

Instruction manual

Marine Diesel engine

N3.21

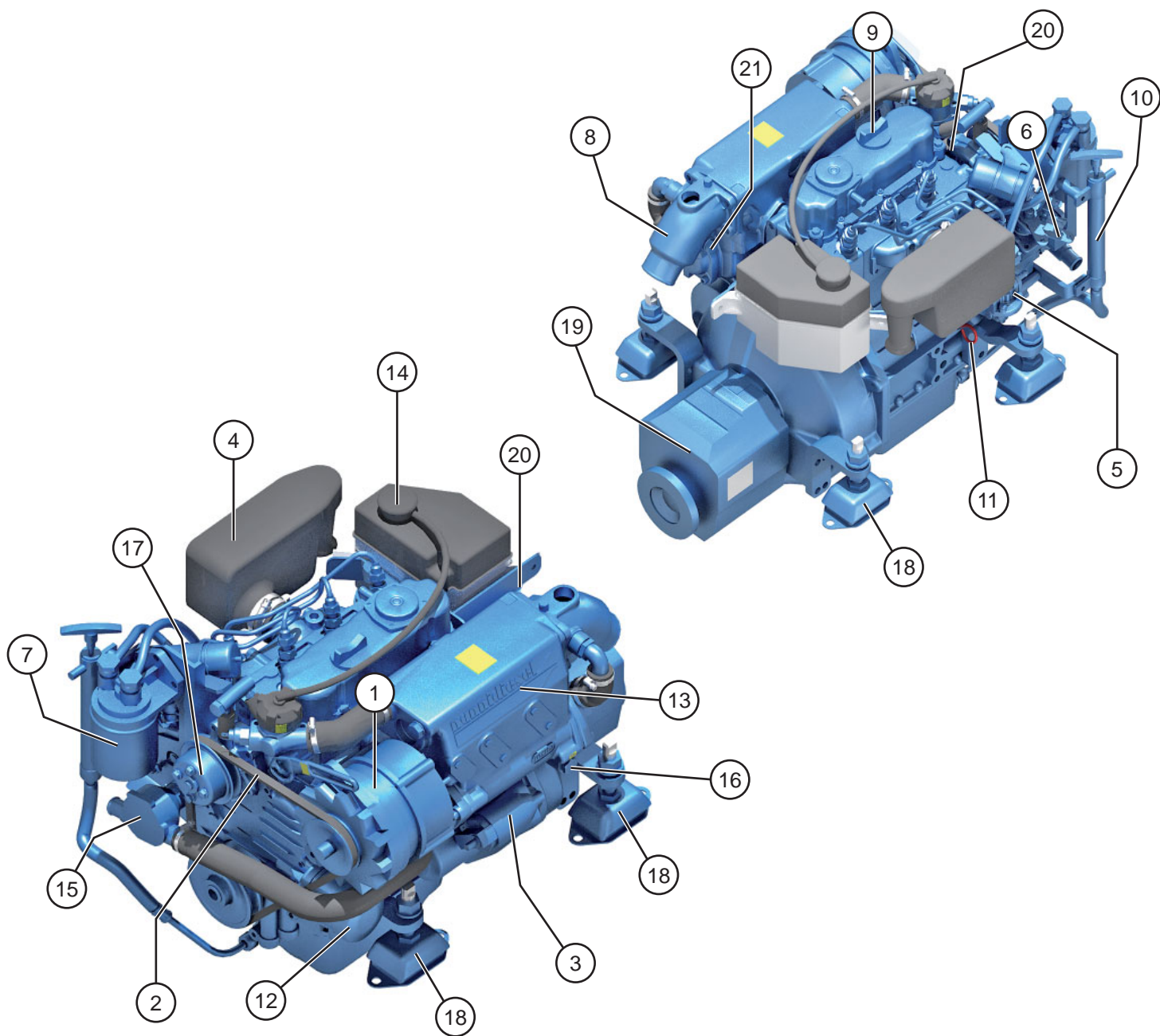
Technical characteristics

ENGINE SPECIFICATIONS		N3.21
Cycle		4 strokes, Diesel
Max. power - kW (hp)*		15,4 (21)
Number of cylinders / Arrangement		3 in line
Displacement (cm ³)		719
Fuel timing before TDC (°)		20 to 22
Compression rate		23:1
Aspiration		Atmospheric
Bore x stroke (mm)		67 x 68
Maximum rpm speed at full throttle (rpm)*		3600
Idle rpm speed (rpm)*		1050
No load rpm speed (rpm)*		3820
Recommended cruising speed (rpm)		2880 - 3240
Weight without gearbox (kg)		97
INJECTION SYSTEM		N3.21
Injection		Indirect (E-TVCS)
Injection order		1-2-3
Injection pump		BOSCH MD Mini type
Injection pressure (bar)		140
LUBRICATION		N3.21
Oil type (temperate climat)		API CF-SAE 15W40
Oil pressure at idle speed (bar)		1
Oil pressure at max speed (bar)		2 - 4.5
Engine oil capacity (litre)		3
COOLANT		N3.21
Coolant (litres) (50% water - 50% antifreeze)		4
ELECTRICAL		N3.21
Battery capacity mini (Ah)		35-50
Alternator		12V / 70A
CONNECTIONS		N3.21
Exhaust (mm)		40
Fuel (suction and return) (mm)		8
Seawater (mm)		20

* At engine flywheel, according to ISO 8665-1.

Certain specifications may vary according to your order

Main parts of the engine



Non-binding photographs. The coupled equipment and accessories can vary according to your level of equipment.

- | | |
|----------------------------------|--------------------------|
| 1. Alternator | 12. Oil filter |
| 2. Alternator belt | 13. Heat exchanger |
| 3. Starter | 14. Coolant filler port |
| 4. Air filter | 15. Sea-water pump |
| 5. Injection pump | 16. Exchanger drain plug |
| 6. Acceleration control | 17. Coolant pump |
| 7. Fuel filter | 18. Flexible suspensions |
| 8. Water injection exhaust elbow | 19. Gearbox |
| 9. Oil filler port | 20. Hoisting rings |
| 10. Oil drain port | 21. Anode |
| 11. Oil gauge | |

Inspection and adjustment of the levels

Oil level

⚠ Warning !: The oil checks must always be performed with the engine stopped and cold. Be careful, these fluids are flammable. Do not smoke in the vicinity of these fluids and do not allow for any sparks or flame in the vicinity.

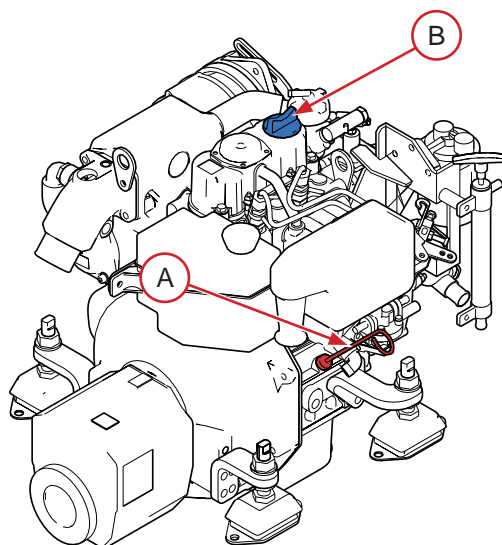
A. Oil gauge

B. Oil filler port

Engine casing oil: remove the gauge, wipe off the gauge and reinstall it in the gauge tube.

Pull out the gauge again and check the oil level. It should be located between the min. and max. positions on the gauge.

If necessary, top up the oil level: open the air filler port, pour the recommended oil (see technical appendices) to reach the max level indicated on the gauge without exceeding the max level. Close the oil filler port.



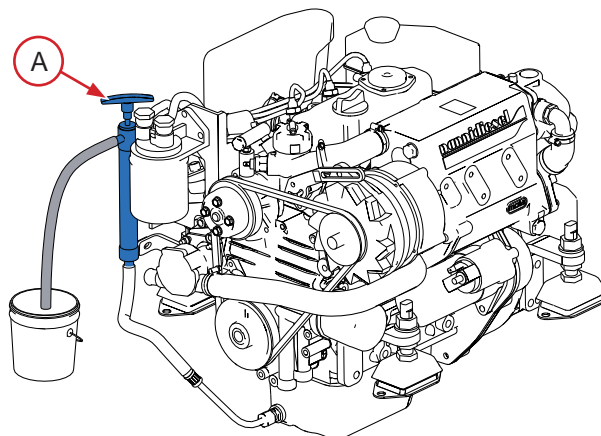
Draining the engine oil

⚠ Warning !: Hot oil can burn. Avoid any contact with the skin. Observe the environment protection rules.

A. Oil drain port

The oil is removed using a drain pump, preferably: engine slightly warm.

- Fully pump out all the oil
- Fill with new oil
- Check the oil level using the gauge
- Do not exceed the maximum level



Air filter

A. Air filter

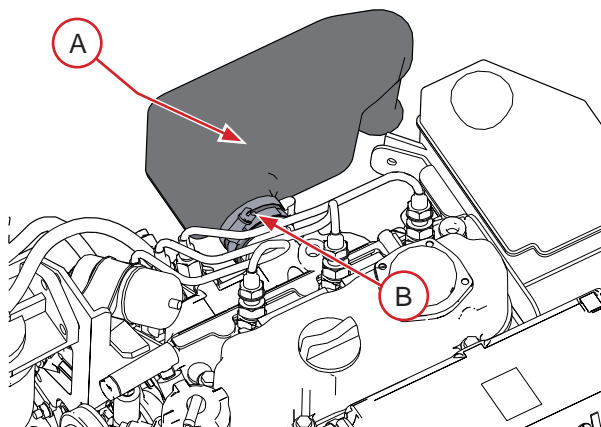
B. Clamps

⚠ Warning !: Be sure no impurities get into the engine.

Remove the clamp from the hose and remove the filter. Remove the spring inside the filter. If necessary, clean the filter by washing it with soapy water. Then, rinse the filter with clear water. Press the filter to remove any water and to dry it.

NANNI DIESEL has designed a cleaning kit which is suited to certain models of air filters.

Use of this kit is recommended on our engines to perform effective cleaning and ensure good engine « breathing ».

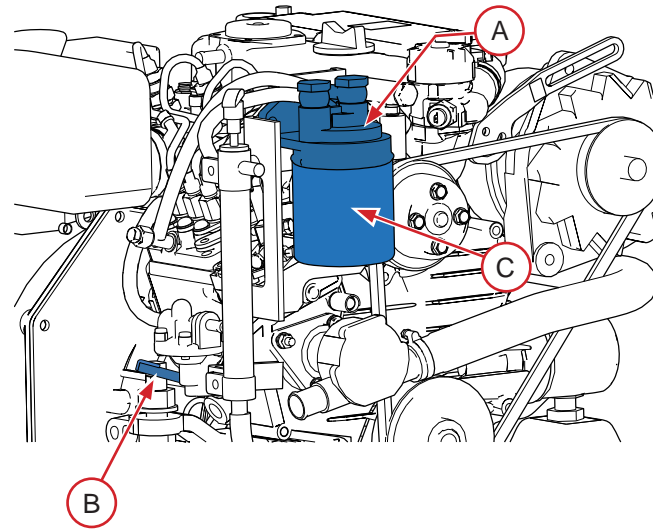


Bleeding the fuel system

The fuel system is self-priming but it needs to be manually bled when the filter is changed, after it runs out of fuel or after work on the system if it has run dry or it has been emptied.

- Open the fuel valve
- Place a container beneath the bleed screw **A** and loosen it.
- Activate repeatedly the priming pump by pressing the lever **B** until fuel with no air bubbles flows through the bleed screw. If the fuel is not flowing after few minutes, rotate the crankshaft a quarter turn.
- Tighten the bleed screw **A**

⚠ **Warning !: Avoid emptying all the fuel in the filter during bleeding.**



Replacing the fuel filter cartridge

This filter treats the water and impurities contained in the fuel before it flows into the injection system.

- Cut off fuel intake at the tank.
- Place a container below the filter and then dispose of the used filter cartridge **C**.
- Refit the new filter by attaching it securely to the engine. Turn up the hoses on the filter by squeezing the clamps.
- Loosen the bleed screw to bleed the air, open the fuel valve again and bleed the system.
- Start the engine and check that the assembly is properly sealed

⚠ **Warning! :** Used filters must be disposed of in containers designed for this purpose.

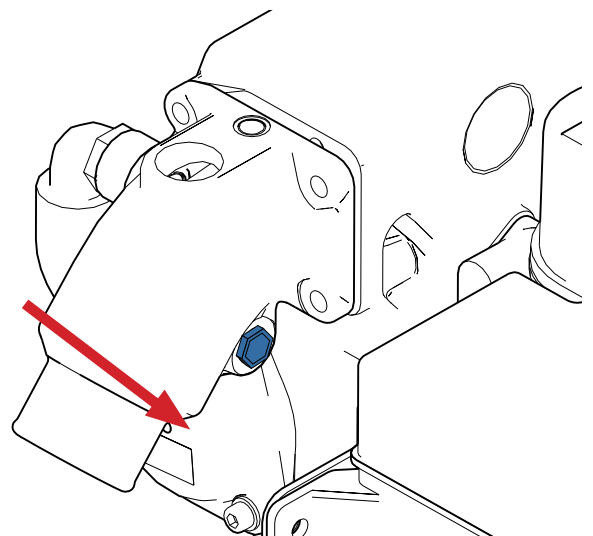
Zinc anode

⚠ **Warning !: Perform this operation with the engine stopped and cold.**

A zinc anode forms part of the exhaust elbow . It serves as an anticorrosion anode. The anode must be replaced when more than 50% of it has been consumed.

Diameter : 10 mm

Length : 16 mm



Alternator belt

⚠ Warning !: Perform this operation with the engine stopped.

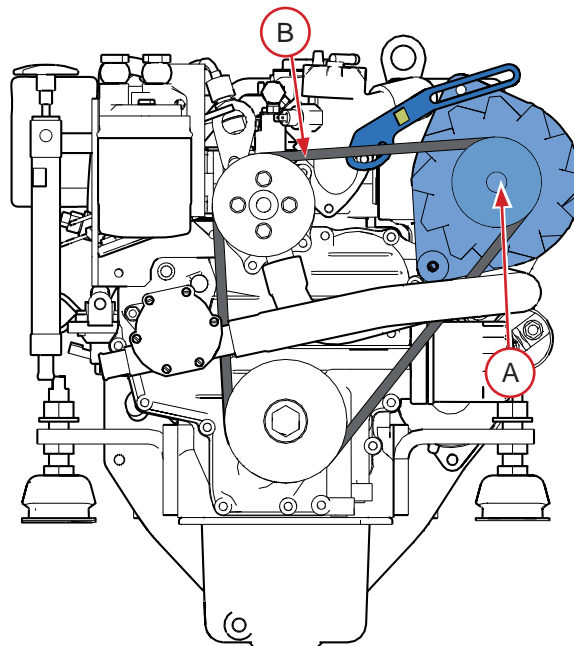
A. Alternator

B. Alternator belt

Regularly check the tensions of the alternator belt. Tension the belt between the pulleys in accordance with the tension or deflection given in the technical characteristics using a DENSO meter.

Inspect drive belt : Visually check the belt for excessive wear, frayed cords, etc. If any defect has been found, replace the drive belt. If the belt has chunks missing from the ribs, it should be replaced.

Check that it fits properly in the ribbed grooves. Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.



Seawater pump

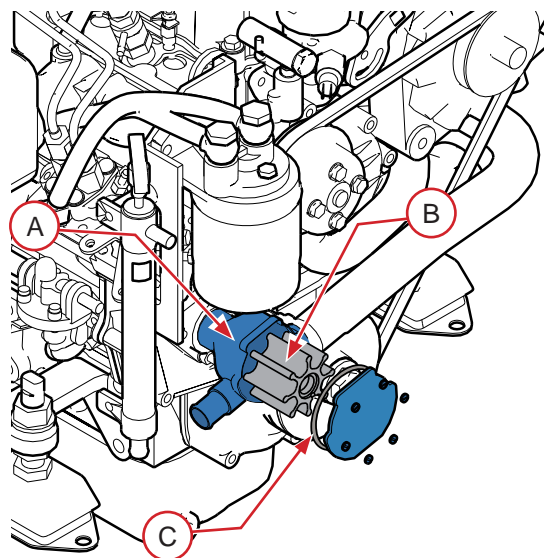
⚠ Warning !: Close the seawater intake valve as there is a risk of water penetrating into the engine.

A. Seawater pump

B. Impeller

C. Gasket

- Close the seawater intake valve
- Close the seawater pump cover
- Using a channel lock pliers, remove the worn Impeller
- If the rotor shows any signs of cracks or defects, it should be replaced
- Clean the parts preserved
- Fit a new rotor by applying a clockwise rotary movement
- Install the seawater pump cover using a new seal
- Open the seawater intake valve
- Start-up the engine and check for any leaks in the circuit



Coolant level

⚠ **Warning !:** When filling the cooling system, the coolant level must be checked after 10 minutes of use since the system purges itself automatically. Top up if necessary.

A. Coolant plug

B. Expansion tank

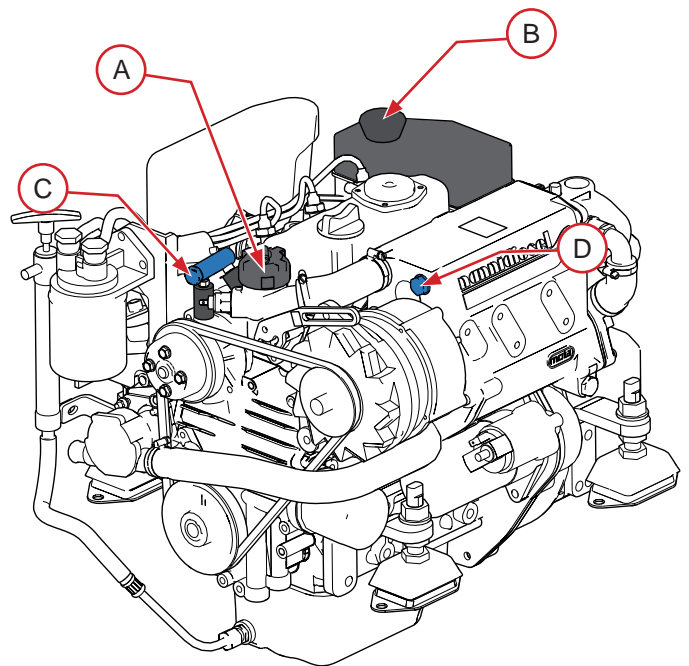
Turn the filler plug up to its first stop to allow the pressure in the system to escape before removing the plug. Inspect the fluid level.

The level should be between the lower edge of the filler neck and the level pin (if equipped), respectively representing the minimum and maximum level in the expansion chamber.

Top up if necessary using a fluid comprising 50% water and 50% antifreeze.

Degassing procedure

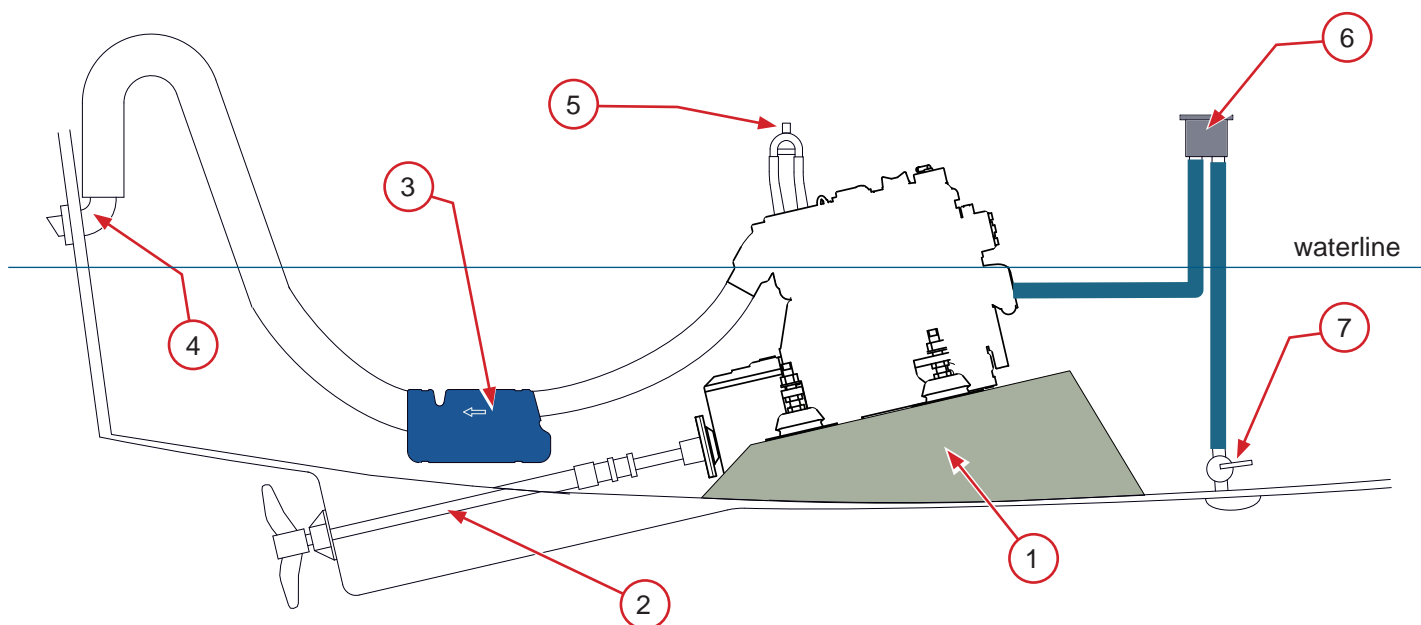
- Make sure that the drain plugs (block, heat exchanger) are closed
- Open the vent plugs **C** and **D** (heat exchanger, clamp by-pass)
- Open the filler plug **A** and fill with the recommended liquid
- Close the vent plug when the liquid escape from it
- Finish the filling of the exchanger
- Close the filler plug
- Fill half the expansion chamber by the filler plug **B**



Installation Inspection

⚠ **Warning!** : Your engine must be installed by an authorised shipyard or a qualified Nanni Industries representative in accordance with the on board assembly instructions.

However, you can check some important points on the installation of the engine. However, your installation can be different than the one that is indicated in this chapter.



1. Engine frame

The engine frame must be solid and able to absorb all the dynamic stress as well as the weight of the engine. It must be connected to the hull by a big surface area as possible.

The engine must not be at an angle of more than 15° when the boat is stopped.

2. Propeller shaft

The choice of propulsion system must be made according to the restrictions arising from the engine and the boat.

3. Water exhaust box (waterlock)

The waterlock must be positioned as close to the engine and as low as possible. Its volume must be of 5 litres minimum. The maximum allowable back pressure is 10.5 kPa (1.523 PSI).

4. Hull outlet

The hull outlet must be located 15cm above the water line. The tube between the exhaust box and the hull outlet must form a swan-neck shape to avoid any water getting into the exhaust system through the hull outlet.

5. Anti-siphon valve

This is obligatory on boats whose engine is below the waterline. The anti-siphon valve must be installed at the end of the seawater system before injection in the exhaust elbow and must be positioned above the waterline, between 0.5 and 2 meters.

6. Seawater filter

This must always be positioned at least 15cm above the waterline.

7. Through-hull valve

On yachts and boats that do not go above 12 knots, the water inlet must be turned towards the end of the boat.

On motor boats that go over 12 knots, the water inlet must be turned forwards.

Engine room

The temperature inside the engine compartment must not exceed 50°C with a maximum difference of 20°C with the outside temperature.

Slow boats must have a ventilator fitted. Fresh air from the front is circulated from front to back. The front air intake is located low down at the front of the engine compartment and the outlet high at the back for optimum air circulation (engine air consumption : 160 m³/h).

The cables and extensions must be securely fastened to the engine and / or on the walls of the engine room (do not let it dangle in the hold or let it exposed to water or moisture).

Fuel supply system

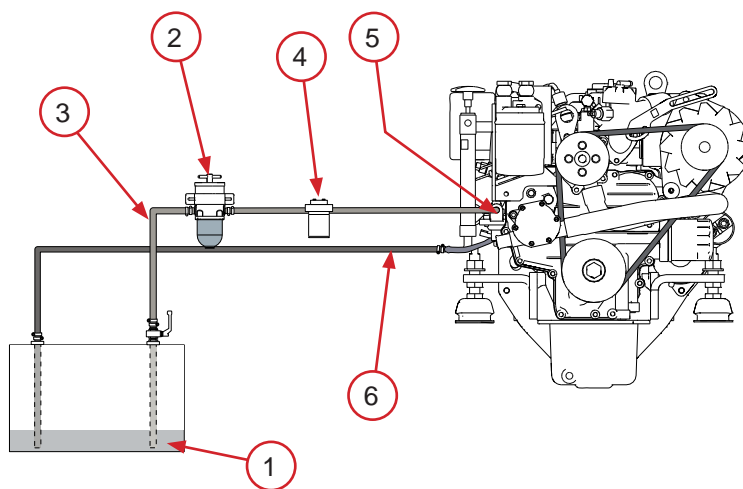
The fuel tank of the engine must be placed as possible at the same level or slightly higher than the engine.

The return pipe must be placed under the mini level of the fuel tank.

The max height between the fuel pump and the mini level of the tank is indicated on the right. The standard pump is capable of sucking the fuel to a height of 0.5m. An electric pump has to be installed beyond this value.

1. Tank
2. Prefilter
3. Fuel feed pipe Ø8 mm
4. Electrical pump (option)
5. Engine fuel pump
6. Return fuel pipe Ø8 mm

Pump	Max height (m)
Standard pump	0.5
Electrical pump	1.8



Electrical installation

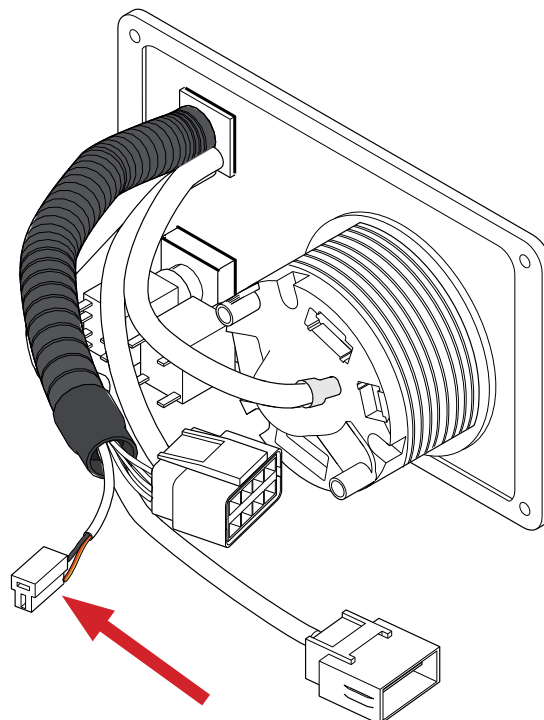
An incorrect or faulty electrical installation can cause leakage currents that can affect the galvanic protection of the engine and damage the engine subsequently.

The installer must ensure to take all necessary precautions to protect the engine against corrosion.

Auxiliary 12V output on instruments panel

The A4, B4 and C4 panels are equipped with an auxiliary output of 12V / 3A.

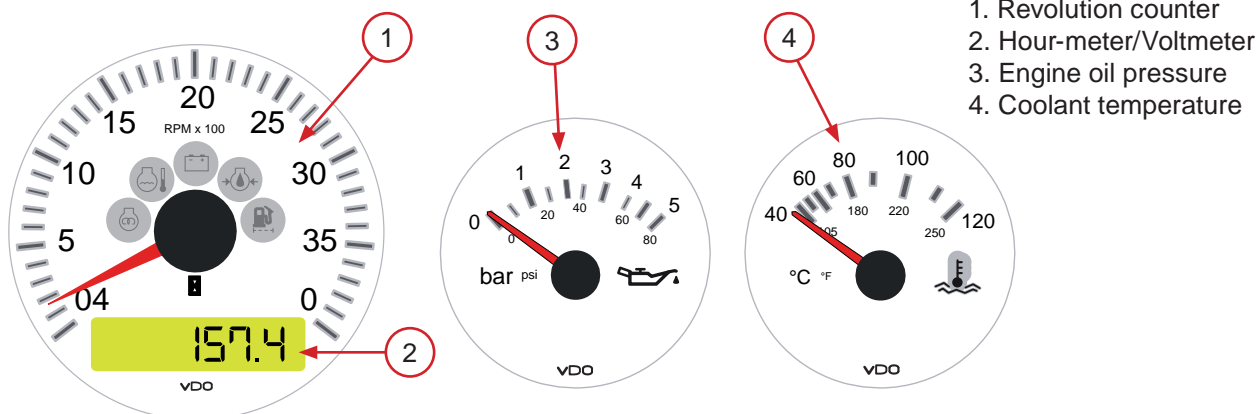
The interfaces linking the panels to the engine are fitted with a fuse.



Instrument panel

The instrument panel provides you with important information on the engine when it is in operation. Regularly check this information when the engine is running.

2 ranges of instruments panels are available. Only the position and / or appearance of the instruments and / or the icons vary depending on the type of panel. All panels are not composed of all these elements.



Battery charge. This warning light comes at ignition. If this warning light comes on while the engine is running, this means there is a charging fault in the alternator.



Coolant temperature warning light. This light comes on and an alarm goes off in the event of overheating in the cooling system.



Engine oil pressure warning light. This light comes on when the pressure in the lubrication system is too low.



Pre-heating. This light is on when the spark plugs are pre-heating the combustion chambers (if your engine has these).



Water in the diesel filter warning light (optional). This light comes on when there is too much water in the diesel filter.



Ignition. This light indicates that the ignition is on.

Operation of an engine equipped with an Eco4, A4, B4 or C4 panel:

To start the engine :

1. Put the throttle in the neutral position.
2. Put the key into the ON/STOP ignition.
3. Turn the key a quarter turn to the right. All the warning lights will come on and it will make a sound signal. This stage allows you to check that these elements are working properly. After a few moments, only the oil alert and battery charge lights will remain on.
4. Press the START button at halfway to start preheating. **Hold the button for 5 to 15 seconds**, depending on ambient temperature, in order to let the engine preheat. Press fully to start the engine.

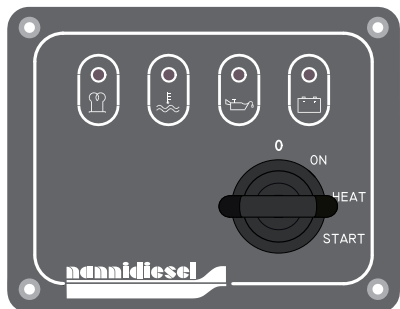
⚠ Warning !: Never press the START button when the engine is running.

Stopping the engine:

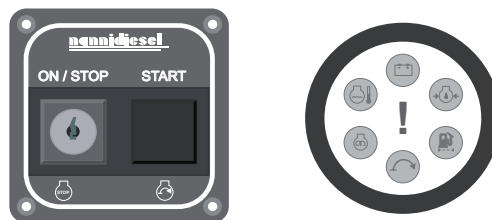
Turn the key counter clockwise. The engine switches off and all the warning lights go out.

The operation of the ECO3, A3, B3 and C3 panels is explained in the user manual reference 970313180 that is also delivered with the engine.

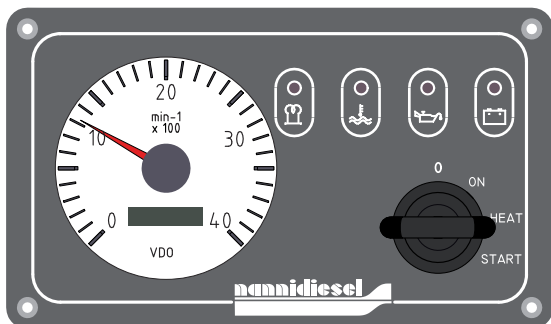
Eco3



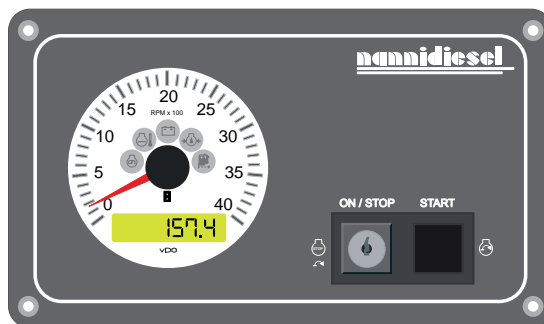
Eco4



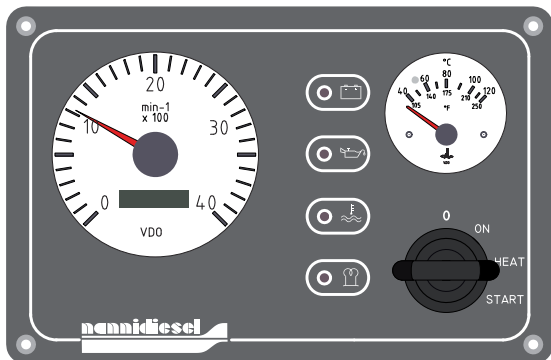
A3



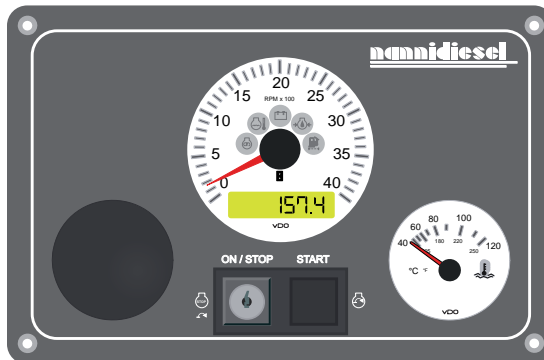
A4



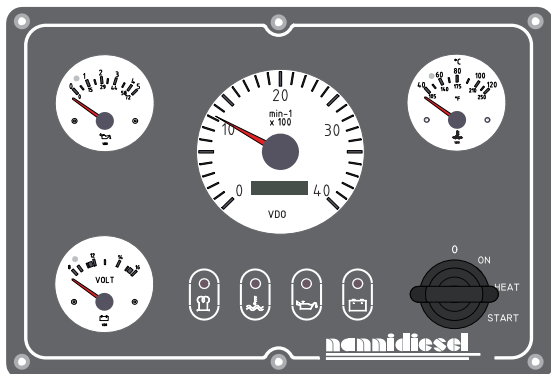
B3



B4



C3



C4



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