NANNI MARINE ENGINE

USER MANUAL

DGBXXT09062

ENGINES

T4-3 Series

Z4-3 Series

Q00 TRACKED CHANGES

TRACKED CHANGES

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NOTES

S00 SUMMARY

Q00 TRACKED CHANGES 3
TRACKED CHANGES 3
S00 SUMMARY 5
S01 INTRODUCTION 7
INTRODUCTION 7
ABOUT THIS MANUAL 8
Contents & updates 8
S02 SAFETY 9
SAFETY SIGNALS 10
A signal word 10
Engine - Genset safety Icons 11
SAFETY PRECAUTIONS 11
Hot exhaust precautions 11
Work In ventilated area 11
Waste disposal 11
Unwanted engine start 11
Safe maintenance practice 12
Work In clean area 12
Protective clothing 12
Service engines safely 12
Proper use of tools 12
Support engines properly 12
Safe illuminated work area 12
Proper lifting equipment 12
Noise protection 13
Genset output generated power 13
Guards requirements 13
Staying clear of rotating drive lines 13
Paint removal before heating 13
High - pressure fuel system opening risk 13
Avoid high - pressure fluids leaks 13
Safe cooling system service 14
Avoid heat near pressurized fluid lines 14
Welding near electronic control unit (ECU) 14
Static electricity risk 14
Handle fuel safely - avoid fires 14
Be prepared for emergencies 14
Handling batteries safely 15
Prevent battery explosions 15
Frost protection - winterization 15
Live with safety 16
Prevent accidents 16
S03 FLUIDS 17
FUELS 18
Storing fuel 18
Diesel fuel 18
Lubricity of diesel fuel 19
Handling and storing diesel fuel 20
Recommended fuel 20
Biodiesel fuel 20
Testing diesel fuel 21
Minimizing the effect of cold weather on diesel engines 21
DIESEL ENGINE COOLANTS 22
Recommended coolants 22
Water quality 22
Coolant drain intervals 22
Operating in warm temperature climates 22
Water quality for mixing with coolant concentrate 23
Testing coolant freeze point 23
LUBRICANTS 24
Engine oil and filter service intervals — Tier 3 and Stage IIIA — OEM applications 24
Diesel engine oil — Tier 3 and Stage IIIA 25
Oil filters 25
Fuel filters 25
Alternative and synthetic lubricants 26
Lubricant storage 26
Mixing of lubricants 26
DISPOSING OF WASTE FLUIDS 26
S04 WARRANTY 27
ENGINE IDENTIFICATION 28
Engine approval 29
Engine responsibility 29
Warranty 30
Proposition 65 state of California 30
EPA warranty 31
S05 INSTRUMENTATION 33
DASHBOARDS 33
Si-5 33
GETTING STARTED - BASIC 33
Switching on & off 33
ButtonS function 33
C-5 34
S05 INSTRUMENTATION 34
S06 COMPONENTS 35
ENGINE MAIN COMPONENTS 36
Engines views all T4 Evo3 models 37
Engine viewS Z4 Evo3 models 38
S07 START & RUNNING 39
BEFORE STARTING 40
Engine installation 40
Fuel system 40
Raw water system 40
Electrical system 40
Check before starting 41
STARTING THE ENGINE 41
Cold weather operation 41
Engine start 42
Engine started 43
Starting with booster batteries 43
Engine reluctant to start 43
Idling engine 43
Normal engine operation 44
Break in 44
Power take off 44
Remote control 45
RUNNING 45
Behaviour of the boat 45
During operation 45
Cruising speed 46
Manoeuvring 46
Engine and Sailing 47
Trolling valve 47
AFTER RUNNING 48
Stopping the engine 48

S00 SUMMARY

After stopping the engine 48
Anchoring 49
Cold weather precautions 49
S08 MAINTENANCE 51
ABOUT 52
GENERALITIES 52
MAINTENANCE 53
ENGINE MOUNTS CHECK 54
EXHAUST SYSTEM 54
TURBOCHARGER 55
Turbo service 55
AIR INTAKE 56
Check the air filter box 56
Cleaning the air filter 56
FUEL SYSTEM 57
Drain water in fuel prefilter 57
Replacing the fuel filter 58
Air bleeding 58
LUBRICATION SYSTEM 60
Oil level - adding engine oil 60
Draining the engine oil 61
Changing the oil filter 61
Power Assisted Steering oil level 62
Stern drive gear lube (Z series) 62
COOLING SYSTEM 63
Overview 63
Coolant 64
Coolant level 64
coolant circuiT Draining 65
Coolant - filling 65
RAW WATER SYSTEM 66
Zinc sacrificial anode check 66
Siphon breaker 66
Extract the raw water pump impeller 67
Cleaning the raw water filter 68
Raw water system - draining 68
Raw water system - cleaning 69
Risk of icing - protection against frost 69
Heat exchanger service 70
Intercooler service 71
ELECTRICAL SYSTEM 72
Wires and connectors 72
BATTERY 72
Keep clean the battery 72
Disconnect the starter cables 73
Connect the cables 73
Battery electrolyte level 73
Electrolyte level check 73
Alternator belt 74
Fuses 75
MISCELLANEOUS 78
Camshaft timing - FOR INFORMATION ONLY 78
S09 STORAGE 80
LONG TERM STORAGE 80
Long term storage procedure 80
Restarting the engine 81
Battery 81
S10 TROUBLESHOOTING 82
EPA 84

S01 INTRODUCTION

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.

Document of origin : Translation of the French original document.

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.

S02 SAFETY

S02 SAFETY 9
SAFETY SIGNALS 10
A signal word 10
Engine - Genset safety Icons 11
SAFETY PRECAUTIONS 11
Hot exhaust precautions 11
Work In ventilated area 11
Waste disposal 11
Unwanted engine start 11
Safe maintenance practice 12
Work In clean area 12
Protective clothing 12
Service engines safely 12
Proper use of tools 12
Support engines properly 12
Safe illuminated work area 12
Proper lifting equipment 12
Noise protection 13
Genset output generated power 13
Guards requirements 13
Staying clear of rotating drive lines 13
Paint removal before heating 13
High - pressure fuel system opening risk 13
Avoid high - pressure fluids leaks 13
Safe cooling system service 14
Avoid heat near pressurized fluid lines 14
Welding near electronic control unit (ECU) 14
Static electricity risk 14
Handle fuel safely - avoid fires 14
Be prepared for emergencies 14
Handling batteries safely 15
Prevent battery explosions 15
Frost protection - winterization 15
Live with safety 16
Prevent accidents 16

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 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

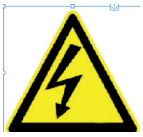


Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.

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.

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.

S03 FLUIDS

S03 FLUIDS 17
FUELS 18
Storing fuel 18
Diesel fuel 18
Required fuel properties 18
E-diesel fuel 19
Lubricity of diesel fuel 19
Handling and storing diesel fuel 20
Recommended fuel 20
Approved fuel 20
Biodiesel fuel 20
Testing diesel fuel 21
Minimizing the effect of cold weather on diesel engines 21
Use winter grade fuel 21
Air intake heater 21
Coolant heater 21
Seasonal viscosity oil and proper coolant concentration 21
Biodiesel 21
Winter-fronts 21
DIESEL ENGINE COOLANTS 22
Recommended coolants 22
Water quality 22
Coolant drain intervals 22
Operating in warm temperature climates 22
Water quality for mixing with coolant concentrate 23
Freeze protection 23
Testing coolant freeze point 23
LUBRICANTS 24
Engine oil and filter service intervals — Tier 3 and Stage IIIA — OEM applications 24
Approved oil types 24
Diesel engine oil — Tier 3 and Stage IIIA 25
Multi-viscosity diesel engine oils are preferred. 25
Oil filters 25
Fuel filters 25
Alternative and synthetic lubricants 26
Lubricant storage 26
Mixing of lubricants 26
DISPOSING OF WASTE FLUIDS 26

FUELS

STORING FUEL



DANGER !

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

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

DIESEL FUEL

Consult your local fuel distributor for properties of the diesel fuel available in your area.
In general, diesel fuels are blended to satisfy the low temperature requirements of the geographical area in which they are marketed.
Diesel fuels specified to EN 590 or ASTM D975 are recommended.

Renewable diesel fuel produced by hydro-treating animal fats and vegetable oils that meets EN 15940 IS NOT 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 engines may void the machine warranty

CAUTION !

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

Sulphur Content for Tier 3 and Stage III A Engines

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

Sulphur Content for Tier 2 and Stage II Engines

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

Sulfur Content for Other Engines

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

IMPORTANT!

Do not mix used diesel engine oil or any other type of lubricating oil with diesel fuel.
Improper fuel additive usage may cause damage on fuel injection equipment of diesel engines.

LUBRICITY OF DIESEL FUEL

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

IMPORTANT!

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

Fuel lubricity should pass a maximum scar diameter of 0.52 mm as measured by ASTM D6079 or ISO 12156-1.
A maximum scar diameter of 0.45 mm is preferred.

HANDLING AND STORING DIESEL FUEL



CAUTION !

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

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

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

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

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

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



IMPORTANT!

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

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

RECOMMENDED FUEL

Approved fuel

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

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

These regulations are in compliance with ISO 8217 DMX.



CAUTION !

Paraffin-based fuel that complies with European standard EN15940 CAN'T BE USED for all NANNI Toyota bases engines.

BIODIESEL FUEL

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

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



IMPORTANT!

Biodiesel is not recommended by NANNI.
Raw pressed vegetable oils are NOT acceptable for use as fuel in any concentration in NANNI engines. Their use could cause engine failure.

TESTING DIESEL FUEL

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

MINIMIZING THE EFFECT OF COLD WEATHER ON DIESEL ENGINES

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

Use winter grade fuel

When temperatures fall below 0°C (32°F), winter grade fuel (No. 1-D in North America) is best suited for cold-weather operation. Winter grade fuel has a lower cloud point and a lower pour point.
Cloud point is the temperature at which wax begins to form in the fuel. This wax causes fuel filters to plug. Pour point is the lowest temperature at which movement of the fuel is observed.

NOTE!

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

Air intake heater

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

Coolant heater

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

Seasonal viscosity oil and proper coolant concentration

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

Biodiesel

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

Winter-fronts

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

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

DIESEL ENGINE COOLANTS

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

RECOMMENDED COOLANTS

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

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

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

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

WATER QUALITY

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

COOLANT DRAIN INTERVALS

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

IMPORTANT!

Do not use cooling system sealing additives or antifreeze that contains sealing additives.
Do not mix ethylene glycol and propylene glycol base coolants.
Do not use coolants that contain nitrites.

OPERATING IN WARM TEMPERATURE CLIMATES

NANNI engines are designed to operate using recommended engine coolants.

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

IMPORTANT!

Water may be used as coolant in emergency situations only.
Foaming, hot surface aluminium and iron corrosion, scaling, and cavitation occur when water is used as the coolant, even when coolant conditioners are added.
Drain cooling system and refill with recommended engine coolant as soon as possible.

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 I hardness	<170 mg/L
pH	5.5—9.0

IMPORTANT!

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

Freeze protection

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

Ethylene Glycol	Freeze Protection Limit
40%	-24°C (-12°F)
50%	-37°C (-34°F)
60%	-52°C (-62°F)
Propylene Glycol	**Freeze Protection Limit**
40%	-21°C (-6°F)
50%	-33°C (-27°F)
60%	-49°C (-56°F)

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

TESTING COOLANT FREEZE POINT

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

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

To use this tool:

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



Part Number 945400245

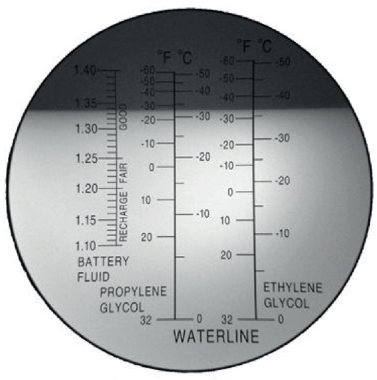


Image with a Drop of 50/50 Coolant Placed on the Refractometer Window

LUBRICANTS

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

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

Approved oil types

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

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

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

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

IMPORTANT!

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

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

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

DIESEL ENGINE OIL — TIER 3 AND STAGE IIIA

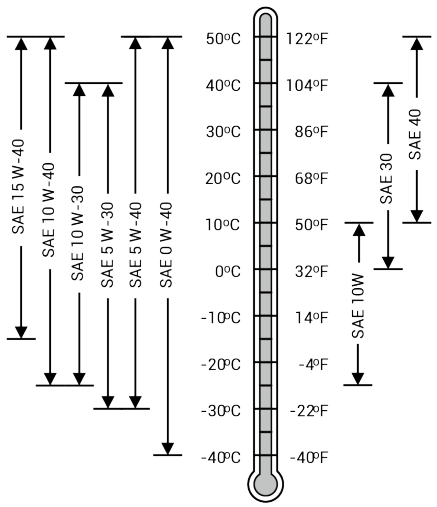
Failure to follow applicable oil standards and drain intervals can result in severe engine damage that might not be covered under warranty. Warranties, including the emissions warranty, are not conditioned on the use of NANNI parts, or service.
Use oil viscosity based on the expected air temperature range during the period between oil changes.

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

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

Multi-viscosity diesel engine oils are preferred.

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



Oil Viscosities for Air Temperature Ranges

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

OIL FILTERS

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

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

Always change oil filters regularly as specified in this manual

FUEL FILTERS

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

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

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

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

ALTERNATIVE AND SYNTHETIC LUBRICANTS

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

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

Consult your NANNI dealer to obtain information and recommendations.

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

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

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

LUBRICANT STORAGE

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

Use clean containers to handle all lubricants.

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

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

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

MIXING OF LUBRICANTS

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

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

Consult your NANNI dealer to obtain specific information and recommendations.

DISPOSING OF WASTE FLUIDS

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

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

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

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



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

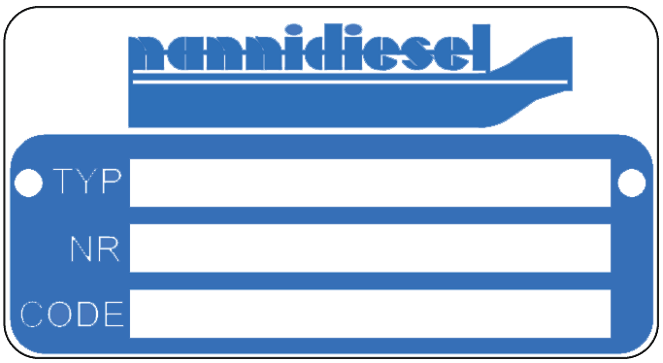
S04 WARRANTY

S04 WARRANTY 27
ENGINE IDENTIFICATION 28
Engine approval 29
Engine responsibility 29
Warranty 30
Damage caused 30
Proposition 65 state of California 30
EPA warranty 31
Emission control system(s) laws 31
European Union (EU) declaration of emissions and conformity 31

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:

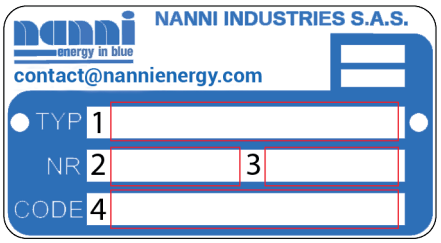


TYP	Indicates the commercial designation of the engine.
NR	Indicates the engine serial number.
CODE	Lists various specifications of the engine.

NOTE !

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

Example:



1 : Type of engine

2 : Engine serial number

3 : Nanni engine serial number

4 : Engine code

S04 WARRANTY

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 follow by the user.

Nanni's responsibility for the engine specification being in accordance with the certification will be void if one or several of this 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 :

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

❖Always start and operate the engine in a well ventilated area.

❖If in an enclosed area, vent the exhaust to the outside.

❖Do not modify or tamper with the exhaust system.

❖Do not idle the engine exept as necessary.

For more information, go to :

www.P65warnings.ca.gov/diesel.

WARNING :

Batteries, battery posts, terminals & related accessories do contain lead & lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. **WASH HANDS AFTER HANDLING.**

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.

NOTES

DASHBOARDS

NANNI T4-3 engines may work either with a fully digital electronic unit (SI-5), or via a set of separate electronic instruments (C5) at best convenience for end user.

SI-5

For complete & detailed information about this unit, please consult the DGBXXT09061 User Manual.

This Multifunction Display redefines clarity and control in marine environments. Featuring a 4.3" optically bonded IPS TFT screen with anti-glare mineral glass, it delivers brilliant visibility even in harsh conditions.

Designed for seamless integration, it supports NMEA 2000® and SAE J1939 protocols, analog sensors, and Ethernet connectivity.

With lightning-fast startup, customizable multilingual GUI, and robust IPX7-rated housing, the Si-5 is built to perform.

Whether monitoring engines, tanks, batteries, or navigation data, this display offers intuitive interfaces, graphical insights, and real-time alarms. Its compact 85 mm round form factor and flame-retardant housing make installation simple and safe.



Front of SI-5 Unit

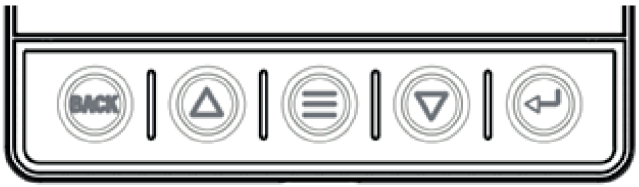
GETTING STARTED - BASIC

SWITCHING ON & OFF

Start: Turn the ignition key to the **ON** position: the screen lights up. Then, NANNI logo and software version followed by a security message will appear, followed by the last data page displayed before turning off.

Stop: In turning the ignition key to the **OFF** position, the unis goes OFF.

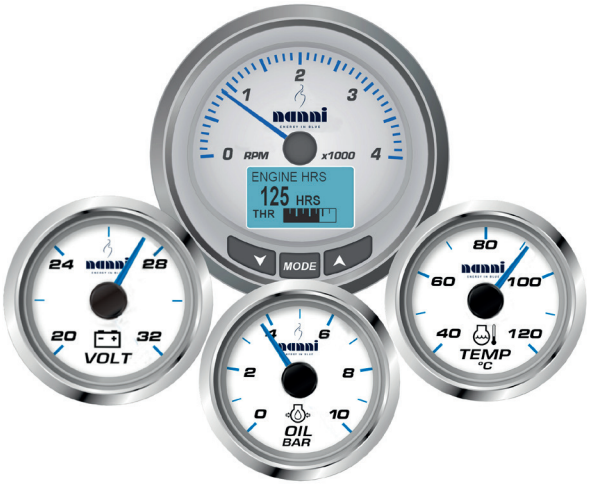
BUTTONS FUNCTION



Button	Name	Function
	BACK	Short press: • In normal operation: Day/Night Mode switch • In menus: Return to the previous menu • 3 sec press: • From any point to return to the data pages
	UP DOWN	Short press: • Scroll screens/options/menu items
	MENU	Short press: • Open the menu • Return to the previous menu • 3 sec press: • In normal operation: Edit current screen • In menus: Return to the data pages
	ENTER	Short press: • Open a sub-menu • Confirm the selection

C-5

For complete & detailed information about this set of instruments, please consult the DGBXXT09032 User Manual.



S06 COMPONENTS

S06 COMPONENTS 35
ENGINE MAIN COMPONENTS 36
Engines views T4-3 37
Engines view Z4-3 38

S06 COMPONENTS

ENGINE MAIN COMPONENTS



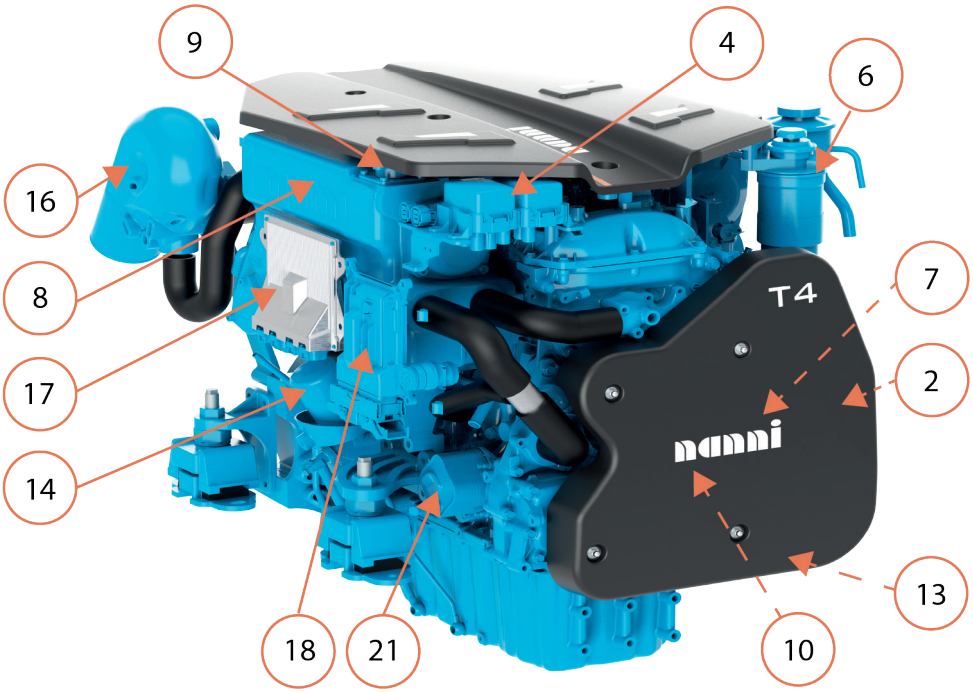
NOTE !

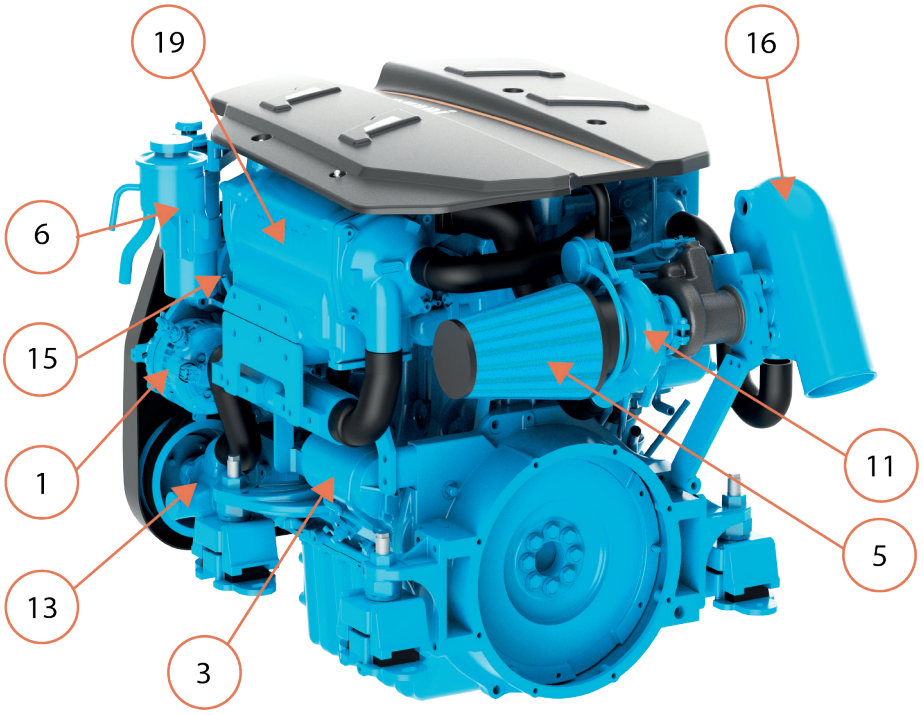
Minor engine details may not be exactly as shown. Some components may not be part of the engine ordered. Not binding pictures.

PART/NUMBER	COMPONENTS
1	Alternator
2	Alternator Belt
3	Starter
4	Fuses box
5	Air filter
6	Fuel filter (depending on model)
7	High pressure fuel injection pump
8	Heat exchanger
9	Heat exchanger coolant filler plug
10	Coolant pump
11	Turbocharger
12	Coolant drain plug
13	Raw water pump
14	Oil filter
15	Oil gauge
16	Water cooled exhaust elbow
17	ECU
18	EDU
19	Intercooler
20	Steering hydraulic motor (Z4 only)
21	Oil cooler

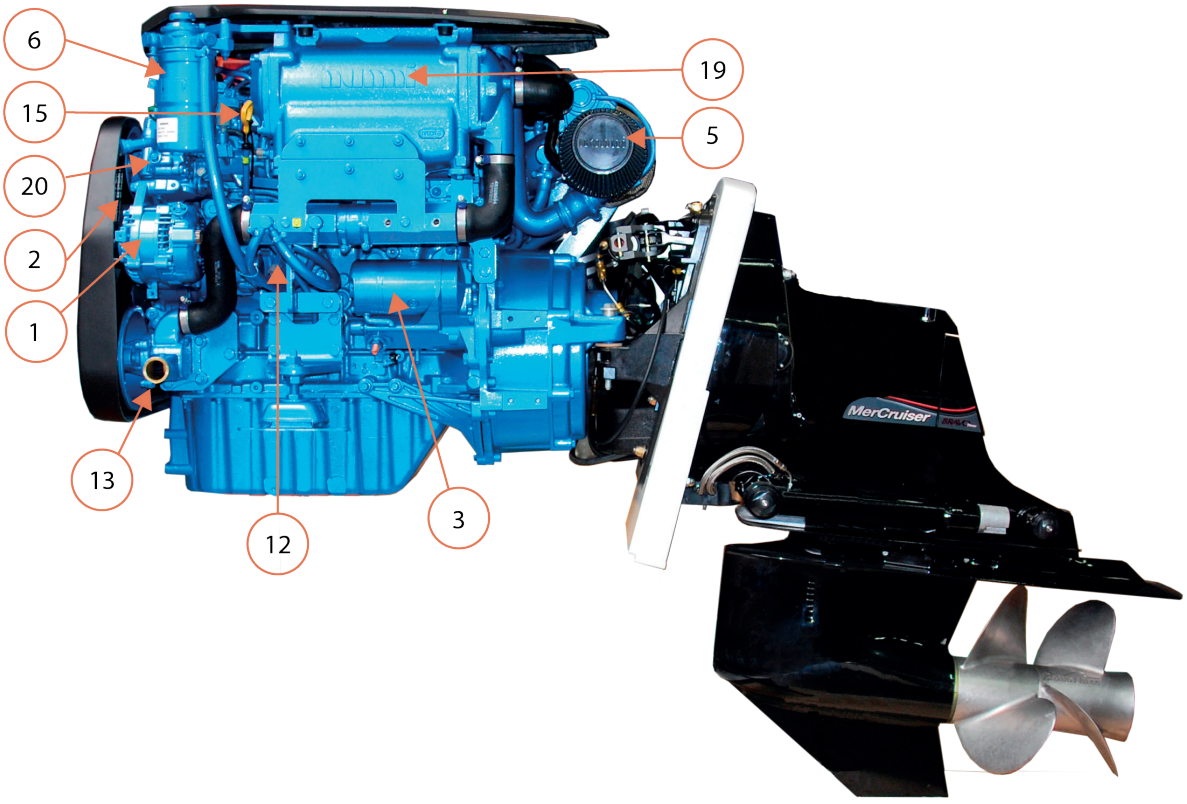
S06 COMPONENTS

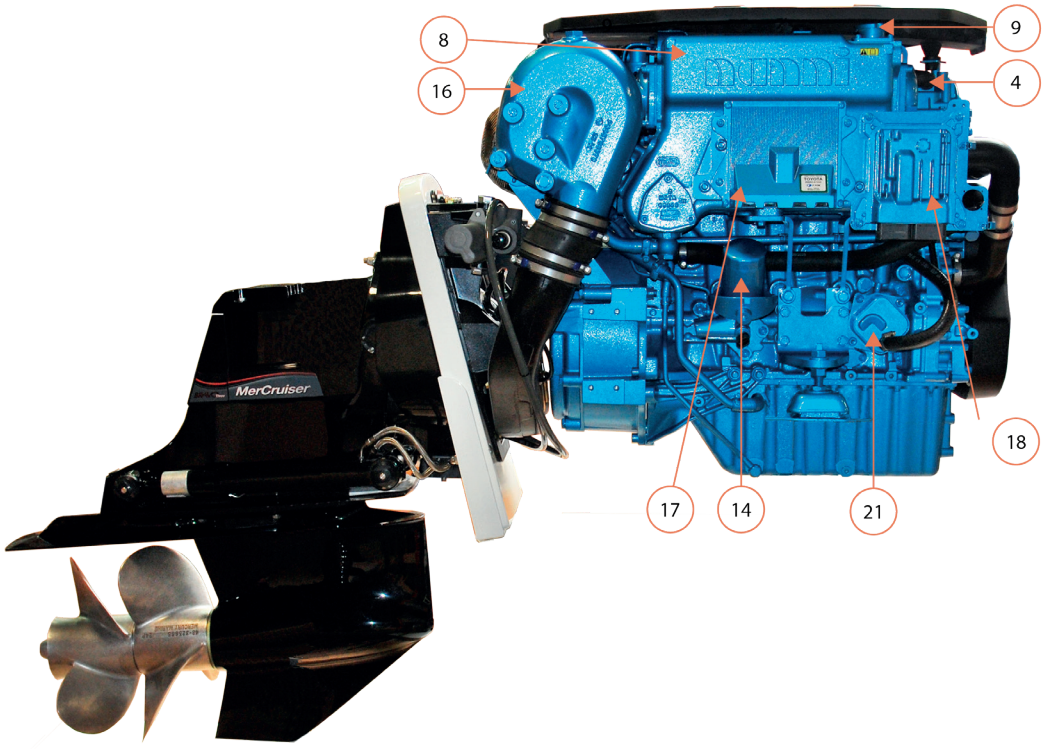
ENGINES VIEWS ALL T4-3 MODELS





ENGINE VIEWS Z4-3 MODELS





S07 START & RUNNING

S07 START & RUNNING 39
BEFORE STARTING 40
Engine installation 40
Fuel system 40
Raw water system 40
Electrical system 40
Check before starting 41
STARTING THE ENGINE 41
Cold weather operation 41
Engine start 42
Engine started 43
Starting with booster batteries 43
Engine reluctant to start 43
Idling engine 43
Normal engine operation 44
Break in 44
Power take off 44
Remote control 45
RUNNING 45
Behaviour of the boat 45
During operation 45
Cruising speed 46
Manoeuvring 46
Engine and Sailing 47
Trolling valve 47
AFTER RUNNING 48
Stopping the engine 48
After stopping the engine 48
Anchoring 49
Cold weather precautions 49

BEFORE STARTING

ENGINE INSTALLATION

At this stage, Engine installation must be fully completed and checked. See Engine Installation Manual DGBXXT13002B for more information.

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 !

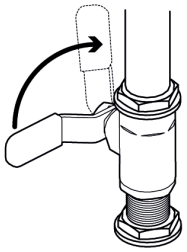
Put all the protective covers back before starting the engine.

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.

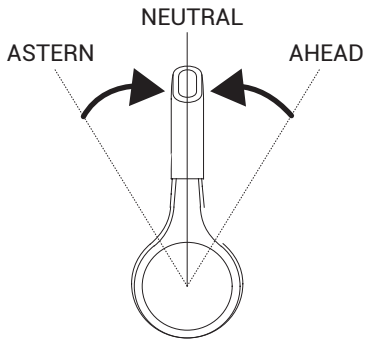
Synthetic oils improve flow at low temperatures, especially in Arctic conditions.

S07 START & RUNNING

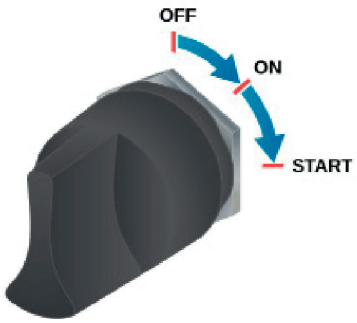
ENGINE START

Panel with key (general case):

1. Move the control lever to the neutral position.



2. Insert the key in the OFF/ON/START starter switch.



3. Turn the key to the ON position, LCD screen displays the current software information, tachometer will cycle through several lighting variations, all indicator/ gauge will sweep to full scale then they go to current value, heating procedure starting and audible signal sound.

4. Turn the key in START position to start the engine, then release them.

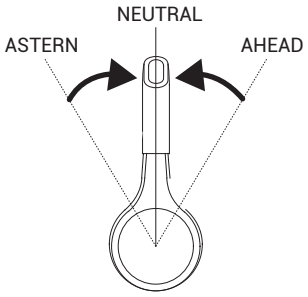
5. If the engine is fit with water cooled exhaust elbow, check that water flows from the exhaust outlet at the hull. If the water does not flow, stop the engine and check the raw water system.

6. Turn the key to OFF position to stop the engine.

Panel without key:

1. Switch the key of the main panel to ON position (if equipped).

2. Move the control lever to the neutral position.



3. Press the ON/STOP button, LCD screen displays the current software information, tachometer will cycle through several lighting variations, all indicator/ gauge will sweep to full scale then they go to current value, heating procedure starting and audible signal sound.



4. Press the START button to start the engine.

5. 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.

6. Press the ON/STOP button to stop the engine.

S07 START & RUNNING

ENGINE STARTED

NOTE !

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 C5 temperature and pressure 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

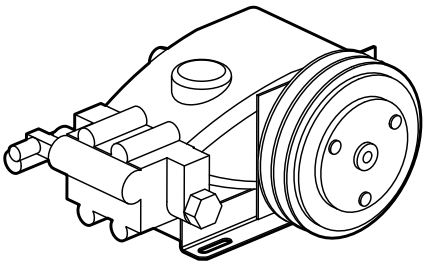
Operate the engine with care for the first 50 hours of operation.
Do not race the engine while it is cold. Do not operate it at full load except for short periods. Never run the engine at constant engine speed for long periods during the break in period.

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.





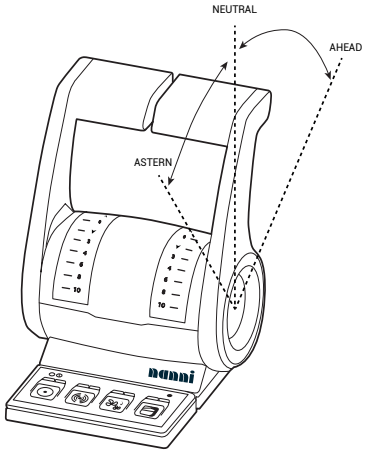
NOTE !

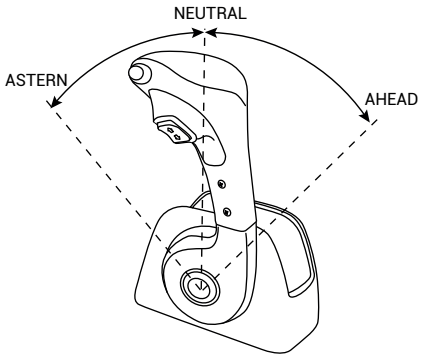
Any mechanical power taken from the engine from a PTO reduces the power delivered to the propeller. The use of a PTO should always be studied and approved by the R&D department of Nanni Industries S.A.S France. Contact your Nanni dealer for more informations.

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.

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 !

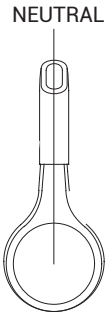
Shifting at high speed can damage both the engine and the transmission and be dangerous for passengers.

CAUTION !

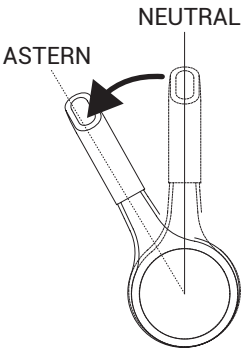
On a twin engine boat, both engines should be started during reversing manoeuvres to reduce the risk of water ingress in the stationary engine.

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.



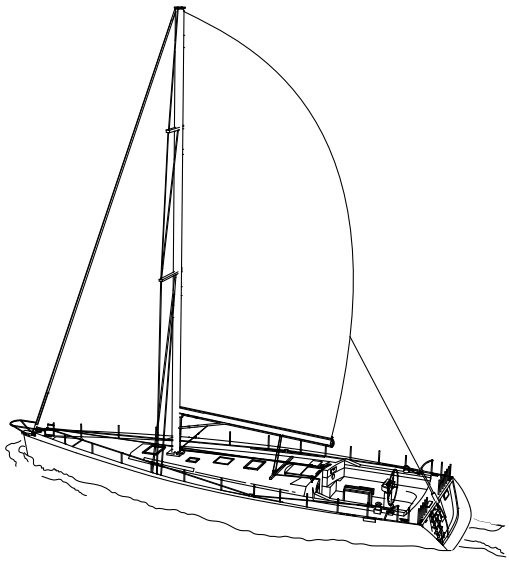
3. Move the control lever into astern. Increase the speed.



S07 START & RUNNING

ENGINE AND SAILING

When under sail, it is possible to limit the resistance produced by the propeller of the engine.



CAUTION !

Refer to the manufacturer's recommendations regarding the use of the transmission in sailing condition.

Foldable blades:

- Put the throttle lever astern (in reverse). The blades will close as soon as the boat moves forward. Hydrodynamic resistance created by the blades is then reduced and minimized.

Non foldable blades:

- Put the throttle lever astern (in reverse). The propeller does not rotate and create a hydrodynamic resistance.
- Put the lever in neutral, the propeller will rotate and will generate a lower hydrodynamic resistance than in astern.

CAUTION !

Sailing with the engine stopped and with the lever in neutral must not exceed 6 hours in a row. The propeller can drive the rotation of the shaft and damage the transmission. Run the engine for 15 minutes to lubricate the transmission at least every 6 hours.

Whatever the type of propeller and transmission, never sail with the engine stopped in forward gear (in ahead mode).

Under sail, close the seacock if the boat is reaching a speed above 8 knots.

Water can enter in the raw water intake and fill the exhaust system. Do not forget to open the seacock again before restarting the engine.

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.

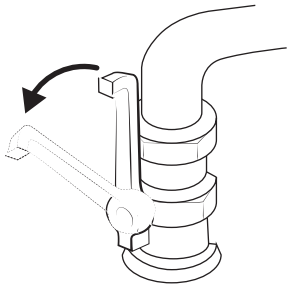
AFTER STOPPING THE ENGINE

CAUTION !

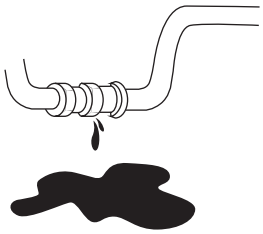
Even after the engine has stopped, some components and fluids will remain hot and under pressure for several minutes. As far as possible, limit works on the engine immediately after stopping it. allow it to cool down first.

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.

S07 START & RUNNING

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.

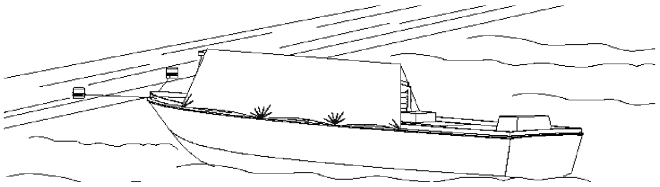
When the boat is at anchor or in port for an extended period of time, vegetation may develop on the hull, the keel, the drive, the rudder, the propeller, etc. It will significantly affect the behaviour of the boat and the performance of the engine if the vegetation is not removed before the next time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

S08 MAINTENANCE

S08 MAINTENANCE 51
ABOUT 52
GENERALITIES 52
MAINTENANCE 53
CONTROL CABLES 54
ENGINE MOUNTS CHECK 54
EXHAUST SYSTEM 55
TURBOCHARGER 56
Turbo service 56
AIR INTAKE 57
Check the air filter box 57
Cleaning the air filter 57
FUEL SYSTEM 58
Drain water in fuel prefilter 58
Replacing the fuel filter 59
Air bleeding 59
LUBRICATION SYSTEM 61
Oil level - adding engine oil 61
Draining the engine oil 62
Changing the oil filter 62
Power Assisted Steering oil level 63
Stern drive gear lube (Z series) 63
COOLING SYSTEM 64
Overview 64
Coolant 65
Coolant level 65
Draining the coolant circuit 66
Coolant - filling 66
RAW WATER SYSTEM 67
Zinc sacrificial anode check 67
Siphon breaker 67
Extract the raw water pump impeller 68
Cleaning the raw water filter 69
Raw water system - draining 69
Raw water system - cleaning 70
Risk of icing - protection against frost 70
ELECTRICAL SYSTEM 71
Wires and connectors 71
BATTERY 71
Keep clean the battery 71
Disconnect the starter cables 72
Connect the cables 72
Battery electrolyte level 72
Electrolyte level check 72
Alternator belt 73
Fuses 74
MISCELLANEOUS 76
Camshaft timing 76

S08 MAINTENANCE

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.

MAINTENANCE

COMPONENTS	PERIODICITY				
	Daily	1st Maintenance 90 days or 100 hours (1)	Every 250 hours or 1 year (1)	Every 500 hours or 2 years (1)	Every 1000 hours or 4 years (1)
Fuel Circuit					
Water in fuel - Pre-filter / Filter Draining	○				
Fuel filter replacement (2)		●	●		
Fuel injectors (2)					○
Lubrication Circuit					
Engine oil level (2)	○				
Oil replacement (2)		●	●		
Oil filter replacement (2)		●	●		
Cooling Circuit					
Coolant level (2)	○				
Coolant Liquid (2)				●	
Heat Exchanger Cleaning (2)				○	
Thermostat Replacement (2)				●	
Calibrated Heat-Exchanger Cap (2)				●	
Heat-exchanger - O-rings				●	
Inter-cooler - O-rings				●	
Raw Water Circuit					
Raw Water Filter Check & Clean (2)	○				
Raw Water Pump Impeller (2)			●		
Zinc Anodes (2)		○	○		
Air Intake & Exhaust Circuit					○
Turbo-charger				○	
Turbo Waste-Gate Free Movement & Lubrication	After each period of non-use exceeding 2 months				
Turbo-charger Heat Insulator			○		
Air Intake Filter (2)			○		●
Exhaust Mixer (2)			○		●
Electrical					
Battery electrolyte level	○				
Electrical Harness Connectors		○	○		
Alternator Belt Condition (2)		○	○		
Panel Command : Indicators & Warning Lamps		○	○		●
Whole Engine					
Engine Mounts		○	○		●
Engine Alignment		○			○
Hoses / Clamps tightness / Bolts / Nuts Tightening		○	○		
Visual Inspection (Coolant, fuel, oil, exhaust & raw water leaks)	○				
Accessory Belt check		○	○		
Valve Clearance					○
Transmission					
Transmission Oil level (3)	○				
Transmission Oil (3)		●	●		
Transmission Oil Filter (3)		●	●		
Fuel & Transmission Oil Cooler		○	○		

(1) Whichever come first (at the first occurrence)
(2) Operations to be performed in accordance with this user and maintenance manual.
(3) Operation to be perform in accordance with the manufacturer user and maintenance manual.

○ CHECK/ADJUST/CLEAN/SERVICE/REPLACE IF NECESSARY ● REPLACE

ENGINE MOUNTS CHECK

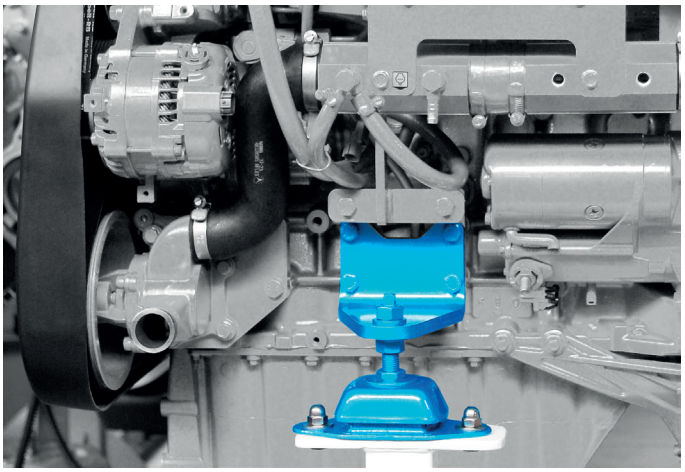
Engine mounting is the responsibility of the vessel or generator manufacturer. Follow manufacturer's guidelines for mounting specifications. Flexible engine mounts are specific to each model of engine. Suitable engine flexible mounts are available from Nanni Energy.

IMPORTANT !

Use only SAE Grade 8 or higher grade of hardware for engine mounting. Ban any type of stainless srews.

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.



EXHAUST SYSTEM

An engine's exhaust system must be able to freely discharge all high temperature exhaust gas after combustion to the outside air.

Exhaust resistance must be as low as possible in order to prevent a decrease in power, however exhaust noise must be kept at an acceptable level. Careful design is required to reconcile these two conflicting factors. Exhaust gas from the exhaust manifold can either be directly fed into the muffler or routed to a place which will not interfere with the operator by exhaust pipe.

The most important point in all cases is to reduce back pressure to a minimum.

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.

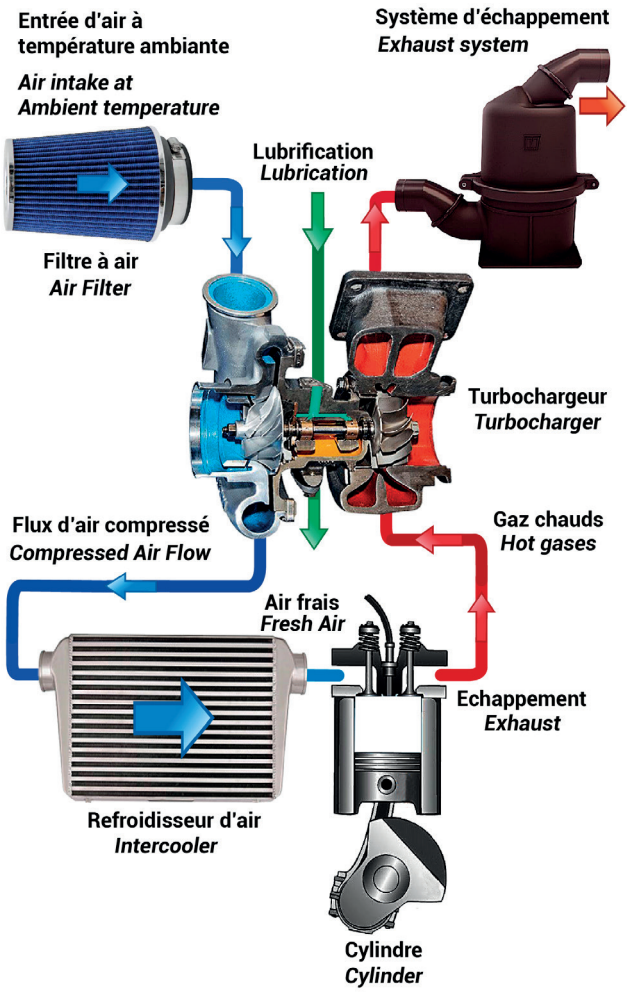
Should any defect appear on any item of the exhaust system, replace it as there is a risk of exhaust leakage or water penetration in the engine.

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

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 (intercooler not on all models)

TURBO SERVICE

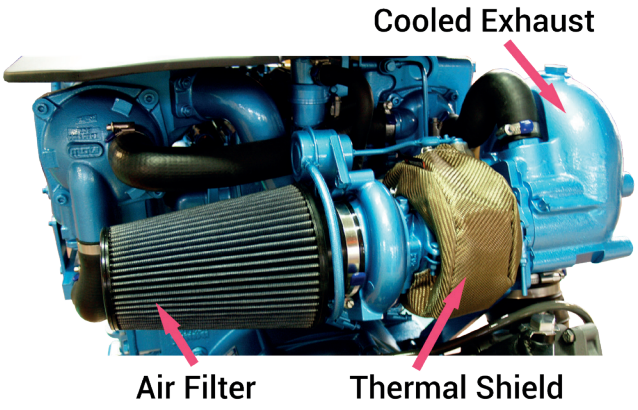
An engine turbocharger is designed to provide long years of trouble free service, which if required, can only be performed by a specialized workshop. In view to maintain turbocharger performances for as long as possible, some basic rules must be followed.

Changing or cleaning the air filter 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.

Do not get confused : a turbocharger is driven by the flux of exhaust gases. On a supercharger, the air intake turbine is driven through the intermediate of a belt. In addition to a rotation speed far lower compared to a turbocharger, an amount of output power is subtracted fom the engine because of the belt drive system.



NOTE !

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

AIR INTAKE

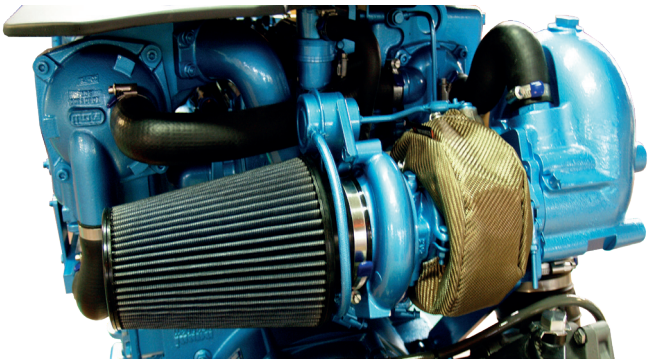
WARNING !

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 BOX

1. Remove the holding clamps and remove the filter (in blue on the picture).
2. Replace or clean the element.
3. If the air filter is crushed, flattened or punched, replace it.
4. Install the new filter with new clamps. Do not overtight, and not damage the inlet mouth.





Long life NANNI air filter

CLEANING THE AIR FILTER

Special 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 !

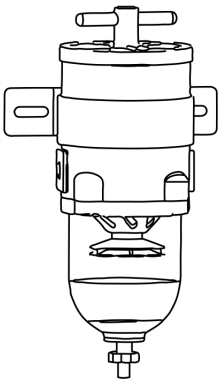
The fuel feed pump is an extremely precise unit. Water entry in the fuel system will cause major failure to the injection pump and to the whole fuel system.

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).

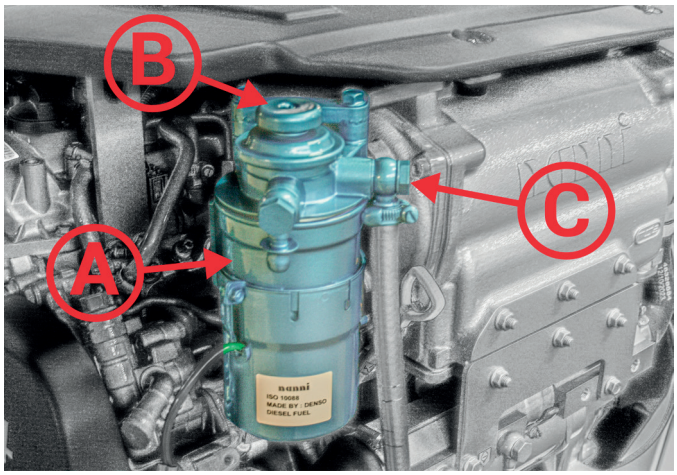


1. Close the fuel butterfly (control) valve on the fuel tank.
2. Place a suitable container under the fuel prefilter. Get floorcloths at hand to mop up any fuel which may spill. Drain water and remove impurities in opening the bottom plug.
3. Tighten the plug once the water has been drained.
4. Check 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.

REPLACING THE FUEL FILTER

NOTE !

To ease up the air bleeding during fuel filter replacement, the filter assembly may be filled with some fuel, only if you are sure not to spill any.



Above picture : fuel filter assembly.

1. Close the fuel butterfly (control) valve. Wipe up the holding filter bracket with a clean non flint cloth.
2. Remove the protective tank.
3. Put a plastic bag over the filter (**A**) to prevent spills on the engine.
4. Remove the fuel filter. Use a filter wrench tool if filter is seized.
5. Check and clean the sealing surface of the filter bracket. Apply a thin film of fuel onto the seal.
6. Screw the new filter by hand until the seal is flush with the matting surface. Tight up a further half turn.
7. To bleed the air in the fuel system, see next paragraph for complete explanations.

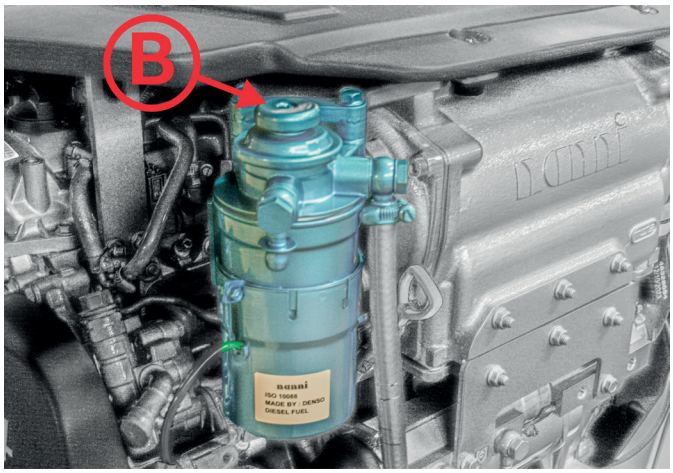
AIR BLEEDING

Bleeding the air in the fuel system might be required :

- After a maintenance operation on the fuel system.
- If the fuel tank has been emptied.
- The engine has not been started for a long time.

To bleed the fuel system fitted with the standard mechanical pump:

1. Fill up completely the fuel tank. Open the fuel valve.
2. To avoid spills, Dispatch a non flint cloth around the venting screw (**C**) of the fuel filter holder and loose it up (see picture on left side of this page).
3. Pump the fuel using the push button (**B**) back and forth until fuel free of air bubbles flows out of the venting screw.



4. At this stage, you can tighten the venting screw.
5. Pump a few more times to make sure to prime completely the system.

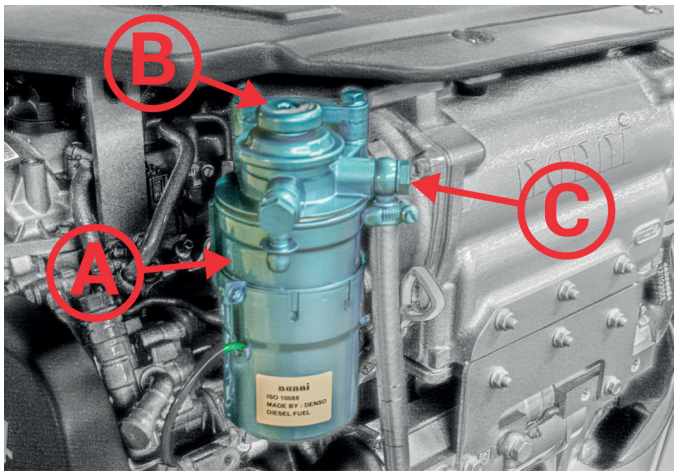
To bleed the fuel system fitted with an additional electric fuel feed pump :

1. Fill completely the fuel tank. Open the fuel valve.
2. Loose the venting screw (**C**). Dispose floorcloths under the venting screw.
3. Start the engine for 5 to 10 seconds to let the electric fuel feed pump bring fuel up to the injection pump.
4. Pump the fuel using the lever (**B**) until fuel free of air bubbles flows from the venting screw.
5. At this stage, you can tighten the venting screw.
6. Pump again a few more times to make sure to completely prime the system.



CAUTION !

Avoid draining fuel from the filter during this process.



LUBRICATION SYSTEM

CAUTION !

Never over-fill the engine oil crankcase.

NOTE !

With a new or reconditioned engine, oil and oil filters must be replaced after 20 hours of operation. Use oil grades as indicated in the section FLUIDES.

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

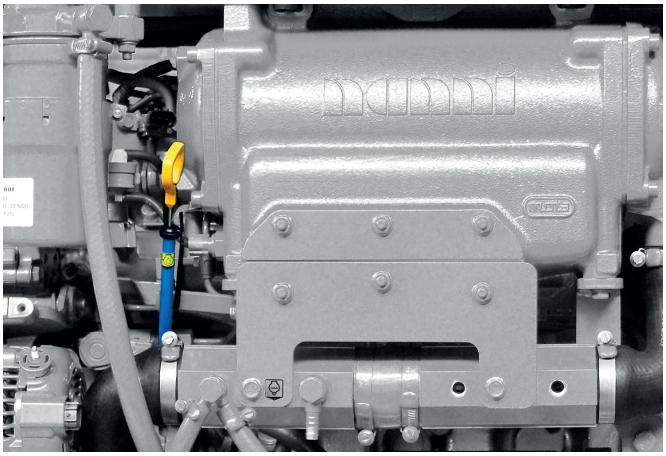
The viscosity may be adapted depending the climatic conditions.

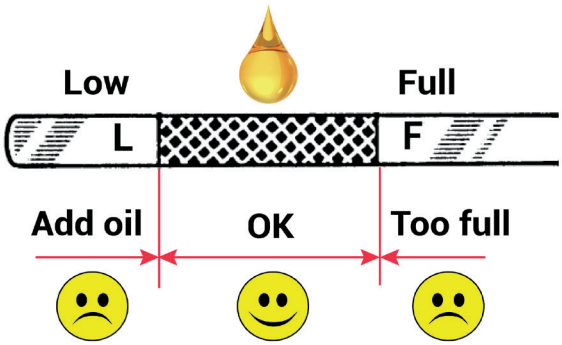
OIL LEVEL - ADDING ENGINE OIL

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.





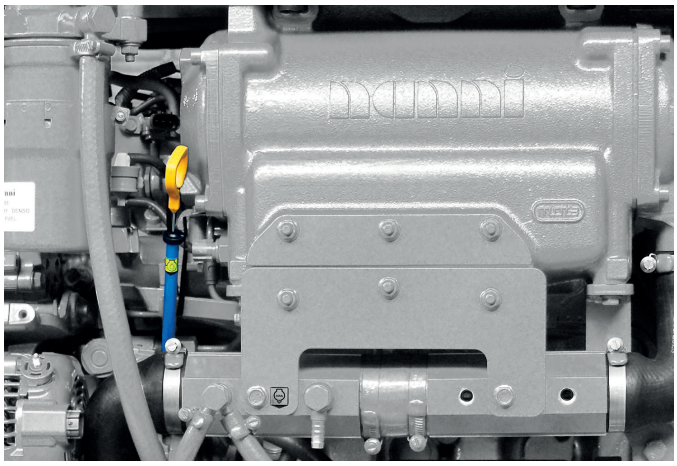
NOTE !

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

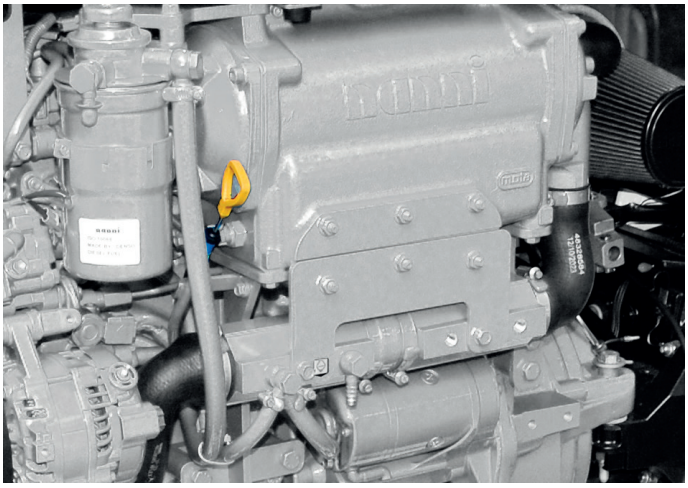
DRAINING THE ENGINE OIL

Principle of operation:

5. Start the engine and let it warm a few minutes to render oil more fluid to ease suction.
6. Stop the engine and remove the key from the panel.
7. Remove the oil dipstick and connect the oil drain pump.
8. Pump all used oil out from the pan.
9. Disconnect the oil drain pump and replace the cap on the drain pipe.



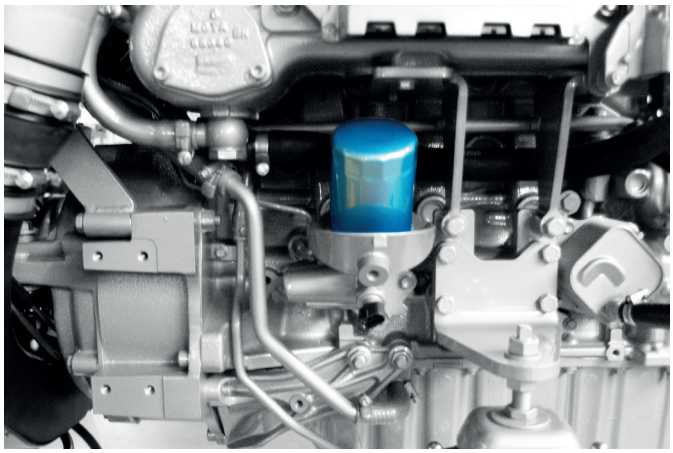
Above picture: draining oil - close up.



Above picture: larger view of oil stick.

CHANGING THE OIL FILTER

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

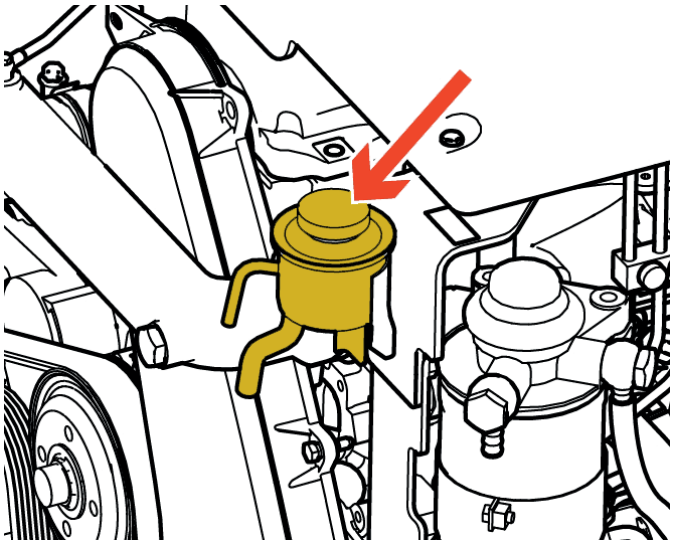


1. Remove the oil filter with a filter wrench tool. Turn the filter counter-clockwise (CCW). Remove the gasket.
2. Clean the mating surface in order to prevent impurities from entering the engine.
3. Apply a film of oil on the new gasket. Screw the new filter by hand with the new gasket. When the gasket contacts the mating surface, turn the filter a half turn.
4. Fill with proper amount of new oil. Check for leaks and check the oil level.
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.

POWER ASSISTED STEERING OIL LEVEL

Stern Drive version only.

The tank mounted on the engine allows to check the oil level of the power steering.



1. Remove the plug, wipe clean the dipstick.
2. Replace the plug and remove it again.
3. Check that the oil level is between the Mini and the Maxi mark. If the level is too low, fill to a safe operating level as indicated by the dipstick. Do not exceed the maximum level.
4. Use the special fluid for power-assisted steering or Dextron III automatic transmission fluid. Replace the fill cap and dipstick.

STERN DRIVE GEAR LUBE (Z SERIES)

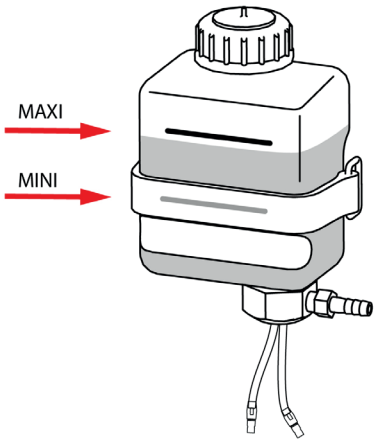
CAUTION !

Damage to the Stern Drive unit may occur due to lack of lubrication.

If any water is visible at the bottom of the gear lube monitor, or if the gear lube appears discolored, stop the engine except in case of emergency, and contact a NANNI workshop. it may indicate a water leak in the Stern drive unit.

Check the gear lube with the engine cold, before starting.

1. Check the gear lube monitor to determine the gear lube level. The appropriate level should be between the Mini and Maxi level marks.



2. Add gear lube if necessary. Remove the gear lube monitor cap and add a high performance gear lube for Stern drive.

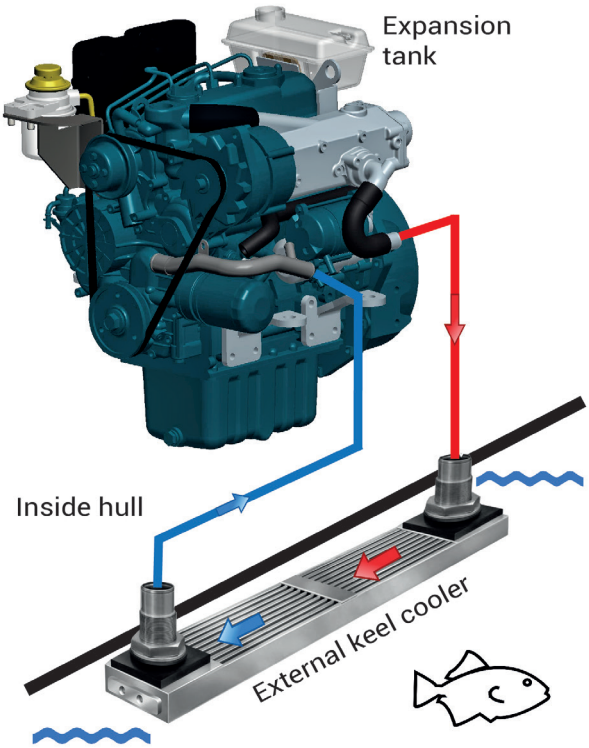
COOLING SYSTEM

OVERVIEW

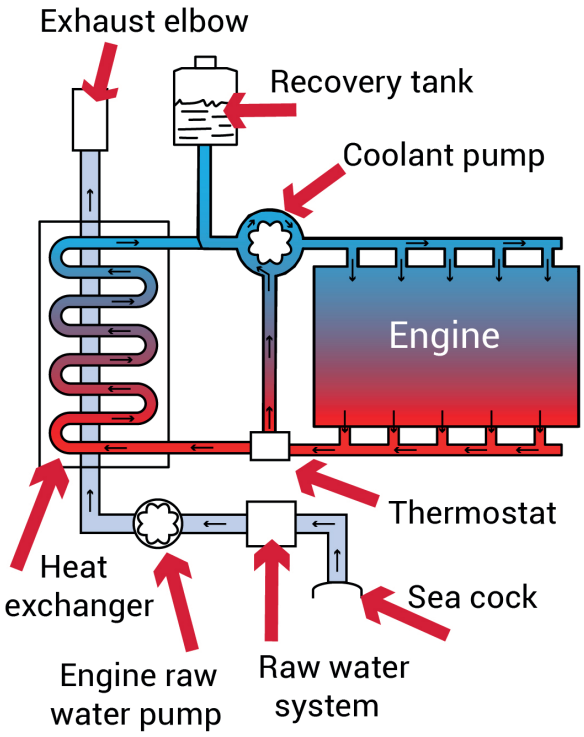
The cooling system cools the engine in order to maintain a proper operating temperature and to prevent overheating. On some engines, the cooling system also cools the fuel, the oil or the air intake. The cooling system is built around two circuits:

- 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.



External keel cooling principle



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.

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.

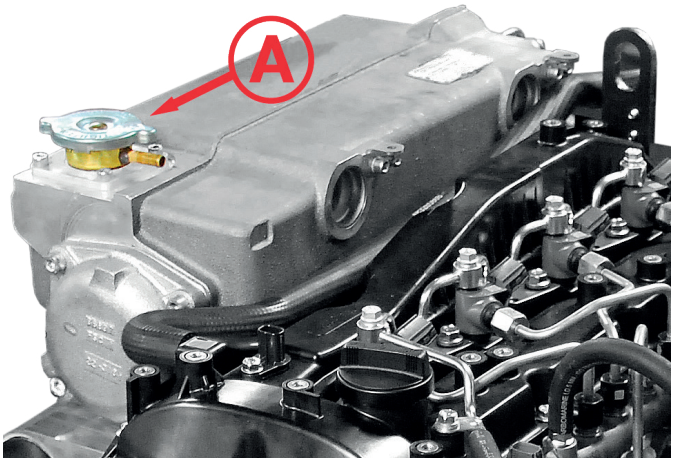
A raw water filter must be fitted between the raw water intake and the raw water pump of the engine.

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 !

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

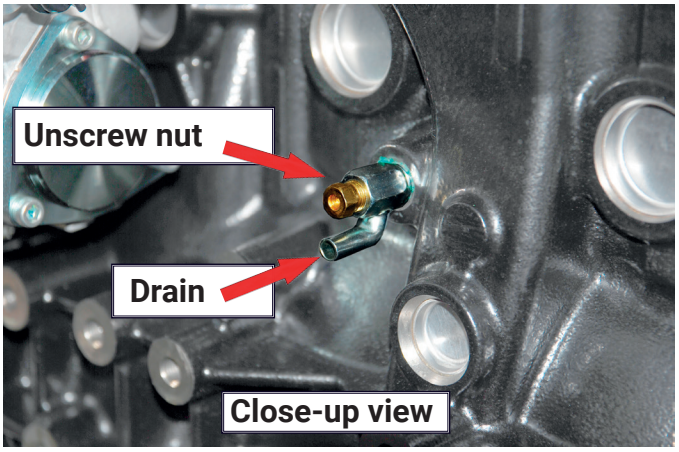


NOTE !

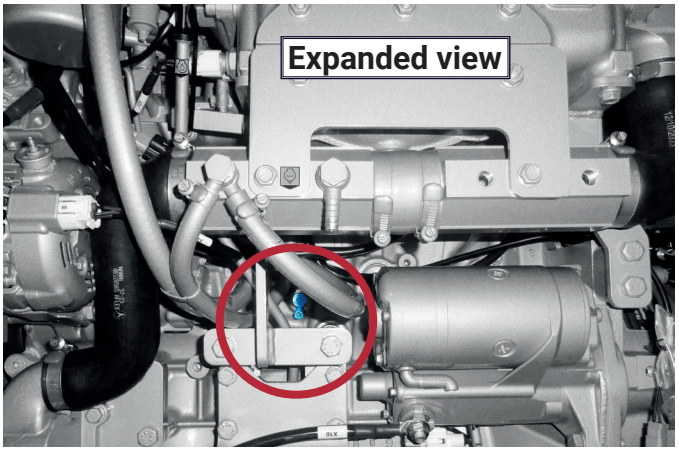
This Max level in the tank is representing the effective level of coolant only when the engine is cold.

COOLANT CIRCUIT DRAINING

1. Stop the engine and remove the key from the panel.
2. The drain plug is located on the engine starter side. Place a container under the drain plug (**in blue, bottom view**) to collect coolant via a small plastic hose inserted into the drain bended pipe. Remove the filler cap on top of engine. Unscrew the plug just a few to allow coolant to flow.



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. Screw back the drain plug, secure it and fill with new coolant as explained on next paragraph.

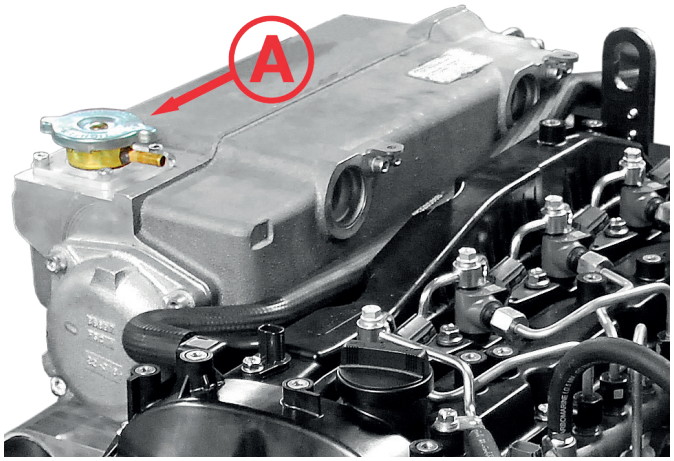


COOLANT - FILLING

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 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. To make sure that there is not an air bubble caught somewhere inside the engine block, start the engine and let it run for a few minutes at idling. 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.

RAW WATER SYSTEM

DANGER !

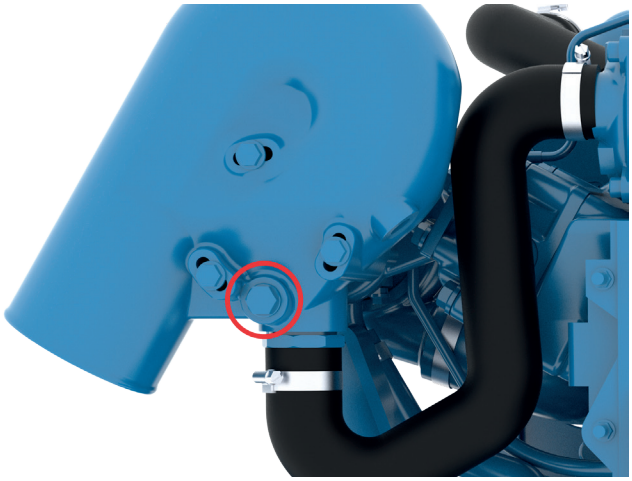
When the boat is on the water, it is possible than water can flow into the boat via components located below the waterline. Close the raw water cock (if fitted) or prevent water discharge before working on the raw water system.

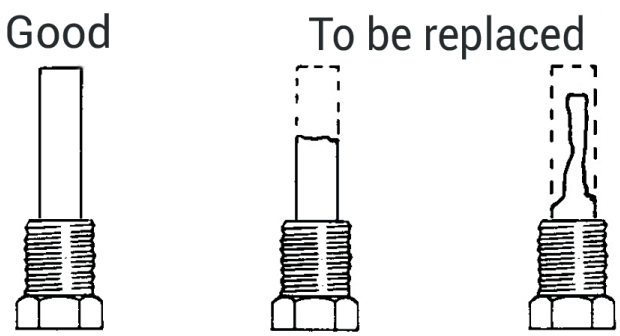
NOTE !

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

ZINC SACRIFICIAL ANODE CHECK

Zinc anode is located on the top of the exhaust elbow, as shown on the picture below in blue:





SIPHON BREAKER

DANGER !

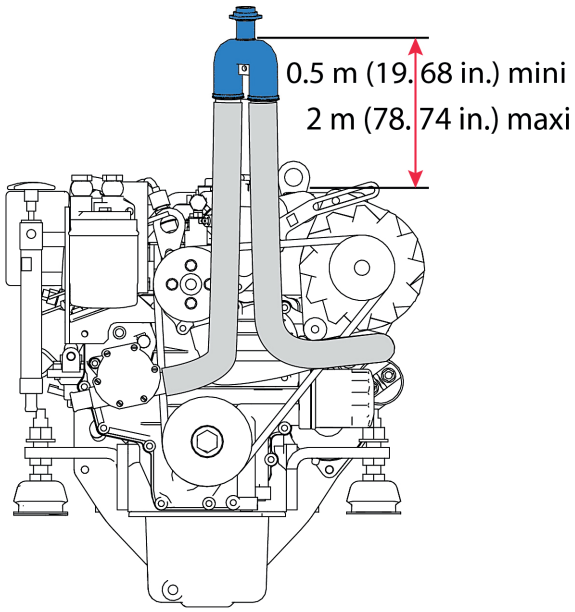
Close the sea cock before any operation on the siphon breaker.

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.

S08 MAINTENANCE

EXTRACT THE RAW WATER PUMP IMPELLER

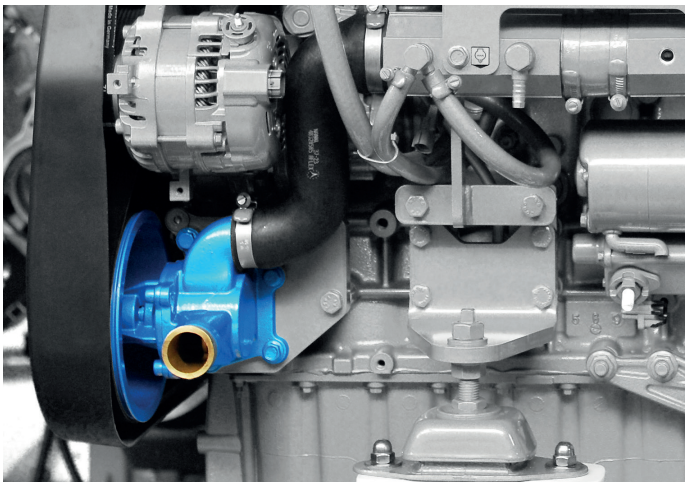
CAUTION !

If the engine did run without supply of raw water, check the raw water pump impeller. Change if needed.

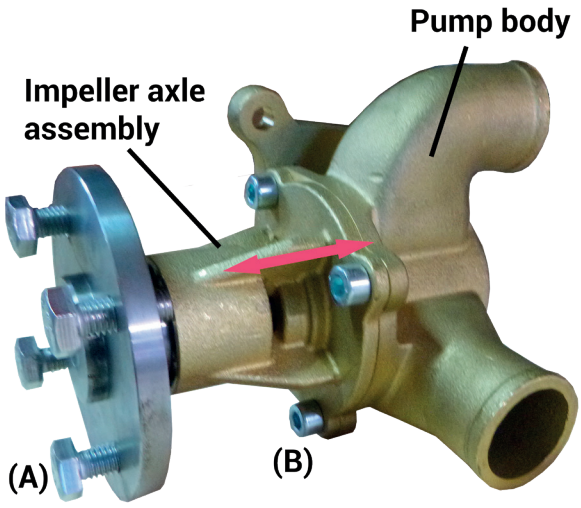
NOTE !

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.

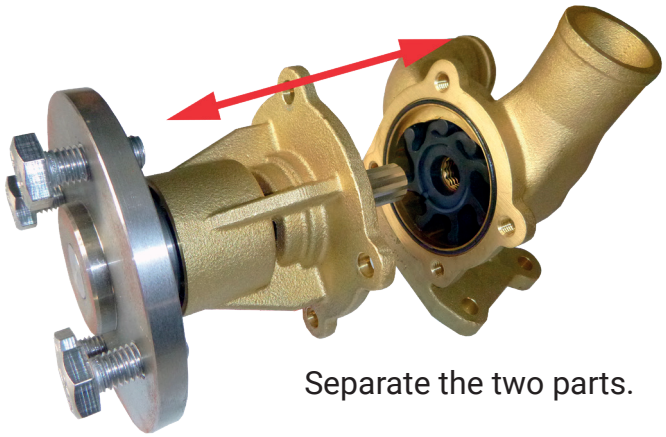


Raw water pump on engine block.

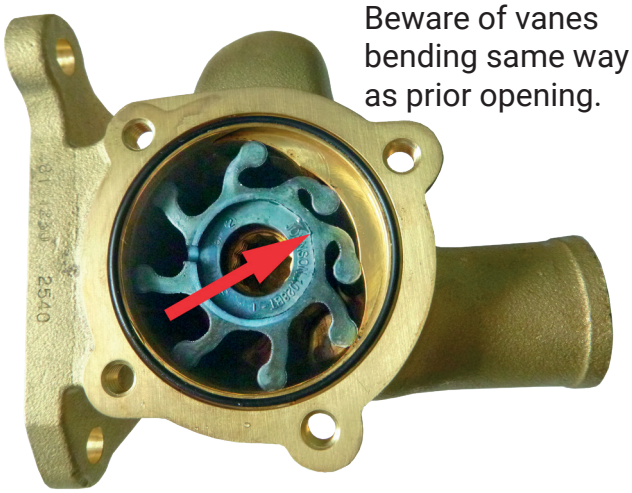


How to extract the impeller:

1. Stop the engine, remove the key from the panel and close the sea cock.
2. Remove the front cover from the engine & accessory belt. Remove pump hoses.
3. Remove the pulley from the pump [4 screws (**A**)].
4. Remove the four Allen screws (**B**) from pump body.
5. Pull off the impeller axle assembly from the body. Closely inspect the impeller. Check for damaged, cracked, broken missing or flattened vanes. Change the impeller if damaged.
6. Inspect the impeller axle assembly and the gasket for corrosion or damage. Replace if damaged.
7. Lubricate the inside of the pump and the axle assembly with waterproof grease for rubber.
8. Install the impeller. Rotate the impeller in the same direction as the engine rotation. Lubricate the impeller with waterproof grease for rubber.
9. Inspect (replace) the Oring gasket seal betwenn body and impeller axle.
10. Screw back the impeller axle assembly onto the pump housing. Fit back hoses. Secure clamps.
11. Open the sea cock, check for leaks. Prime the raw water system by adding water through the raw water filter if necessary.
12. Start the engine and check again for leaks.



Separate the two parts.



Beware of vanes bending same way as prior opening.

S08 MAINTENANCE

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 !

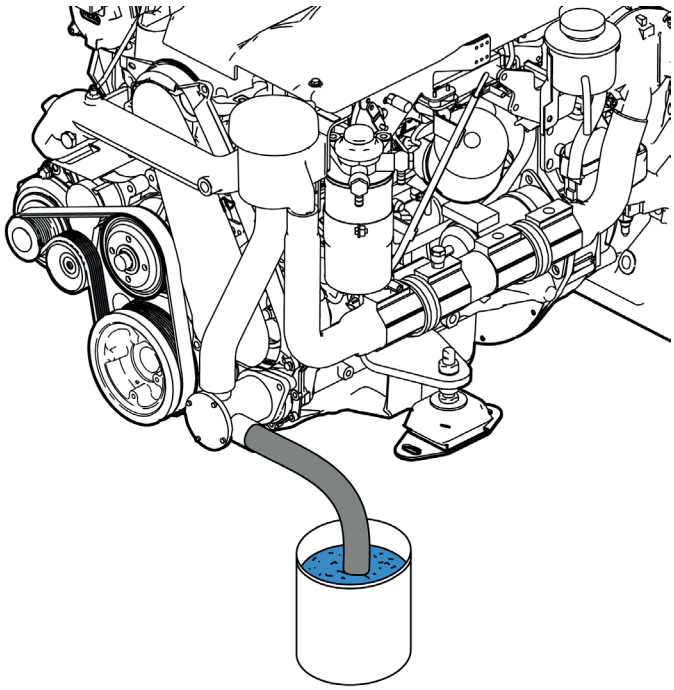
It is highly recommended to carry out these operations when the boat is laid up on bare ground. If the boat cannot be removed from the water, close the sea cock and prevent water entry by any means.

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.



Generic image; does not affect actual engine.

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.

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.

HEAT EXCHANGER SERVICE

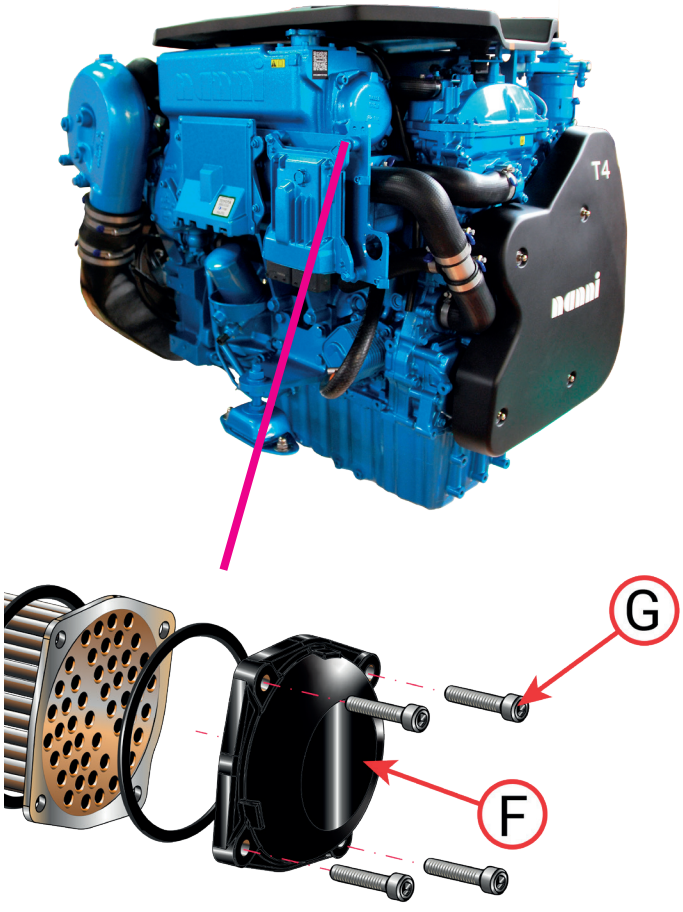
IMPORTANT !

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

Heat exchanger inspection:

1. Close the sea cock 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 and disconnect sea water hose tube.
4. Remove cap screws (**G**) and remove end cap (**F**). Identify end cap so it can be installed in the same position as removed.
5. 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.

Heat exchanger location & end cap removal:



Heat exchanger internal core cleaning:

1. Thoroughly clean all build-up from both end caps.
2. When end cap is removed, pull off the internal core tube stack for cleaning.
3. 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 (**G**) .

INTERCOOLER SERVICE

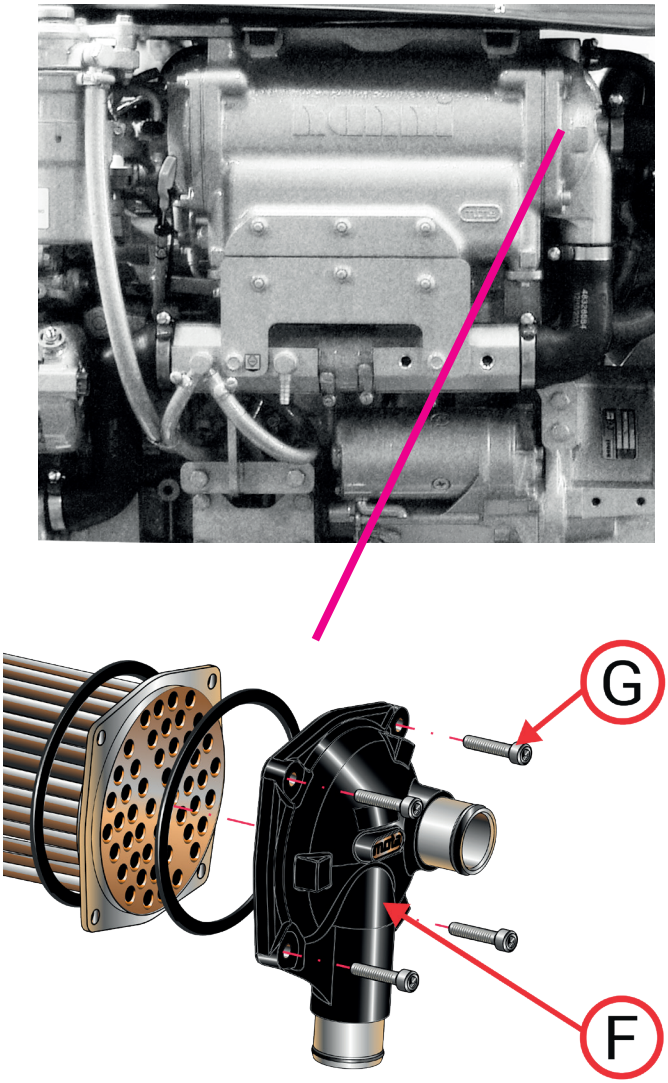
IMPORTANT !

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.

Intercooler inspection:

1. Close sea cock and drain the sea water or coolant system.
2. Remove cap screws and end cap.
3. It must be anticipated to remove the fuel filter prior proceeding to core removal with ease.
4. Remove intercooler core tube stack.

Intercooler location & end cap removal:



1. Clean the intercooler core with a brass rod.



2. Install O-rings (replace if damaged), in front and rear caps. Lubricate O-rings with clean-multipurpose grease.
3. Install intercooler core in same position as removed.
4. Install front and rear caps (**F**) in same position as removed. Tighten cap screws (**G**).
5. Install ducts and lines. Evenly tight clamp screws.
6. Open sea cocks.

S08 MAINTENANCE

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.

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.

S08 MAINTENANCE

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	Nominal Capacity (K20)	Cold Test Icc
	A.h	A
T4 Evo3	100 (Min) -120 (Best)	650-700

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.

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 :

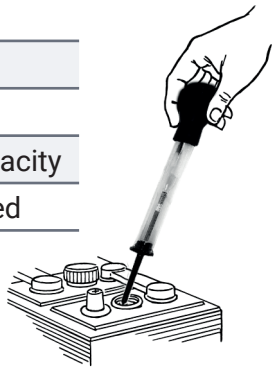
Unscrew completely the vent plugs and check level with a flashlight in each and every orifice.

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 !

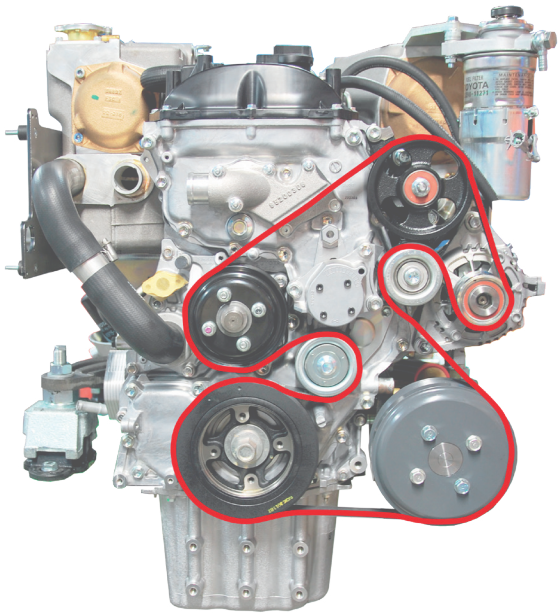
Always keep a spare replacement belt on-board.

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:

Should belt internal wires become frayed, replace the belt. Check that belt fits properly in the pulley. Belt is constantly tensioned by an automatic belt tensioner.



To replace the belt:

1. Stop the engine and remove the key from the panel.
2. Remove the front cover.
3. Move the tensionner(s) in using an appropriate tool to be able to slip out the belt from the pulleys.
4. Install the new belt. Check that the belt seats properly between the flanges of all the pulleys.
5. Restart the engine only when front cover is back in place and properly bolted.

FUSES

The engine electrical system is protected from electrical overloads by fuses. Fuses and relays are located in the electrical loom.

If the engine does not start or if the instruments panel does not operate, a fault might be somewhere in the electrical system and a fuse may have blown up.

Investigate the cause before replacing the faulty fuse straight away. Keep an assortment of spare fuses on hand. Replace a fuse with one of the same rating.

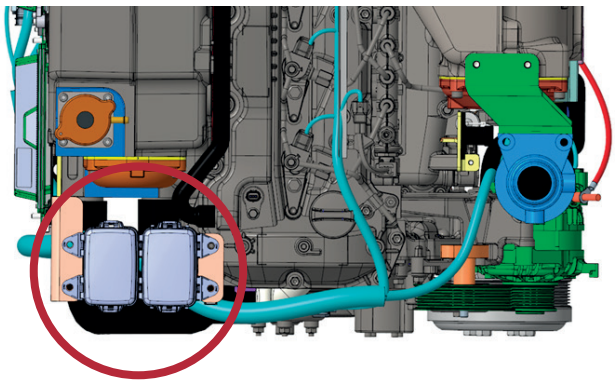
CAUTION !

If the replaced fuse blows again, the failure is larger than a simple incident. If you are still at shore, do not start the engine, and check first on your on in taking all usual precautions. If the fault is not resolved quickly, contact your nearest Nanni representative for repair.

If you are at open sea, try to locate the fault and to repair by yourself. Depending of the severity of the fault and if the event is endangering navigation, establish a radio contact to get help. Take steps as advised.

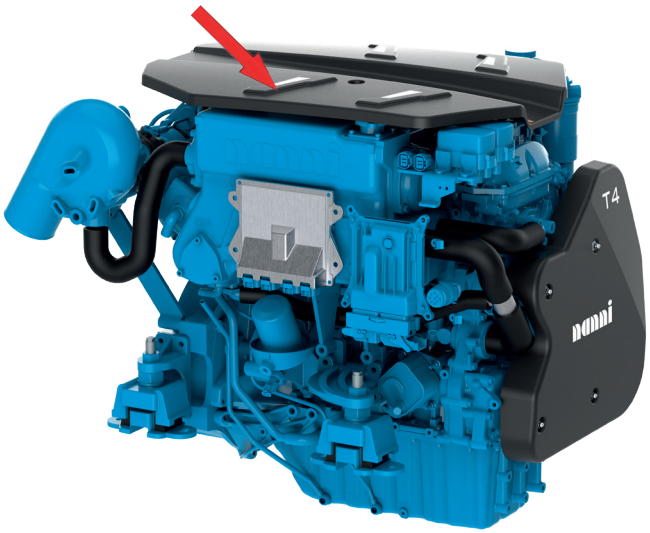
Location of main electrical components:

Fuses and associated relays are located on the front of the engine into two separate isolated and waterproof boxes. See detailed view next page.

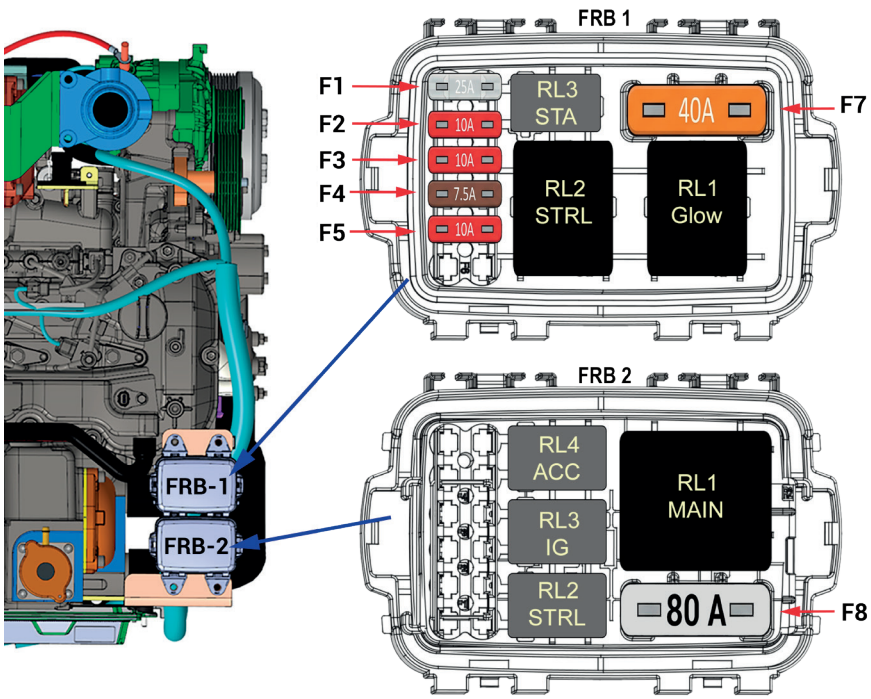


NOTE !

Engine top cover must be removed for full access to the lids of the fuses boxes:



Fuses & Relays boxes:



Glossary:

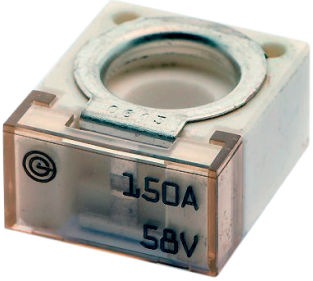
F1 = EDU : Electronic Drive Unit : 25 A
F2 = EFI : Electronic Fuel Injection : 10 A
F3 = IG : Ignition : 10 A
F4 = ALT-S : Alternator regulator : 7.5 A
F5 = CAN : 10 A
F6 = N/A : Slot empty
F7 = START : Starter Motor Relay : 40 A
F8 = GLOW : Glow Plugs : 80 A
F9 = ALT : Alternator : 150 A (M8-Fuse on alternator body)

Alt Fuse:

150 Amps fuse is fitted between positive lug and alternator binding post.

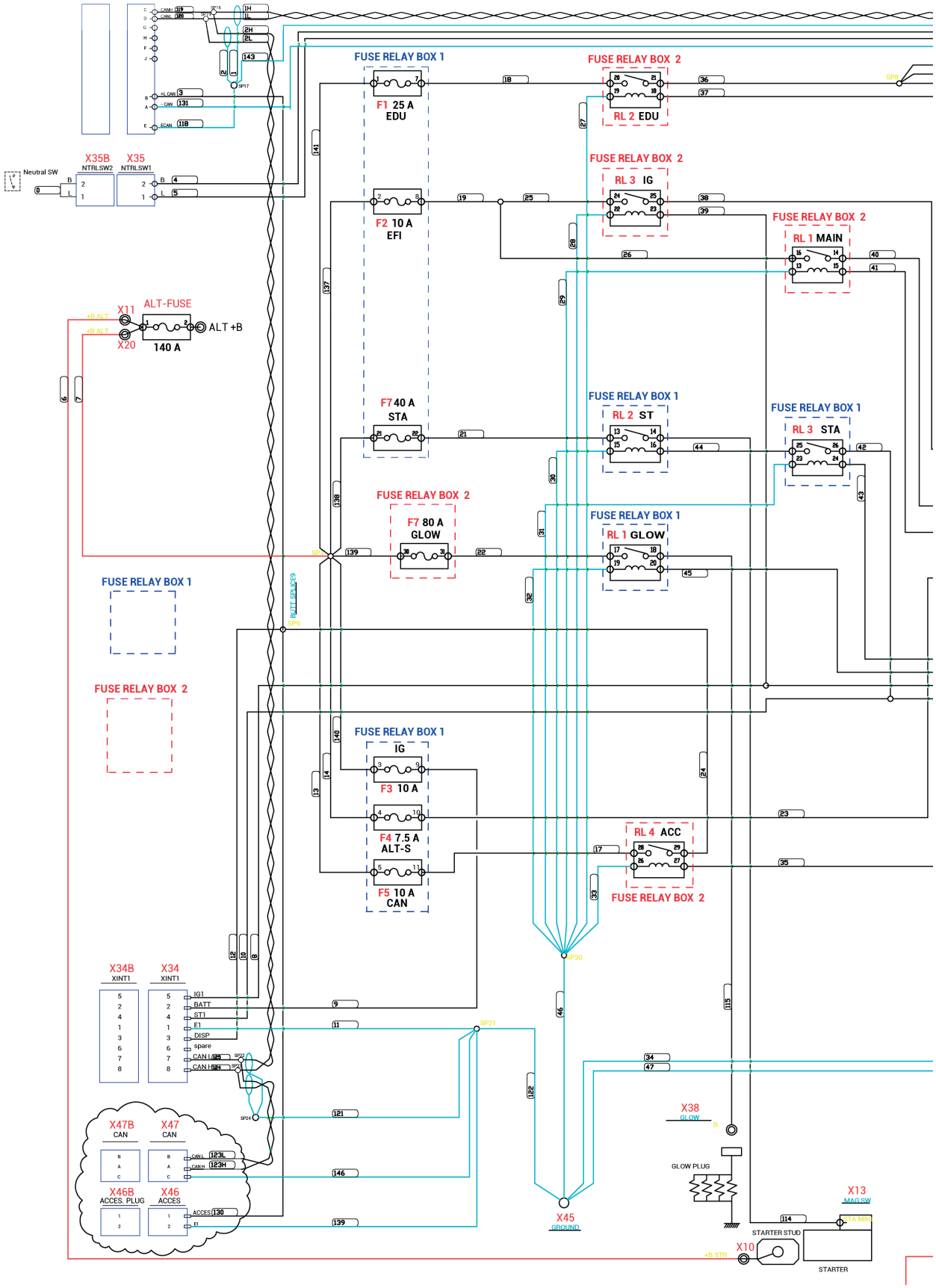
To replace the fuse : unbolt the red isulator nut with a 19 mm metric wrench. **Do not** use an adjustable wrench as it may damage the nut.

Beware : the red insulator nut is a hard to get part if lost in the engine room.





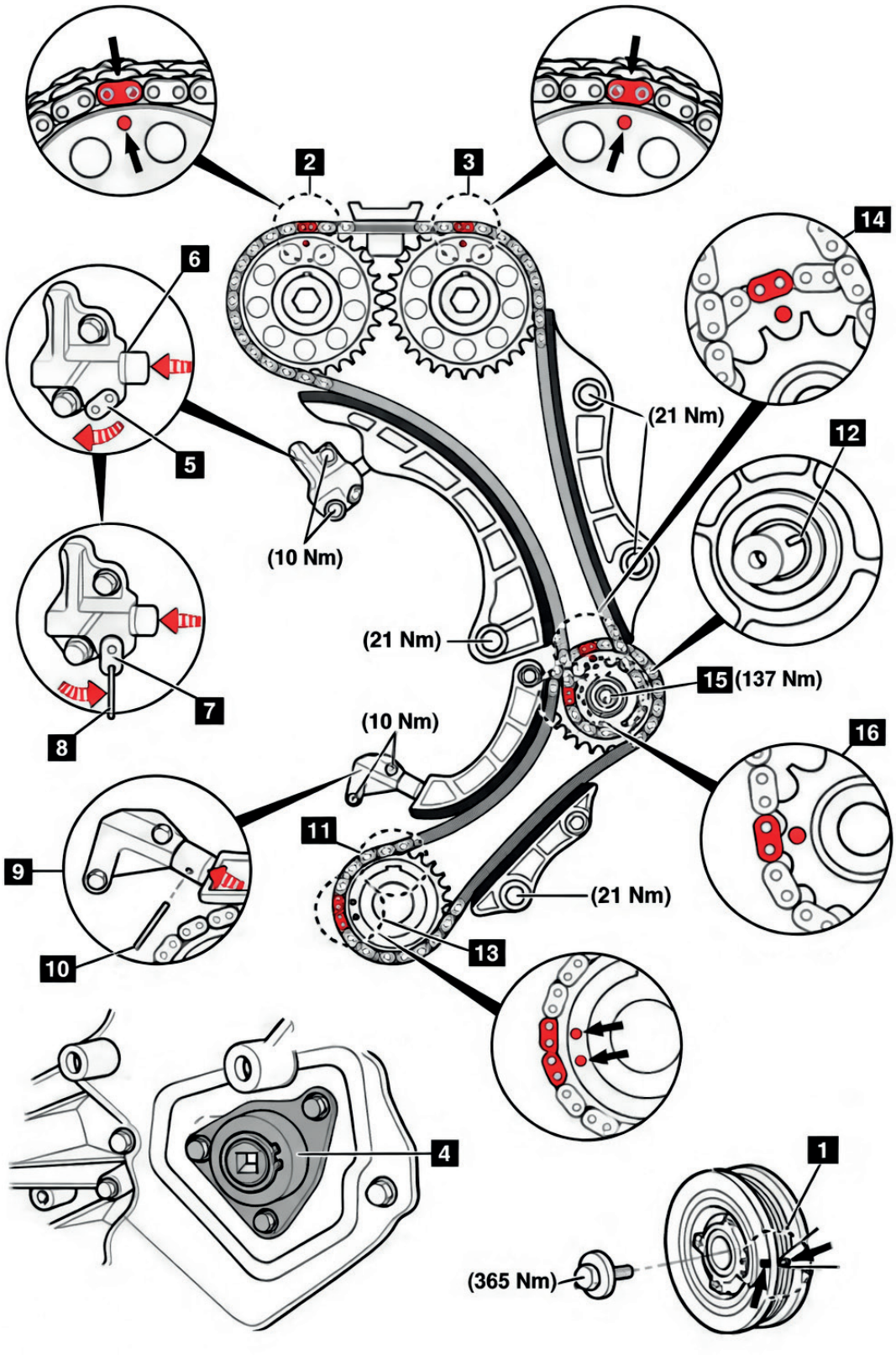
Location of Fuses & Relays on electrical diagram:



MISCELLANEOUS

CAMSHAFT TIMING - FOR INFORMATION ONLY

Timing is ordered through a set of two chains cased behind the alternator belt as shown below. Cam belt service can only be performed by a NANNI representative.



S08 MAINTENANCE

S09 STORAGE

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.

S09 STORAGE

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 ordered. 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

EMISSION CONTROL SYSTEM WARRANTY STATEMENT USA ONLY

This Emission Control System Warranty ECSW applies solely to engines certified to United States of America EPA 40 CFR 1042 and sold through Nanni Industries S.A.S - France network (named the "Company") that are installed in vessels flagged or registered in the United States of America and associated waters (ie., Pacific & Carribean).

SCOPE OF ECSW

Nanni Industries S.A.S warrants to the first owner and subsequent purchaser of a new diesel engine sold by the Company, the following:

That the engine has been assembled, equipped and tested to be in conformity at the time of sale with the relevant regulations in force of the U.S Environmental Protection Agency.

That the engine is defect free both in material and workmanship causing the engine to fail to conform with the above mentioned regulation for a warranty period in years and hours of engine operations listed herewith in this document, and whichever would occur first.

ECSW CONDITION

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

When applied onto engine, Emission Control label must never be removed from engine neither covered with a layer of paint. This label is the evidence showing that the engine is meeting U.S Emissions Regulations.



Above picture: Sample proof of EPA Label.

WARRANTY COVERAGE

Repair or replacement of warranted parts will be performed by an authorized Nanni distributor/representative. ECSW covers engine components that are part of the emission control system of the engine as delivered by the Company to the purchaser. Such components include the following:

- Injection pumps
- Injectors
- Air intake manifold
- Turbocharger
- Intercooler

WARRANTY PERIOD

The warranty period starts on either the date of:

- Delivery to the first-end user,
- Date the unit is first leased, rented or loaned,
- Date of commissioning by shipyard,

Whichever applies by mutual agreement between involved parties for the engines listed below:

Engine	Warranty Period
T4 150 Evo3 T4 180 Evo3 T4 230 Evo3 T4 260 Evo3	Five (5) years or 5 000 hours
T8V.320 T8V.350 T8V.370	Five (5) years or 5 000 hours

Only for year model 2025 (refer to serial number i.e.,TYx20xxxxxx).

WARRANTY LIMITATIONS

As far as Nanni Industries S.A.S engines are ECS certified, it means that the Company guarantees that all engines of the same type that are assembled are approved and certified by the authorities in accordance with different exhaust emissions standards.

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

- Identical & equivalent replacement parts can be used for maintenance or service onto the engine and shall not void ECSW. Having an unauthorised agent perform an intervention is also acceptable.
- The engine must not be modified in any way except with accessories and service kits approved by Nanni Industries S.A.S. France.
- Maintenance intervals must be observed.
- Service of the fuel system must be carried out by seasoned mechanics.
- No modifications to the air intake and exhaust system may be undertaken.
- The operation instructions stated in the relevant manuals must be followed by the user.

Nanni responsibility for the engine specification being in accordance with the certification will be void if one or several of above conditions are not closely observed.

ENVIRONMENTAL RESPONSABILITY

Nanni engines are assembled and tested in view to cause the minimum possible environmental impact. This objective, however, can only be achieved with full cooperation of the end user.

Operating and maintenance instructions issued in the Company User Manuals are providing the best help for the user to protect their engine(s) and to adopt environmentally responsible behaviour.

Nanni engine(s) users must ensure that they only use recommended fuels and oils. 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.

CUSTOMER ASSISTANCE

Should you have any question regarding the Emission Control System, your authorized Nanni dealer will be glad to inform you and to guide you for the correct care and operating procedures to follow on your engine. Should you be in need of additional assistance, please contact:

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