

NANNI MARINE ENGINE

USER MANUAL

DGBXXT09015B

ENGINES

N6.250 CR2

N6.285 CR2

N6.325 CR2

N6.360 CR2

N6.405 CR2

The Nanni logo is rendered in a dark blue, stylized, lowercase font. The letters are bold and modern, with the 'i' at the end featuring a solid circular dot above it.

TRACKED CHANGES

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*Please note all changes and pages associated.
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NOTES

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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

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 boat from you.

Any unauthorized modifications, or use outside its specified mechanical, electrical, or other operating limits may cause personal injury and/ or property damage, including damage to the engine. Any such unauthorized modifications: constitute «misuse» and/or «negligence» within the meaning of the product warranty there by excluding warranty coverage for any resulting damage and invalidate certifications or listings.



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 engine, 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 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.

S02 SAFETY

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.

S02 SAFETY

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.

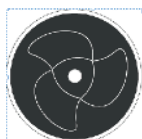
STAYING CLEAR OF ROTATING DRIVE LINES



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 LEAKS



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.

S02 SAFETY

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.

S02 SAFETY

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:



- 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.

S02 SAFETY

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.

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°C (-4°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°C (18°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 machine 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 Interim Tier 4, Final Tier 4, Stage III B, Stage IV Engines, and Stage V engines

- Use **ONLY** ultra low sulphur diesel (ULSD) fuel with a maximum of 15 mg/kg (15 ppm) sulphur content.

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.
- **BEFORE** using diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm), contact your NANNI dealer.

Sulphur Content for Other Engines

- Use of diesel fuel with sulphur content less than 5000 mg/kg (5000 ppm) is **RECOMMENDED**.
- Use of diesel fuel with sulphur 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.

Lubricity of biodiesel fuel

Fuel lubricity can improve significantly with BioDiesel blends up to B20 (20% BioDiesel). Further increase in lubricity is limited for BioDiesel blends greater than B20.

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.

Diesel fuel can be the source of performance or other operational problems for many reasons. Some causes include poor lubricity, contaminants, low cetane number, and a variety of properties that cause fuel system deposits. These and others are referenced in other sections of this Operator's Manual.

To optimize engine performance and reliability, closely follow recommendations on fuel quality, storage, and handling, which are found elsewhere in this Operator's Manual.

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.

Before using fuel containing biodiesel, review the Biodiesel Use Requirements and Recommendations in this Operator's Manual.

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

Stage V Engines Operating in the European Union

Where the engine is to be operated within the Union on diesel or non-road gas-oil, a fuel with a FAME content not greater than 8% volume (B8) shall be used.

Engines with Exhaust Filter Except Stage V Engines Operating in the European Union

Biodiesel blends up to B20 can be used ONLY if the biodiesel (100% biodiesel or B100) meets ASTM D6751, EN 14214, or equivalent specification. Expect a 2% reduction in power and a 3% reduction in fuel economy when using B20.

Biodiesel concentrations above B20 can harm the engine's emission control systems and should not be used. Risks include, but are not limited to, more frequent stationary regeneration, soot accumulation, and increased intervals for ash removal.

John Deere Fuel conditioners or equivalent, which contain detergent and dispersant additives, are required when using biodiesel blends from B10 to B20, and are recommended when using lower biodiesel blends.

Engines Without Exhaust Filter

Biodiesel blends up to B20 can be used ONLY if the biodiesel (100% biodiesel or B100) meets ASTM D6751, EN 14214, or equivalent specification. Expect a 2% reduction in power and a 3% reduction in fuel economy when using B20.

These engines can operate on biodiesel blends above B20 (up to 100% biodiesel). Operate at levels above B20 ONLY if the biodiesel is permitted by law and meets the EN 14214 specification (primarily available in Europe). Engines operating on biodiesel blends above B20 might not fully comply with or be permitted by all applicable emissions regulations. Expect up to a 12% reduction in power and an 18% reduction in fuel economy when using 100% biodiesel.

Fuel conditioners, which contain detergent and disper-

sant additives, are required when using biodiesel blends from B10 to B100, and are recommended when using lower biodiesel blends.

Biodiesel Use Requirements and Recommendations

The petroleum diesel portion of all biodiesel blends must meet the requirements of ASTM D975 (US) or EN 590 (EU) commercial standard.

Biodiesel users in the U.S. are strongly encouraged to purchase biodiesel blends from a BQ-9000 Certified Marketer and sourced from a BQ-9000 Accredited Producer (as certified by the National biodiesel Board). Certified Marketers and Accredited Producers can be found at the following website: <http://www.bq9000.org>.

Biodiesel contains residual ash. Ash levels exceeding the maximums allowed in either ASTM D6751 or EN14214 can result in more rapid ash loading and require more frequent cleaning of the Exhaust Filter (if present).

The fuel filter can require more frequent replacement when using biodiesel fuel, particularly if switching from diesel. Check engine oil level daily prior to starting engine. A rising oil level can indicate fuel dilution of the engine oil. Biodiesel blends up to B20 must be used within 90 days of the date of biodiesel manufacture. Biodiesel blends above B20 must be used within 45 days from the date of biodiesel manufacture.

When using biodiesel blends up to B20, the following must be considered:

- Cold-weather flow degradation
- Stability and storage issues (moisture absorption, microbial growth)
- Possible filter restriction and plugging (usually a problem when first switching to biodiesel on used engines)
- Possible fuel leakage through seals and hoses (primarily an issue with older engines)
- Possible reduction of service life of engine components

Request a certificate of analysis from your fuel distributor to ensure that the fuel is compliant with the specifications provided in this Operator's Manual.

Consult your John Deere dealer for John Deere fuel products to improve storage and performance with biodiesel fuels.

The following must also be considered if using biodiesel blends above B20:

- Possible coking or blocked injector nozzles, resulting in power loss and engine misfire if John Deere fuel additives and conditioners or equivalent containing detergent/dispersants are not used
- Possible crankcase oil dilution (requiring more fre-

quent oil changes)

- Possible lacquering or seizure of internal components
- Possible formation of sludge and sediments
- Possible thermal oxidation of fuel at elevated temperatures
- Possible compatibility issues with other materials (including copper, lead, zinc, tin, brass, and bronze) used in fuel handling, distribution, and storage equipment
- Possible reduction in water separator efficiency
- Possible damage to paint if exposed to biodiesel
- Possible corrosion of fuel injection equipment
- Possible elastomeric seal and gasket material degradation (primarily an issue with older engines)
- Possible high acid levels within fuel system
- Because biodiesel blends above B20 contain more ash, using blends above B20 can result in more rapid ash loading and require more frequent cleaning of the Exhaust Filter (if present)



IMPORTANT!

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 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 John Deere 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 option for some engines to aid cold weather starting.



CAUTION !

Ether is highly flammable. 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.)



IMPORTANT!

Treat fuel when outside temperature drops below 0°C (32°F). For best results, use with untreated fuel. Follow all recommended instructions on label.

Biodiesel

When operating with biodiesel blends, wax formation can occur at warmer temperatures. Begin using John Deere Fuel-Protect Diesel Fuel Conditioner (winter formula) or equivalent at 5°C (41°F) to treat biodiesel fuels during the cold-weather season. 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).

ENGINE COOLANT

ENGINE COOLANTS

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

- Pre-mix coolant meeting ASTM D6210 requirements
- Is formulated with a 2-ethylhexanoic acid (2-EHA) free additive package
- 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 to either the John Deere Cavitation Test Method or a fleet study run at or above 60% load capacity
- Is formulated with a nitrite-free additive package
- Is formulated with a 2-ethylhexanoic acid (2-EHA) 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 interval to 2 years or 2000 hours of operation.



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.

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 l 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.

S03 FLUIDS

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.

To use this tool:

1. Allow cooling system to cool to ambient temperatures.
2. Open radiator 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

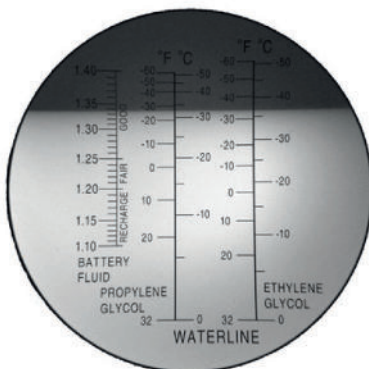


Image with a Drop of 50/50 Coolant Placed on the Refractometer Window

LUBRICANTS

ENGINE OIL AND FILTER SERVICE INTERVALS

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.

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	Tier 3 and Stage IIIA – CR2 Engines Oil Pan Size (L/kW)				Tier 3 and Stage IIIA – Mechanical Engines 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	Greater than or equal to 0.22	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)				Less than 1000 mg/kg (1000 ppm)		
Service interval	250 hours	250 hours	250 hours	250 hours	250 hours	250 hours	250 hours
Fuel Sulfur	1000–2000 mg/kg (1000–2000 ppm)				1000–2000 mg/kg (1000–2000 ppm)		
Service interval	200 hours	200 hours	250 hours	250 hours	200 hours	200 hours	250 hours
Fuel Sulfur	2000–5000 mg/kg (2000–5000 ppm)				2000–5000 mg/kg (2000–5000 ppm)		
Service interval	Not Recommended Contact NANNI dealer (Dealer refers to NANNI solution)				150 hours	175 hours	250 hours
Fuel Sulfur	5000–10 000 mg/kg (5000–10 000 ppm)				5000–10 000 mg/kg (5000–10 000 ppm)		
Service interval	Not Recommended Contact NANNI dealer (Dealer refers to NANNI solution)				125 hours	125 hours	125 hours

DIESEL ENGINE OIL

Failure to follow applicable oil standards and drain intervals can result in severe engine damage that might not be covered under warranty.

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

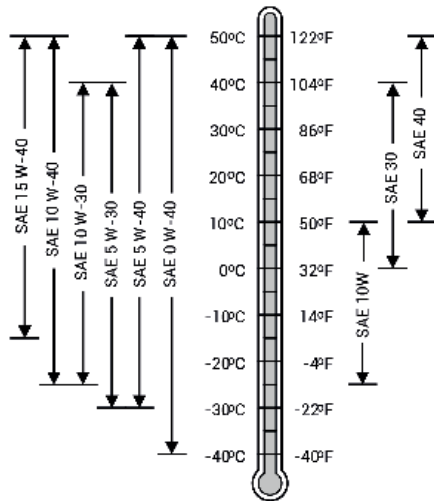
Approved oil types

Oils meeting 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 sulphur content must comply with all existing emissions regulations for the area in which the engine operates.



Oil Viscosities for Air Temperature Ranges

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

DIESEL ENGINE BREAK-IN OIL

New engines are filled at the factory with engine break-in oil.

During the break-in period, add engine break-in oil, respectively, as needed to maintain the specified oil level.

Operate the engine under various conditions, particularly heavy loads with minimal idling, to help seat engine components properly.

If engine break-in oil is used, change the oil and filter at a minimum of 100 hours and a maximum equal to the interval service specified in this manual (250 hours).

After engine overhaul, fill the engine with either break-in oil.

Engine break-in oil used is an SAE 10W-30 viscosity grade diesel engine oil meeting one of the following standards:

- API Service Classification CE
- API Service Classification CD
- API Service Classification CC
- ACEA Oil Sequence E2
- ACEA Oil Sequence E1



IMPORTANT!

Do not use engine oils meeting any of the following for the initial break-in of a new or rebuilt engine:

API CK-4	ACEA E9
API CJ-4	ACEA E7
API CI-4 PLUS	ACEA E6
API CI-4	ACEA E5
API CH-4	ACEA E4
API CG-4	ACEA E3
API CF-4	
API CF-2	
API CF	

These oils do not allow the engine to break in properly.

After the break-in period, use diesel engine oil as recommended in this manual.

OIL FILTERS

Filtration of oils is critically important for proper operation and lubrication. NANNI 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

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.

NOTES

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S04 WARRANTY

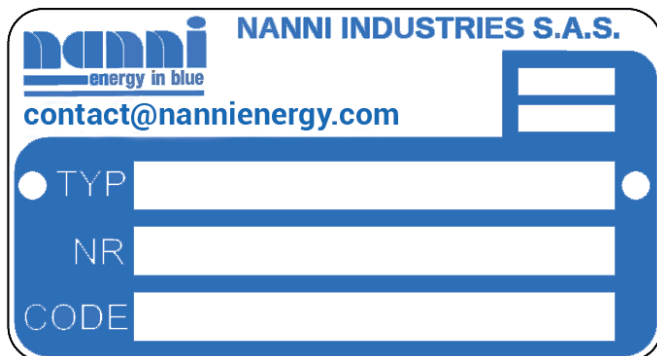
ENGINE IDENTIFICATION

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

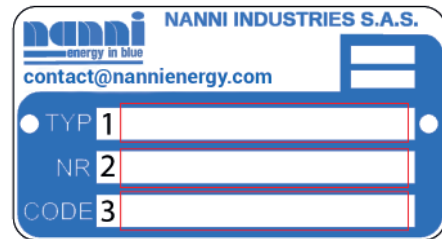
Keep these plates accessible and in good condition. Record and keep serial number and designation. These numbers should always be quoted when ordering service and replacement parts. Depending of type of engine, identification plate are as follows:



Or:



Example:



1 : Type of engine

2 : Nanni engine serial number

3 : Engine code

TYP	Indicates the commercial designation of the engine.
NR	Indicates the engine serial number.
CODE	Lists various specifications of the engine.



NOTE !

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

ENGINE APPROVAL

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 approval 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

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 t 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 and 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.

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S05 INSTRUMENTS

DASHBOARD

Nanni panel depends on your engine, refer to the manual corresponding to your panel.

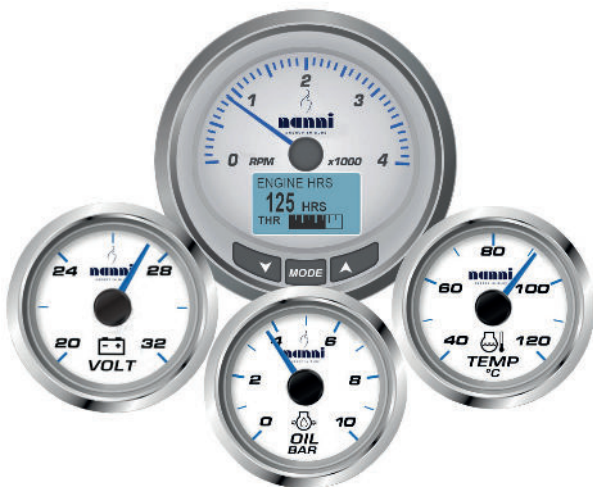
DGBXXT09031 ANALOG PANEL TYPE3 ET
TYPE4



DGBXXT09050 DIGITAL PANEL SI4



DGBXXT09032 ELECTRONIC PANEL C5 AND
C4 PRO



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S06 COMPONENTS

ENGINE MAIN COMPONENTS



NOTE !

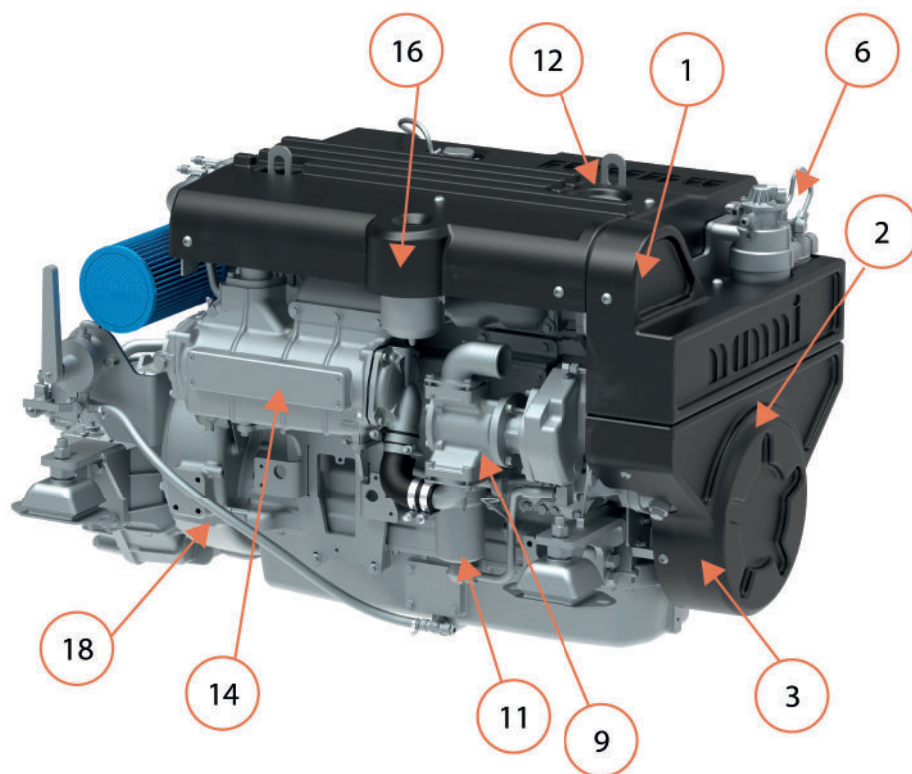
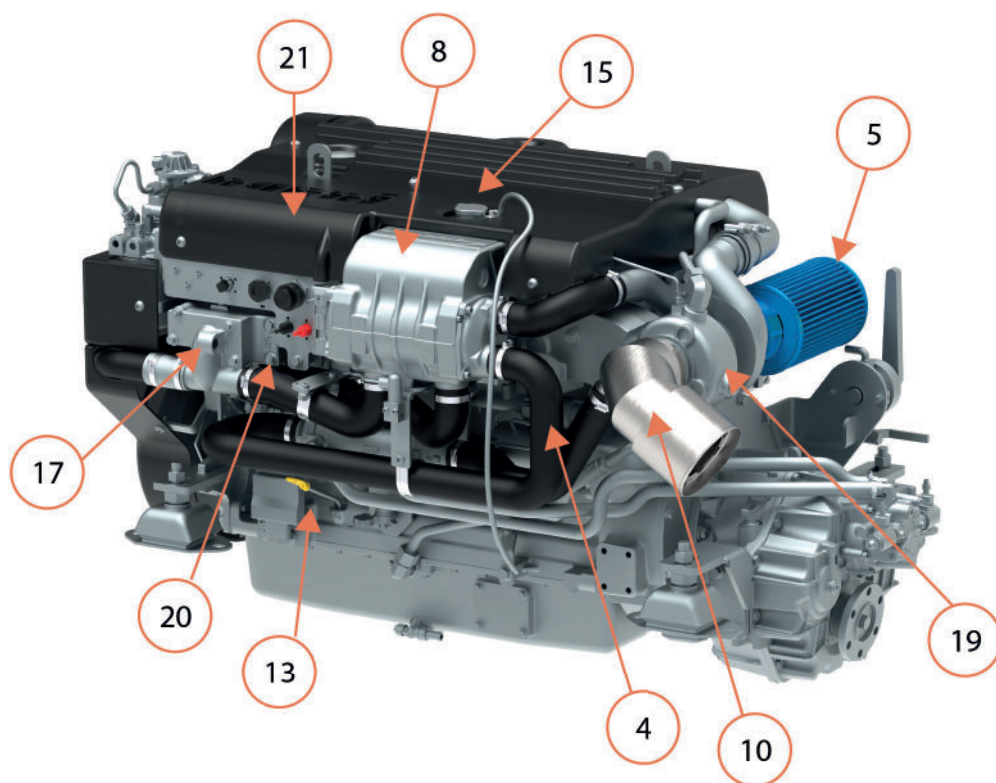
Minor engine details may not be exactly as shown. Some components may not be part of the engine ordered. Not binding pictures.

P/N COMPONENTS

1	Alternator
2	Alternator Belt
3	Belt cover
4	Starter
5	Air filter
6	Fuel filters
7	Fuel injection pump (not visible on picture)
8	Heat exchanger
9	Raw water pump
10	Water cooled exhaust elbow
11	Oil filter
12	Oil filling
13	Oil gauge
14	Intercooler
15	Coolant filling
16	Crankcase ventilation filter
17	Thermostat
18	Flywheel
19	Turbocharger
20	Electric connectors plate
21	E.C.U.

S06 COMPONENTS

ENGINES VIEWS N6.CR2



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S07 START & RUNNING

BEFORE STARTING

ENGINE INSTALLATION

See [Installation manual](#).

FUEL SYSTEM

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

The injection pump delivers a larger amount of fuel than required for combustion. The fuel that is not burned is re-injected into the tank through an over-flow pipe.



ATTENTION !

The injection pump is an extremely precise unit. Water entry in the fuel system will cause major failure to the injection pump and to the whole fuel system.

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

If the fuel tank is located below the engine injection pump, an additional electric fuel feed pump should be installed between the prefilter and the feed pump of the engine.

RAW WATER SYSTEM

The raw water system allows to cool the engine coolant and the exhaust gas.

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

The siphon breaker prevents raw water entry into the cylinders via the raw water/exhaust system.



NOTE !

The use of a siphon breaker is mandatory if the exhaust elbow is under the waterline at full load or at less than 200 mm above it. A siphon breaker is mandatory in all Sail Boat and when there's a risk of water entry in the engine.

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

ELECTRICAL SYSTEM

The engine extension harness should be away from any water projection and must be correctly attached as high as possible in the hold.

Engines in metallic hulls are generally fitted with a two-pole electrical system. This system allows to electrically isolate the engine from the electrical ground of the boat.

The alternator belt drives both the coolant pump and the alternator. Additional belt can also be fitted.

S07 START & RUNNING

CHECK BEFORE STARTING



WARNING !

Put all the protective covers back before starting the engine.

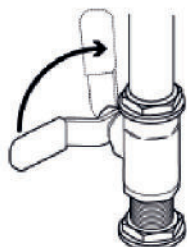


CAUTION !

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

Perform all of the following operations before starting the engine:

1. Open sea cock. Prime the raw water system if necessary.



2. Start the compartment fan (if fitted) for at least five minutes. Otherwise, open the hold.
3. Check that there is sufficient fuel.
4. Move the control lever to the neutral position.
5. Open fuel cock, prime the system if necessary.
6. Check the engine and transmission oil level and fill with the recommended oil if necessary.
7. Check the coolant level, top up if necessary.
8. Check the mechanical control cables, lubricate as required.
9. Check there are no fuel, oil, coolant or water leaks.
10. Check the alternator belt.
11. Turn ON the main battery switch.

STARTING THE ENGINE



DANGER !

The propeller can cause serious injury when rotating. Check that nobody is in the water near the propeller before starting. Never use a start spray or any other equivalent product. These products are highly flammable.



CAUTION !

Always preheat the engine. Never race the engine while it is cold. Do not crank the engine continuously for more than 10 seconds at a time. Let it cool down for 2 minutes between cranking attempts. Failure to follow these guidelines may result in starter motor burnout.



NOTE !

If the engine does not start after 3 attempts, remove the key and drain the water in the waterlock. Failure to do so may lead to water ingress in the cylinders. When starting the engine for the first time, let it run at idle for several minutes and check for leaks or malfunction.

COLD WEATHER OPERATION



NOTE !

Engines may be equipped with coolant heaters as cold weather starting aids. Engine coolant heaters should be used when temperatures are at or below 0 °C (32 °F).

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

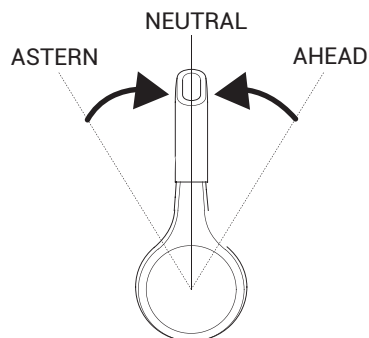
Synthetic oils improve flow at low temperatures, especially in Arctic conditions.

S07 START & RUNNING

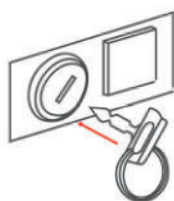
ENGINE START

A4, B4, C4 Panel with key

1. Move the control lever to the neutral position.



2. Insert the key in the ON/STOP starter switch.

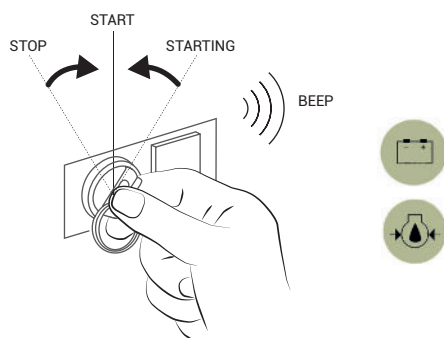


3. Turn the key a quarter-turn to the right (on C4 and A4 panel). All the warning lamps come on and the acoustic alarm sounds. After a few seconds, only the engine oil pressure and Battery charge lamps do lit.

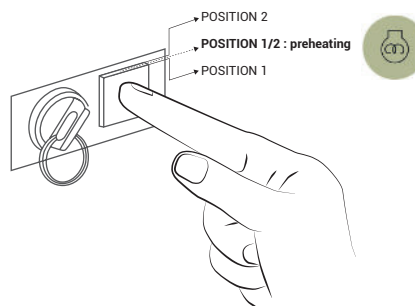


NOTE !

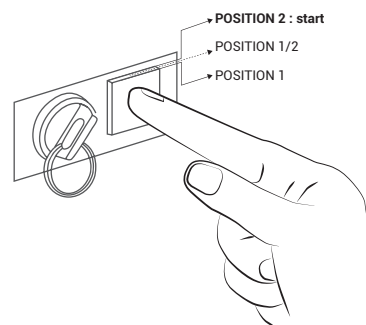
On Eco 4 Panel, only the oil pressure and battery charge lamp light on (not applicable to N5 engines).



4. Press the Start button halfway (position 1/2) to start preheating. Hold the button for 10 to 20 seconds, depending on ambient temperature to preheat the engine.



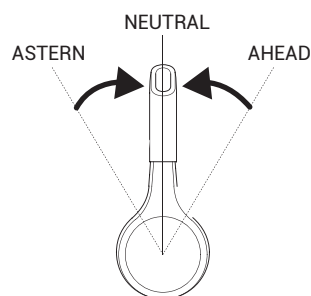
5. Press fully to start the engine (position 2). Once the engine has started, release the button, all lamps go out.



6. If the engine is fit with water cooled exhaust elbow, check that water flows from the exhaust outlet at the hull. If the water does not flow, stop the engine and check the raw water system.

A4, B4, C4 Panel without key

1. Switch the key of the main panel to ignition (if equipped).
2. Move the control lever to the neutral position.



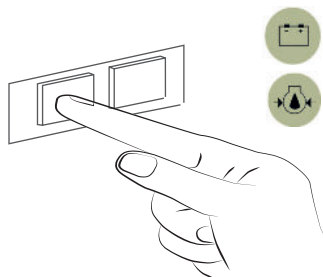
3. Press the ON/STOP button. All the warning lamps come on and the alarm sounds (on C4 and A4 panel). After a few seconds, only the engine oil pressure and Battery charge lamps remain lit.

S07 START & RUNNING

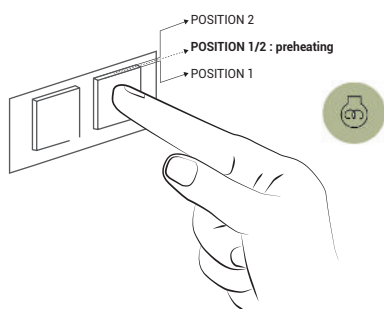


NOTE !

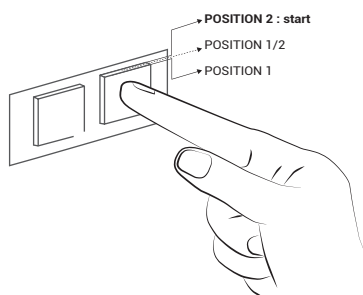
On Eco 4 Panel, only the oil pressure and battery charge lamp light on (not applicable to N5 engines).



4. Press the Start button halfway (position 1/2) to start preheating. Hold the button for 10 to 20 seconds, depending on ambient temperature to preheat the engine.



5. Press fully (position 2) to start the engine. Once the engine has started, release the button, all lamps go out.



6. If the engine is fit with water cooled exhaust elbow, check that raw water flows from the exhaust outlet at the hull. If the water does not flow, stop the engine and check the raw water level.

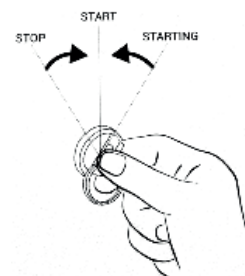
Panel C4 PRO

1. Turn the key from "OFF" to the "ON" position to warm the glow plugs. Voltmeter will show the battery state.
2. Turn the key to the "START" position to crank the engine. Release the key when engine has started.
3. Press the instrument light button as needed.
4. Press the "STOP" button for immediate engine stop.



Electronic type 5

Turn the ignition key to the ON position.



It is not required to start the engine for system initialization. The tachometer will start an automatic self-test at every powering up. This self test is as follows:

1. The L.C.D screen displays the current inbed software.
2. All dial indicators will be checked : pointers will sweep up to full scale, then will return to the current value;
3. When self-test is completed, the LCD screen will display data.
4. If the C5 is powered for the first time, the user will be prompted to the system set-up.

S07 START & RUNNING

ENGINE STARTED

To insure adequate lubrication, operate engine at or below 1200 rpm with no load for 1-2 minutes. Extend this period to 2-4 minutes at freezing or sub-zero temperatures.

1. Check oil pressure gauge as soon as engine starts. If gauge needle does not level up to minimum oil pressure specification within 5 seconds, stop the engine and determine the cause.
2. Watch coolant temperature gauge. Do not place engine under full load until properly warmed up.

It is a good practice to operate the engine under a lighter load and at lower speeds than normal for the first few minutes after start-up.

STARTING WITH BOOSTER BATTERIES



CAUTION !

Make sure to use batteries with the same rated voltage as the engine's system voltage. On an engine with a two pole electrical system, connect the other end of the jumper cable to the negative pole (-) of the booster battery.

1. Connect the jumper cable to the positive pole (+) of the flat 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 of the engine block.

Start the engine following the starting procedure:

3. Let the engine run at idle for few minutes to charge the battery.
4. Stop the engine and remove the cables in the exact reverse order from installation.

ENGINE RELUCTANT TO START

If a water lift (water lock) muffler is installed on the exhaust line, excessive cranking could cause seawater to enter the cylinders and damage the engine. To start engine, reduce starting attempts to three and if not OK, undertake to do this:

1. Close the seacock to avoid filling the muffler with water.
2. Try to start the engine by following the regular starting procedure.
3. When the engine does start, stop the engine immediately and turn off the switch.
4. Re-open the seacock and restart the engine.

IDLING ENGINE

Avoid excessive engine idling as it may cause the coolant temperature to fall below its normal range. This, in turn, causes crankcase oil dilution, due to incomplete fuel combustion, and permits formation of gummy deposits on valves, pistons, and piston rings. It also promotes rapid accumulation of engine sludge and unburned fuel in the exhaust system.

Once an engine is warmed to normal operating temperatures, engine should be idled at slow idle speed. Slow idle speed for engine is set at the factory. If an engine is left idling for more than 5 minutes, stop and restart later.



Above: typical temperature and pressure Type 5 and 4 gauges

S07 START & RUNNING

NORMAL ENGINE OPERATION

Check engine coolant temperature and oil pressure. Temperatures and pressures will vary between engines and with changing operating conditions. If coolant temperature rises above the maximum coolant temperature, reduce load on engine. Unless temperature drops quickly, stop engine and determine cause before resuming operation.

Operate the engine under a lighter load and at slower than normal speed for first 15 minutes after start-up. DO NOT run engine at slow idle unless necessary for manoeuvring out of dock and harbor.

Stop engine as soon as possible if there are any signs of part failure. Symptoms that may be early signs of engine problems are:

- Sudden drop in oil pressure
- Abnormal coolant temperatures
- High marine gear oil temperature
- Unusual noise or vibration
- Sudden loss of power
- Excessive black exhaust
- Excessive fuel consumption
- Excessive oil consumption
- Fluid leaks

BREAK IN

Operate the engine with care for the first 50 hours of operation.

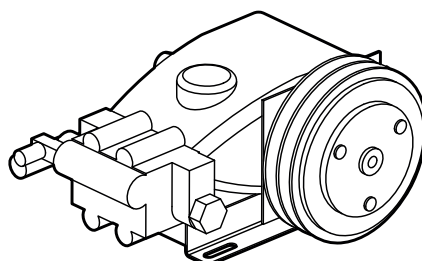
Do not race the engine while it is cold. Do not operate it at full load except for short periods. Never run the engine at constant engine speed for long periods during the break in period.

Check the oil and coolant level frequently during the running-in period. The oil consumption can be more important during the running in period.

See Maintenance section.

POWER TAKE OFF

Some engines can be fit with a Power Take Off system. This system allows to power accessories like bilge pump, watermaker, etc.



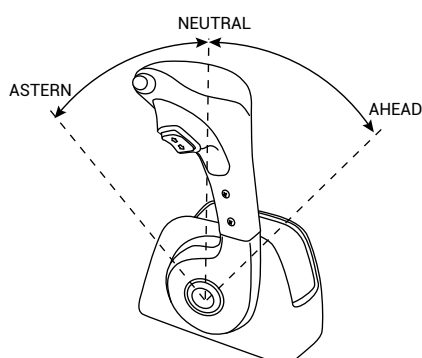
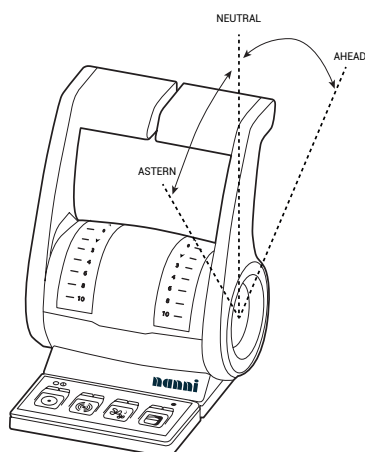
NOTE !

Any mechanical power taken from the engine from a PTO reduces the power delivered to the propeller. The use of a PTO should always be studied and approved by the R&D department of Nanni Industries S.A.S France. Contact your Nanni dealer for more informations.

S07 START & RUNNING

REMOTE CONTROL

The remote control is an optional extra not in the scope of supply of the engine. The remote control installed on the boat can be different than the ones shown in this document.



On most boats, the control lever controls both the engine rpm and the gear shift (ahead / astern). However, some boats can be equipped with a separated shift command.

It can also be fitted with a neutral safety switch that prevents the engine from starting until the lever is in neutral position.

Consult the boat builder or your Nanni dealer if you are not sure about the operation of the remote control.

RUNNING

BEHAVIOUR OF THE BOAT

If this is your first boat or if you are not familiar with the boat, we urge you to practice controlling the boat at slow speed as a first step. Avoid violent manoeuvres or unexpected speed changes while sailing. People can fall over or overboard.

Keep also in mind that the weight distribution (passengers, equipments, etc.) inside the boat has an impact on the behaviour of the boat when cruising. Depending the position of the load, the behaviour of the boat may change, particularly in the case of a planning hull.

The condition of the hull and the propeller is also a critical factor. A dirty and / or damaged hull will modify the behaviour of the boat and therefore the engine performance. It can also cause cavitation which can seriously erode the surface of the propeller, the drive, etc.

DURING OPERATION



NOTE !

Never press the START button when the engine is running.

The solenoid of the starter motor would push up the cog and make the starter motor to start, against the turning flywheel of the engine already in motion. This action would destroy the starter motor.

Check the instruments and warning lamps after starting, and regularly when cruising.

S07 START & RUNNING

CRUISING SPEED

A recommended engine speed is given in the **TECHNICAL DATA** section to help you to set your cruising speed.



NOTE !

Always consider sailing conditions and load of the boat to set the cruising speed.

Operating the engine at wide open throttle should be avoided since it is both uncomfortable and uneconomical. Note that operating the engine at a too low rpm for a long period could lead among other things to increased oil consumption.

Deposits may also form in the injection system if the engine do not reach its nominal operating temperature regularly. Run the engine at full throttle regularly in order to burn off any possible deposits in the fuel system.

MANOEUVRING



WARNING !

Shifting at high speed can damage both the engine and the transmission and be dangerous for passengers.



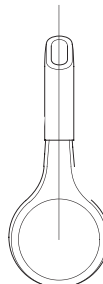
CAUTION !

On a twin engine boat, both engines should be started during reversing manoeuvres to reduce the risk of water ingress in the stationary engine.

Carry out the following operations for forward / reverse manoeuvres:

1. Reduce engine speed to idling and, if possible, let the boat lose most of its speed.
2. Move the control lever to the neutral position and wait a few seconds.

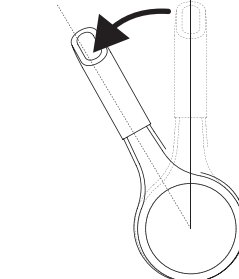
NEUTRAL



3. Move the control lever into astern. Increase the speed.

NEUTRAL

ASTERN



S07 START & RUNNING

TROLLING VALVE

The Trolling valve system allows to reduce the rotation speed of the propeller below its speed when the engine is at idle. The boat speed is reduced by 30% to 70%.



CAUTION !

The Trolling valve system must never be used for manoeuvring. It also must never be used at an engine speed of more than 1200 rpm (refer to Gear Box operating manual).

AFTER RUNNING

STOPPING THE ENGINE



CAUTION !

Never stop the engine by using the main switch. This could damage the electrical system.

Before stopping the engine, let it run at idle in neutral for few minutes, especially if the engine has been operated at high speed and load. This will allow the coolant to cool down the engine.

1. Start the fan in the engine compartment (if fitted) or open the hold.
2. Turn the key of the starter switch counter-clockwise, the engine stops and all indicators turn off. The engine stops, all lamps go out. For panel without key, press the ON/STOP button and release it. The engine stops. Turn the key of the main panel counter-clockwise. All indicators will turn off.

S07 START & RUNNING

AFTER STOPPING THE ENGINE

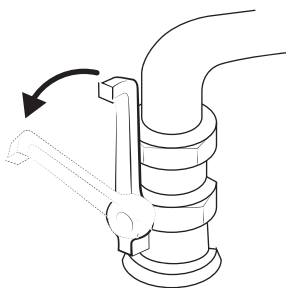


CAUTION !

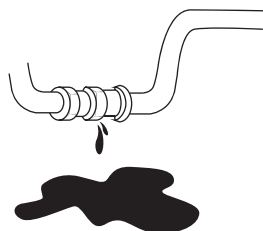
Even after the engine has stopped, some components and fluids will remain hot and under pressure for several minutes. As far as possible, limit works on the engine immediately after stopping it. Allow it to cool down first.

After the engine has stopped:

1. Turn off the main switch.
2. Close the sea cock and the fuel cock.



3. Inspect the engine compartment and check for leaks.



CAUTION !

If the boat is being towed, put the lever in neutral, stop the engine and close the sea cock to prevent the engine from being filled with raw water.

On a twin-engine boat, if cruising with a single engine, close the sea cock of the stopped engine.

Do not forget to open the sea cock before restarting the engine.

ANCHORING

If the boat is not going to be used for some time but is being left in the water, the engine must be run to operating temperature at least once every 2 weeks. This prevents corrosion in the engine.

When the boat is at anchor or in port for an extended period of time, vegetation may develop on the hull, the keel, the drive, the rudder, the propeller, etc. It will significantly affect the behaviour of the boat and the performance of the engine if the vegetation is not removed before the next time the boat is used.

Vegetation and fouling can also obstruct the raw water system and result in damage to the engine by overheating.

Inspect and clean the boat and the raw water system each time the engine is used. Clean if necessary. If the boat is removed out of water, clean the hull and spray a coat of anti-fouling. Never paint the anodes.

Furthermore, when the boat is at anchor or in port for an extended period, water can fill the exhaust system via the exhaust outlet. It is necessary to drain regularly the waterlock when the boat is at anchor.



COLD WEATHER PRECAUTIONS

See [Maintenance](#) Section for complete details.



CAUTION !

A poorly charged battery may burst as a result of freezing.

NOTES

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ABOUT



This section is describing preventive maintenance operations to be carried out by the owner/operator of the engine. This is not a part of a workshop repair manual.

Carrying a set of preventive maintenance operations in accordance with the service intervals will ensure engine optimal reliability and service life.

During the warranty period, it is essential to get any work carried out by a Nanni authorized workshop. Furthermore, any service should be registered in the Nanni after-sale system.

However, some regular checks, particularly those made every time the engine is used, are of the duty of the user. Some operations are explained further on for you to work on the engine in case of an emergency or if there is no repair workshop nearby.

We recommend to have all your works checked by a Nanni authorized workshop.

Repairs and/or adjustment works on the engine by unseasoned marine trained technicians is forbidden for obvious safety reasons. Improper works endangers life, even not at open sea. Operations on valve timing and injection system belong to the exclusive domain of Nanni trained representatives. These may be against EPA or other worldwide environmental regulations.



NOTE !

The service intervals and relevant informations about the preventive maintenance of the transmission are indicated in the user manual provided by the manufacturer of the transmission. Contact your Nanni representative for further information regarding the maintenance of the transmission.

GENERALITIES



WARNING !

Perform maintenance operations having the engine stopped and cold. Get the starting key out from the panel, put it in your pocket and turn off the power supply.

Read this whole chapter and take all safety precautions before contemplating any maintenance or repair work. Make sure you understand how to perform every operation.



CAUTION !

Clean the engine before any maintenance. Watch for any oil or fluid drop as it is an evidence of a leak somewhere.



CAUTION !

Do not let oil, fuel or grease deposits build up around the engine as they may increase the risk of fire in the engine compartment. Furthermore, these deposits may hide potential heavy unseen failures.

CONTROL CABLES

The engine rpm and the gearbox shift command may be controlled by mechanical control cables connected to the control lever.

Adjust the tightness of the cable as required. If any defect appears (rust, crack, etc.), the control cable must be replaced.

MAINTENANCE

COMPONENTS	PÉRIODICITÉ			
	Daily	Every 250 hours or 1 year ⁽¹⁾	Every 500 hours or 2 years ⁽¹⁾	Every 2000 hours or 2 years ⁽¹⁾
FUEL CIRCUIT				
Water in fuel - Pre-filter / Filter Draining	○			
Fuel Filter ⁽²⁾		●		
Fuel injectors - Check Cut out and misfiring with Diagnostic Tool ⁽⁴⁾			○	
Mechanical Fuel injectors ⁽⁵⁾				○
LUBRICATION CIRCUIT				
Engine oil level ⁽²⁾	○			
Engine Oil ⁽²⁾		●		
Oil Filter ⁽²⁾		●		
Crankcase Ventilation Filter (C.C.V.)			●	
COOLING CIRCUIT				
Coolant level ⁽²⁾	○			
Coolant Concentration control ⁽²⁾			○	
Coolant Liquid ⁽²⁾		● 6000 hours or 4 years ⁽¹⁾		
Thermostat Inspection ⁽²⁾			●	
Calibrated Heat-Exchanger Cap ⁽²⁾			●	
Heat-exchanger - O-Rings			●	
Inter-cooler - O-Rings			●	
RAW WATER CIRCUIT				
Raw Water Filter. ⁽²⁾	○			
Raw Water Pump Impeller. ⁽²⁾		○	●	
Raw water pump Overhaul.				●
Anodes Check and Replacement. ⁽²⁾		○		
AIR INTAKE & EXHAUST CIRCUIT				
Turbo-charger Inspection			○	
Air Intake Filter ⁽²⁾		○	●	
Exhaust Mixer Inspection ⁽²⁾			○	
ELECTRICITY / ELECTRONIC				
Battery electrolyte level	○			
Electrical Harness Connectors Inspection		○		
Alternator Belt ⁽²⁾	○			
Panel Command : Indicators & Warning Lamps		○		
Read out the Defect Trouble Codes ⁽⁶⁾		○		
WHOLE ENGINE				
Engine Mounts Inspection.		○	● 4 years	
Engine Alignment		○	When Mount Replacement	
Hoses / Clamps tightness / Bolts / Nuts Tightening		○		
Visual Inspection (Coolant, fuel, oil, exhaust & raw water leaks)	○			
Valve Clearance				○
Check Crankshaft Vibration Damper ⁽⁷⁾				○
TRANSMISSION				
Transmission Oil level ⁽³⁾	○			
Transmission Oil and Filter ⁽³⁾		●		
Transmission Oil Cooler (if equipped)			○	

⁽¹⁾ Whichever come first (at the first occurrence)

⁽²⁾ Operations to be performed in accordance with user and maintenance manual for your engine. For all technical information specific to your engine, refer to the user and maintenance manual.

⁽³⁾ Operation to be performed in accordance with the transmission manufacturer user and maintenance manual.

⁽⁴⁾ Mechanical injection engines N5.150 - N5.140E - N6.160 - N6.180 - N6.200 - N6.230 - N6.240E - N6.270E - N6.300E are not concerned.

⁽⁵⁾ Only mechanical injection engines N5.150 - N5.140E - N6.160 - N6.180 - N6.200 - N6.230 - N6.240E - N6.270E - N6.300E are concerned.

⁽⁶⁾ Only engines N5.150 - N6.160 - N6.180 - N6.200 - N6.230 are not concerned.

⁽⁷⁾ For N5 and N6 check if the engine is equipped. The crankshaft vibration damper must be replaced after 4500 hours or 5 years whichever come first (at the first occurrence)

○ CHECK/ADJUST/CLEAN/SERVICE/REPLACEMENT IF NECESSARY

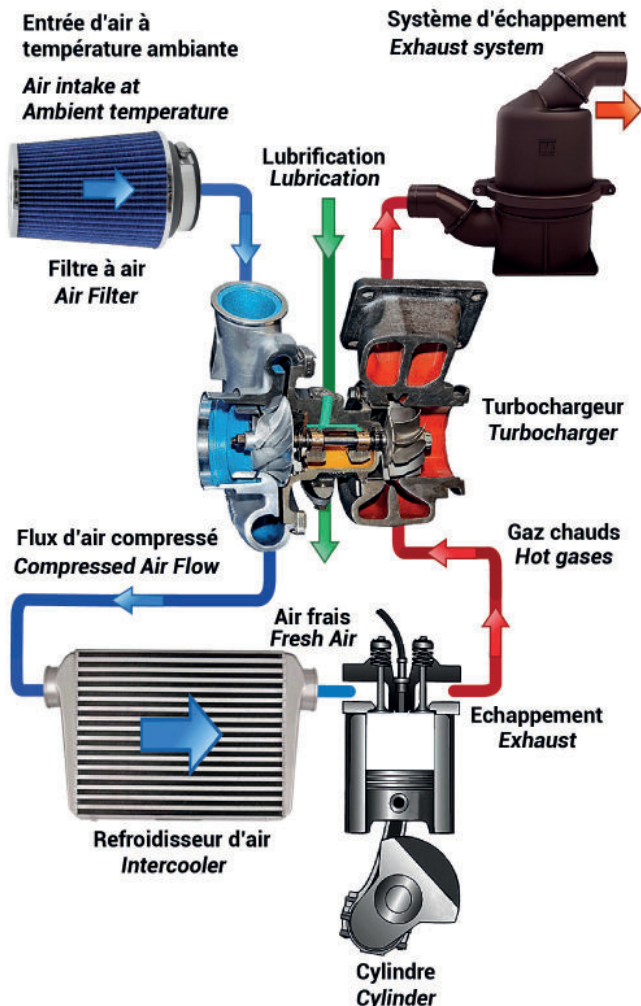
● REPLACE

TURBOCHARGER



CAUTION !

A turbocharger is an exhaust-driven mechanical device that boost engine power by pumping more air into the engine. A turbocharger uses a pair of fan-like castings mounted on a common shaft. One (called the turbine) is piped to the exhaust, while the other (the compressor) is piped to the engine intake. The flow of exhaust spins the turbine, which causes the compressor to turn. The compressor serves to blow air into the engine at a greater rate than it can pull it in on its own. The greater volume of air can be mixed with a greater volume of fuel, which increases the power output.



Principle of operation of a turbocharger.

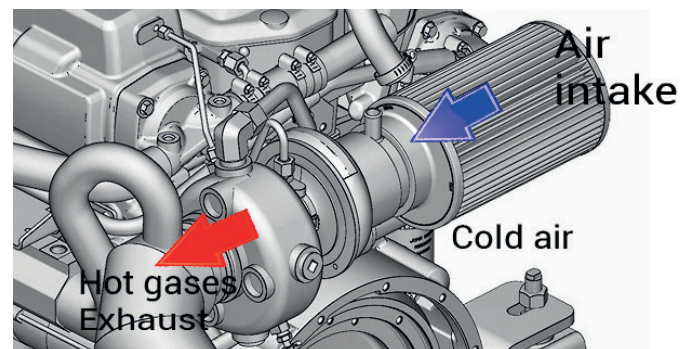
TURBO SERVICE

Engine turbochargers are designed to provide long years of trouble free service, which if required, can only be performed by a specialized workshop. In view to maintain turbochargers performances for as long as possible, some basic rules must be followed.

Changing or cleaning the air filters on a regular basis is a good way to keep debris from causing problems with the intake side of turbochargers.

A turbocharged engine will definitely need more oil changes than an ordinary atmospheric one, as the turbines axle requires excellent lubrication. For this reason, oil characteristics must be followed closely. Never use low grade bargain lubrication oil.

Turbochargers get very hot when engine is running and a protective metal shield or thermal sleeve is always affixed onto the exhaust side to prevent burns. Never remove these shields.



Above picture: Turbo & Air intake



IMPORTANT !

There is no serviceable part for the end user inside turbochargers. Any attempt to disassembling would lead to a total failure.

EXHAUST SYSTEM

Inspect the exhaust system at whole (hoses, clamps, mixing elbow, manifold, etc.) Check for cracks, leaks and rust. Tight or change them if necessary.

Check for carbon or soot deposits on exhaust components as it is a conclusive sign of an exhaust leak.

Should any defect appear on any item of the exhaust system, replace it as there is a risk of exhaust leakage or water penetration in the engine.

During any dismantling of the exhaust system, replace the exhaust seal gasket(s).

ENGINE MOUNTS CHECK

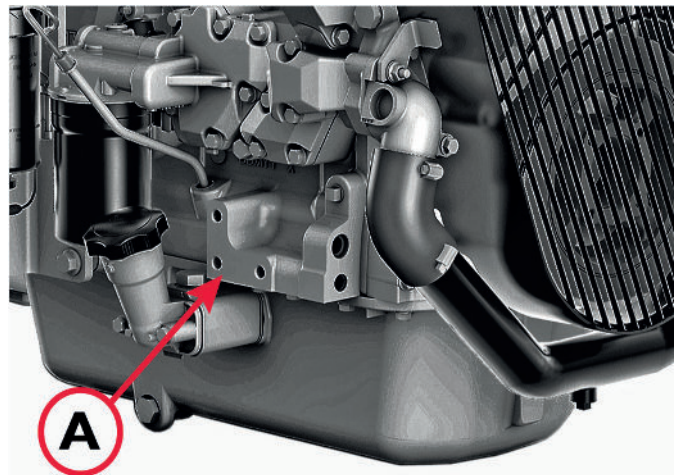
Engine mounting is the responsibility of the vessel or generator manufacturer. Follow manufacturer's guidelines for mounting specifications. Front engine mounts (A) only are available from Nanni Diesel.



IMPORTANT !

Use only SAE Grade 8 or higher grade of hardware for engine mounting.

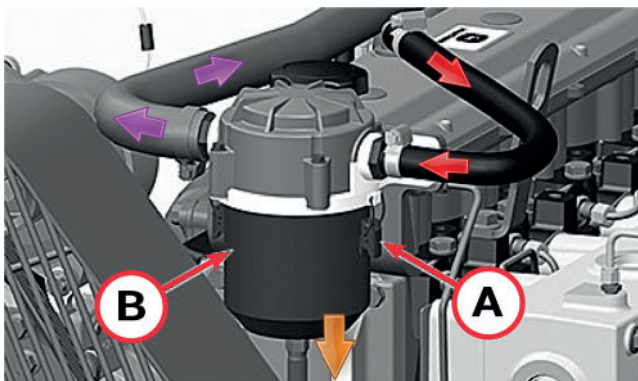
1. Check the engine mounting bolts on support frame and engine block for tightness. Tighten as necessary.
2. Inspect overall condition of vibration isolators, if equipped. Replace isolators, as necessary, if rubber has deteriorated or mounts have collapsed.



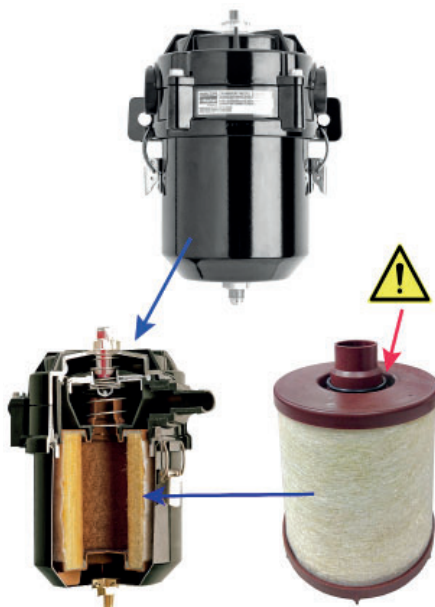
VENT CRANKCASE FILTER

Crankcase Ventilation is a system that was developed to remove harmful vapors from the engine and to prevent those vapors from being expelled into the atmosphere. This is a very efficient way to reduce pollution as well as engine oil consumption.

Crankcase vapors (red arrow) are sent into a specific device. From there, light fumes are directed to the air intake to be burned (violet arrow), while heavy oil vapors get into a filter trapping debris (B). Condensed oil returns back to the crankcase (yellow arrow) by gravity.



Crankcase assembly, cut away and filter views:



The filter is made of a non woven fabric to avoid introduction of flint in the engine.

REPLACING CRANKCASE VENT FILTER

The top of the crankcase filter is equipped with a sensor popping up when the filter is full and needs to be replaced. If the indicator has not surfaced, there is no need to open the unit for inspection.

1. Open clamps (A) and remove the crankcase vent housing (B).
2. While unit is opened, check that the inlet and outlet ports are not cocked up, as well as the relevant ducts.
3. Remove old filter and discard it (*).
4. Install new filter into crankcase housing and snap it into place. Make sure that the top O ring seal is in place and in good condition.
5. Install housing and lock up side clamps.
6. Inspect bottom oil drain line for kinks, blockage, or other damage.

(*) Do not throw the used filter in domestic garbage bin. Enquire with an authorized recycling center.



Above applies for engines equipped with this device.

AIR INTAKE



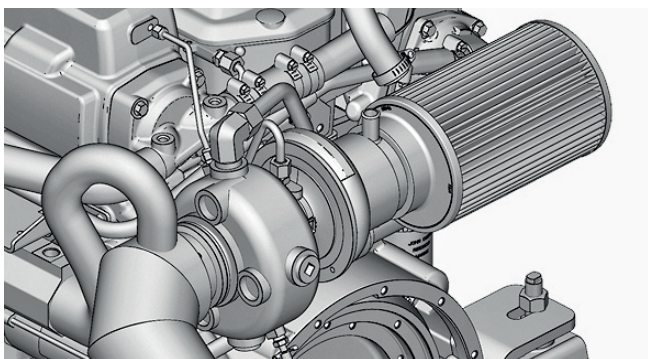
WARNING !

Carry out these operations when the engine is stopped and cold. Make sure that no dust or dirt enter the intake manifold.

The reliability and the performances of the engine depend among other things on the quantity and the temperature of the global air intake design.

CHECK THE AIR FILTER

1. Remove the holding clamps and remove the filters.
2. Replace or clean the elements.
3. If the air filters are crushed, flattened or punched, replace them.
4. Install the new filters with new clamps. Do not overtight, and do not damage the inlet mouth.



Long life NANNI air filter

CLEANING THE AIR FILTER

Specific tool:

For best results, order the NANNI filter cleaning kit:

Number	Description	Illustration
970317077	Kit air filter cleaner EN, ESP, SUOMI	
970317078	Kit Air filter cleaner FR, IT, DEU	

Long life NANNI air filters require periodic cleaning. Maintenance of these air filters is very simple. Please follow the 4 steps below:



Cleaning: Spray liberally the NANNI cleaner onto both sides of the filter and let it soak for 10 minutes to loosen dirt. Do not allow cleaner to dry up on the air filter.



Rinsing: Wash the filter with cold water at low pressure on the outside to flush dirt out of the filter. Continue rinsing until removing all traces of cleaner. You may need to repeat steps 1 and 2 several times.



Drying: After rinsing, shake off any excess of water and let it dry naturally. Do not oil the filter before it is completely dry.



Oiling: Spray oil (Aerosol) evenly on the crown of each pleat while maintaining the nozzle at approximately 8 cm from the filter. Allow oil to penetrate into fabric for around 20 minutes. Respray oil wherever some white spots are still visible on sides of the filter until there is a uniform blue color throughout.

FUEL SYSTEM



DANGER !

Stop the engine and let it cool down before refuelling or carrying out any operation on the fuel system.



CAUTION !

Fuel is flammable and can be dangerous. Fuel spilled on hot surfaces or near sparks can ignite. Do not step onto the injection piping. Take care to always keep them in good condition.



WARNING !

Total cleanliness must be guaranteed when working on the fuel system. No impurities should enter the injection system. Make sure not to spill fuel on nearby hoses.



NOTE !

Any work on the fuel injection system must be carried out by a authorized Nanni technician. Check regularly the condition of the components of the fuel system (hoses, filter, clamps, etc). When a clamp is removed, replace it by a new one, always in stainless steel.



WARNING !

The fuel feed pump is an extremely precise unit. Water entry in the fuel system will cause major failure to the injection pump and to the whole fuel system.

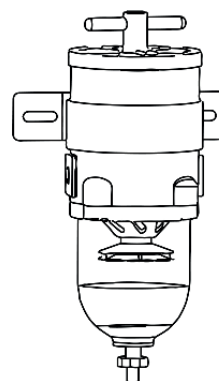
DRAIN WATER IN FUEL PREFILTER

The fuel prefilter is an optional extra not in the scope of supply of the engine. The model of prefilter may vary according to the boat.



NOTE !

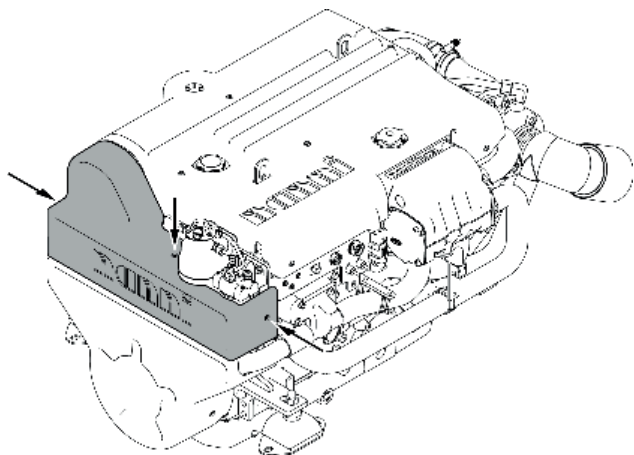
Drain the water out of the prefilter several hours after the engine has been stopped (when completely cold).



1. Close the fuel butterfly (control) valve on the fuel tank.
2. Place a suitable container under the fuel prefilter. Get floorcloths at hand to mop up any fuel which may spill. Drain water and remove impurities in opening the bottom plug.
3. Tighten the plug once the water has been drained.
4. Check the fuel filter element, change it if necessary.
5. Open the fuel butterfly (control) valve.
6. Bleed the fuel system (see in the following paragraphs).
7. Start the engine and check for leaks.

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REMOVING FUEL FILTER COVER



Removing the top part of the front cover is required in view to provide service onto the fuel filters.

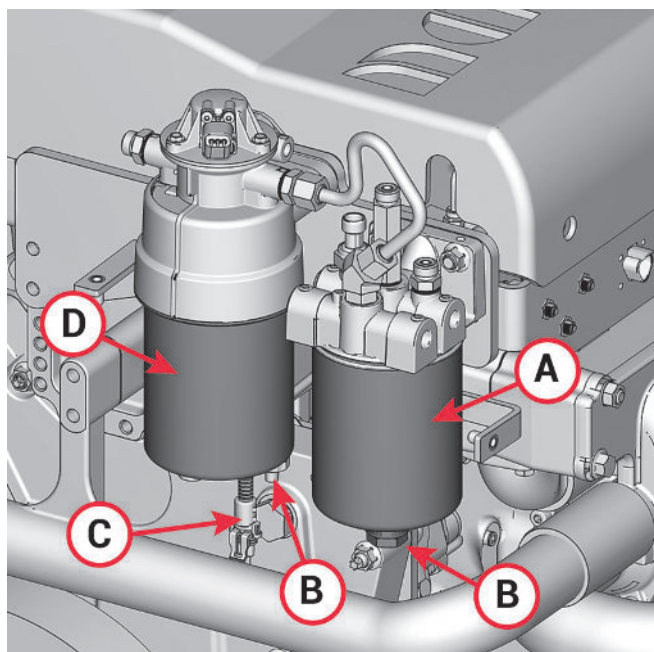
Remove the 3 holding screws (2 on the sides and 1 on the top). Store the cover on a spot where no one could step over it.

REPLACING THE FUEL FILTER



NOTE !

Primary fuel filter and secondary fuel filter must both be replaced whenever audible alarm sounds and diagnostic trouble code indicates a plugged filter (fuel supply pressure moderately/extremely low).



1. Close fuel shut-off valve (if equipped).
2. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.
3. Disconnect water-in-fuel connector (C).
4. Open drain valve (B) and drain fuel from water separator into a suitable container.
5. Remove primary fuel filter (D) by hand or in using a suitable filter wrench.
6. Remove water separator bowl, if equipped, from primary fuel filter by hand or in using a suitable strap wrench.
7. Clean separator bowl and dry it.
8. Lubricate new water separator bowl seal with thin film of clean fuel, and hand tighten to primary fuel filter.



IMPORTANT !

Locators on fuel filter canisters must be indexed properly with slots in mounting base for correct installation.

9. Lubricate new primary fuel filter seal with thin film of clean fuel.
10. Screw primary fuel filter into header until the seal contacts the fuel filter header.
11. When seal contacts the fuel filter header, tighten until a "click" is heard.
12. Connect water-in-fuel sensor connector (C).
13. Remove secondary fuel filter (A) using a suitable filter wrench.
14. Lubricate new secondary fuel filter seal with a thin film of clean fuel, and screw filter into fuel filter header until the seal contacts the fuel filter header.
15. When the seal contacts the header, tighten until a "click" is heard.
16. Open fuel supply shutoff valve (if equipped).
17. Turn ignition key to the ON position for 120 seconds to allow the fuel system to prime itself.
18. Start engine and allow to run for a minimum of 5 minutes.

Legend:

- A : Secondary fuel filter
- B : Drain
- C : Water in fuel connector
- D : Primary fuel filter

DRAINING WATER FROM FUEL FILTERS

If instrument panel provides a water in fuel warning, drain water or debris from filter using the following steps:

1. Loosen thumb screw (**B**) and drain water and debris into a suitable container. Tighten thumb screw.
2. Dispose of water and debris in an environmentally safe manner.

LUBRICATION SYSTEM



CAUTION !

Never over-fill the engine oil crankcase.



NOTE !

With a new or reconditioned engine, oil and oil filters must be replaced earliest after 100 hours of operation. Use oil grades as indicated in the section TECHNICAL DATA.

Warranty claims may be rejected if unsuitable oil grade has been used.

The viscosity may be adapted depending the climatic conditions.

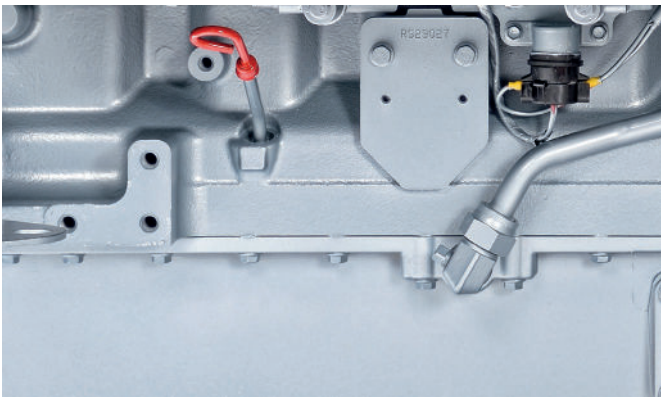
S08 MAINTENANCE

OIL LEVEL - ADDING ENGINE OIL

Check the engine and transmission oil level before starting the engine. The oil level should be within the range indicated on the dipstick, between the Mini and Maxi level.

How to check the oil level:

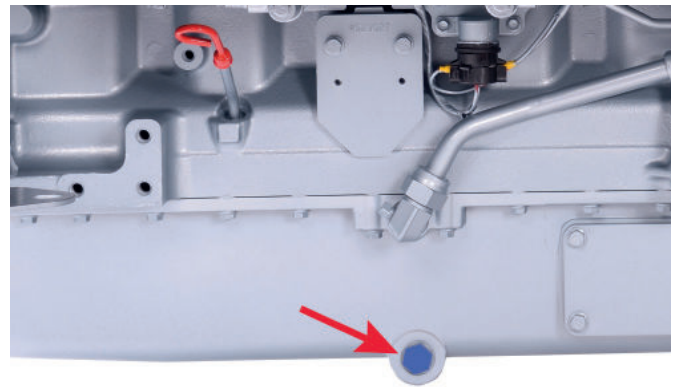
1. Pull off and wipe the dipstick (in red in the picture below).
2. Re-insert and remove the dipstick.
3. Check that the oil level is between the Mini and Maxi marks.
4. If the level is too low, remove the oil filler cap and add some oil slowly at a time. Wait a few minutes before checking the oil level to allow the oil to get down to the oil pan.



DRAINING THE ENGINE OIL

Standard draining:

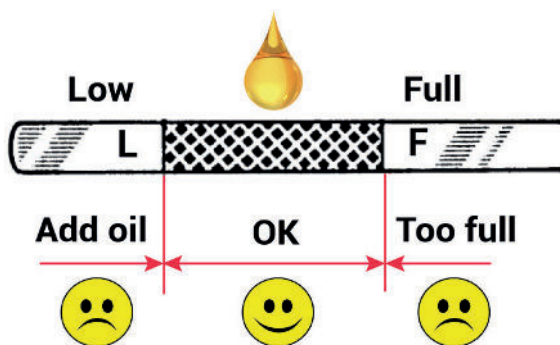
1. Start the engine and let it warm few minutes to render oil more fluid to ease suction.
2. Stop the engine and remove the key from the panel.
3. Open the oil filler cap to ease up draining.
4. Remove the drain plug oil.
5. Drain all used oil out from the pan.
6. Reinstall the drain plug oil with a new seal.



Oil drain plug

Draining with external oil pump:

Oil draining may also be performed through an external pump connected to the oil check dipstick duct.

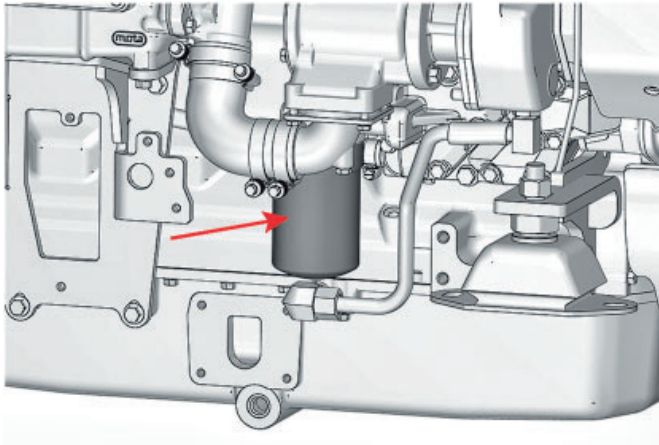


NOTE !

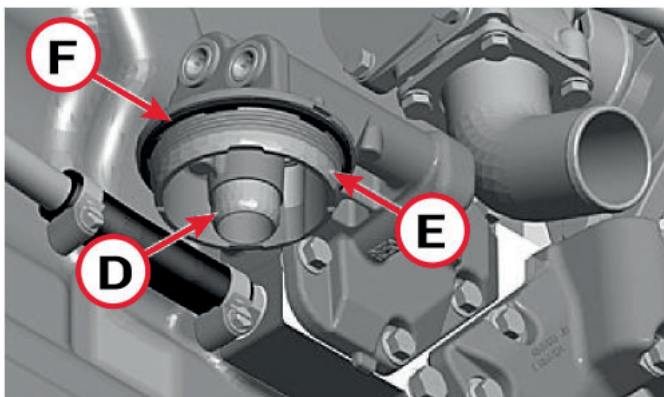
To top up oil level, use the same oil which is in the engine.
Do not mix different types of oil.

CHANGING THE OIL FILTER

Replace the oil filter every time the engine oil is drained.



1. Remove the oil filter with a filter wrench tool. Turn the filter counter-clockwise (CCW). Remove the gasket.
2. Apply clean engine oil to the new filter at the inner (B) and outer (C) seals and to filter threads.
3. Wipe both sealing surfaces of the header (D, E) with a clean cloth. Ensure that the notches in dust seal (F) are properly installed in the slots of the housing. Replace
4. Install and tighten oil filter by hand until firmly against dust seal (F). DO NOT apply an extra 3/4 to 1-1/4 turn after gasket contact as done with standard filters. Tighten drain plug to specifications :
5. Start the engine and let it operate few minutes at idle. Check if the oil pressure warning lamp turns off.
6. Stop the engine, wait for the engine to cool down and check the oil level. Top up if necessary.



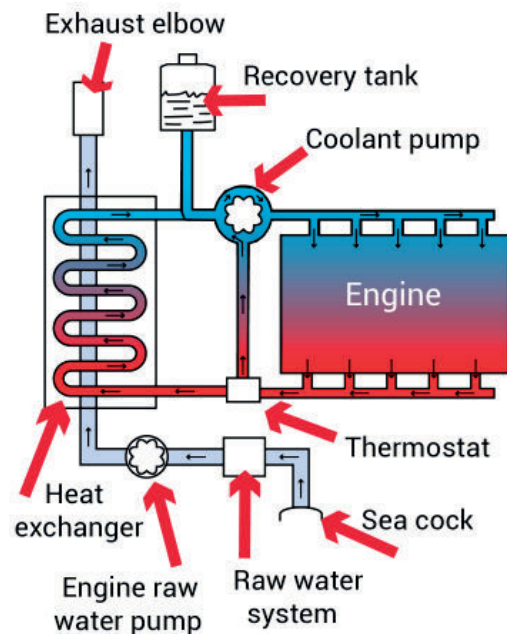
COOLING SYSTEM

OVERVIEW

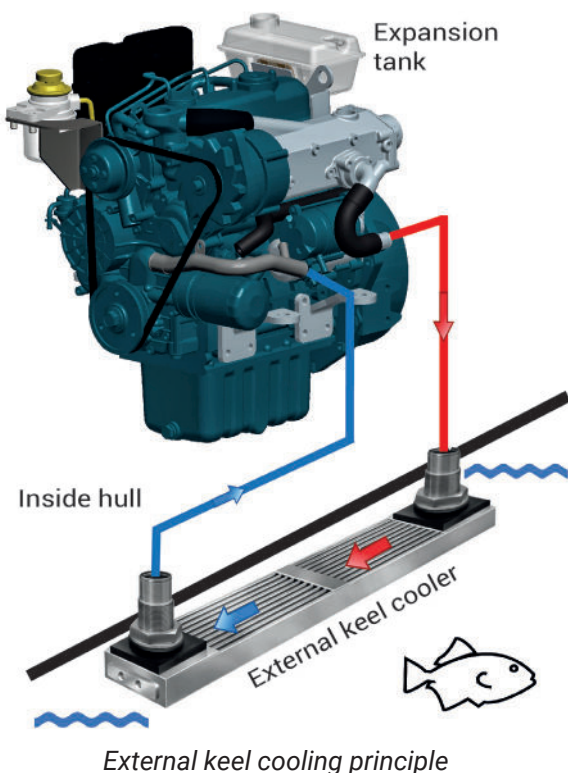
The cooling system cools the engine in order to maintain a proper operating temperature and to prevent overheating. On some engines, the cooling system also cools the fuel, the oil or the air intake. The cooling system is built around two circuits:

- The COOLANT CIRCUIT which is the engine internal cooling system. It is a closed-circuit in which coolant flows and cools the engine.
- The RAW WATER CIRCUIT which cools the coolant via an heat exchange with raw water. Nanni engines are delivered as standard with an heat exchanger, in which the coolant is cooled by heat exchange with raw water taken from a sea cock. A Keel Cooling system can also be used to cool the coolant instead.

A thermostat maintains the coolant at a proper and constant operating temperature. With thermostat control, the coolant only enter the heat exchanger when the engine reach the appropriate temperature of the engine.



Above picture: Principle of operation of water cooling with heat exchanger on an engine.



CAUTION !

Engines designed with an heat exchanger are not suitable for a Keel Cooling system. Operating the engine without coolant or raw water supply, even for few seconds, will lead to a complete engine breakdown.

Instead of proper mix coolant, raw clean water can only be used in case of emergency and for the shortest time possible. As soon as back to shore, get in touch with the nearest Nanni representative or seasoned marine shipyard or workshop. Please refer to the Fluids section for complete information.

- Always use coolant made of 50% antifreeze with anticorrosion additive and 50% of clean water. The antifreeze protects the engine against internal corrosion.
- This mix must be used all year around, even if there is no risk of frost.
- Never use water alone to completely fill the coolant system. Please refer to the Fluids section for complete information.

COOLANT

Water & anti-freeze:

Please refer to the Fluids section for complete information.

Water boiler:

A water boiler can be connected to the engine coolant circuit. If the boiler is located above the engine, an additional recovery tank must be installed above the boiler.

Ducts to the boiler must be in accordance with high temperature and high pressure. Do not use flexible hoses supplied from a general hardware store.

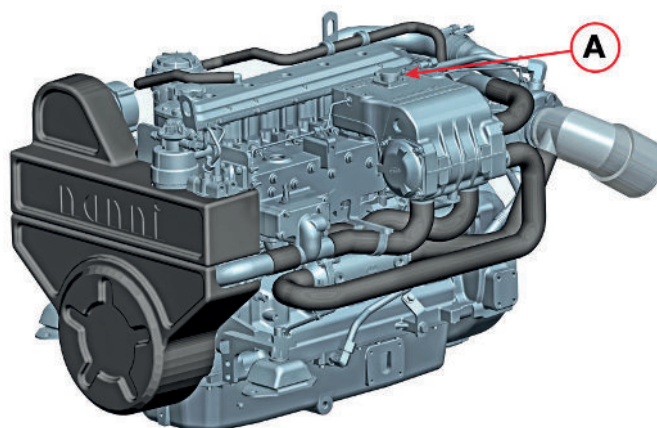
A specific boiler kit is available from Nanni Industries. Please contact your nearest Nanni representative for more information.

The amount of coolant must be adapted depending the model of water boiler to completely fill the coolant system.

Coolant expansion:

When the engine is running, the internal temperature is high ; as a result, the coolant liquid expands its volume. The heat exchanger is designed to accommodate this normal and physical expansion.

Make sure not to overfill the heat exchanger when filling with coolant.



S08 MAINTENANCE

COOLANT LEVEL

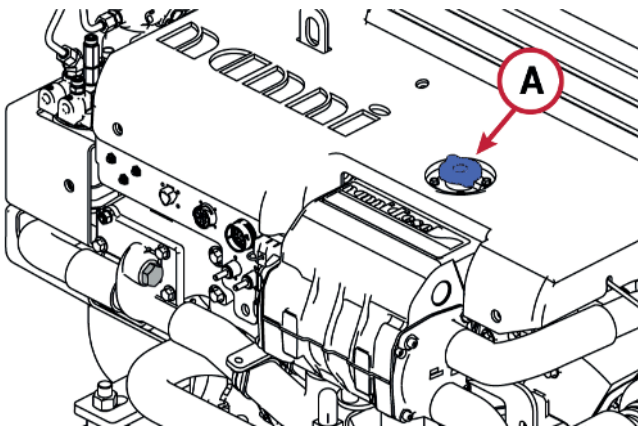


DANGER !

Never open the coolant filling cap or any plug of the cooling system when the engine is operating or still warm. Steam or hot fluid can spray out. Prevent potential injuries !

Check the coolant level before starting the engine.

1. Stop the engine and remove the key from the panel.
2. Unscrew the filler cap (A) on the exchanger tank on picture below.
3. You may top-up with clean water only, if amount to fill is very remote. Use glycol mix if tank is almost empty.
4. Stop filling when level is at bottom lip of the cap filler.

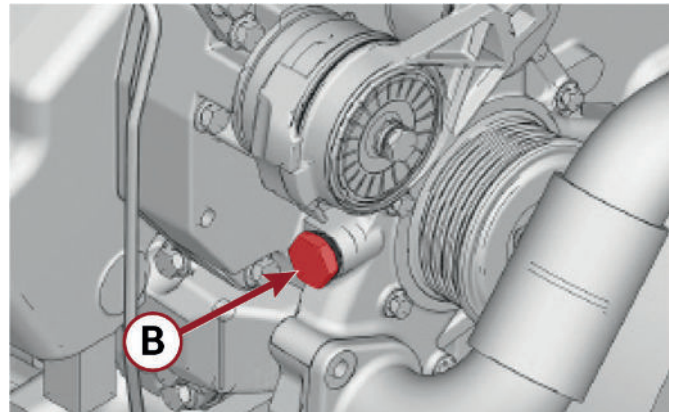


NOTE !

This Max level in the tank is representing the effective level of coolant only when the engine is cold.

DRAINING THE COOLANT CIRCUIT

1. Stop the engine and remove the key from the panel.
2. Put a container under the drain plug (B) of the engine to collect coolant. Unscrew the plug and remove the filler cap (A) on top.



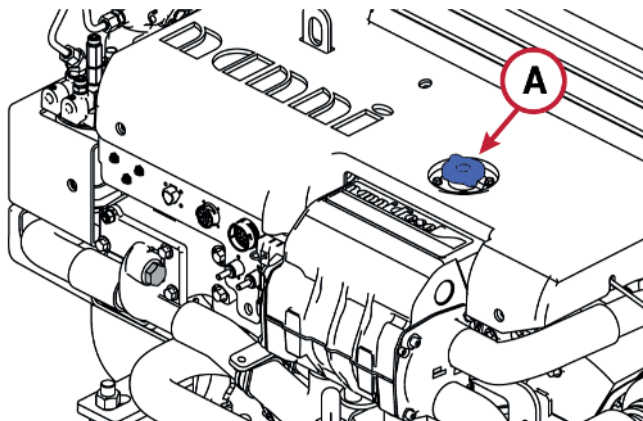
3. Drain off all coolant. Empty the recovery container as well as the hoses.
4. Insert a hose into the heat exchanger filler port. Rinse with fresh water until water which flows from the drain port is clean.
5. Reinstall the drain plug, secure it and fill with new coolant as explained on next paragraph.

COOLANT - FILLING

Mix the anti-freeze with water in a clean container before filling the heat exchanger. The coolant must be totally free from dust. Fill the exchanger slowly not to introduce air into the coolant system.

Refer to the chapter **TECHNICAL DATA** to know the coolant capacity of the heat exchanger. For Keel Cooling system or when using a water boiler, the coolant capacity must be adapted according to the pipes length and the tank capacity.

How To fill the coolant system:



1. Check that the drain plug (B) on the side of the engine is properly tightened.
2. Add coolant through the heat exchanger filler port on top (A). Stop filling when coolant is reaching the bottom of the filler cap lip.
3. Close and secure cap.
4. Start the engine and let it operate few minutes at idle. Stop the engine, wait few minutes and check the coolant level in the heat exchanger and in the expansion tank. Top up if necessary.



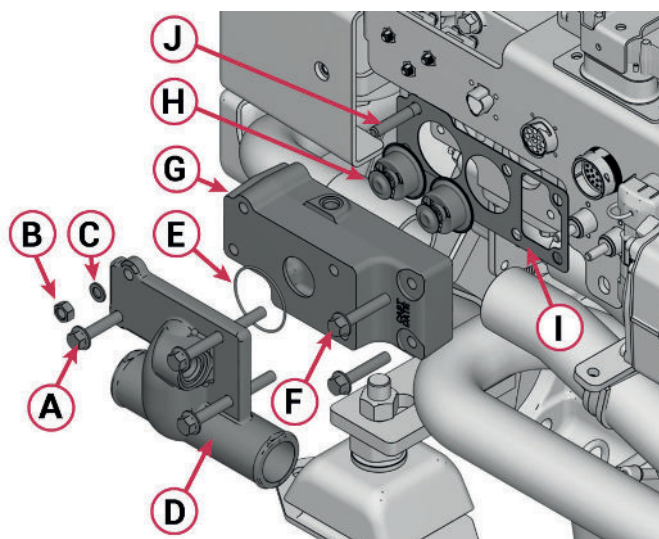
CAUTION !

If a boiler is connected to the engine, follow the filling procedure given by the manufacturer of the boiler. If the boiler is above the engine in the boat, first fill the heat exchanger, the boiler, and top up with coolant the recovery tank located above the boiler.

Make sure not to overfill the heat exchanger when filling with coolant. If too much coolant has been added, drain part of the coolant.

REMOVING AND INSTALLING THERMOSTATS

1. Visually inspect area around thermostat housing and cover for leaks.
2. Remove coolant tank pressure cap and partially drain coolant system.
3. Remove cap screws (A), nut (B) and washer (C) attaching coolant cover (D) with sealing O-ring (E) to the thermostat housing (G) and exhaust manifold.
4. Remove cap screws (F) attaching thermostat housing to the exhaust manifold.
5. Remove thermostat housing with gasket (I). Remove and discard all gasket material. Clean all sealing surfaces.
6. Inspect and test thermostats for proper opening temperature.
7. Install thermostats with a new gasket and pilot housing on stud (J). Install thermostat housing cap screws finger tight.
8. Inspect thermostat cover sealing O-ring and replace if necessary. Install thermostat cover with O-ring, cap screws, washer, and nut. Tighten nut and all cap screws to the following specifications : 35 Nm (25 lb.-ft.).



TESTING THERMOSTATS

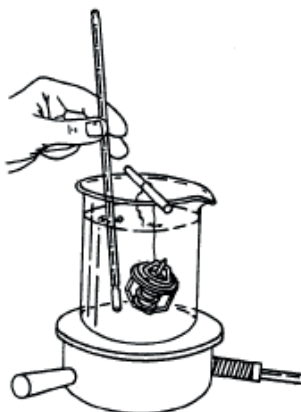
1. Remove thermostats.
2. Visually inspect thermostats for corrosion or damage. Replace thermostats as a matched set as necessary.
3. Inspect thermostat with wiggle wire in vent notch. If wire movement is restricted, replace thermostat if cleaning does not free movement.



CAUTION !

DO NOT allow thermostat or thermometer to rest against the side or bottom of container when heating water. Either may rupture if overheated.

4. Suspend thermostats and a thermometer in a container of water.
5. Stir the water as it heats. Observe opening action of thermostat and compare temperatures with specifications.
6. Remove thermostat and observe its closing action as it cools. In ambient air the thermostat should close completely. Closing action should be smooth and slow.
7. If any one thermostat is defective, replace both thermostats.

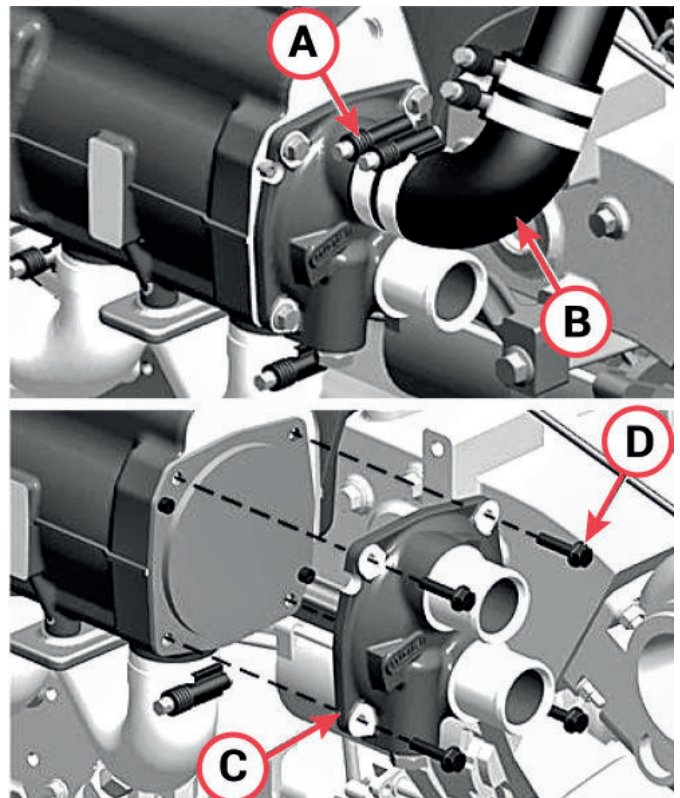


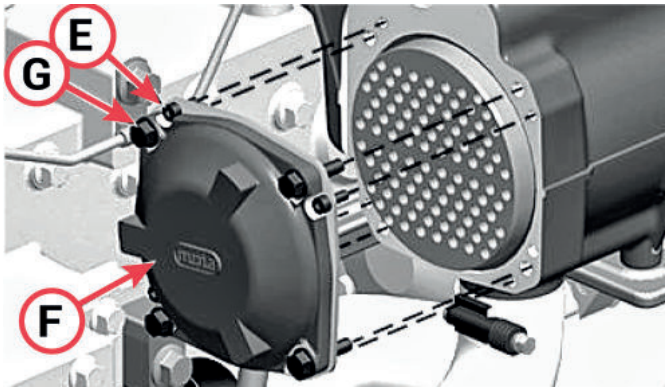
Thermostat and thermometer in water

HEAT EXCHANGER SERVICE

Heat exchanger inspection:

1. Close sea cocks and drain the sea water system.
2. Open drain valve on cylinder block and drain engine coolant into a clean container. Close drain valve.
3. Loosen hose clamps (A) and disconnect sea water tube (B).
4. Remove cap screws (D) and remove rear end cap (C). Identify end cap so it can be installed in the same position as removed.
5. Remove socket head cap screws (E).
6. Remove cap screws (G) and remove front end cap (F). Identify end cap so it can be installed in the same position as removed.
7. Thoroughly inspect condition of end cap sealing O-rings. Sealing O-rings may be reused if not excessively worn or damaged during disassembly. Replace sealing rings as necessary.





INTERCOOLER SERVICE

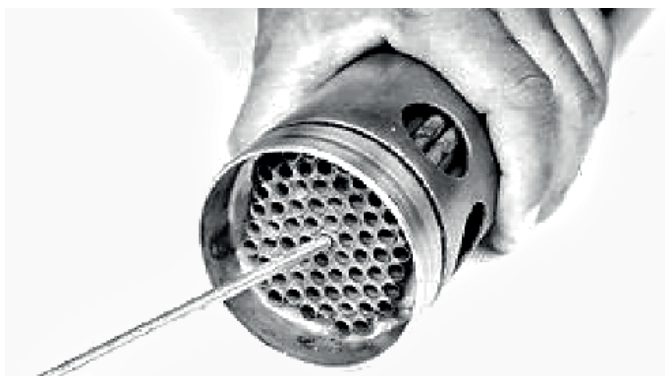


IMPORTANT !

The following is given as information only. Maintenance on intercooler must be performed by trained and seasoned technicians only. Please refer to your nearest Nanni representative for service on this device.

8. Remove socket head cap screws (I).
9. Remove heat exchanger core (H) through rear side of housing.
10. Remove remaining end cap from water manifold/heat exchanger housing. Remove end cap from heat exchanger core.
11. Thoroughly clean all build-up from both end caps and inspect zinc plug in each. Replace plugs as needed.
12. Use a brass rod to clean out any build-up in each heat exchanger tube. Run the rod the entire length of each tube to push debris out. Flush the heat exchanger tubes with clean water, making sure all tubes are cleared of debris.

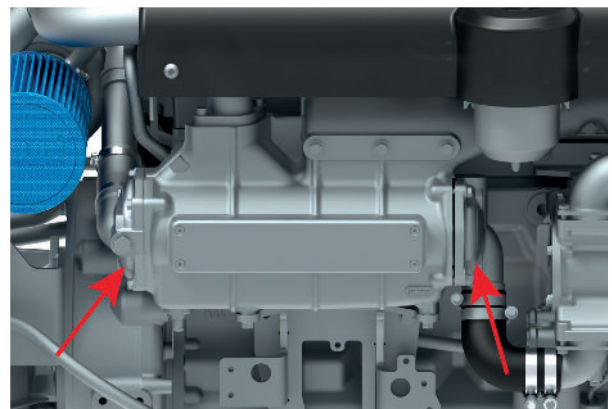
If you suspect that your heat exchanger core is defective, have your authorized Nanni representative to handle this task. Replace the heat exchanger core as required. Remove and thoroughly clean with water the manifold/heat exchanger housing if needed.



Inspect end cap O-rings which may be reused if not worn nor flattened. Lubricate front and rear end cap O-rings with clean multi-purpose grease. Tighten cap screws (D) to 24 Nm (18 lb-ft).

Intercooler inspection:

1. Close sea cocks and drain the sea water or coolant system.
2. Remove cap screws and rear end cap.
3. It must be anticipated to remove the air filter prior proceeding to core removal.
4. Remove intercooler core tube stack.
5. On opposite side of exchanger, remove ducts, cap screws and end cap for internal inspection.



S08 MAINTENANCE

6. Clean the intercooler core with a brass rod.



7. Install O-rings (replace if damaged), in front and rear caps. Lubricate O-rings with clean-multipurpose grease.
8. Install intercooler core in same position as removed.
9. Install front and rear caps in same position as removed. Tighten cap screws to 29 Nm (230lb.-in.).
10. Install ducts and lines. Evenly tight clamp screws to 29 Nm (230lb.-in.).
11. Open sea cocks.

RAW WATER SYSTEM



DANGER !

When the boat is on the water, it is possible than water can flow into the boat via components located below the waterline. Close the raw water cock (if fitted) or prevent water discharge before working on the raw water system.

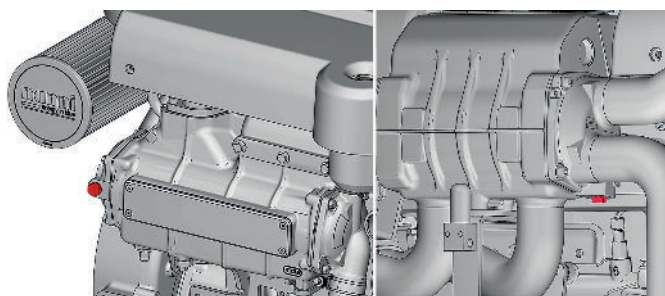


NOTE !

If there's any risk of frost, raw water system should be drained.

CHECKING SACRIFICIAL ANODES

Two protective zinc plugs installed on the sea water cooling system **MUST BE** removed from end cap and inspected at regular intervals.



Good



To be replaced



Zinc plugs new part dimensions are 31.8 mm (1.25 in) long and 9.5 mm (0.38 in) diameter.

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SIPHON BREAKER



DANGER !

Close the sea cock before any operation on the siphon breaker.



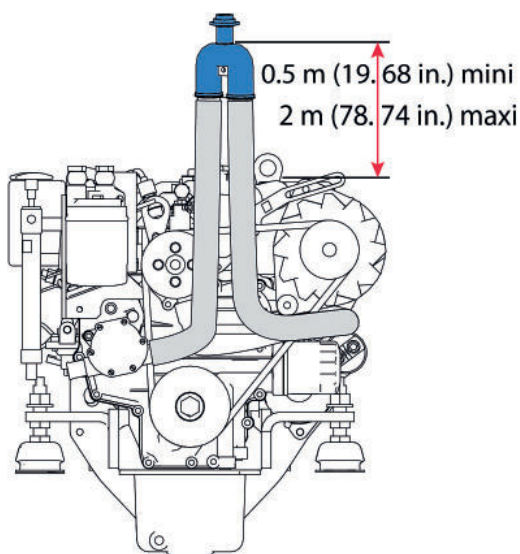
NOTE !

Siphon-breaker itself is not part of maintenance schedule, but check regularly that the ducts are in good condition during the walk around. Please keep in mind that a siphon-breaker is compulsory if top of exhaust elbow is below the waterline.



CAUTION !

A faulty operation of the siphon breaker will lead to water entry in the engine. Inspect it regularly and clean it following the instructions given by the manufacturer.



On above picture: siphon breaker in blue.

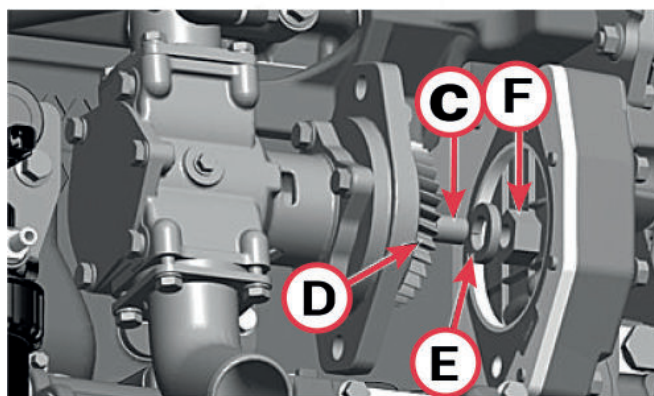
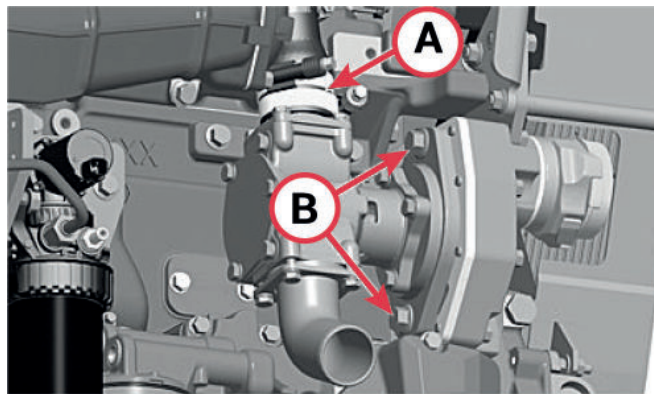
EXTRACT THE RAW WATER PUMP IMPELLER



CAUTION !

If the engine has been run without supply of raw water, check the raw water pump impeller. Change it if needed. The service life of the raw water pump impeller vary depending the operating conditions.

The raw water pump is an essential component of the engine. A worn impeller could crack and damage the cooling system. Always have a spare raw water pump impeller on board.



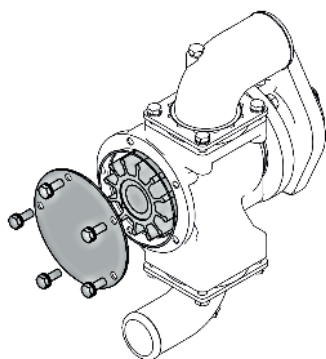
TO REMOVE THE SEA WATER PUMP:

1. Close sea cock and drain sea water system.
2. Remove sea water outlet connection (A), remove sea water pump cap screws (B) and remove pump.
3. Clean all gasket material from both mating surfaces.
4. Inspect gear teeth for damage. Install new gear (D) by aligning key (C) to the pump shaft keyway.

5. Install pump overhaul kit.
6. Install lock washer (E) and hex nut (F) finger tight and insure key is properly in place.
7. Tighten hex nut to specifications : 68 Nm (50 lb.-ft.).
8. Install sea water pump with new gasket to front plate and tighten cap screws to specifications : 140 Nm (103 lb.-ft.).

To replace the sea water pump impeller:

1. Remove cap screws and cover plate from the raw sea water pump.
2. Remove impeller from pump housing.
3. Remove O-ring.
4. Inspect impeller for damages such as tears, stress cracks, excess abrasions on vane ends, or chunks of material missing. Impellers that are run dry will overheat and fail the impeller blades at the root. Impellers that swell and stick, fail the impeller in the middle of the blade. If impeller replacement is necessary, order an impeller repair kit.
5. Lubricate new impeller blades with a non-petroleum based lubricant such as silicone or soapy water. Install impeller using a twisting motion and be sure that the impeller blades are bent in the same direction as they were upon removal to prevent damage at start-up. Rotate impeller on shaft to align key ways and spines and slide the impeller onto the shaft.
6. Using a new O-ring, install cover plate and cap screws with washers and tighten to specifications : 35 Nm (26 lb.-ft.).
7. Open sea cock, start engine and check pump operation.



CLEANING THE RAW WATER FILTER

The model of prefilter can vary according the boat as the raw water filter is an optional extra not in the scope of supply of the engine. These instructions are given as an example only.



CAUTION !

Check the raw water filter more regularly than indicated in the service schedule if the boat is used in water with lot of dirt and/or mud.

To clean the filter:

1. Stop the engine, remove the key from the panel and close the sea cock.
2. Check the condition of the raw water filter. If deposits have formed, unscrew the cover and remove the seal plate.
3. Remove all the contaminants. Rinse the filter and the housing with fresh water and check the condition of the seal.
4. Reinstall all the components and open the sea cock. Start the engine and check for leaks.
5. Notice: When the boat is out of water, check that the through-hull is not clogged by mud or algae.



RAW WATER SYSTEM - DRAINING



WARNING !

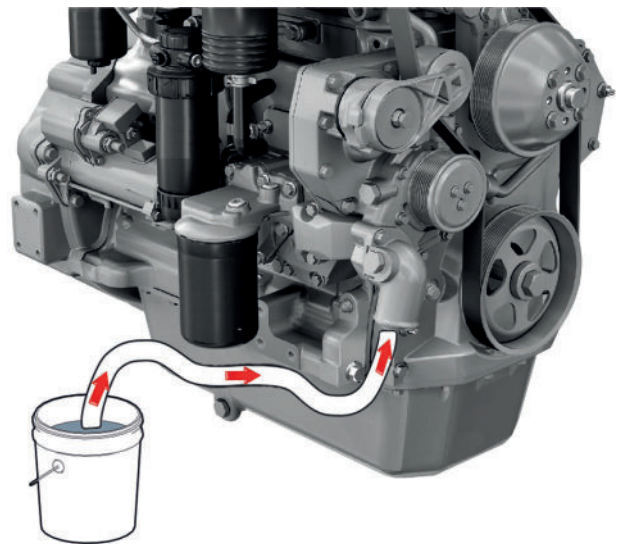
It is highly recommended to carry out these operations when the boat is laid up on bare ground. If the boat cannot be removed from the water, close the sea cock and prevent water entry by any means.

1. Stop the engine, remove the key from the panel and close the sea cock.
2. Remove the cover of the raw water pump.
3. Remove the cover and the seal from the raw water filter.
4. If a siphon breaker is fitted, drain it in following the manufacturer recommendations.
5. Drain the cooling system of the transmission lubrication circuit (if fitted).
6. Drain the waterlock and any other equipment connected to the raw water and exhaust system.
7. Reinstall correctly all components. Open the sea cock and check for leaks. Prime the raw water system by adding water through the raw water filter if necessary.

RAW WATER SYSTEM - CLEANING

The raw water system must be cleaned to remove the building up of deposits and salt crystals as soon as detected or suspected.

1. Stop the engine and close the sea cock valve.
2. Disconnect the hose on the outlet side of the raw water filter.
3. Place the freed hose end in a container filled with fresh water. Ensure that the tank is large enough as the raw water pump must never run without water. Keep enough water on hand to add up constantly.



4. Check that no one is in the vicinity of the engine, the propeller and the exhaust outlet. Put the lever in neutral and start the engine.
5. Let the engine to run for a few minutes at idle. Add up fresh water in the container before container is being emptied.
6. Stop the engine.
7. At this stage, the raw circuit is alleged to be cleaned up. If deposits and salt crystals are still present, consult your Nanni representative. Do not add up cleaners additives like caustic soda, as aluminium parts are prone to fast corrosion if harshly cleaned.
8. Clearly identify all closed valves with labels: on wheelhouse dashboard, on valves.

S08 MAINTENANCE

RISK OF ICING - PROTECTION AGAINST FROST

1. Start process after point 8 of previous paragraph is done. Empty the remaining fresh water left in the container.
2. Fill the container with engine coolant mix (50% clean water, 50% anti-freeze).
3. Start the engine and let it run at idle. Add enough coolant to fill the raw water system with coolant.
4. Stop the engine before the container is empty.
5. Reconnect the hose.
6. Clearly identify all closed valves with labels: on wheelhouse dashboard, on valves.
7. Drain the coolant mix and refill the raw water circuit when safe weather conditions are resuming.



WARNING !

Check for leaks before the next engine start.



CAUTION !

When preparing the engine for long term storage, if the engine is likely to be subject to frost, drain and flush away all water remaining in the raw filter circuit.

ELECTRICAL SYSTEM



DANGER !

Stop the engine and switch off the main breaker before working on the electrical system. Isolate shore current to any accessories supplying the engine.



CAUTION !

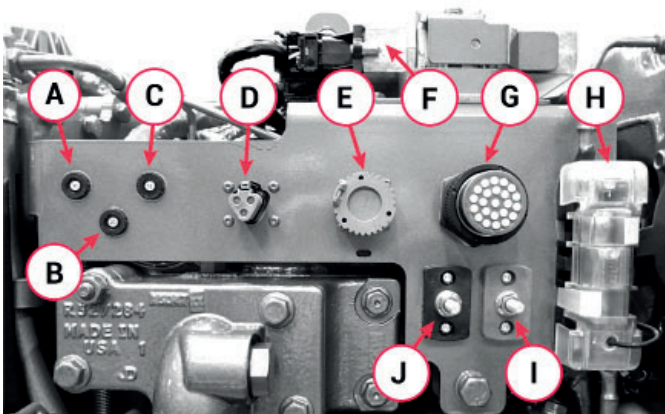
The main breaker switch must remain ON when the engine is operating. Never disconnect the cable between the alternator and the battery when the engine is running.

WIRES AND CONNECTORS

Check that electrical wires and connectors are dry and in good condition. Replace any defective part. Do not scrape green deposits on lugs in using grit : nickel plating would be removed and bare copper would corrode even faster. Tighten time to time all terminals secured by screws. Do not forget breakers in the electrical cabinet.

S08 MAINTENANCE

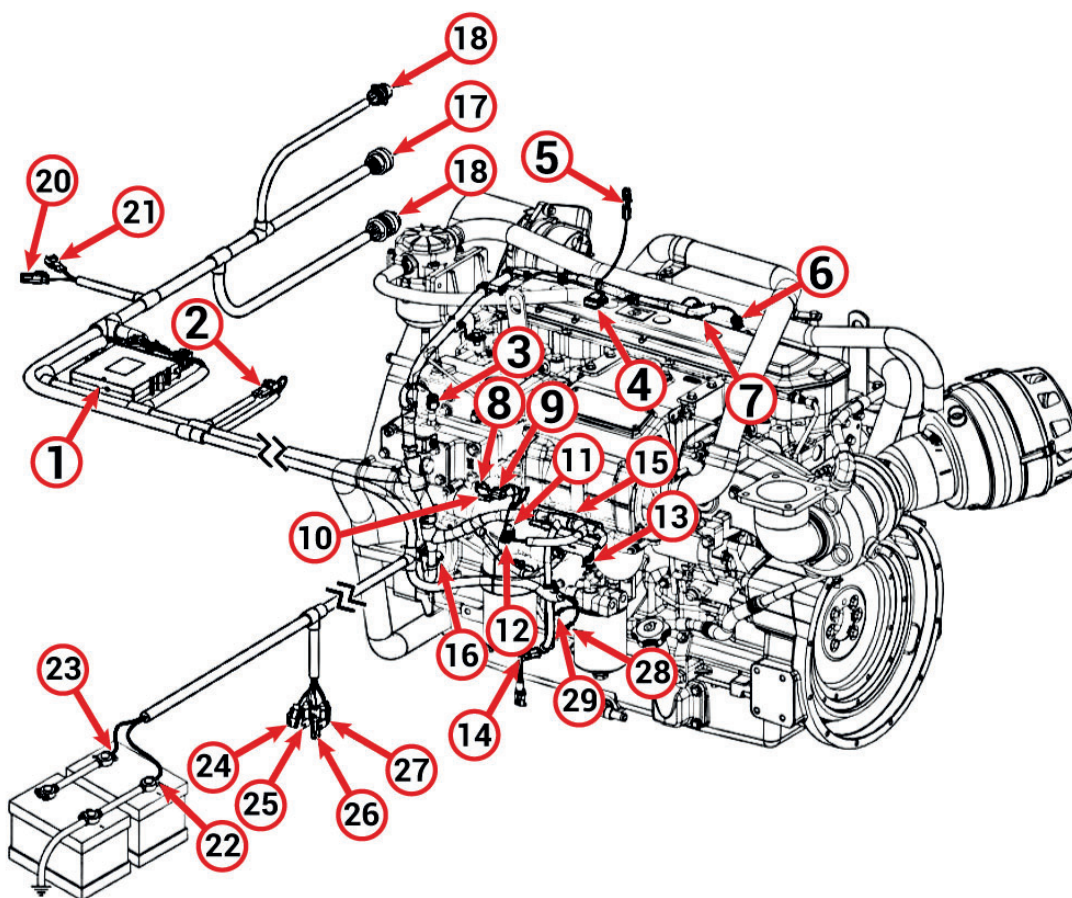
ENGINE ELECTRIC PANEL



Legend :

- A. 30 Amps Accessories
- B. 20 Amps E.C.U
- C. 15 Amps Fuel transfer pump
- D. CAN termination 120 Ω
- E. Diagnostic connector
- F. E.C.U
- G. Auxiliary connector
- H. 150 Amps Alternator fuse
- I. To battery positive (direct supply to E.C.U)
- J. To battery negative (direct supply to E.C.U)

ELECTRICAL HARNESS



LEGEND:

- | | |
|---|---|
| 1. E.C.U. | 16. Crankshaft position sensor connector. |
| 2. Auxilliary power connector. | 17. Control panel connector. |
| 3. Coolant temperature sensor connector. | 18. Auxilliary connector. |
| 4. Fuel injection harness connector. | 19. Diagnostic connector. |
| 5. Alternator connector. | 20. CAN termination connector. |
| 6. Manifold air pressure connector. | 21. Remote ON/OFF connector. |
| 7. Manifold air temperature sensor connector. | 22. Unterminated ground battery. |
| 8. Suction control valve sensor connector. | 23. Unterminated power battery. |
| 9. Fuel temperature sensor connector. | 24. Low pressure fuel pump fuse (15A). |
| 10. Camshaft position sensor connector. | 25. E.C.U fuse (20A). |
| 11. Low pressure fuel pump compressor. | 26. Transient voltage protection connector. |
| 12. Oil pressure sensor detector. | 27. System fuse (30A). |
| 13. Fuel pressure sensor connector. | 28. Starter relay coil connector (power). |
| 14. Water in fuel sensor connector. | 29. Starter relay coil connector (GND). |
| 15. Fuel rail pressure sensor connector. | |

BATTERY



DANGER !

Disconnect the battery cables before contemplating any kind of soldering work. Arc welding is a carrier of heavy transients currents and may affect (or destroy) many sensitive electronic components such as the E.C.U.



Read below recommendations before operating or servicing the battery.

To charge two independent batteries with a single alternator, an isolator is available as an option on most engines. Contact an authorized Nanni representative.

KEEP CLEAN THE BATTERY

The Battery(ies) should be kept clean and dry. Oxidization deposits on the battery and on terminals posts may lead to a wide variety of disturbances like: dead shorts, voltage drops, premature discharging, notably in wet or cold weather. In some occurrences, these disturbances may be hard to locate. Use a brass brush to clean battery terminals posts.

DISCONNECT THE STARTER CABLES

1. Disconnect the negative cable (-) first.
2. Then remove the positive (+) cable.

If the battery is replaced, make sure that the previous one was the correct model. Check against the table below:

Engine	CCA at 0°F (-18°C)
N6.CR2	Amps
12 V	925
24 V	625

CONNECT THE CABLES

1. Always connect first the positive lead (+) to the positive terminal (+) of the battery
2. And then the negative (-).

BATTERY ELECTROLYTE LEVEL



DANGER !

Never touch the battery electrolyte with bare fingers. The diluted sulphuric acid solution burns skin and will pierce clothing. Should this occur, immediately wash garments with spring water. Obtain medical advice and assistance without delay for burns.

S08 MAINTENANCE

ELECTROLYTE LEVEL CHECK

In general, detailed informations for service provided by battery manufacturers are very scarce. As a conservative rule, electrolyte level must always be above the top of the lead plates (+/-1 cm - slightly less than half of an inch). Electrolyte is a mix of sulphuric acid and water. If level is decreasing, acid concentration is not supposed to deplete with evaporation. Water alone must be added, but it is a good practice to check also the specific gravity with a hydrometer. Follow these indications :

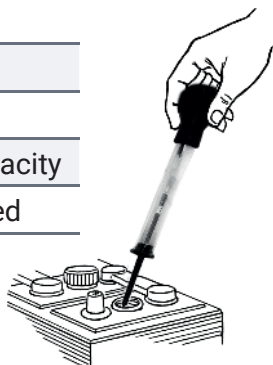
Unscrew completely the vent plugs and check level with a flashlight in each and every orifice.

Use a syringe filled with distilled water to top up the compartment where electrolyte level is too low.

Check gravity in each cell. A reading below 1.215 requires either charging the battery or to replace it.

If the lead plates are not sulphated and still in good condition, charging will improve specific gravity.

Specific Gravity	Charge
1.260	100%
1.230	75%
1.200	50%
1.170	25%
1.140	Very low capacity
1.110	Discharged



NOTE !

Never shake the battery during the process of adding electrolyte !

If the battery electrolyte level cannot be adjusted (maintenance free battery type), do not use or charge the battery if the fluid level is below the lower limit level.

If the battery has been left unattended for an extended period of time, it is likely that the battery has entered in a deep discharge process. In such a case, voltage read would be around 7 Volts or so.

ALTERNATOR BELT

The engine alternator is driven by a belt through pulleys. These components must be in good order at all times in view for the alternator to provide electricity, among others, to the engine, to the battery, to the engine control panel.



DANGER !

Stop the engine and remove the key before checking or servicing the alternator belt.



NOTE !

Always keep a spare replacement belt on-board.

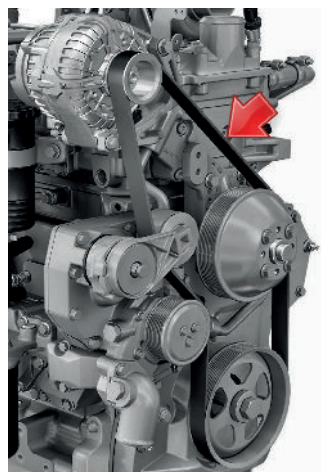


IMPORTANT !

A loosen or damaged belt can result in overheats or lack of alternator charge. A too tighten belt can damage the bearings of the water pump and of the alternator.

Visual check of the alternator belt:

If belt internal wires become visible and frayed, replace it. Check that belt fits properly in the pulleys. Belt is constantly put under tensioning device.



S08 MAINTENANCE

To replace the belt:

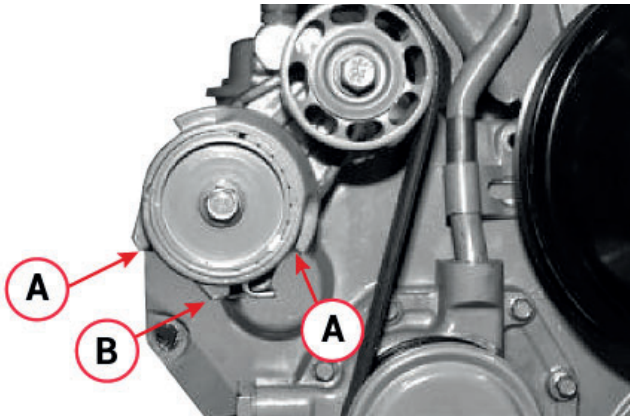
1. Stop the engine and remove the key from the panel.
2. Carefully remove beltguard cover from engine.
3. Release tension on belt on tension arm and remove poly-vee belt from pulleys.
4. Install the new belt. Check that the belt seats nicely between the flanges of all the pulleys.
5. Apply tension to belt with tensioner. Remove socket.

Check the belt tension:

Belt drive systems equipped with automatic (spring) belt tensioners cannot be adjusted or repaired. The automatic belt tensioner is designed to maintain proper belt tension over the life of the belt. If tensioner spring tension is not within specification, replace tensioner assembly.

The belt tensioner is designed to operate within the limit of arm movement provided by the cast stops (A and B) when correct belt length and geometry is used.

Visually inspect cast stops (A and B) on belt tensioner assembly. If the tensioner stop on swing arm (A) is hitting the fixed stop (B), check mounting brackets (alternator, belt tensioner, idler pulley, etc.) and the belt length. Replace belt as needed.



Checking the belt tension with a smartphone:

Nowadays, it is possible to check a belt tension in using an application on a smartphone. Several applications may be tested and used. In the majority of cases, results are very performing.

The principle consists of the comparison of the belt vibration against an algorithm stored in the application.

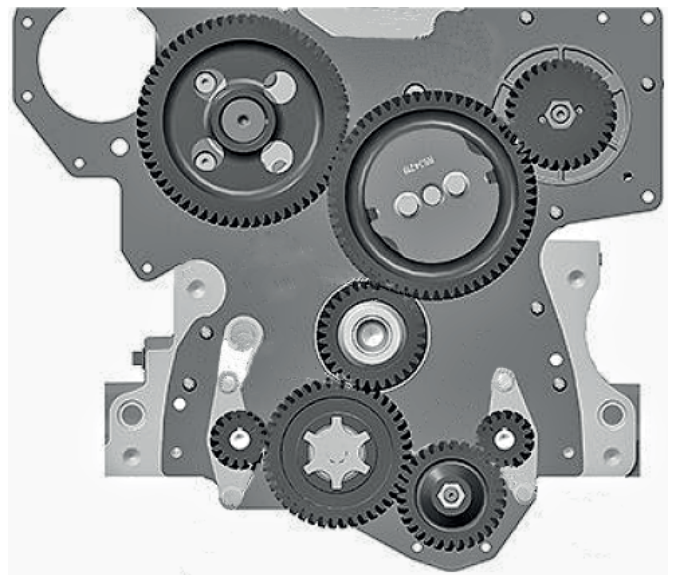
Among the applications freely available, one may consider one of these :

- Tension 2Go APP (Continental)
- PT Toolkit APP (Gates)
- Easy tension APP (Hutchinson)

MISCELLANEOUS

CAMSHAFT TIMING

From the two camshafts down to the crankshaft, engine timing is ordered through a gear system. The complete assembly is service free. Inspection is occurring only during a major service on the engine



[illegible]

LONG TERM STORAGE

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

See the Maintenance Section 08 - Raw water System - Risk of icing conditions / Protection against frost, to perform some of the Long Term Storage operations. We recommend that you have all these operations carried out by a Nanni authorized workshop.



NOTE !

It might be necessary to adapt these operations depending the climatic conditions. Contact a Nanni authorized workshop for further informations.

For a prolonged storage (over 12 months), a specific set of measures must be performed. All these operations should be carried out by a Nanni authorized workshop.



CAUTION !

If the engine is likely to be subject to frost, drain all water in the seawater circuit.

LONG TERM STORAGE PROCEDURE

Complete the nearest periodic maintenance inspections and operations before performing the long term storage procedure.

1. Drain and change the engine and transmission oil.
2. Change the engine oil filter.
3. Change the fuel filter and prefilter.
4. Run the engine to normal operating temperature.
5. Stop the engine and take the boat out of water.
6. Drain and clean all components of the seawater system. Protect the components against corrosion.
7. Remove the impeller from the seawater pump (if fitted). Store it in a cool and dry place. Indicate by any means that the impeller has been removed.
8. Check the engine coolant level and condition. Top up if necessary.
9. Drain any water and contaminants from the fuel tank.
10. Fill totally the fuel tank.
11. Remove the air filter. Secure all air intake with clean clothes.
12. Clean the engine. Repair any damaged areas of paintwork with Nanni original paint.



CAUTION !

Do not point a high pressure water jet toward seals, hoses, grommets, etc.

13. Clean the hull, the hold and the drive (if fitted).
14. Check all control cables. Use grease and rust inhibitor to protect the cables.
15. Disconnect battery leads. Adjust electrolyte level if necessary. Charge the battery. Store the battery in a dry place.
16. Release tension. on belts.
17. Spray the engine with water-repellent product.
18. Remove the propeller for storage. Check the overall condition of all components of the propulsion system.

RESTARTING THE ENGINE

1. Perform external cleaning of the engine and control its condition.
2. Drain and change the engine and transmission oil.
3. Change oil filters.
4. Drain the coolant from the seawater system.
5. Check the condition of the raw water pump impeller. Change it if needed. Install the impeller.
6. Remove cloth and tape from openings. Install the air filter.
7. Close/Tighten all plugs and drain cocks.
8. Check the condition of hoses and clamps.
9. Check the engine coolant level and its condition. Top up if necessary.
10. Connect fully charged batteries.
11. Check the anodes.
12. Install the propeller.
13. Check the operation of the control cables and their condition.
14. Check belts. Adjust the tension.
15. Bleed the fuel system.

Once the boat is in the water:

16. Open the sea cock and prime the seawater system (if fitted).
17. Start the engine. Check for leaks and correct operation.

BATTERY

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

Do not left the battery unattended for a long period of time: it will get into deep discharge (around 7-8 Volts). In such a situation, the battery will not recover.

S10 TROUBLESHOOTING



CAUTION !

If the engine does not function properly, use the following chart to identify the cause. If the cause of trouble can not be found, contact to Nanni authorized workshop.



NOTE !

Some components may not be part of the engine orderes. This list is not exhaustive and is only an assistance in case of emergencies.

	PROBABLE CAUSES
The engine fails to start	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13
The engine starts but suddenly stops	1, 2, 3, 4, 5
The engine is difficult to start	1, 2, 3, 4, 5, 6, 8, 9
The starter motor is not turning or turn slowly	8, 9
The starter motor turns but the engine does not start	1, 2, 3, 4, 5, 6, 7
The engine does not reach its rated speed at wide open throttle	2, 3, 4, 5, 6, 7, 12, 14, 15, 16, 17, 26, 28
The engine operate unevenly	1, 2, 3, 4, 5, 6, 7, 14, 15, 16, 17, 18, 19, 20, 24, 28
The engine vibrates a lot	16, 27
Black exhaust smoke	4, 5, 14, 15, 16, 19, 20, 28, 29
White exhaust smoke	4, 5, 23, 25
High fuel consumption	4, 7, 14, 15, 16, 19, 20, 22, 28
The engine overheats / coolant temperature too high	14, 15, 16, 18, 19, 20, 21, 22, 28
The control lever is hard to operate	12, 14, 15, 16, 17, 26
No shift between ahead and astern	9, 11, 12, 16, 17, 26
Battery charge warning lamp comes on	8, 9, 11, 18

The numbers refer to the possible causes indicated on the following page.

* Contact a Nanni authorized workshop.

S10 TROUBLESHOOTING

1. Lack of fuel
2. Air in fuel system
3. Fuel filter fouled or clogged
4. Fuel do not meet specified standard
5. Water/contaminants in fuel
6. Valve clearance is wrong *
7. Low compression *
8. Insufficient battery charge / Defective battery
9. Faulty electrical cables contact
10. Faulty starter or starter switch *
11. Tripped fuse / Main switch is open
12. Transmission is damaged*
13. Control lever not in neutral / Stop control pulled out
14. Too much load on board
15. Fouling on underwater hull, drive or propeller
16. Defective/incorrect propeller *
17. Faulty operation of control lever / control cables
18. Loosen or damaged belt
19. Incorrect coolant / Low coolant level / Coolant leaks
20. Cooling system does not operate correctly *
21. Faulty thermostat *
22. Sea cock valve closed / Raw water filter clogged
23. Lube oil burns. Excessive oil consumption *
24. Engine oil level too low
25. Engine oil level too high
26. Transmission oil level too low
27. Defective engine mounting *
28. Insufficient air supply *
29. Clogged air filter or lack of air on admission

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