain and flush the cooling system and refill with fresh coolant at the indicated interval, which varies with the coolant used.



#### IMPORTANT!

**Do not use cooling system sealing additives or antifreeze that contains sealing additives.**

**Do not mix ethylene glycol and propylene glycol base coolants.**

**Do not use coolants that contain nitrites.**

## OPERATING IN WARM TEMPERATURE CLIMATES

NANNI engines are designed to operate using recommended engine coolants.

Always use a recommended engine coolant, even when operating in geographical areas where freeze protection is not required.



#### IMPORTANT!

**Water may be used as coolant in emergency situations only.**

**Foaming, hot surface aluminium and iron corrosion, scaling, and cavitation occur when water is used as the coolant, even when coolant conditioners are added.**

**Drain cooling system and refill with recommended engine coolant as soon as possible.**

## S03 FLUIDS

### WATER QUALITY FOR MIXING WITH COOLANT CONCENTRATE

Engine coolants are a combination of three chemical components: ethylene glycol (EG) or propylene glycol (PG) antifreeze, inhibiting coolant additives, and quality water.

Water quality is important to the performance of the cooling system. Deionized or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

All water used in the cooling system should meet the following minimum specifications for quality:

Chlorides	<40 mg/L
Sulfates	<100 mg/L
Total solids	<340 mg/L
Total dissolved hardness	<170 mg/L
pH	5.5–9.0



#### IMPORTANT!

**Do not use bottled drinking water because it often contains higher concentrations of total dissolved solids.**

#### Freeze Protection

The relative concentrations of glycol and water in the engine coolant determine its freeze protection limit.

Ethylene Glycol	Freeze Protection Limit
40%	-24°C (-12°F)
50%	-37°C (-34°F)
60%	-52°C (-62°F)

Propylene Glycol	Freeze Protection Limit
40%	-21°C (-6°F)
50%	-33°C (-27°F)
60%	-49°C (-56°F)

**DO NOT** use a coolant-water mixture greater than 60% ethylene glycol or 60% propylene glycol.

### TESTING COOLANT FREEZE POINT

The use of a hand-held coolant refractometer is the quickest, easiest, and most accurate method to determine coolant freeze point. This method is more accurate than a test strip or a float-type hydrometer which can produce poor results.

A coolant refractometer can be used to provide an economical solution to accurate freeze point determination in the field.

To use this tool:

1. Allow cooling system to cool to ambient temperatures.
2. Open heat-exchanger cap to expose coolant.
3. With the included dropper, collect a small coolant sample.
4. Open the lid of the refractometer, place one drop of coolant on the window and close the lid.
5. Look through the eyepiece and focus as necessary.
6. Record the listed freeze point for the type of coolant (ethylene glycol coolant or propylene glycol) being tested.



Part Number 945400245

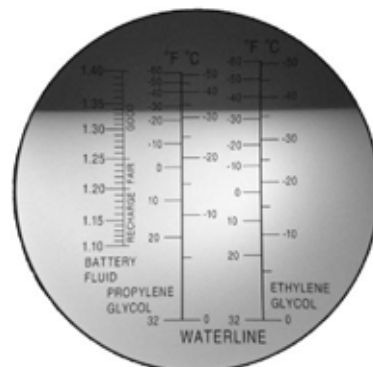


Image with a Drop of 50/50 Coolant Placed on the Refractometer Window

## LUBRICANTS

### ENGINE OIL AND FILTER SERVICE INTERVALS — TIER 3 AND STAGE IIIA — OEM APPLICATIONS

Recommended oil and filter service intervals are based on a combination of oil pan capacity, type of engine oil and filter used, and sulphur content of the diesel fuel. Actual service intervals also depend on operation and maintenance practices.

Approved Oil Types:

- API CK-4, API CJ-4, API CI-4 PLUS, API CI-4, ACEA E9, ACEA E7, ACEA E6, ACEA E5, and ACEA E4

Use oil analysis to evaluate the condition of the oil and to aid in selection of the proper oil and filter service interval. Contact your NANNI dealer or other qualified service provider for more information on engine oil analysis.

Change the oil and oil filter at least once every 12 months even if the hours of operation are fewer than the otherwise recommended service interval.

**Diesel fuel sulfur content** affects engine oil and filter service intervals.

- Use of diesel fuel with sulfur content less than 1000 mg/kg (1000 ppm) is **RECOMMENDED**.
- Use of diesel fuel with sulfur content 1000–2000 mg/kg (1000–2000 ppm) **REDUCES** the oil and filter service interval.
- **BEFORE** using diesel fuel with sulfur content greater than 2000 mg/kg (2000 ppm), contact your NANNI dealer or qualified service provider.
- **DO NOT** use diesel fuel with sulfur content greater than 10 000 mg/kg (10 000 ppm).



#### IMPORTANT!

To avoid engine damage:

- **Reduce oil and filter service intervals by 50% when using biodiesel blends greater than B20. Oil analysis may allow longer service intervals**
- **Use only approved oil types**

Oil pan capacity	Oil Pan Size (L/kW)		
	Greater than or equal to 0.10	Greater than or equal to 0.12	Greater than or equal to 0.14
Fuel Sulfur	Less than 1000 mg/kg (1000 ppm)		
Periodicity	250 hours	250 hours	250 hours
Fuel Sulfur	1000–2000 mg/kg (1000–2000 ppm)		
Periodicity	200 hours	200 hours	250 hours
Fuel Sulfur	2000–5000 mg/kg (2000–5000 ppm)		
Periodicity	150 hours	175 hours	250 hours
Fuel Sulfur	5000–10 000 mg/kg (5000–10 000 ppm)		
Periodicity	125 hours	125 hours	125 hours

Oil analysis may extend the service interval of "Other Oils", to a maximum not to exceed the higher interval. Oil analysis means taking a series of oil samples at 50-hour increments beyond the normal service interval until either the data indicates the end of useful oil life or the maximum service interval.

## DIESEL ENGINE OIL – TIER 3 AND STAGE IIIA

Failure to follow applicable oil standards and drain intervals can result in severe engine damage that might not be covered under warranty. Warranties, including the emissions warranty, are not conditioned on the use of NANNI parts, or service.

Use oil viscosity based on the expected air temperature range during the period between oil changes.

Oils may be used if they meet one or more of the following standards:

- API Service Category CK-4
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

Multi-viscosity diesel engine oils are preferred.

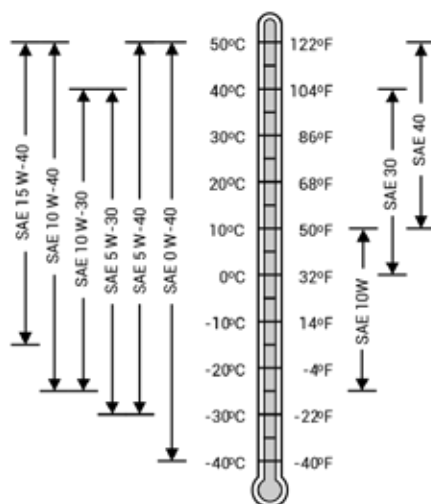
Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.

## OIL FILTERS

Filtration of oils is critically important for proper operation and lubrication. NANNI brand oil filters have been designed and produced specifically for NANNI applications.

NANNI filters adhere to engineering specifications for quality of the filter media, filter efficiency rating, strength of the bond between the filter media and the element end cap, fatigue life of the canister (if applicable), and pressure capability of the filter seal. Non-NANNI branded oil filters might not meet these key NANNI specifications.

Always change oil filters regularly as specified in this manual



*Oil Viscosities for Air Temperature Ranges*

**DO NOT** use diesel fuel with sulfur content greater than 10 000 mg/kg (10 000 ppm).

### FUEL FILTERS

The importance of fuel filtration cannot be overemphasized with modern fuel systems. The combination of increasingly restrictive emission regulations and more efficient engines requires fuel system to operate at much higher pressures.

Higher pressures can only be achieved using fuel injection components with very close tolerances. These close manufacturing tolerances have significantly reduced capacities for debris and water.

NANNI brand fuel filters have been designed and produced specifically for NANNI engines.

To protect the engine from debris and water, always change engine fuel filters as specified in this manual.

### ALTERNATIVE AND SYNTHETIC LUBRICANTS

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual.

Some NANNI brand coolants and lubricants may not be available in your location.

Consult your NANNI dealer to obtain information and recommendations.

Synthetic lubricants may be used if they meet the performance requirements as shown in this manual.

The temperature limits and service intervals shown in this manual apply to NANNI branded fluids or fluids that have been tested and/or approved for use in NANNI equipment.

Re-refined base stock products may be used if the finished lubricant meets the performance requirements.

### LUBRICANT STORAGE

Your equipment can operate at top efficiency only when clean lubricants are used.

Use clean containers to handle all lubricants.

Store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

Make certain that all containers are properly marked to identify their contents.

Properly dispose of all old containers and any residual lubricant they may contain.

### MIXING OF LUBRICANTS

In general, avoid mixing different brands or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements.

Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

Consult your NANNI dealer to obtain specific information and recommendations.

## DISPOSING OF WASTE FLUIDS

Prior to contemplate any draining, make sure that all adequate gear such as : funnel(s), hose(s), suitable container(s) and so on, are at hand.

Use leak-proof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Wear gloves and eye protection glasses. Follow all safety rules. Wait for engine to cool down.

Do not let waste to drip on the ground, down a city drain, or into any water source. Improperly disposing of engine coolants, oils, or other chemical fluids is a threat against environment and is an offence in many countries.



**Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your Nanni engine representative or service dealer.**





# S04 WARRANTY

## ENGINE IDENTIFICATION

Both the engine and the alternator have an identification plate showing important informations.

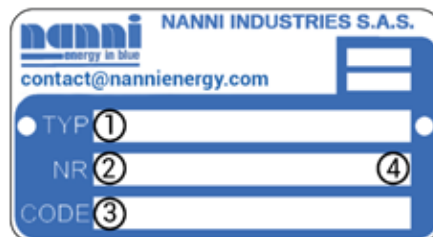
Keep these plates accessible and in good condition. Record and keep serial number and designation. These numbers should always be quoted when ordering service and replacement parts. Depending of type of engine, identification plate are as follows :



Or :



Example :



1 : Type of engine

2 : Engine serial number

3 : Engine code

4 : Nanni engine serial number

<b>TYP</b>	Indicates the commercial designation of the engine.
<b>NR</b>	Indicates the engine serial number.
<b>CODE</b>	Lists various specifications of the engine.



### NOTE!

ID plates may differ in appearance from models shown above without any change in equipment itself.

## S04 WARRANTY

### ENGINE HOMOLOGATION

The engine type can be exhaust emission certified. It means that Nanni guarantees that all engines of the same type that are manufactured are approved and certified by the authorities in accordance with different exhaust emissions standards.

For the engine to be in accordance with this standards, special requirements for maintenance and service are to be followed :

Only Nanni replacement parts must be used.

Maintenance intervals must be observed.

The engine must not be modified in any way except with accessories and service kits approved by Nanni Industries S.A.S. France.

Service of the fuel system must always be carried out by an authorized Nanni workshop.

No modifications to the air intake and exhaust system may be undertaken.

Seals may only be broken by authorized personnel.

The operation instructions stated in the relevant manuals should be followed by the user.

Nanni's responsibility for the engine specification being in accordance with the certification will be void if one or several of these conditions are breached.

### ENGINE RESPONSIBILITY

Nanni designs its engines to have minimum environmental impact. This objective, however, can only be achieved with your full cooperation.

Our operating and maintenance instructions are to help you to protect your engine and adopt environmentally responsible behaviour.

Ensure you only use the fuels and oils recommended. Using another type of fuel or oil could cause major malfunctions, an higher fuel consumption, a reduced engine service life, and a greater discharge of exhaust gases.

When draining the oil and changing the oil or fuel filter, dispose of the waste in an appropriate container. These fluids cause major damage to flora and fauna if discharged into nature. Use an absorption kit in the event of accidental discharge of oil or fuel into the water.

# S04 WARRANTY

## WARRANTY

This manual is supplemented by a Warranty Information Booklet. We recommend that you read this publication thoroughly.

Pay special attention to the applicable duty cycle and to the resulting limitations. Failure to comply with the warranty conditions will void the Warranty.

The validity of the Warranty is also dependent on proper installation and maintenance operation being carried out by an authorized Nanni representative.



### NOTE!

**Late or improper maintenance or use of spare parts other than NANNI original spare parts will invalidate NANNI's responsibility for the engine accordance with homologation and will void the Warranty.**

Modifications to the engine's settings, as well as any other technical modification (accessories, spare parts, additional equipment, etc) **ARE FORBIDDEN WITHOUT WRITTEN AUTHORIZATION FROM NANNI INDUSTRIES S.A.S.**

Any modification will void the Warranty. Damage caused by failure to follow operation instructions or incorrect operation is also not covered by the warranty.

## PROPOSITION 65 STATE OF CALIFORNIA



### WARNING!

**Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.**

**Battery posts and terminals, related devices do contain lead or Lead compounds, chemicals known to State of California to cause cancer, birth defects or other reproductive harm. Thoroughly wash your hands after handling any of the above components**

# S04 WARRANTY

## EPA WARRANTY

EPA and CARB warranties only apply to new engines having the certification label affixed to the engine and sold as stated above in the geographic areas.

The presence of an EU number signifies that the engine has been certified with the European Union countries per Directive 97/68/EC. The EPA and/or CARB emissions warranties do not apply to the EU countries.

When applied onto engine, Emission Control label must never be removed from engine block neither covered with a layer of paint. This label is the evidence showing that the engine is meeting U.S emissions regulations. It must be kept available at anytime once the vessel has entered waters being in the scope of the North American Emission Control Area (ECA).

### Emission Control System(s) Laws

The U.S. EPA and CARB prohibit the removal or rendering inoperative of any device or element of design installed on or in engines/equipment in compliance with applicable emission regulations prior to or after the sale and delivery of the engines/equipment to the ultimate purchaser.

### European Union (EU) Declaration of Emissions Conformity

The presence of an EU number on the label signifies that the Marine Diesel Engine has been certified with the European Union countries per Directives 97/68/EC as amended by Directive 2004/26/EC. The EU engine family is listed on the Emissions Label.

When installed in accordance with the manufacturer's instructions, Nanni Industries Marine Diesel Propulsion Engines without integral exhaust certified under Directive 97/68/EC as amended by Directive 2004/26/EC produce exhaust emissions of carbon monoxide, hydrocarbons, nitrogen oxides and particle emissions complying with the requirements of the Recreational Craft Directive 2003/44/EC.

## ALTERNATOR IDENTIFICATION

The characteristics of the alternator are mentioned on its type nameplate affixed to its casing. Never remove it or cover it with paint.

If the nameplate went to be missing at some stage, it would become very difficult to quickly determine the corresponding characteristics of the alternator.



Above : I.D plate of an alternator.



### NOTE!

**The generator sets are designed for long term service. There are no serviceable parts inside the alternator for the end user. In the event of a fault, consult your nearest NANNI representative.**

The alternator identification plate provides to the marine electrician in charge of the installation, all the information needed to define the entire electrical system on board the vessel.



### NOTE!

**Any modification to the alternator will void the warranty and will be in opposition to safety regulations.**



### IMPORTANT!

**To ensure than your generating set will always deliver efficient operation when required, start the engine and run it loaded between 50-70 % for 30 minutes every two weeks.**

**DO NOT** allow the generator set to run unloaded for an extended period of time.

# S05 COMPONENTS

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## GENSET MAIN COMPONENTS

### LIST OF COMPONENTS



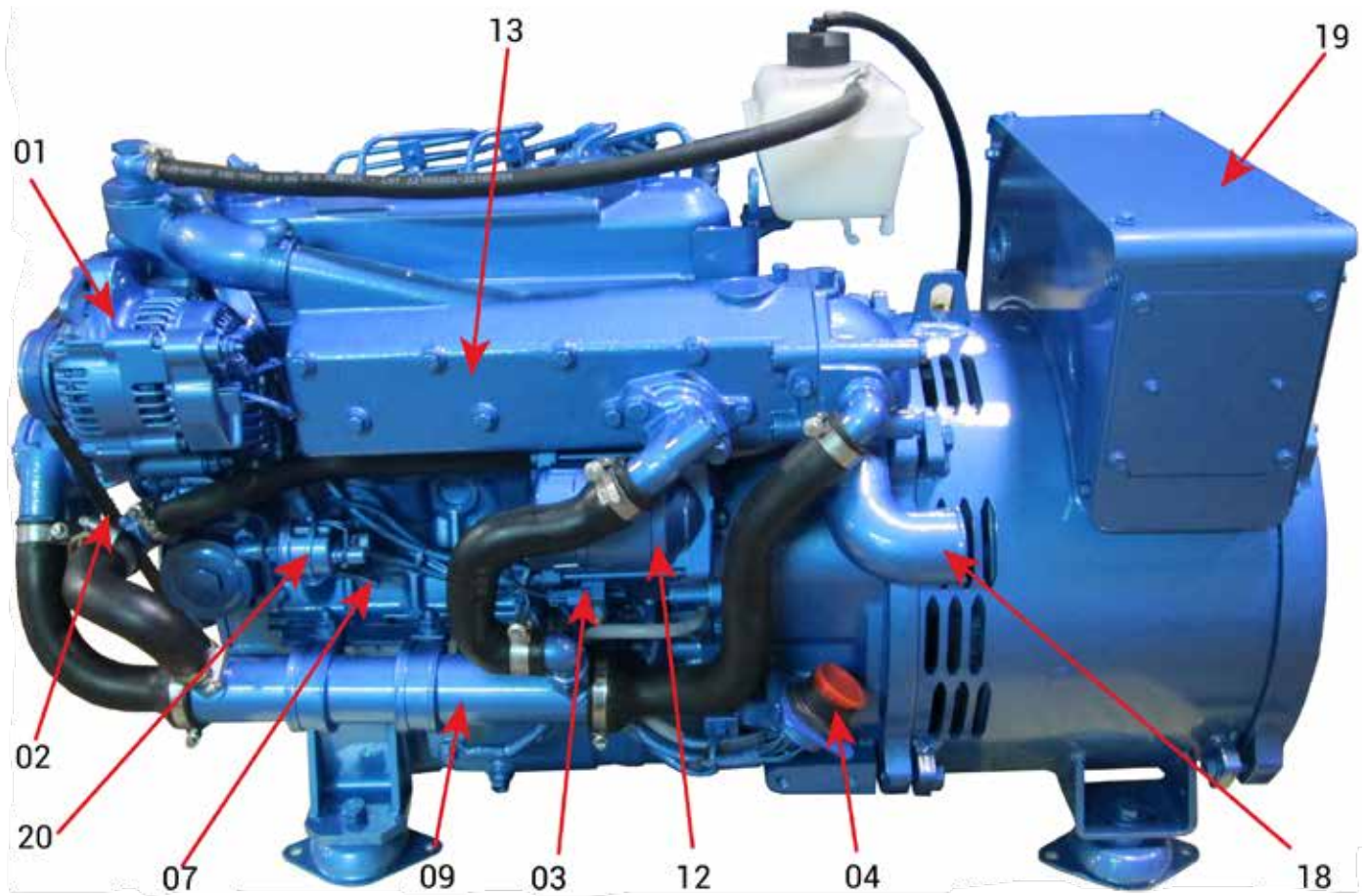
#### NOTE!

Minor details may differ from those shown. Some components may not be included in the order. Illustrations are not contractual.

Items	COMPONENTS
1	Engine alternator
2	Alternator belt
3	Starter motor
4	Control panel connector
5	Air filter
6	Fuel filter
7	Coolant drain valve
8	Fuel injection pump
9	Heat exchanger
10	Coolant filler cap
11	Coolant pump
12	Starter solenoid
13	Cooled exhaust manifold
14	Fuel priming pump
15	Oil filter
16	Oil port plug
17	Oil dipstick
18	Exhaust elbow
19	Alternator
20	Oil pressure sensor
21	Raw water pump
22	Engine nameplate
23	Alternator nameplate
24	Expansion tank

## S05 COMPOSANTS

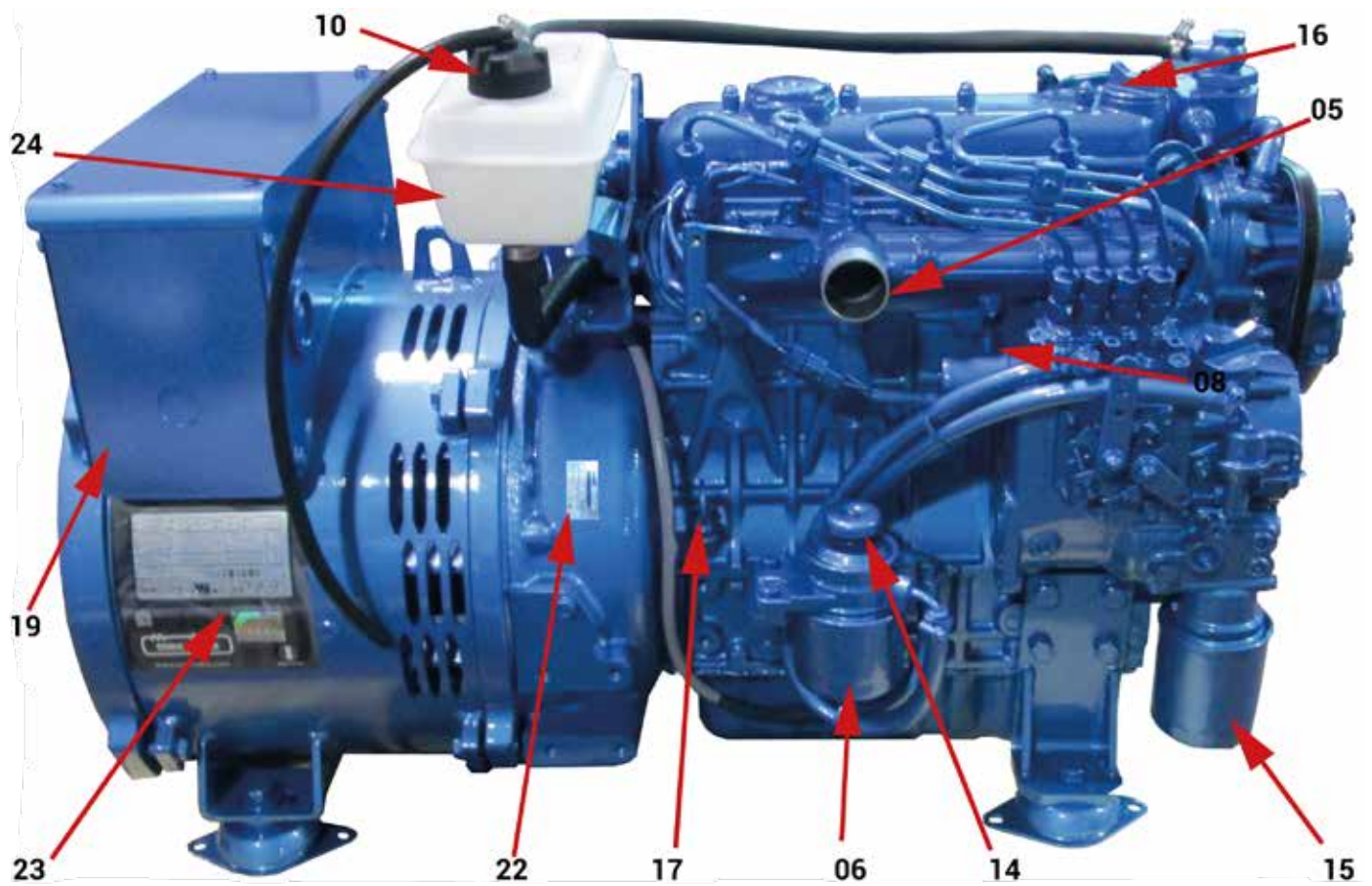
VIEW N°1 OF THE GENERATOR SET





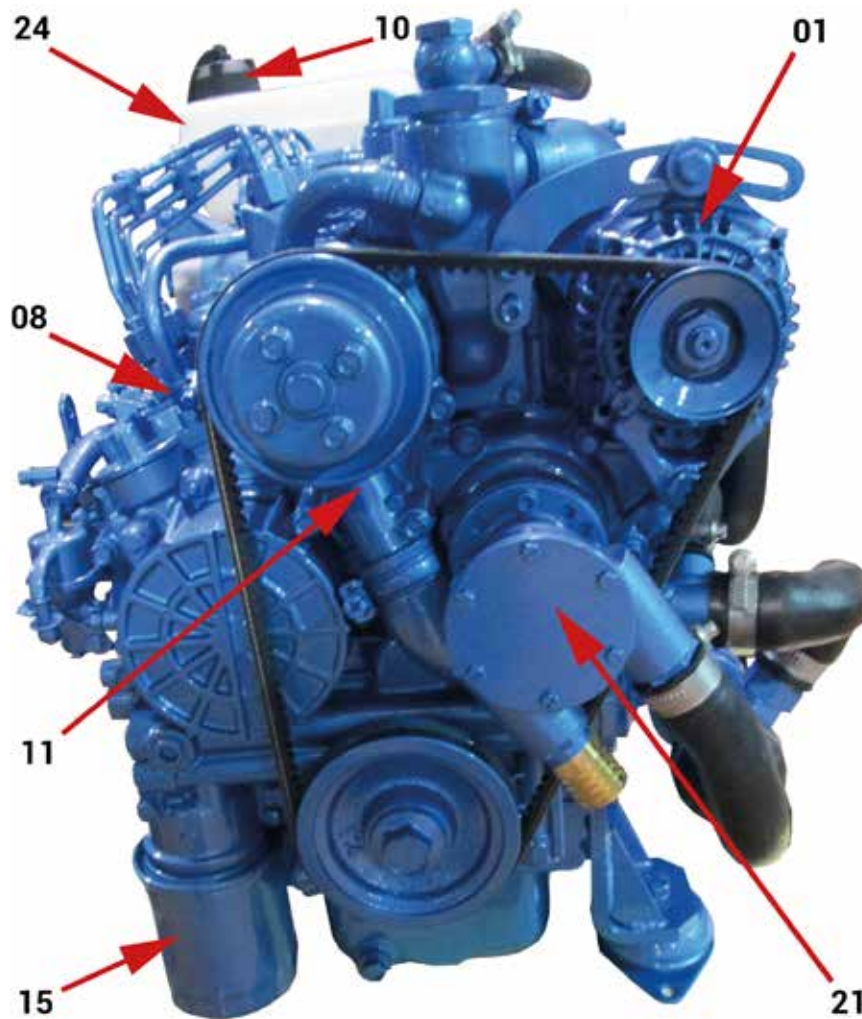
# S05 COMPOSANTS

VIEW N°2 OF THE GENERATOR SET



## S05 COMPOSANTS

### VIEW N°3 OF THE GENERATOR SET



#### ! NOTE!

- Always lift the generating set in using the lifting eyelets. Adjust the lifting slings to lift the unit horizontally.
- For safety and operational reasons, never insert any objects or block the vents of the generator.
- Do not stand under the unit while it is being lifted/installed.

# S06 STARTING & RUNNING

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# S06 STARTING & RUNNING

## COMMAND PANEL SI-2

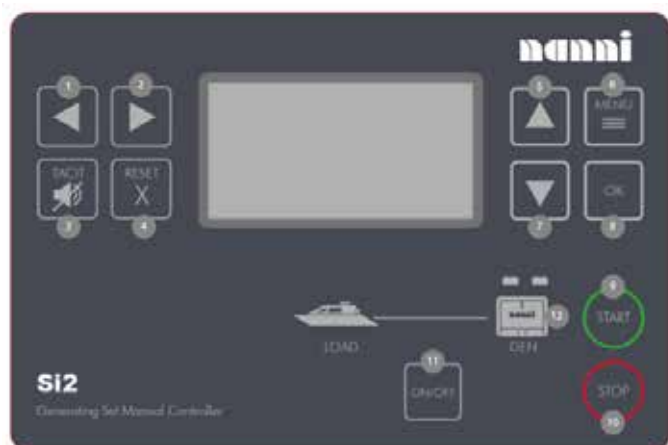
This panel integrates all the information necessary for the operation and monitoring of the generator set. The control panel is delivered complete in working condition and does not require any internal wiring by the user. The connection to the generator engine is made via a dedicated extension cable or installed on the sound Proof.



### IMPORTANT!

The control panel must be integrated in a dash protected from splashing water.

### DESCRIPTION OF THE GENERATOR SET CONTROL PANEL



Pos.	Pic.	Description
1		<p><b>LEFT button.</b> Use this button to move left or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed.</p> <p><b>Note!:</b> This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – “Operating modes” chapter.</p>
2		<p><b>RIGHT button.</b> Use this button to move right or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed.</p> <p><b>Note!:</b> This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – “Operating modes” chapter.</p>
3		<p><b>HORN RESET button.</b> Use this button to deactivate the horn output without acknowledging the alarms.</p>

4		<p><b>FAULT RESET button.</b> Use this button to acknowledge alarms and deactivate the horn output. Inactive alarms will disappear immediately and status of active alarms will be changed to “confirmed” so they will disappear as soon as their reasons dismiss.</p>
5		<p><b>UP button.</b> Use this button to move up or increase value.</p>
6		<p><b>PAGE button.</b> Use this button to switch over display pages.</p>
7		<p><b>DOWN button.</b> Use this button to move down or decrease value.</p>
8		<p><b>ENTER button.</b> Use this button to finish editing a set-point or moving right in the history page</p>
9		<p><b>START button.</b> Works in MAN mode only. Press this button to initiate the start sequence of the engine.</p>
10		<p><b>STOP button.</b> Works in MAN mode only. Press this button to initiate the stop sequence of the Gen-set. Repeated pressing of button will cancel current phase of stop sequence (like cooling) and next phase will continue.</p>
11		<p><b>GCB button.</b> Works in MAN mode only. Press this button to open or close the GCB.</p>

#### Indicators and others

12		<p><b>GENERATOR status indicator.</b> There are two states – Gen-set OK (indicator is green) and Gen-set failure (indicator is red). Green LED is on if the generator voltage and frequency is present and within limits. Red LED starts flashing when Gen-set failure occurs. After FAULT RESET button is pressed, Red LED goes to steady light (if an alarm is still active) or is off (if no alarm is active).</p>
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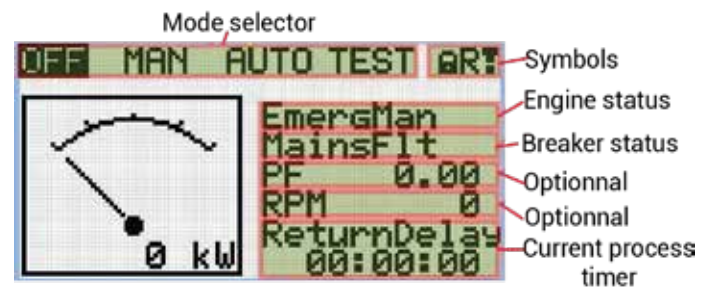
# S06 STARTING & RUNNING

## DISPLAY SCREENS & PAGES STRUCTURES

The displayed information is structured into "pages" and "screens". Use PAGE button to switch over the pages.

- The page Measurement consists of screens which display measured values like voltages, current, oil pressure etc., computed values like i.e. gen-set power, statistic data and the alarm list on the last screen.
- The page Set-points contains all set-points organized to groups and also a special group for entering password.
- The page History log shows the history log in the order that the last record is displayed first.

## MAIN SCREEN



## Symbols

- Padlock – active when LBI ACCESS LOCK is active
- R – active when there is active remote connection to controller
- Exclamation mark – active when there is any alarm in alarm list

## STARTING & USE

### STARTING AND STOP BUTTONS

These buttons are used to start and stop the engine.



**START button.** Works in MAN mode only. Press this button to initiate the start sequence of the engine.



**STOP button.** Works in MAN mode only. Press this button to initiate the stop sequence of the Gen-set. Repeated pressing of button will cancel current phase of stop sequence (like cooling) and next phase will continue.



### IMPORTANT!

For more information please refer to the Si-2 User Manual reference: DGBXXT09028A.

# S06 STARTING & RUNNING

## BEFORE STARTING

### FUEL SYSTEM

Fuel is drawn from the tank by the fuel feed pump and injected into the combustion chamber by the injection pump. A fuel filter is placed between the fuel supply pump and the injection pump.

The injection pump delivers more fuel than is required for combustion. The unburned fuel is returned to the tank through an overflow pipe.



#### CAUTION!

The injection pump is an extremely sophisticated device. The entry of water into the fuel system will result in a major failure of the injection pump and the entire fuel system.

A fuel prefilter with a water separator must be installed between the fuel tank and the engine fuel filter. The prefilter should be installed as close as possible to the engine fuel filter. It should never be installed on top of the engine because vibration affects the fuel/water separation process.

If the fuel tank is located under the engine fuel injection pump, an additional electrical supply pump must be installed between the prefilter and the engine fuel pump.

### RAW WATER

The raw water system cools the engine coolant and the exhaust gases.

The raw water is drawn into the heat exchanger by the engine's raw water pump. The raw water is discharged via the exhaust elbow, where it is mixed with the exhaust gases.

The anti-siphon prevents raw water from entering the cylinders via the raw water/exhaust system.



#### NOTE!

**A siphon is mandatory if the exhaust elbow is below the waterline at full load or less than 200 mm above. An anti-siphon is mandatory on all sail-boats and when there is a risk of water entering the engine.**

A raw water filter must be installed between the raw water intake and the engine raw water pump.



# S06 STARTING & RUNNING

## ELECTRIC SYSTEM

The electrical harness of the generating set must be kept away from any splash of water and must be correctly fixed as high as possible in the hold.

The electrical diagrams related to the generator set are in the Maintenance chapter.

## PRELIMINARY CHECKS



### **DANGER!**

**All covers must be put back in place before starting the genset.**

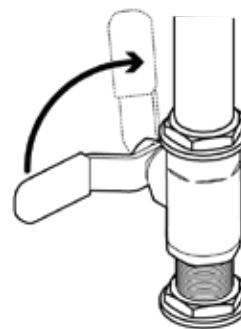


### **CAUTION!**

**Open the sea cock before starting the engine. The raw water pump impeller will be damaged if it runs dry, even for a few seconds, and may cause the engine to overheat.**

Perform the following before starting the engine:

1. Open the sea cock. Prime if required.



2. Start the compartment fan (if applicable) for at least five minutes. Otherwise, open the bilge.
3. Check the fuel level.
4. Turn the control lever to Neutral.
5. Open the fuel valve. Prime if necessary.
6. Check engine and transmission oil level and adjust if necessary.
7. Check coolant level, and adjust if necessary.
8. Check mechanical cables and lubricate as needed.
9. Check for fluid leaks.
10. Check alternator belt tension.
11. Apply power to the electrical system.

# S06 STARTING & RUNNING

## STARTING THE GENSET



### CAUTION!

Do not force continuous starting for more than 10 seconds at a time. Allow it to cool for 2 minutes between starting attempts. Failure to do so may cause the starter to overheat and burn out.



### NOTE!

If the engine does not start after 3 attempts, remove the key and drain the water from the airlock. Failure to do so may result in water seeping into the cylinders. When you first start the engine, let it idle for several minutes and check for leaks or malfunction.

## COLD CLIMATE START-UP



### NOTE!

Engine coolant heaters should be used when temperatures are at or below 0°C (32°F).

Turn on the engine coolant heater for at least 2 hours before starting the engine. Additional information on cold weather operation is available from your Nanni engine distributor or authorized dealer.

Synthetic oils improve flow at low temperatures, especially in Arctic conditions.

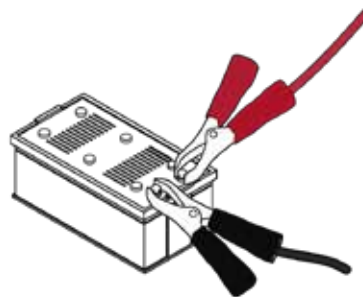
## STARTING WITH BACK-UP BATTERIES



### CAUTION!

Be sure to use batteries with the same voltage rating as the motor system voltage.

1. Connect the jumper cable to the positive (+) pole of the discharged battery, then to the positive (+) pole of the booster battery.
2. Connect the jumper cable to the negative (-) pole of the booster battery. Connect the other end to a bolt on the engine block.
3. Start the engine following the starting procedure.
4. Let the engine idle for a few minutes to charge the battery.
5. Stop the engine and remove the cables in the reverse order of installation.



*Beware of polarities !*



# S06 STARTING & RUNNING

## RUNNING

### WHILE RUNNING



#### NOTE!

**Never press the START button while the engine is running.**

The starter solenoid would engage the pinion and start the starter, against the already moving flywheel. This action will destroy the starter.

Check the alarm lights after starting and regularly while navigating.

### FUNCTIONAL ANOMALIES

Stop the engine of the unit (if possible), if there are signs of trouble. Symptoms that may be early signs of engine problems include:

- Sudden drop in oil pressure
- Abnormal coolant temperature
- Unusual noise or vibration
- Sudden loss of power
- Excessive black exhaust fumes
- Excessive fuel consumption
- Abnormal oil consumption
- Fluid leaks...

If it is not possible to stop the generator during navigation or to repair it, try to reduce the load delivered by the generator and check the whole system once back in port. If necessary, consult your local Nanni representative.

## AFTER RUNNING

### HOW TO STOP THE GENSET



#### CAUTION!

**Never shut down the generator set using an "Emergency Stop" type device on the boat. This could damage the electrical system.**

Turn off all devices powered by the generator set, turn the starting key on the generator set panel counterclockwise: the engine will stop and all indicators will go out.

### AFTER GENSET STOP

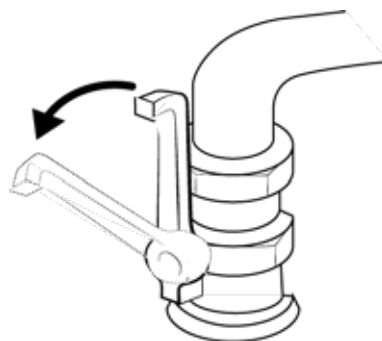


#### CAUTION!

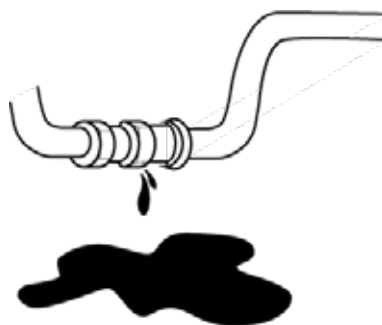
**After the generator set is shut down, some components and fluids remain hot and pressurized for several minutes. If possible, limit work on the engine immediately after it has stopped. Let it cool down first.**

After engine stop:

1. Close the through-hull to prevent the engine from filling with raw water.
2. Close the fuel valve.



3. 3. Inspect the generator set for leaks.



## S06 STARTING & RUNNING



### **CAUTION!**

**Do not forget to open the sea cock before restarting the group.**

### COLD CLIMATE PRECAUTIONS

See maintenance chapter fore more details.



### **CAUTION!**

**Keep the battery fully charged. An improperly charged battery may burst due to freezing.**

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S 07

MAINTENANCE

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## GENERATOR SET MAINTENANCE

### ABOUT THIS MANUAL

This manual describes the preventive maintenance operations to be performed by the owner or operator of the equipment. It is not a shop repair manual.

Performing a series of preventive maintenance procedures in accordance with the maintenance intervals will ensure optimum reliability and engine life.

During the warranty period, it is essential to have all work performed by an authorized Nanni workshop. In addition, all interventions must be recorded in the Nanni after-sales system.

However, some regular checks, especially those performed each time the device is used, are the responsibility of the end user. Nevertheless, some operations are described for emergency cases, or if there is no qualified repair shop nearby.

Repairs or adjustments to the engine by technicians not trained in marine techniques are prohibited for obvious safety reasons. Operations related to the timing and injection system are the exclusive responsibility of Nanni's trained representatives. These operations may be contrary to EPA standards or other worldwide environmental regulations.



### NOTE!

**The hour meter cannot be reset: it displays the total number of hours the engine has been running since the factory acceptance test.**

### GENERALITIES



### DANGER!

**Perform maintenance with the engine off and cold. Remove the ignition key, put it in your pocket and turn off the power.**

**Read this chapter and take all necessary safety precautions before attempting any maintenance or repair. Make sure you understand how to perform each operation.**



### CAUTION!

**Clean the engine before servicing. Watch for oil or fluid spillage, which is a sign of leakage.**



### CAUTION!

**Do not allow oil, fuel or grease deposits to build up around the unit as they may increase the risk of fire in the engine compartment. These deposits may hide malfunctions.**

## MAINTENANCE INTERVALS

COMPONENTS	PERIODICITY					
	Daily	25 hours	Every 250 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
<b>Fuel supply system</b>						
Water in fuel - Prefilter / Drain - Cartridge	○		●			
Fuel filter <sup>(1)</sup>		●	●			
Injectors					○	
<b>Lubrication system</b>						
Oil level <sup>(1)</sup>	○					
Engine oil <sup>(1)</sup>		●	●			
Oil filter <sup>(1)</sup>		●	●			
<b>Cooling system</b>						
Cooling system level <sup>(1)</sup>	○					
Coolant <sup>(1)</sup>				●		
Thermostat control <sup>(1)</sup>				●		
Pressurized plug <sup>(1)</sup> <sup>(5)</sup>				●		
Heat Exchanger - O-rings <sup>(5)</sup>				●		
Air cooler - O-rings <sup>(4)</sup>				●		
<b>Raw water system</b>						
Check and clean the raw water filter.	○					
Raw Water Pump Impeller <sup>(1)</sup>				●		
Zinc anodes <sup>(1)</sup>		○	○			
<b>Air intake and exhaust system.</b>						
Turbocharger control <sup>(3)</sup>				○		
Free movement and oiling of the turbo valve <sup>(3)</sup>				○		
Thermal protection of the turbocharger <sup>(3)</sup>				○		
Intake air filter <sup>(1)</sup>			○		●	
Exhaust elbow <sup>(1)</sup>			○			
<b>Electricity</b>						
Battery electrolyte level	○					
Checking the connectors of the harness		○	○			
Checking the alternator belt tension - Replacement <sup>(1)</sup>		○	○			●
Control panel: Indicator lights and alarms		○	○			
<b>Engine (generalities)</b>						
Flexible motor supports -Replacement		○	○		●	
Condition of the hoses / clamps - Screws		○	○			
Visual inspection (leakage of coolant, fuel, oil, sea water, etc...)	○					
Tappet clearance					○	
<b>Alternator</b>						
Check all assembly screws/bolts <sup>(2)</sup>		○	○			
Cleaning the cooling system <sup>(2)</sup>	○					
Condition of the protective vents <sup>(2)</sup>	○					
General cleaning <sup>(2)</sup>				○		

<sup>(1)</sup> Operations must be performed in accordance with the operation and maintenance manuals for your engine. For all technical information specific to your engine, refer to the operation and maintenance manual.

<sup>(2)</sup> Operation to be performed in accordance with the manufacturer's operation and maintenance manual.

<sup>(3)</sup> Only Q3300 & Q3800 are concerned

<sup>(4)</sup> Only Q3800 is concerned

<sup>(5)</sup> Q1100 series are out of scope

○ CHECK/ADJUST/CLEAN/MAINTAIN/REPLACE AS NEEDED

● REPLACE

## CHECKING THE ENGINE OIL LEVEL

**DANGER!**

Stop the engine before checking the oil level.

Engine oil level

- To check the oil level, take out the dipstick (red circle), wipe it clean, put it back in and take it out again. Check that the oil level is between the two notches (Mini - Maxi).



- If the level is too low, add new oil to the specified level.

**IMPORTANT!**

When using a different brand or viscosity of oil, change the old oil. Never mix two different types of oil.

**NOTE!**

Be sure to inspect the engine by placing it on a level surface. If it is placed on slopes, the oil level may not be measured accurately.

Be sure to keep the oil level between the upper and lower limits of the dipstick. Too much oil can cause poor performance or excessive leakage gas. On closed breather engines where mist is drawn through the port, too much oil can cause water hammer. Lack of oil can cause seizure of rotating and sliding parts of the engine.

## CHECKING THE ENGINE COOLANT LEVEL

- Remove the expansion tank cap (1) and check that the coolant level is between the low and high marks.



- If the coolant level is too low, check the reason for the low coolant level.

**IMPORTANT!**

If the coolant decreases due to evaporation, refill only with fresh water. If the coolant is leaking, refill with the same brand and type of coolant in the specified mixing ratio (50% fresh water and 50% antifreeze). If the brand of coolant cannot be identified, or if it is different from the previous brand, drain all remaining coolant and refill with a completely different brand of coolant mixture.

**DANGER!**

Do not remove the heat exchanger cap until the coolant temperature is below boiling. Then loosen the cap slightly to relieve any excess pressure before removing it completely.

**IMPORTANT!**

When filling the coolant, air must be removed from the engine coolant passages. Be sure to close the heat exchanger cap tightly. If the cap is loose or improperly closed, coolant can escape and the engine can overheat. Do not use antifreeze and scale inhibitor at the same time. Never mix different types or brands of antifreeze.



# S 07 MAINTENANCE

## ENGINE OIL REPLACEMENT



### DANGER!

When changing or inspecting, be sure to level and stop the engine.



### ENVIRONMENT!

Use a suitable container. Used oil must be disposed of in accordance with national and international laws and regulations.

- Remove the oil dipstick



- Insert a hose connected to an electric pump inside the hole.
- When draining is complete, remove the hose and electric pump.
- Put the oil dipstick back on

### Oil filling



- Open the oil filler cap (3) and fill with new oil to the top mark on the dipstick (Maxi). Then close the oil filler cap and run the engine for a few minutes; stop the engine and check the level again. Adjust the oil level if necessary.



### IMPORTANT !

When using a different brand or viscosity of oil, remove all the old oil. Never mix two different types of oil. Use the proper SAE engine oil for the ambient temperature.

Above 25 °C (77 °F)	SAE 30 or SAE 10W-30 SAE 10W-40
0 °C to 25 °C (32 °F to 77 °F)	SAE 20 or SAE 10W-30 SAE 10W-40
Below 0 °C (32 °F)	SAE 10W or SAE 10W-30 SAE 10W-40
Engine oil capacity in liters (US Gal)	
Volume	
5.1 (1.35)	

Fuel type	Classification of engine oils (API Classification)
High sulfur fuel [0.05% (500 ppm) ≤ sulfur content < 0.50% (5000 ppm)].	CF (If "CF-4, CG-4, CH-4, or CI-4" engine oil is used with high sulfur fuel, change the engine oil at shorter intervals. (About half))
Low sulfur fuel (sulfur content < 0.05% (500 ppm)) or ultra low sulfur fuel (sulfur content < 0.0015% (15 ppm)).	CF, CF-4, CG-4, CH-4 or CI-4

## OIL FILTER REPLACEMENT

**DANGER!**

Be sure to stop the engine before replacing the filter cartridge.

**ENVIRONMENT!**

Use a suitable container. Used oil must be disposed of in accordance with national and international laws and regulations.

- Remove the oil filter cartridge (1) with the filter key.
- Apply a light coat of oil to the new cartridge seal.
- To install the new cartridge, screw it in by hand. Overtightening may cause the rubber seal to deform.
- After replacing the new cartridge, the engine oil normally decreases a little. Therefore, make sure that the engine oil does not leak from the seal and read the oil level on the dipstick. Then fill up the engine oil to the specified level..

**IMPORTANT!**

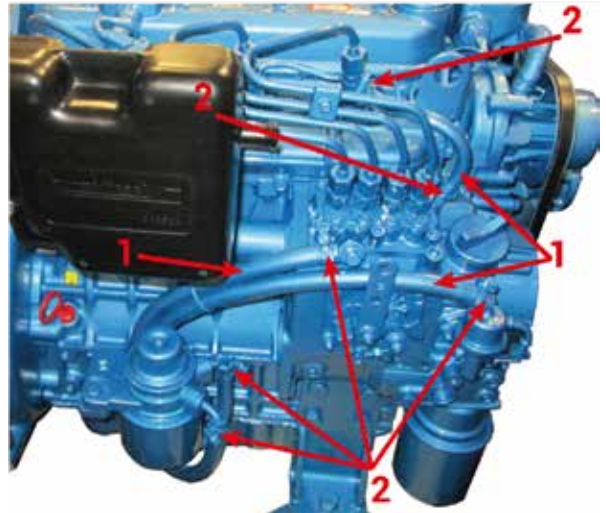
To prevent serious damage to the engine, replacement element must be highly efficient. Use only a NANNI genuine filter or its equivalent.

## CHECK FUEL HOSES AND CLAMPS

**DANGER!**

Stop the engine before the inspection.

- If the clamp (2) is loose, apply oil to the threads and tighten it properly.
- The fuel hose (1) is made of rubber and deteriorates naturally. Replace the fuel hose and clamp every two years.
- But if the fuel hose and clamp are damaged before 2 years, replace them.
- After replacement, bleed the fuel system (see section on Replacing the fuel filter).



## S 07 MAINTENANCE

### CHECK AND CLEAN THE AIR FILTER HOUSING

- Remove the air filter housing from the engine
- Wash it with soap and water
- Dry it with compressed air and reassemble it on the engine; the compressed air pressure must be less than 210 kPa (2.1 kgf/cm<sup>2</sup>, 30 psi). Tighten the clamp.



#### CAUTION!

Make sure the box is completely empty of water and completely dry before reinstalling it. Water drawn into the motor may damage it. Do not oil or grease the motor. Do not operate the motor without the filter element.

### ALTERNATOR BELT

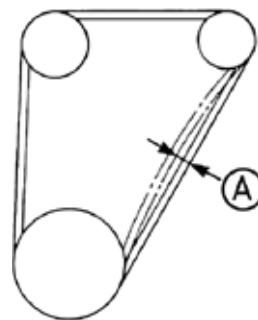
#### Belt tensioning



#### DANGER!

#### Stop the engine before working on the alternator belt

- Measure the deflection (A) by pushing the belt halfway between the crankshaft pulley and the alternator pulley with a specified force of 98 N (10 kgf - 22 lbf).



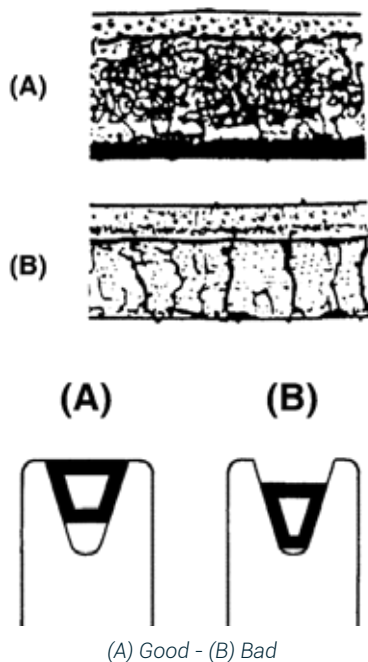
#### IMPORTANT!

If the measurement is not within factory specifications, loosen the alternator mounting screws and move the alternator to adjust.

Deflection (A)	
Factory specifications	7.0 à 9.0 mm
	0.28 à 0.35 in.

#### Deterioration and wear of the belts

- Check the fan belt for damage.
- If the fan belt is damaged, replace it.
- Check if the fan belt is worn and pressed into the pulley groove.
- If the fan belt is almost worn and deeply seated in the pulley groove, replace it.



## FUEL FILTER CARTRIDGE REPLACEMENT

**DANGER!**

Stop the engine before replacing the fuel filter cartridge. Isolate the fuel system before replacing the filter.

**IMPORTANT!**

Water and dust from the tank and circuit are collected in this cartridge. It should therefore be replaced at the first service visit and every 250 hours of operation or annually, whichever comes first.

**ENVIRONMENT!**

Use a suitable container. Used oil must be disposed of in accordance with national and international laws and regulations.

## Belt replacement

**Disassembly**

1. Loosen the bolt (1) on the tensioner guide.
2. Loosen the bolt (2) while holding the nut behind it.
3. Release the belt (3) by pushing the alternator, then remove the belt.

**Installation**

1. Install the new alternator belt (3) as shown in the picture below.
2. Push on the alternator and tighten the bolt (1).
3. Tighten the bolt (2) holding the nut behind.
4. Check the deflection and adjust if necessary.

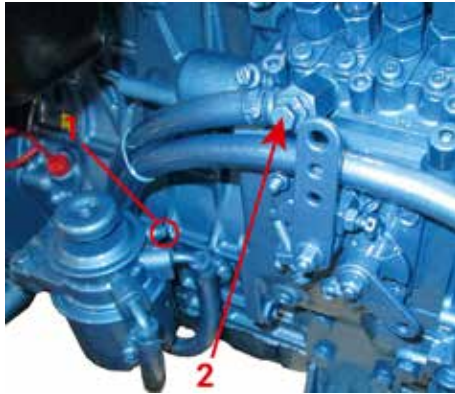


- Remove the old filter cartridge (1) with the filter wrench.
- Apply a thin film of clean fuel to the sealing surface of the new cartridge before installation.
- Tighten by hand.
- Loosen the bleed screw to release air (2).
- Prime the system with the hand pump (3) until all air is removed from the system.
- Tighten the bleed screw and continue pumping until the system resistance is reached. Start the engine and check for fuel leaks.

## Bleeding the fuel system

- Fill the fuel tank. Loosen the air bleed plug (1) on

the fuel filter a few turns. Open the fuel drain valve (2).



#### Engine equipped with an electric pump (optional).

- Turn the key to the ON position and feed fuel through the pump for 10 to 15 seconds.

#### Engine equipped with a mechanical pump (standard)

- Turn the stop lever to the STOP position and run the engine with the starter motor for 10 to 15 seconds.
- Close the air bleed valve properly after bleeding the air.
- Tighten the cap (1) when the bubbles no longer rise.
- Close the bleed valve (2) on top of the fuel injection pump.



#### **NOTE!**

Always keep the air bleed valve on the injection pump closed unless you are releasing air. Otherwise, it may cause the engine to stop.

#### FLEXIBLE ENGINE MOUNTS

On new or outdated generators, make sure that the front and rear flexible supports are properly adjusted.

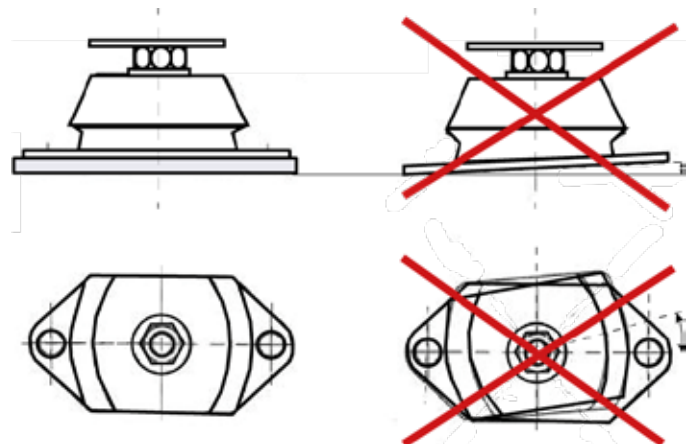


Check that the four flexible brackets are correctly positioned, then attach them to the frame.



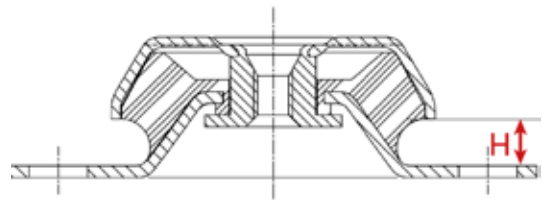
#### **CAUTION!**

Twisting or straining of the rubber mounts is not acceptable.



#### **CAUTION!**

The flexible support must be replaced every 2 years. Observe the minimum value H (2 mm - 0.08 in.); if the value is lower, replace the motor support.





## EXHAUST ELBOW INSPECTIONS

Aluminum wet exhaust elbow :

**Disassembly**

- Unscrew and remove the 4 bolts (1).



- Remove the exhaust elbow (2) with its gasket (3).



- Inspect the exhaust inside and outside for corrosion and/or leaks. Replace if necessary.

**Installation**

- If necessary, install a new exhaust elbow with a new gasket.
- Tighten the 4 bolts.

**IMPORTANT!**

On this type of elbow, there is no anode, so there is no need to check or replace the zinc anodes.

Stainless steel dry exhaust elbow (optional for the non-soundproof version):

**Disassembly**

- Unscrew and remove the 4 bolts (1).



- Remove the exhaust elbow (2) with its gasket (3).



- Inspect exhaust inside and outside for corrosion and/or leaks. Replace if necessary.

**Installation**

- If necessary, install a new exhaust elbow with a new gasket.
- Tighten the 4 bolts.

**IMPORTANT!**

This type of elbow does not have an anode. There is no need to check or replace the zinc anodes.

## TIGHTENING OF SCREWS, CLAMPS AND RAW WATER AND COOLANT HOSES

**IMPORTANT!**

Check that the hoses are properly attached at the first service visit, then every 250 hours of use or annually, whichever comes first.

- If the hose clamps are loose, apply oil to the threads and tighten them securely.
- The hoses are made of rubber, in contact with heat, oil, fuel, etc. .... and tend to age. They should be inspected and replaced if necessary. If cracks appear, replace them immediately. Also replace the clamps and tighten them firmly.

**CAUTION!**

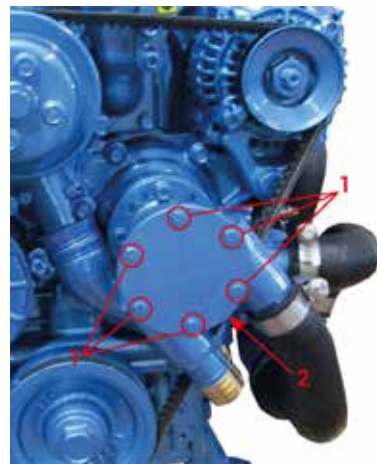
To avoid serious damage to the motor, prevent dust and foreign objects from entering the pipes.

## RAW WATER PUMP IMPELLER REPLACEMENT

**CAUTION!**

Before replacing the seawater pump impeller, make sure that the seawater valves are all closed and that the motor is stopped.

- Close the seawater suction and discharge valves.
- Unscrew and remove the 6 cover screws (1) and the cover (2) of the seawater pump.

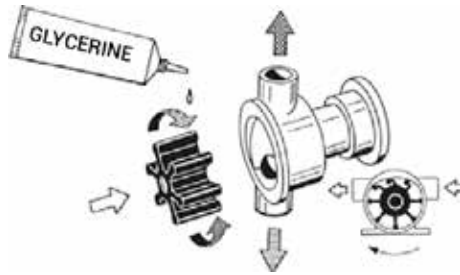


- Remove the paper seal and clean the contact surface.
- Remove the impeller (3) from the seawater pump with pliers.



- Inspect the inside of the pump for wear and debris. Replace worn components as necessary.
- Replace impeller shaft seal if necessary.
- Lubricate the lip seal with glycerin (do not lubricate the mechanical seal).
- Lubricate the inside of the pump with the glycerin included in the kit.

- Install the new impeller with a rotary motion in the direction it will rotate.



- Lubricate the seal with glycerin. Install the O-ring/gasket and cover.

**CAUTION!**

**Do not use petroleum-based products to lubricate the inside of the pump. Use only glycerin. Other products can damage the impeller, which will damage the pump and cause motor failure. Do not operate the impeller without water or lubricant, as this may cause motor failure or fire.**

## COOLANT REPLACEMENT

**DANGER!**

**Do not remove the pressure cap from the heat exchanger when the engine is hot. Then loosen the cap slightly to release excess pressure before removing it completely.**

**ENVIRONMENT!**

**Use a suitable container. Used oil must be disposed of in accordance with national and international laws and regulations.**

## Coolant draining

1. Stop the engine and let it cool down.
2. To drain the coolant, open the drain valve (1) on the engine block under the oil pressure sensor.



3. Remove the expansion tank cap (2) and the exhaust manifold cap (3).



4. Unscrew the clamps (4) and remove the hoses (5) and (6).





5. When all liquid has been drained, close the drain valve, replace the drain plugs and hoses.

#### Coolant filling

1. Fill the expansion tank through the opening (2) to the maximum level.
2. Allow the coolant to fill the system (liquid level drop) and refill the tank to the maximum level.
3. Repeat steps 1 and 2 until the coolant level has stabilized at the maximum level.
4. Reinstall the pressure cap (2).
5. Start the generator and let it run for a few minutes.
6. Stop the generator and let it cool down. Check the coolant level in the expansion tank and add coolant if necessary.



#### CAUTION!

Do not start the engine without coolant. Use a mixture of 50% clean, fresh, non-calcareous water and 50% antifreeze to fill the cooler.



#### CAUTION!

For the water-antifreeze mixture, the proportion of antifreeze should be 50%. Tighten the radiator cap securely. If the cap is loose or not properly tightened, water may leak out and the engine may overheat.



#### CAUTION!

Do not use antifreeze and scale inhibitor at the same time. Never mix different types or brands of coolants or antifreeze. This coolant should be replaced every 2 years or 500 hours, whichever comes first.

## ANTIFREEZE

There are two types of antifreeze: use the permanent type (PT) for this motor.

Before adding antifreeze for the first time, clean the inside of the heat exchanger by pouring fresh, cool water and draining it several times.

The procedure for mixing water and antifreeze differs depending on the brand of antifreeze and the ambient temperature.

In principle, the SAE J1034 standard should be referred to, more precisely also the SAE J814c standard.

Mix the antifreeze with fresh fresh water and fill the heat exchanger.



#### IMPORTANT!

**When antifreeze is mixed with fresh water, the antifreeze mixing ratio should be 50%.**

Vol % Antifreeze	Freezing point		Boiling point*	
	°C	°F	°C	°F
40	-24	-11.2	106	222.8
50	-37	-34.6	108	226.4

\*At a pressure of  $1.013 \times 100000$  Pa (760 mmHg) (atmospheric pressure). A higher boiling point is achieved by using a radiator cap that allows pressure development in the cooling system.



#### IMPORTANT!

**The above data represents industry standards that require a minimum glycol content in the antifreeze concentrate.**



#### IMPORTANT!

**When the coolant level drops due to evaporation, add fresh fresh water only so that the antifreeze mixing ratio is less than 50%. If there is a leak, add antifreeze and fresh water mixed in the specified ratio.**

**Antifreeze absorbs moisture. Store unused antifreeze in a tightly sealed container.**



#### IMPORTANT!

**Do not use cleaning products when antifreeze has been added to the coolant (antifreeze contains an anti-corrosion agent, which will react with the cleaning product to form a sludge that will affect engine parts).**

## S 07 MAINTENANCE

### HOSE AND CLAMP REPLACEMENT



#### NOTE!

The images shown may differ from your model.

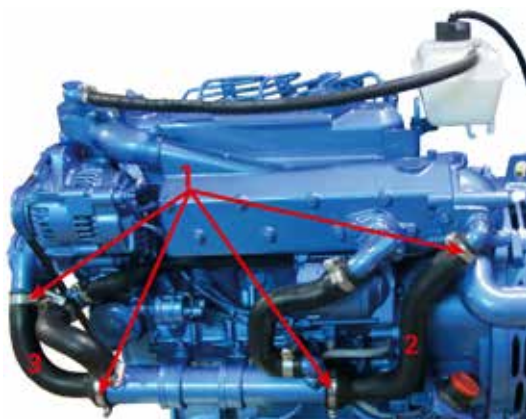
Coolant and raw water system



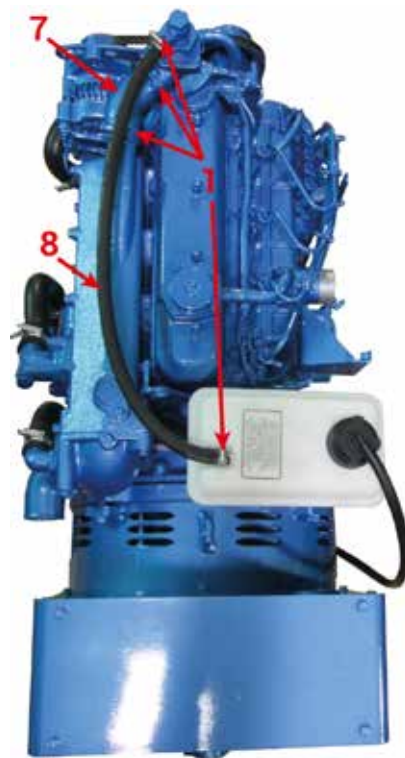
#### DANGER!

Do not remove the expansion bowl cap when the engine is hot. Then loosen the cap slightly to the stop to relieve any excess pressure before removing it completely.

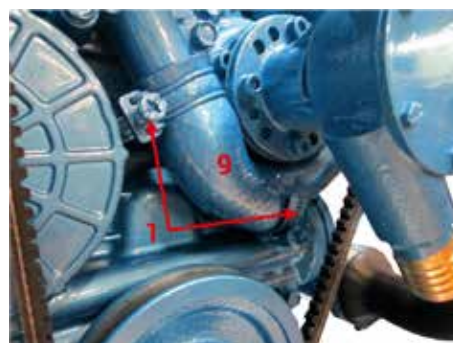
1. Drain the coolant.
2. Unscrew all clamps (1).
3. Remove seawater (2) and (3)



4. Remove the coolant hoses (4), (5), (6), (7), (8) and (9).



5. Remove the hose (9) under the seawater pump after loosening the two clamps (1).



6. Inspect and replace seawater and coolant hoses and hose clamps as necessary.
7. Reassemble the hoses and clamps
8. Tighten the clamping bands

#### Specification

Clamp bands - Torque	5 N·m (3.69 ft-lbs)
-------------------------	------------------------

9. Fill with a mixture of clean water and antifreeze until the coolant level is just below the hole. Install the radiator cap securely.

# S 07 MAINTENANCE

## Fuel system

1. Loosen the clamps (2) and remove the fuel hoses (1).



2. Replace the new fuel hoses (1) using the hose kit and 8 new clamps.



### CAUTION!

The fuel return hoses are not visible in the picture above but are subject to the same replacement recommendations.

3. Tighten the hose clamps (2).

Specification	
Clamp bands - Torque	3 N·m (2.21 ft-lbs)



### DANGER!

Stop the engine during the inspection and replacement described above.

4. Drain fuel system (see fuel filter replacement)



### IMPORTANT!

Except when venting, be sure to keep the fuel injection pump air vent coupling bolt closed. Otherwise, the engine may stall.

## THERMOSTAT REPLACEMENT



### DANGER!

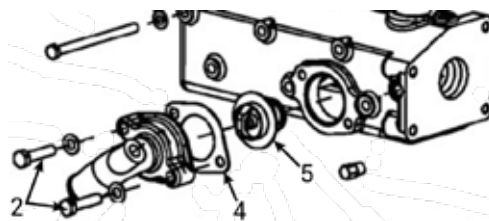
Stop the engine before replacing the thermostat. Do not remove the thermostat from the heat exchanger until the coolant temperature is too high. The thermostat should be replaced every 2 years or 500 hours, whichever comes first.

#### Thermostat Removal :

1. Drain the coolant (see relevant chapter).
2. Unscrew the hose clamp and remove the coolant hose (see chapter on hose and clamp replacement).
3. Remove the two screws (2) that hold the thermostat cover and remove the thermostat cover (3) with its gasket (4).



4. Remove the thermostat (5) with its seal (4).



#### Thermostat installation :

1. Reinstall the thermostat (5) in the correct position (label down).
2. Reinstall the cover (3) with a new gasket (4), then replace and tighten the two screws (2).
3. Fill the coolant with the liquid recommended by NAN-NI (see corresponding chapter).

4. Bleed the system and start the engine to check for leaks.

Thermostat valve opening temperature

1. Push the thermostatic valve down and insert a string between the valve and the valve seat..
2. Place the thermostat and a thermometer in a container with water and gradually heat the water.



3. Hold the string to suspend the thermostat in the water. As the water temperature rises, the valve on the thermostat opens, allowing it to fall off the string. Read the temperature at this time on the thermometer.
4. Continue to heat the water and read the temperature when the valve has risen approximately 6 mm (0.2 in).

#### Specifications

Thermostat valve opening temperature	69.5 à 72.5°C (157.1 à 162.5 °F)
Temperature at which the thermostat opens fully	85 °C (185 °F)



#### CAUTION!

If the measurement is not acceptable, replace the thermostat

## REPLACEMENT OF THE PRESSURIZED FILLER CAP

1. Remove the pressurized cap from the expansion tank.



2. Install a new pressurized plug on the expansion tank.



#### DANGER!

Do not remove the heat exchanger cap when the coolant temperature is too high. Then loosen the cap slightly to release residual pressure before removing it completely.



#### CAUTION!

Close the heat exchanger cap carefully. If the cap is loose or not properly closed, coolant may leak out and cause the engine to overheat.



#### CAUTION!

The pressure cap should be replaced every 2 years or 500 hours, whichever comes first.



# S 07 MAINTENANCE

## HEAT EXCHANGER MAINTENANCE



### **DANGER!**

**Do not remove the heat exchanger cap (1) when the engine is hot. Then loosen the cap slightly to release excess pressure before removing it completely.**

Coolant drain.

- See coolant replacement section.

Coolant hoses removal

- See chapter on replacing hoses and clamps

Raw water hoses removal

- See chapter on replacing hoses and clamps

Heat exchanger removal

- Unscrew and remove the 2 nuts (1) and remove the heat exchanger (2) with the two RSGU collars.



### **DANGER!**

**Do not start the engine without coolant or without the seawater system isolated.**

Cleaning the heat exchanger core.

1. Clean the cooler core on the coolant side with a paraffin-based engine detergent.



2. Remove any internal deposits on the raw water side with a round brush.
3. Replace cooler core if damaged.



### **CAUTION!**

**Do not use caustic soda as it may damage the core.**

Heat exchanger installation

1. Check the condition of the two RSGU clamps (replace them if necessary). Install them before mounting the heat exchanger.



2. Install the heat exchanger (2) on the two RSGU collars using the 2 nuts (1) with their 2 GROWER washers.



3. Tighten the nuts.

Coolant Hose Installation

- See chapter on replacing hoses and clamps

Installation of raw water hoses

- See chapter on replacing hoses and clamps

Filling the coolant system.

**WARNING!**

Do not start the engine without coolant. Use a mixture of 50% clean, fresh, non-calcareous water and 50% anti-freeze to top up the cooler. For the water-antifreeze mixture, the antifreeze ratio should be 50%. Tighten the heat exchanger cap. If the cap is loose or not properly tightened, water may leak out and the motor may overheat. Do not use antifreeze and scale inhibitor at the same time. Never mix different types or brands of coolants or anti-freeze.

- See coolant replacement section.

## RAW WATER PUMP REPLACEMENT

**DANGER!**

Never work on the seawater circuit without taking care to isolate the suction and discharge valves.

## Removal of the raw pump

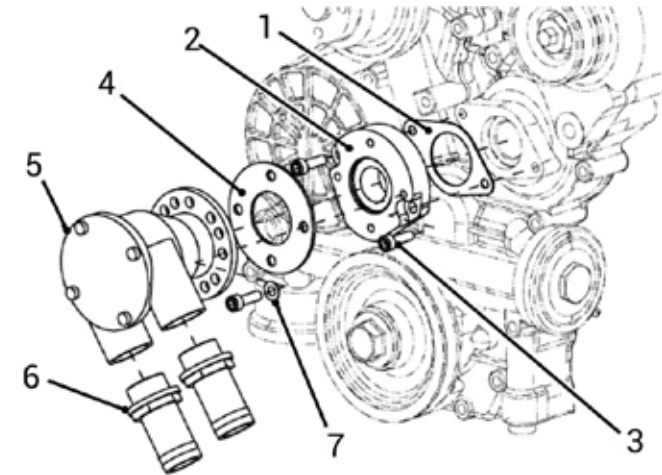
1. Dismantle the raw water outlet hose (see chapter Replacement of hoses and clamps)
2. Unscrew and remove the 4 screws (1) then remove the pump (2) with its seal (3).



3. Clean the surface of the spacer.



## Overview of the raw water pump



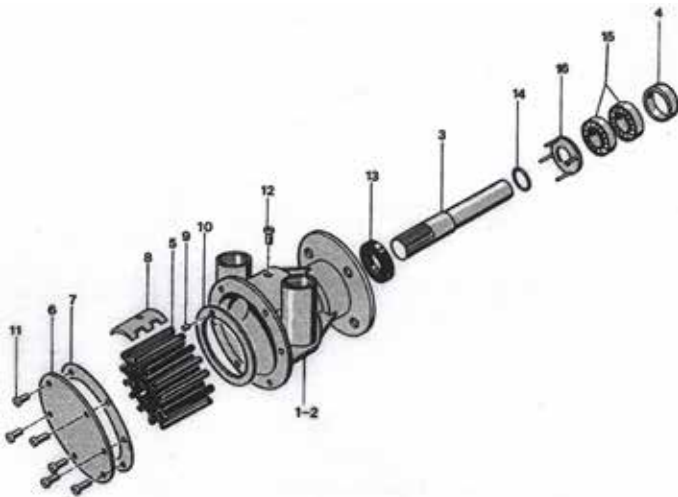
- |   |        |   |                |
|---|--------|---|----------------|
| 1 | Gasket | 5 | Raw water pump |
| 2 | Spacer | 6 | Fittings       |
| 3 | Screw  | 7 | Washers        |
| 4 | Gasket |   |                |

## Raw water pump installation

1. Check the condition of the spacer contact surface before mounting the seal and the pump.



2. Replace the gasket (2) and after greasing it on both sides, install the raw water pump (3) using 4 screws (1) with their washers.



- |   |                          |    |              |
|---|--------------------------|----|--------------|
| 1 | Raw water pump (1 to 16) | 9  | Pin          |
| 2 |                          | 10 | Plate        |
| 3 | Pump shaft               | 11 | Cover screw  |
| 4 | Guide                    | 12 | Cam screw    |
| 5 | Pump impeller            | 13 | Spi gasket   |
| 6 | Cover                    | 14 | O-ring       |
| 7 | Gasket                   | 15 | Ball bearing |
| 8 | Cam                      | 16 | Stop ring    |



3. Install the hose to the heat exchanger using the hose clamps. Tighten the clamp to the correct torque.

## Specifications

Clamps - Tightening torque

5 N·m  
(3.69 ft-lbs)

## BATTERIES

**CAUTION!**

To avoid accidental shorting, be sure to attach the positive cable to the positive terminal before attaching the negative cable to the negative terminal.

Never remove the battery cap while the engine is running. Keep electrolyte away from eyes, hands and clothing. If splashed, rinse immediately and thoroughly with water.

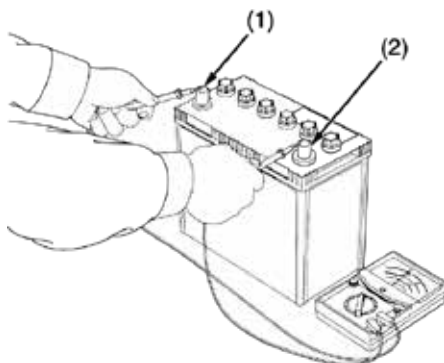
Keep sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes highly explosive.

**IMPORTANT!**

If the machine is to be used for a short period of time without a battery (using a temporary battery for starting), use extra power (lights) while the engine is running and isolate the battery terminal. If this advice is not followed, the alternator and regulator may be damaged.

## Battery voltage

- Stop the motor before measuring the voltage with a circuit tester across the battery terminals.



(1) Positive Terminal (2) Negative Terminal

**IMPORTANT!**

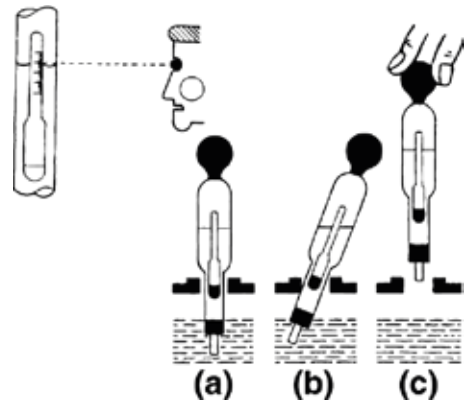
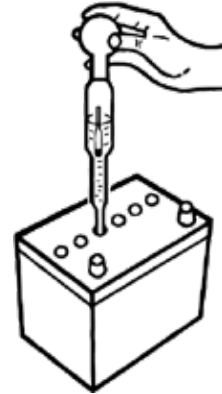
If the battery voltage is below factory specifications, check the density and recharge the battery.

## Spécifications

Battery Voltage - Factory Specification	More than 12 V
---	----------------

## Battery specific gravity

- Check the specific gravity of the electrolyte in each cell with a hydrometer.
- When the temperature of the electrolyte differs from that to which the hydrometer has been calibrated, correct the specific gravity reading.



(a) Good - (b) Bad - (c) Bad

**IMPORTANT!**

If the specific gravity is less than 1.215 (after correction for temperature), charge or replace the battery.

If the specific gravity differs between two cells by more than 0.05, replace the battery.

**NOTE!**

Hold the hydrometer tube vertically without removing it from the electrolyte. Do not draw too much electrolyte into the tube.

Allow the float to move freely and hold the hydrometer at eye level.

The hydrometer reading should be taken at the highest



**electrolyte level.**

Specific gravity varies slightly with temperature. To be exact, specific gravity decreases by 0.0007 with a 1°C increase (0.0004 with a 1°F increase) in temperature, and increases by 0.0007 with a 1°C decrease (0.0004 with a 1°F decrease).

Therefore, using 20 °C (68 °F) as a reference, the specific gravity reading must be corrected by the following formula:

Specific gravity at 20 °C = Measured value + 0.0007 × (electrolyte temperature - 20 °C).

Specific gravity at 68 °F = Measured value + 0.0004 × (electrolyte temperature - 68 °F).

Specific gravity	Load status
1.260 Sp. Gr.	100% loaded
1.230 Sp. Gr.	75% loaded
1.200 Sp. Gr.	50% loaded
1.170 Sp. Gr.	25% loaded
1.140 Sp. Gr.	Very low capacity
1.110 Sp. Gr.	Unloaded

*At an electrolyte temperature of 20°C (68°F)*

## S 07 MAINTENANCE

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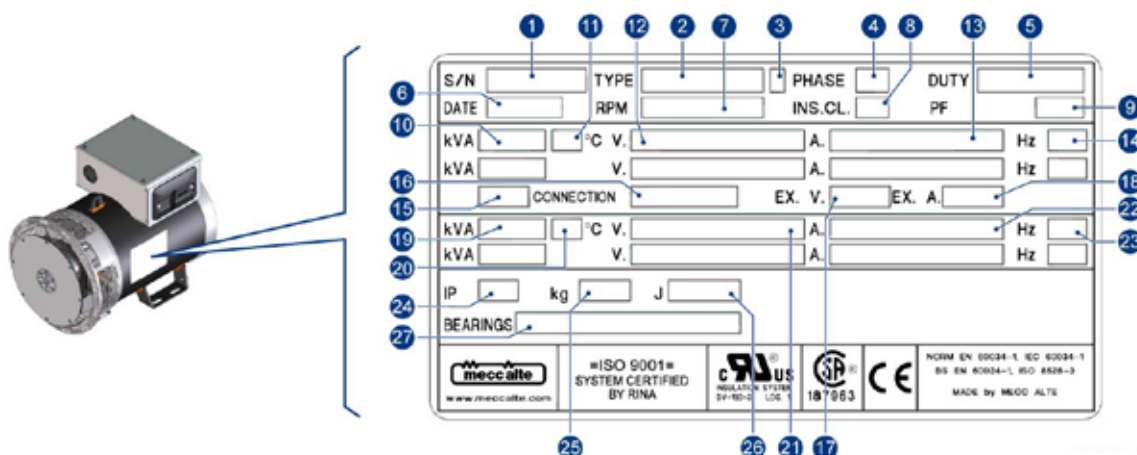


# S08 ALTERNATOR

## ALTERNATOR (8CM50 - 10CT50 - 9CM60 & 11CT60)

### MARKING DATA

#### Alternator nameplate



N°	Identification
1	Serial number
2	Model
3	Update index
4	Number of phases
5	Type of service
6	Date of manufacture mm/yyyy
7	Rated speed of rotation
8	Insulation class
9	Power factor
10	Nominal power as a function of temperature
11	Maximum ambient temperature
12	Rated voltage
13	Rated current
14	Rated frequency

N°	Identification
15	Class of nominal characteristics
16	Connection type
17	Excitation voltage
18	Excitation current
19	Power versus temperature (20)
20	Ambient temperature
21	Rated voltage
22	Current vs. power (19)
23	Rated frequency
24	Protection class
25	Total weight
26	Moment of inertia
27	Type of bearing

# S08 ALTERNATOR

## MACHINE DESCRIPTION

The NPE series alternators are self-regulating, without rings or brushes, with 2 and 4 poles. They have rotating inductors with a damping cage and inclined notched stators.

The windings have shortened pitches to reduce the harmonic content. The alternators are built in compliance with the EEC directives 2006/42, 2006/95, 2004/108 and their modifications, with the standards IEC 2- 3, EN 60034-1, IEC 34-1, VDE 0530, BS4999-5000.

The tests for the verification of the electromagnetic compatibility have been carried out under the conditions prescribed by the standards with the neutral connected to the ground.

The mechanical structure, always very robust, allows an easy access to the connections and allows the checks of the other parts very easily.

The frame is made of steel, the flanges are made of aluminum, the shaft is made of C45 steel with keyed fan. The protection grade is IP21 (on request, it is possible to realize a higher protection grade).

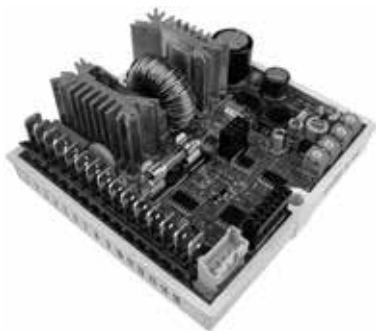
Insulation is class H, the impregnations in epoxy varnish for the rotating parts and the parts with higher tension such as the stators are impregnated under vacuum and pressure.

In the field of interference suppression, the series production complies with EN61000-6-3, EN61000-6-1.

### DSR digital controller

The standard power supply is supplied with the DSR on the 28-32-34 series.

The regulator is normally installed in the terminal box of the alternator.



## GENERAL DESCRIPTION AND OPERATING PRINCIPLE

The drive motor is connected to the flange and the discs (1) of the alternator.



The rotor of the alternator, driven by the drive motor, generates electricity.

The cables for the user's power supply are connected to the terminal block inside the "terminal box" (2).

DSR digital controllers are equipped with an LED indicator. In normal operation, the LED flashes with a period of 2 seconds and a duty cycle of 50% (1 second on, 1 second off), in case of faults it flashes differently.

# S08 ALTERNATOR

## SAFETY REQUIREMENT

Before any cleaning, lubrication or maintenance work is carried out, the engine to which the alternator is coupled must not be running but must be disconnected from its power sources.

To switch off an alternator, it is necessary to follow The alternator is not fitted with an emergency stop, but it will stop instantly according to the shutdown system provided by the installer.

During the consultation of this instruction and maintenance manual, you will find some symbols; these have a specific meaning.

Alternator safety devices

The safety features of the alternator are:



1. Protective screen on the front shield.
2. Terminal box cover.
3. Rear cover.



**DANGER!**

During operation, these guards must be in place

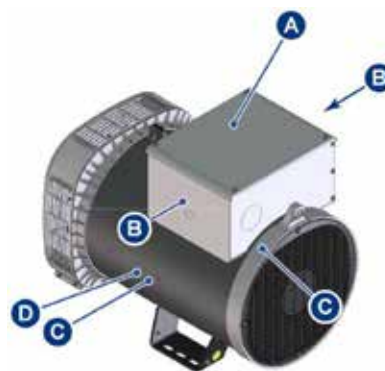
Safety labels



**CAUTION!**

Do not remove the labels attached to the alternator under any circumstances.

The following safety labels are affixed to the machine:



Position	Label	Description
A		Read the manual before removing the covers.
B		Danger!
C		Danger - Electricity !
D		Danger - Hot Surface !



**CAUTION!**

Labels should be replaced if they are worn or no longer legible.

Personal protective equipment



**CAUTION!**

Personnel operating the alternator must wear the personal protective equipment (PPE) listed in the table below.

PPE	Opération
	Always wear
	Maintenance or lifting of the alternator or its components.



## CAUTION!

The operator must comply with the accident prevention regulations in force in the specific country where the alternator is used.



## CAUTION!

The assigned PPE must not be modified. The manufacturer accepts no responsibility for potential damage to persons caused by non-use of PPE.

### Residual risks

The alternator presents the following residual risks:



## DANGER!

**Burn hazard. The operating alternator can generate heat even at a high level.**  
**Before touching the alternator, wait for it to cool.**



## CAUTION!

**Risk of crushing when lifting.**  
**Do not stand under the suspended load, do not approach it, use adequate PPE.**

### Conventional symbols and symbol descriptions



## IMPORTANT!

This symbol warns the personnel involved that the described operation may cause damage to the machine if it is not performed in accordance with safety standards.



## CAUTION!

This symbol warns affected personnel that the described operation may cause damage to the machine and/or injury to personnel if not performed in accordance with safety standards.



## WARNING!

This symbol warns affected personnel that the operation described may result in serious injury or death to personnel if not performed in accordance with safety standards.



## DANGER!

This symbol warns affected personnel that the described operation may result in immediate serious injury or death to personnel if not performed in accordance with safety standards.



## HANDLER

This symbol identifies the type of operator responsible for the operation described.

This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual, as well as specific skills regarding lifting equipment, slinging methods and characteristics, and safe handling procedures.



## MECHANICAL SERVICE AGENT

This symbol identifies the type of operator responsible for the operation described. This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as the specific skills necessary to perform the installation, adjustment, maintenance, cleaning and/or repair operations.



## AGENT DE SERVICE ÉLECTRIQUE

This symbol identifies the type of operator responsible for the operation described. This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as the specific skills necessary to perform electrical operations such as connections, adjustment, maintenance and/or repair.

**The electrician must be able to work even when electrical cabinets and panels are energized.**

In case of exceptional operations and upon written request for maintenance operations, please contact your authorized NANNI dealer.

Before installing the generator, arrangements must be made to ground the machine.

For this reason, you must ensure that the grounding system is in good condition and complies with the



# S08 ALTERNATOR

regulations of the country where the generator will be installed.



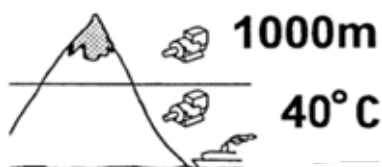
## CAUTION!

The final installer is responsible for the installation of all protections (disconnecting devices, protection against direct and indirect contact, overcurrent and overvoltage protection, emergency stop, etc.), necessary for the machine to comply with existing international / European safety regulations.

The generator must be installed in a ventilated room. If there is not enough air, malfunction or overheating may occur.

All entrance doors to the generator room must be clearly marked "Authorized Persons Only".

Operating temperature



Maximum ambient temperature to guarantee the rated power : 40°C

Maximum operating altitude to ensure power rating: Less than 1000 m



Install the alternator in a well ventilated area. Insufficient ventilation can cause the alternator to overheat and malfunction.

For required air volumes, see installation manual DGBXXT13006A.



## CAUTION!

If any components are changed, they must be replaced with the original parts.



## WARNING!

After long periods of storage or in the presence of moisture/condensation, check the insulation condition. The test must be performed by a qualified technician. Before performing such a test, it is necessary to disconnect the voltage regulator. If the measured values are lower than those required (below 1MΩ) it is necessary to remove the moisture by placing the alternator in an oven at 50-60°C.

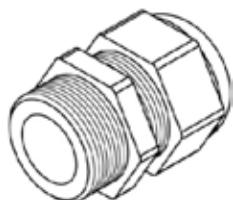
# S08 ALTERNATOR

## ELECTRICAL CONNECTION



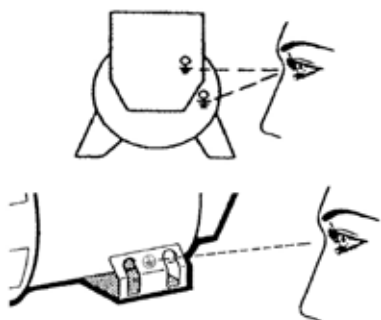
**The operation must be performed by an electrical service technician.**

The electrical connection is provided by the end user and is done at their sole discretion.



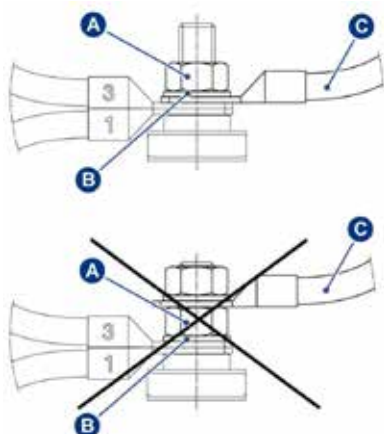
For entry into the terminal box, it is advisable to use cable glands and clamps that comply with the specifications of the user country.

Alternators must always be grounded with a properly sized grounding conductor. Use one of the two dedicated terminals (internal/external).



For the electrical connection, use suitable cables, sized according to the alternator power. Make the connections to the terminals as shown in the figure.

- A) Hexagonal nut
- B) Plain washer
- C) User cable



Once the connection has been made, check the tightening torques of the terminals, which must comply with the instructions given in the chapter "General tightening torques".

Once the connection is complete, refit the terminal box cover.

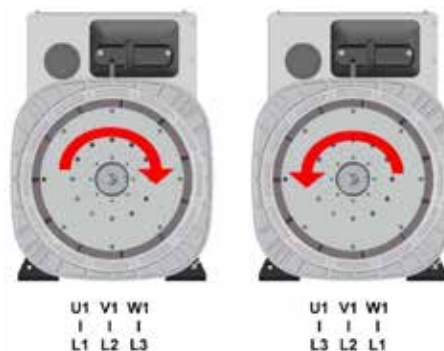


### NOTE!

**The user's power cables must be properly wired and supported so as not to cause mechanical stress on the alternator terminal block.**

Rotation and sequence of phases

All ECP alternator fans are designed to rotate in both directions.



Clockwise rotation, seen from the coupling side: the order of the outgoing phases is L1, L2, L3.

Counter-clockwise rotation, seen from the coupling side: the order of the outgoing phases is L3, L2, L1 (the order is reversed).

Winding connection methods

The alternators are manufactured with 12 standard output cables to allow different output voltages, for example, at 50 Hz, 115 V ( $\Delta\Delta$ ) / 200 V (YY) / 230 V ( $\Delta$ ) / 400 V (Y).

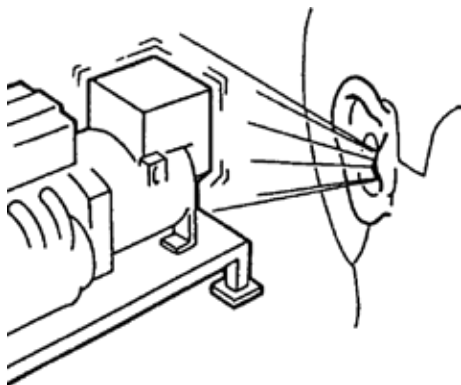
## STARTING AND STOPPING OPERATIONS

All the instrumentation for starting, running and stopping the system is provided by NANNI.



### CAUTION!

Starting, running and stopping operations must be carried out by qualified personnel who have read and understood the safety instructions at the beginning of the chapter.



### IMPORTANT!

When the system is put into operation for the first time, which should be done at reduced speed, the operator should check that no abnormal noise can be detected. If an abnormal noise is detected, stop the system immediately and improve the mechanical coupling.

## CLEANING AND LUBRICATION

Before approaching or touching the alternator, make sure it is de-energized and at room temperature; at this point, it can be cleaned externally using compressed air.



### CAUTION!

Never use liquids or water.

Do not clean the inside of the electrical components with compressed air, as this may cause short circuits or other anomalies.



For bearing lubrication, see the table later in this section.

## MAINTENANCE

The NPE series alternators are designed to provide a long maintenance-free life.



### CAUTION!

**Before performing this operation, read the safety requirements at the beginning of this section.**

Maintenance operations on generators can be divided into ordinary and extraordinary maintenance operations; in both cases, all operations must be authorized by the safety representative and they must be carried out when the machine is switched off and isolated from the electrical system or from the electrical network.

Maintenance operations and any troubleshooting must be carried out by highly qualified mechanical or electrical technicians, as all the operations described below can put personnel at serious risk.

It is also strongly recommended that all necessary precautions be taken to avoid accidental start-up of the machine during maintenance and troubleshooting operations.

The routine maintenance operations can be summarized as follows:








1. Evaluation of the condition of the windings after long periods of storage or inactivity
2. Regular evaluation of the correct operation (absence of abnormal noises or vibrations).
3. Mechanical checks of all fastening bolts and, in particular, of the electrical connections.
4. External cleaning of the generator

The extraordinary maintenance operations can be summarized as follows:

1. Maintenance and replacement (if necessary) of bearings
2. Cleaning of the windings
3. Replacement of the diode bridge
4. Replacement of the exciter
5. Replacement of the voltage regulator
6. Checking the residual voltage

## ROUTINE MAINTENANCE

Evaluation of the condition of the windings after long periods of storage or inactivity.

Intervention type	Operator
	
PPE to wear	Periodicity
    	Every 2500 hours of use
Materials and equipment	

Megohm-meter or similar up to 500V DC.



### DANGER!

**Disconnect the alternator from its power supplies. The drive motor must be stopped and disconnected from its power supplies.**

The measurement of the resistance of the insulating earth allows to evaluate the state of the windings.

This measurement can be made with a Megohmmeter or similar device, with a DC voltage of 500V.



### NOTE!

**It is very important to disconnect the voltage regulator (fig. a), the rotating diode bridge (fig. b) and the radio interference filter (fig. c), as well as any other device connected to the windings to be tested, before making the measurement.**

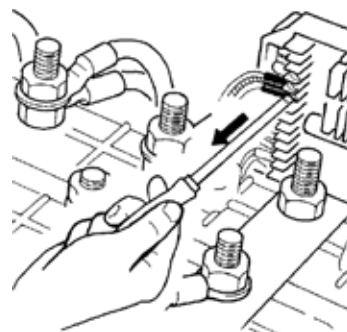


fig a

# S08 ALTERNATOR

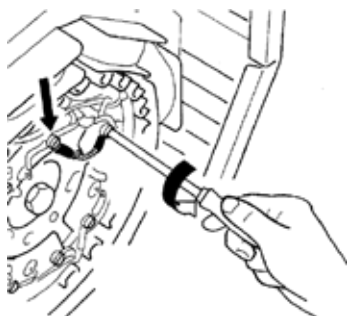


fig b

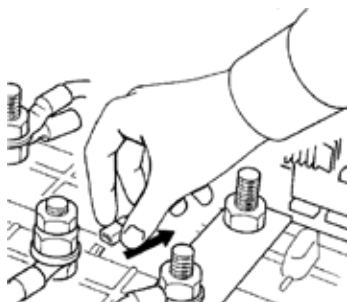
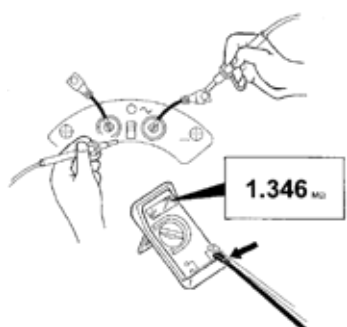









fig c

The figure resulting from the measurement of the winding ground resistance must be greater than 1MΩ.

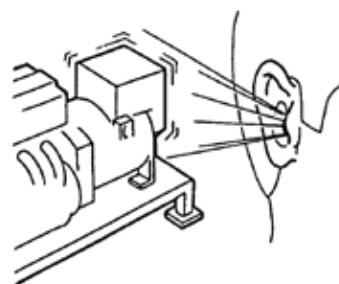


If the figure is lower than the above, the windings must be properly dried. This can be done by directing a jet of hot air of about 50-60°C into the air inlets or outlets of the generator, or by electrically connecting the stator windings and subjecting them to voltage by means of a DC power supply. The amount of current in the windings depends on the size of the generator, although it should be set according to the nominal values indicated on the plate.

Assessment of current operation (absence of abnormal noise or vibration).

Intervention type	Operator
	
PPE to wear	Periodicity
    	Every 2500 hours of use
Materials and equipment	
Outils d'atelier	

At regular intervals, we recommend checking that the alternator is running smoothly without any abnormal noise or vibration. Such phenomena could indicate damage to the bearings.










It should be noted that the alternator itself does not exhibit any particular vibration since the rotating parts are perfectly balanced. Provided that the rotor balancing has not been altered and the rotor bearings have not been damaged, vibrations of the generator set may occur due to the alignment of the couplings, the stresses on the heat engine or the vibration mounts.

We also recommend checking the performance data, which should be consistent with the data on the generator plate.

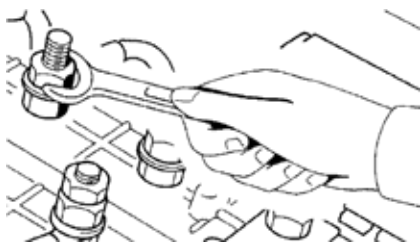
## S08 ALTERNATOR

Mechanical check of the fastening bolts and, in particular, of the electrical connections.

Intervention type	Operator
	
PPE to wear	Periodicity
    	Every 2500 hours of use
Materials and equipment	
Workshop tools	

We recommend a regular check of all fixing bolts, which must be perfectly tightened. Particular attention should be paid to all electrical connections; this check should be carried out in the complete absence of voltage.

To select the correct wrenches for the different bolt sizes, see the relevant chapter.



Internal and external cleaning of the generator.

Intervention type	Operator
	
PPE to wear	Periodicity
  	Every 15 days
Materials and equipment	
Compressed air	

Compressed air can be used for external cleaning of the generator. The use of hydro-cleaners and detergent liquids is strictly forbidden. The standard degree of protection of the generator is IP23; therefore, the use of fluids could cause anomalies or even short circuits.

### EXTRAORDINARY MAINTENANCE



#### DANGER!

This type of maintenance must be performed by a NANNI dealer.



#### CAUTION!

Perform extraordinary maintenance accurately and as often as specified by the manufacturer.



#### WARNING!

All maintenance intervals described below refer to normal use of the alternator. If it is used in more severe conditions (high humidity, temperature or dust), it should be checked more often.

Extraordinary maintenance operations can be summed up as follows:

1. Maintenance and replacement (if necessary) of bearings
2. Cleaning of windings
3. Replacement of diode bridge
4. Replacement of exciter
5. Replacement of voltage regulator
6. Check of residual voltage

## TIGHTENING TORQUE TABLE

Specification	
Terminal block nut - Tightening torque	6 Nm $\pm$ 7%
M8 screw - Tightening torque	21 Nm
M10 screw - Tightening torque	35 Nm

## TROUBLE SHOOTING

Defects	Remedies
The alternator does not excite	<ul style="list-style-type: none"> <li>• Replacement fuse.</li> <li>• Increase the speed by 15%.</li> <li>• For a moment, apply to the «+» and «-» of the electronic regulator a voltage of 12 V from the battery with a resistance of 30<math>\Omega</math> in series, respecting the polarities.</li> </ul>
After being excited, the alternator does not excite	<ul style="list-style-type: none"> <li>• Check the connection cables according to the attached drawings</li> </ul>
Low voltage at no load	<ul style="list-style-type: none"> <li>• Reset the voltage potentiometer.</li> <li>• Check the speed.</li> <li>• Check the windings</li> </ul>
High no-load voltage	<ul style="list-style-type: none"> <li>• Reset the voltage potentiometer to zero.</li> <li>• Replace the regulator</li> </ul>
On load, voltage lower than the nominal value	<ul style="list-style-type: none"> <li>• Reset the voltage potentiometer.</li> <li>• Current too high, power factor less than 0.8, speed less than 4% of rated speed.</li> <li>• Replace the regulator.</li> <li>• Check diodes, disconnect cables.</li> </ul>
On load, voltage higher than nominal value	<ul style="list-style-type: none"> <li>• Reset the voltage potentiometer to zero.</li> <li>• Replace the regulator</li> </ul>
Unstable voltage	<ul style="list-style-type: none"> <li>• Check the uniformity of the rotation.</li> <li>• Adjust the stability of the regulator by acting on the "STAB."</li> </ul>
For any other defects, please contact a NANNI dealer.	





# S10 STORAGE

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## STORAGE PROCEDURE

### LONG-TERM STORAGE

A series of operations must be performed to prepare and protect the engine for long-term storage.

See section 07 Maintenance - Raw water system - Risk of freezing / Protection against freezing, to perform certain long-term storage operations. We recommend that you have all these operations performed by an authorized Nanni workshop.



#### NOTE!

**It may be necessary to adapt these operations depending on the weather conditions. Contact an authorized Nanni workshop for more information.**

It may be necessary to adapt these operations depending on the weather conditions. Contact an authorized Nanni workshop for more information.



#### CAUTION!

**If the motor is in danger of freezing, drain all water from the seawater system.**

### LONG-TERM STORAGE PROCEDURE

Perform the nearest periodic checks and maintenance before performing the long-term storage procedure.

Shutdown of the generator set

1. Drain and change the engine oil.
2. Replace the engine oil filter.
3. Replace fuel filter and pre-filter.
4. Bring the engine to operating temperature.
5. Stop the engine and remove the boat from the water.
6. Drain and clean raw water system components.
7. Protect the components from corrosion.
8. Remove the seawater pump rotor (if installed).
9. Store it in a cool, dry place. Visibly indicate that the impeller has been removed.
10. Check the level and condition of the engine coolant.
11. Drain water and contaminants from the fuel tank.
12. Fill the fuel tank completely.
13. Remove the air filter. Plug air intakes with clean, non-woven cloths.
14. Clean the engine. Touch up paint chips with paint



#### CAUTION!

**Do not direct a high-pressure jet at sensitive areas.**

15. Clean the entire boat.
16. Check the control cables. Grease the cables and apply an anti-moisture product.
17. Remove the battery cables. Adjust the electrolyte level. Charge the battery. Place the battery in a dry place.
18. Release the tension on the belts.
19. Spray motor with anti-moisture product.

# S10 STORAGE



## CAUTION!

**Packaged or not, the alternator must be stored in a cool, dry place, protected from vibrations and never exposed to the elements.**



## CAUTION!

**Bearings require special maintenance, but it is advisable to rotate the shaft once or twice a month to prevent fretting corrosion and grease hardening.**

Engine restart



## CAUTION!

**Before starting the generator set, where regular lubrication of the bearings is required, you should also lubricate it.**



## WARNING!

**After prolonged storage or if there are obvious signs of moisture/condensation, check the condition of the insulation. The insulation test must be performed by a qualified technician. Before performing the test, you must disconnect the voltage regulator. If the test result is too low (less than 1 MΩ) (EN60204-1), you will need to dry the alternator by blowing pressurized air at 50-60 C° into the alternator air inlets and outlets.**

11. Check the condition of the belts. Adjust belt tension.
  12. Drain the fuel tank.
  13. Open the fuel system valves. Bleed the system
  14. When the boat is in the water :  
Open the through-hull and prime the raw water system (if installed).
  15. Start the engine. Check for leaks.
1. Clean the engine and check its condition.
  2. Drain and replace engine oil.
  3. Replace the oil filter.
  4. Drain and replace the coolant.
  5. Check the condition of the water pump rotor which has been stored separately. Replace it if in doubt. Reassemble the rotor
  6. Remove the air intake covers. Check, dry and clean the air box if necessary. Install the air filter if equipped.
  7. Check the hose clamps.
  8. Check the coolant level. Adjust if necessary.
  9. Put in place charged batteries.
  10. Check the condition of the control cables and their operation.

# S10 STORAGE

## BATTERIES

When storing the unit, adjust the electrolyte level of the battery and store it in a dry place at room temperature. Recharge the battery as often as possible to extend its life.



### **WARNING!**

**Do not leave the battery unattended for a long time: it will be deeply discharged (about 7 to 8 volts). In such a situation, the battery will not recover.**



### **CAUTION!**

**Store the lithium battery in a dark place, e.g. in a box. Temperature conditions: for storage, we recommend a cool place, protected from frost and humidity.**

# S11 TROUBLE SHOOTING

## TROUBLE SHOOTING



### CAUTION!

If the engine does not work properly, use the following table to identify the cause. If the cause cannot be found, contact an authorised Nanni workshop.

#### THE ENGINE IS DIFFICULT TO START

Defect	Solutions
The fuel is thick and does not flow well.	<ul style="list-style-type: none"> <li>• See tank and fuel filter.</li> <li>• Remove water and dirt.</li> <li>• All fuel will be filtered through the filter, if there is water or other foreign matter on the filter, clean it with paraffin.</li> </ul>
Air or water in the system.	<ul style="list-style-type: none"> <li>• The fuel pump does not work if there is air in the fuel lines.</li> <li>• Check all pipe connections.</li> <li>• Bleed the fuel system.</li> </ul>
Incorrect valve clearances.	<ul style="list-style-type: none"> <li>• Adjust the valve clearance of the cold engine.</li> </ul>
Valve leaks.	<ul style="list-style-type: none"> <li>• Rode the valves.</li> </ul>
Injection pump timing.	<ul style="list-style-type: none"> <li>• Check the timing of the pump.</li> </ul>
Thick oil in winter and engine starting poorly	<ul style="list-style-type: none"> <li>• Change the type of oil according to weather conditions.</li> </ul>
Compression too low.	<ul style="list-style-type: none"> <li>• Valve, piston, cylinder and ring wear.</li> </ul>
Flat battery.	<ul style="list-style-type: none"> <li>• Charge the battery.</li> <li>• In winter, store the battery in a frost-free place. Recharge it periodically.</li> </ul>

#### LOW POWER OUTPUT

Defect	Solutions
Compression too low.	<ul style="list-style-type: none"> <li>• Wear of valves, pistons, cylinders and rings.</li> <li>• Attempt to break in the valves.</li> </ul>
Lack of fuel.	<ul style="list-style-type: none"> <li>• Fill up with fuel.</li> <li>• Check fuel supply and possible air intakes.</li> </ul>
Overheating of parts.	<ul style="list-style-type: none"> <li>• Check lubrication.</li> <li>• Check oil filter.</li> <li>• Dirt in the oil filter.</li> <li>• Check bearing clearance.</li> <li>• Check injection pump timing.</li> <li>• Adjust the distribution.</li> </ul>
Incorrect valve clearances.	<ul style="list-style-type: none"> <li>• Adjust the valve clearance of the cold engine.</li> </ul>
Injection pump timing.	<ul style="list-style-type: none"> <li>• Check the timing of the pump.</li> </ul>
Dirty air filter.	<ul style="list-style-type: none"> <li>• Change or clean the air filter every 100 hours.</li> </ul>
Fuel pressure too low.	<ul style="list-style-type: none"> <li>• Check the injection.</li> </ul>
Injection pump wear.	<ul style="list-style-type: none"> <li>• Do not use poor quality fuel as it will cause wear to the pump. (See "FUEL" in the "Fluids" section).</li> <li>• Check the fuel injection pump element and the delivery valve assembly and replace them if necessary.</li> </ul>

# S11 TROUBLE SHOOTING

## SUDDEN ENGINE STOP

Defect	Solutions
Lack of fuel.	<ul style="list-style-type: none"> <li>• Fill up with fuel.</li> <li>• Check fuel supply and possible air intakes.</li> </ul>
Injection failure	Check and replace if necessary the injector
Moving parts are overheated due to a lack of oil.	<ul style="list-style-type: none"> <li>• Check the oil level.</li> <li>• Check the lubrication.</li> <li>• Replace the oil filter every second oil change.</li> <li>• Check bearing clearance.</li> </ul>

## EXHAUST SMOKE TOO BLACK

Defect	Solutions
Fuel control defective.	<ul style="list-style-type: none"> <li>• Contact NANNI dealer</li> </ul>
Wrong fuel.	<ul style="list-style-type: none"> <li>• The fuel must comply with EN 590. See fluids section.</li> </ul>
Injection failure	Check and replace if necessary the injector
Combustion incomplete.	<ul style="list-style-type: none"> <li>• Poor atomisation.</li> <li>• Injection pump stalling.</li> <li>• Injection failure</li> <li>• Valve clearance</li> <li>• Compression ratio, etc.</li> </ul> <p>Checks to be carried out by NANNI Dealer</p>

# S11 TROUBLE SHOOTING

## EMERGENCY ENGINE STOP

Defect	Solutions
Engine speed variations.	<ul style="list-style-type: none"> <li>• Check timing and injection.</li> </ul>
Unusual noise.	<ul style="list-style-type: none"> <li>• Check all rotating parts.</li> </ul>
Smoke suddenly turns black.	<ul style="list-style-type: none"> <li>• Check the injection, especially the injection nozzles.</li> </ul>
Overheating of the bearings.	<ul style="list-style-type: none"> <li>• Check the lubricating system.</li> </ul>
Oil indicator ON.	<ul style="list-style-type: none"> <li>• Check the lubrication.</li> <li>• Check bearing clearance.</li> <li>• Check the lubrication lift pump.</li> <li>• Check the pressure sensor.</li> <li>• Check the filter seal.</li> </ul>

## ENGINE OVERHEATING

Defect	Solutions
Oil level too low.	<ul style="list-style-type: none"> <li>• Check the oil circuit, add oil.</li> </ul>
Extended or broken alternator belt	<ul style="list-style-type: none"> <li>• Replace the belt or adjust the tension.</li> </ul>
Coolant level too low.	<ul style="list-style-type: none"> <li>• Check the system and top up with recommended fluid identical to that in the engine.</li> </ul>
Too much antifreeze	<ul style="list-style-type: none"> <li>• Add water and check the antifreeze concentration or replace the coolant as recommended.</li> </ul>
Defective thermostat	<ul style="list-style-type: none"> <li>• Check the thermostat and replace if necessary.</li> </ul>
Faulty temperature sensor	<ul style="list-style-type: none"> <li>• Check the engine temperature with an electronic thermometer</li> <li>• Check the sensor and replace the sensor if necessary.</li> </ul>
Overload	Reduce electrical overload.
Head gasket leakage.	Replace the defective seal.
Clogged seawater circuit	<ul style="list-style-type: none"> <li>• Check and clean the seawater filter.</li> <li>• Check that the valves in the seawater circuit are open.</li> <li>• Check and clean if necessary the heat exchanger tube core.</li> </ul>
Wrong fuel.	<ul style="list-style-type: none"> <li>• The fuel must comply with EN 590. See fluids section.</li> </ul>

# S11 TROUBLE SHOOTING





# nanni



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