

DT44

DT44 DTA44 DT66 DTA66

Operation manual

Operation manual



DEUTZ
DT44 DTA44
DT66 DTA66

Serial numbers

Engine serial number Vetus:

Deutz:

Gearbox serial number:

Please enter the serial numbers here.

These numbers should be quoted when inquiring about Customer Service, Repairs or Spare Parts (see page 6).

We reserve the right to make any changes without previous notice.

Please read and observe the information given in this operation manual. This will enable you to avoid accidents, preserve the manufacturer's warranty*) and maintain the engine in peak operating condition.

This engine has been built exclusively for the application specified in the scope of supply and is to be used only for the intended purpose. Any use exceeding that scope is considered to be contrary to the intended purpose. The manufacturer will not assume responsibility for any damage resulting therefrom. The risks

involved are to be borne by the user.

Use in accordance with the intended purpose also implies compliance with the conditions laid down by the manufacturer for operation, maintenance and servicing. The engine should only be operated, maintained and serviced by persons which are familiar with the former and the hazards involved.

The relevant accident prevention guidelines and other generally accepted safety and industrial hygiene regulations must be observed.

Unauthorized engine modifications will invalidate any liability claims against the manufacturer for resultant damage.

Manipulations of the injection and regulating system may also influence the performance of the engine, and its emissions. Adherence to legislation on pollution cannot be guaranteed under such conditions.

*) For warranty conditions see 'Service and Warranty Manual' STM0016.

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1 Safety measures



Warning!

All safety instructions in this manual are designated by the accompanying symbol. Please follow them carefully.

Pass the safety instructions to other persons operating the engine as well.

General regulations and laws for safety and accident prevention must also be observed.

- Never attempt to touch moving parts when the engine is running.
- Never touch hot parts of the engine, and keep flammable materials well away from the engine.
- Always stop the engine before checking or adjusting components.
- Always stop the engine before checking or topping up the coolant or oil.
- **NEVER** open cap on top of header tank when the engine is at operating temperature.
- Always carry out maintenance safely by only using tools well matched in size.

2 Introduction

Dear customer,

Vetus Deutz engines are designed both for pleasure and commercial craft. Consequently, a wide range of variants are offered to meet the requirements of specific cases.

Your engine is appropriately equipped for your vessel, which means that not necessarily all components described in this manual are mounted to your engine.

We have endeavoured to highlight any differences so that you will be able to locate the operating and maintenance instructions relevant to your engine quickly and easily.

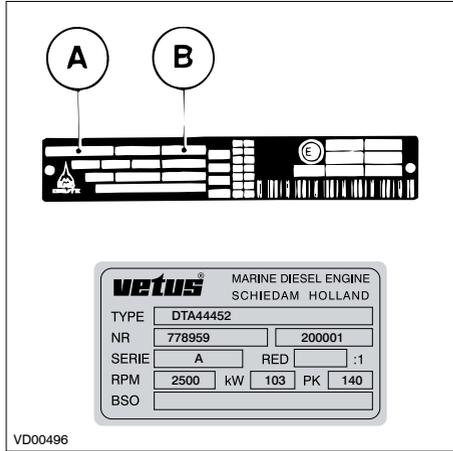
Please read this manual before starting your engine and always observe the operating and maintenance instructions.

We are available to help with any additional inquiries.

Sincerely, Vetus den Ouden n.v.

2 Introduction

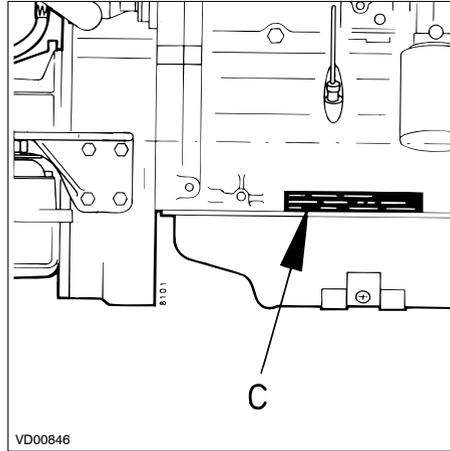
Data tag



1 Engine data tag

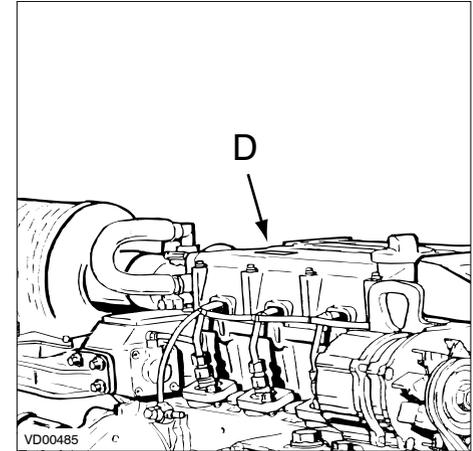
Model (A), Deutz engine serial number (B) and performance data are stamped on the engine data tag.

Model and engine serial number must be given when ordering spare parts.



2 Engine data tag location

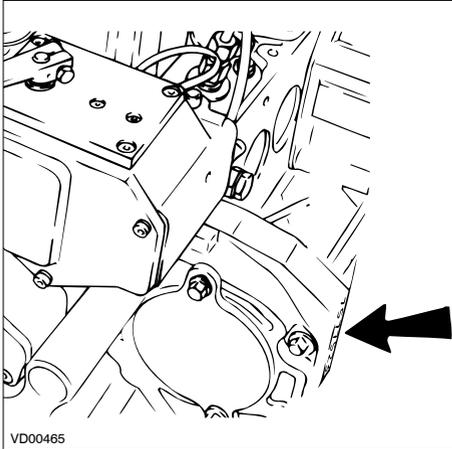
The **DEUTZ** engine data tag (C) is attached to the crank case.



The **VETUS** engine data tag is attached to the valve cover.

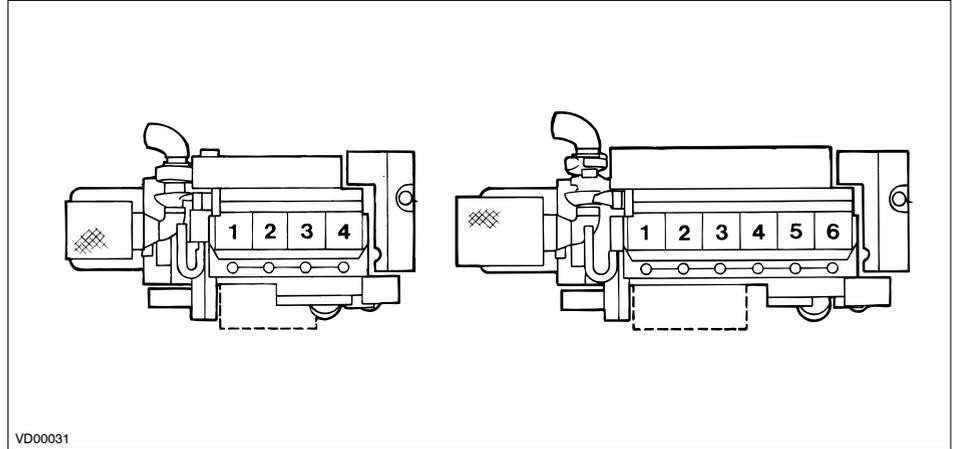
Serial number, Cylinder numbering

2 Introduction



3 Engine serial number

The DEUTZ engine serial number is stamped at the indicated spot.



4 Cylinder numbering

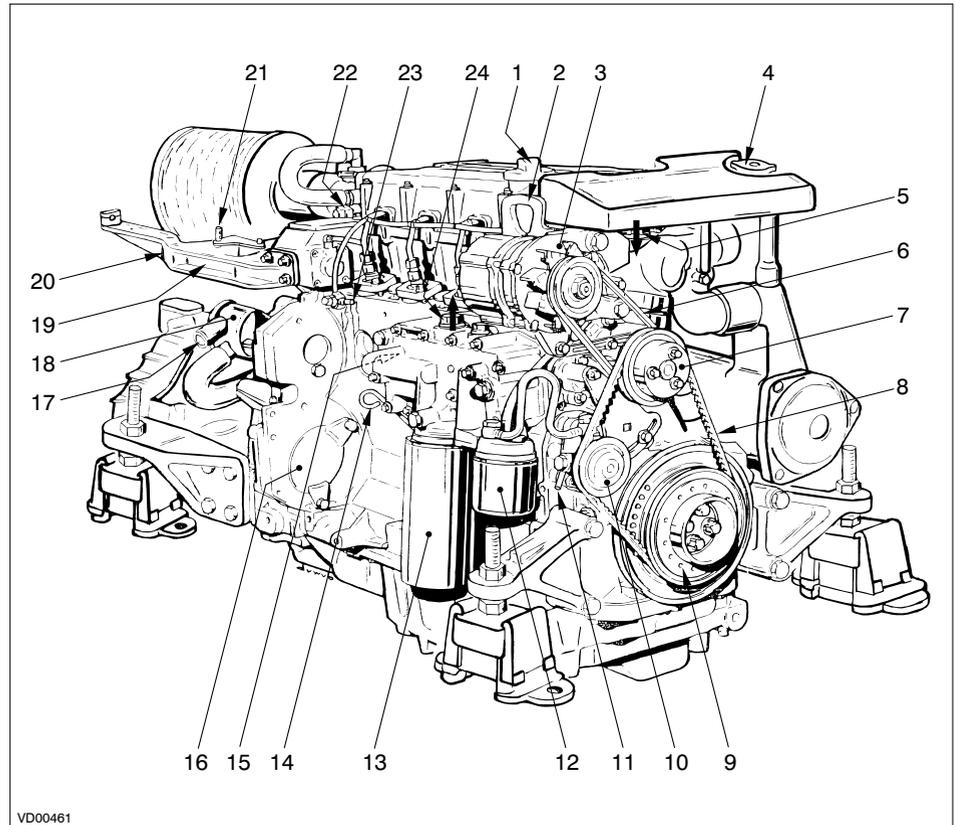
Cylinders are numbered consecutively, beginning at the flywheel end.

2 Introduction

Identification of engine parts

Service side *DT44, DT66*

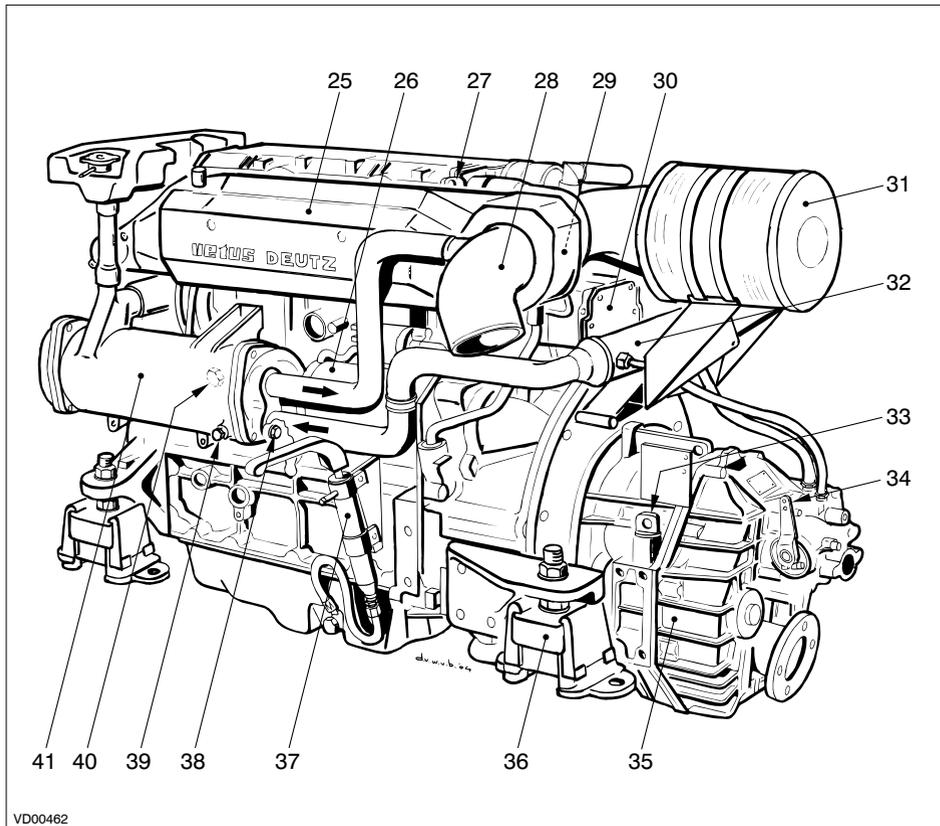
- 1 Oil filler cap
- 2 Lifting eye
- 3 Alternator
- 4 Filler cap for cooling system
- 5 Calorifier connection, engine 'IN'
- 6 V-belt alternator
- 7 Coolant pump
- 8 V-belt alternator fuel pump / coolant pump
- 9 P.T.O. (Mounting facility for extra belt pulley)
- 10 Fuel lift pump
- 11 Fuel supply pipe connection \varnothing 12 mm
- 12 Fuel filter
- 13 Oil filter
- 14 Oil dipstick
- 15 Oil cooler
- 16 P.T.O. (Mounting facility for hydraulic pumps)
- 17 Raw water inlet \varnothing 32 mm
- 18 Raw water pump
- 19 Circuitbreaker
- 20 Electrical system connector
- 21 Connection for throttle push-pull cable
- 22 Manual operated stop



Identification of engine parts

2 Introduction

Starter side DT44, DT66



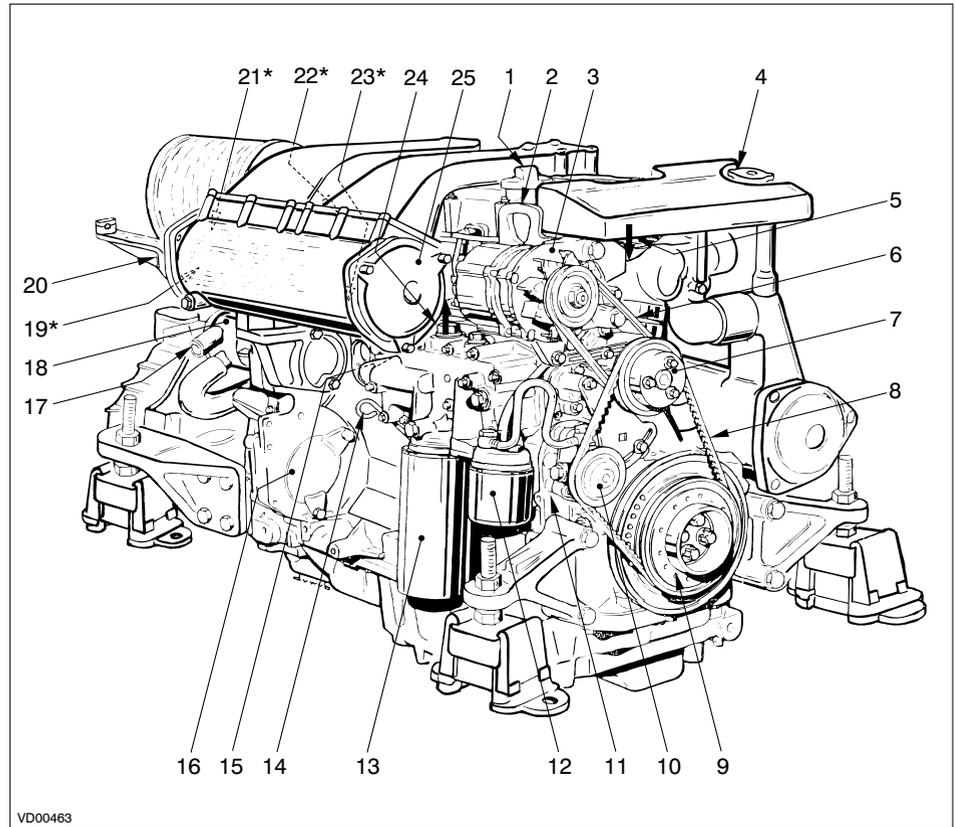
- 23 Fuel return pipe connection
ø 10 mm
- 24 Calorifier connection, engine 'OUT'
- 25 Exhaust insulator
- 26 Starter motor
- 27 Lifting eye
- 28 Exhaust injection bend
- 29 Turbocharger
- 30 Speed governor
- 31 Air intake filter
- 32 Gearbox lube oil cooler
- 33 Gearbox filler cap/ oil dipstick
- 34 Connection for gearbox push-pull
cable
- 35 Gearbox
- 36 Flexible engine mounts
- 37 Oil sump drain pump
- 38 Cooling system drain plug, heat
exchanger cover
- 39 Cooling system drain plug, heat
exchanger
- 40 Cooling system drain plug, engine
block
- 41 Heat exchanger

2 Introduction

Identification of engine parts

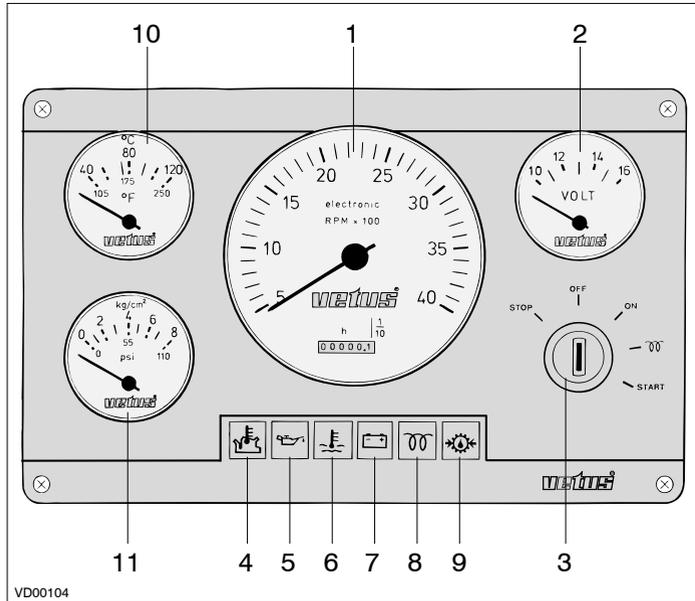
Service side *DTA44, DTA66*

- 1 Oil filler cap
- 2 Lifting eye
- 3 Alternator
- 4 Filler cap for cooling system
- 5 Calorifier connection, engine 'IN'
- 6 V-belt alternator
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- 8 V-belt alternator fuel pump / coolant pump
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ø 12 mm
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- 17 Raw water inlet ø 32 mm
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- 22 Manual operated stop

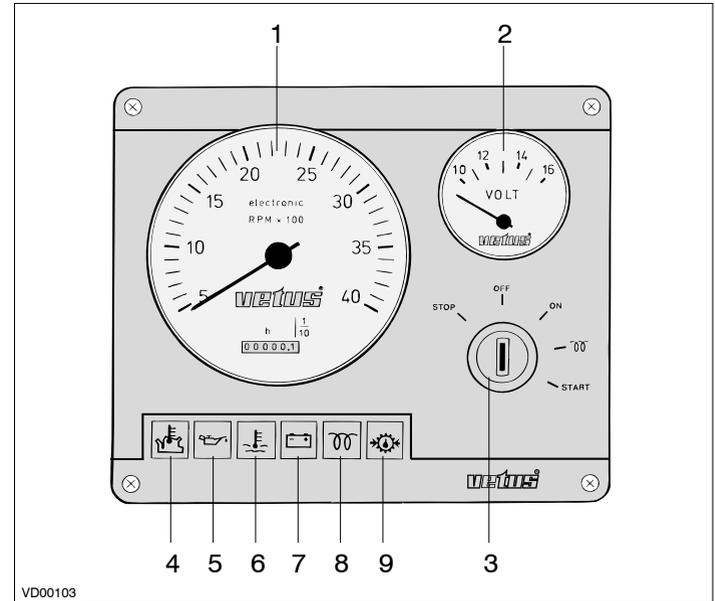


2 Introduction

Control panels



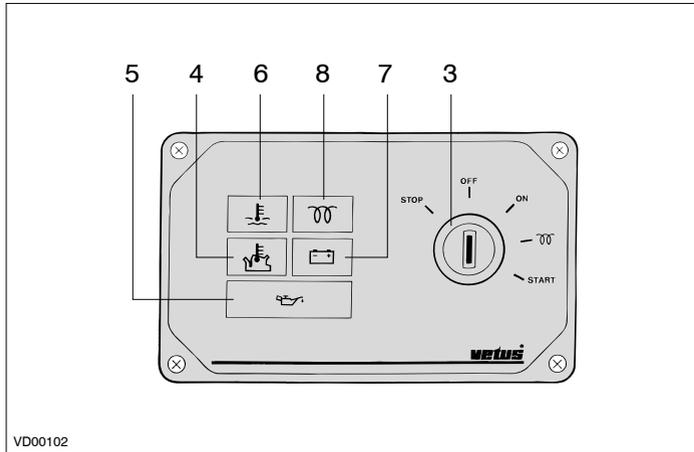
Basic panel (model 34)



Fly-bridge panel (model 22)

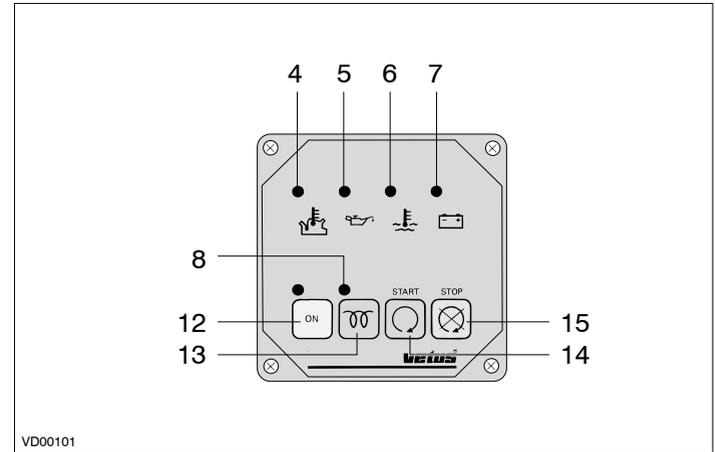
Control panels

2 Introduction



Sailingboat panel (model 10)

- 1 Tachometer/Operating hours counter
- 2 Voltmeter
- 3 Starter pre-heat switch/lock
- 4 Warning light high raw water temperature
- 5 Warning light low oil pressure
- 6 Warning light high coolant temperature
- 7 Warning light battery charging
- 8 Indicator light pre-heating
- 9 Warning light gearbox low oil pressure *)



Push button panel (model 00)

- 10 Temperature gauge, coolant
- 11 Oil pressure gauge
- 12 On push button switch
- 13 Pre-heating push button switch
- 14 Starter push button switch
- 15 Stop push button switch

*) This is an option, not fitted as standard.

General guidelines for use

Implementing the following recommendations will result in longer life and better performance and more economical operation of your engine.

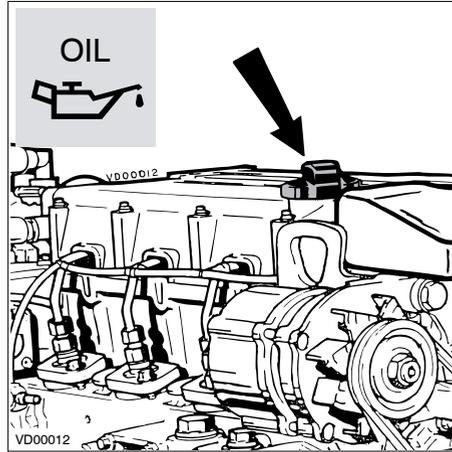
- Carry out the maintenance described regularly, including the 'Daily procedures before starting'.
- Use anti-freeze in the engine coolant all year long, this helps prevent corro-

sion as well as protecting against frost damage. For specifications see page 72.

- Never run the engine without a thermostat.
- Use a good quality lubricating oil. For specifications see page 70.
- Use a good quality diesel fuel that is

free of water and other pollutants.

- Always stop the engine immediately if one of the warning lamps for oil pressure, high coolant temperature, high raw water temperature or battery charging lights up.



1 Commissioning the engine

Before starting the engine for the first time, the following procedures must be carried out:

2 Filling with engine oil

As a rule engines are delivered empty of oil.

Fill the engine with oil through the filler neck on top of the valve cover, for quantity and specification see page 70.

Check the oil level with the dipstick, see page 28.



Engine Oil

4 cyl.: 8.5 litres 10W40 or 15W40
(1.9 UK gal)

6 cyl.: 14 litres 10W40 or 15W40
(3.1 UK gal)

API: CD, CE, CF or CF4

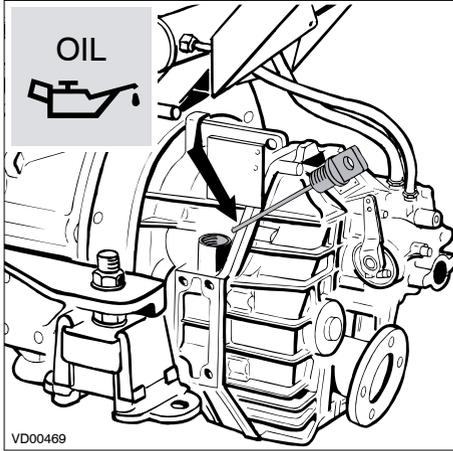
CCMC: D4, D5

For example:

- Vetus Marine Inboard Diesel Motor Oil
- Shell Super Diesel T

3 Use

First commissioning



3 Filling gearbox with oil

Vetus engines are normally equipped with ZF-Hurth gearboxes.

In case your engine is equipped with another brand of gearbox follow the instructions given in the supplied owners manual.

Fill the gearbox with oil.

Check the oil level with the dipstick, see page 40.

Oil gearbox

model ZF45 : 2.0 litres (3.5 UK pt) ATF
model ZF45A : 3.0 litres (5.3 UK pt) ATF
model ZF63 : 3.8 litres (6.7 UK pt) ATF
model ZF63A : 4.0 litres (7 UK pt) ATF

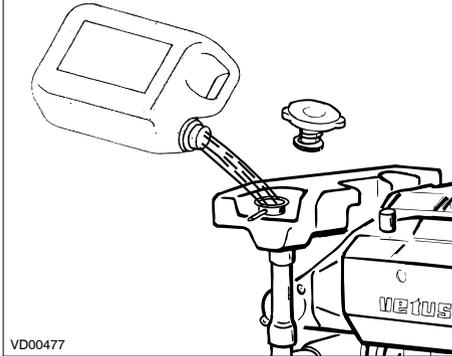
*) ATF: Automatic Transmission Fluid;
type A, Suffix A.

For example : Shell Donax T6
Gulf Dextron

First commissioning

3 Use

COOLANT 4 CYL.: 8.5 litres (1.9 UK gal)
QUANTITY : 6 CYL.: 12 litres (2.6 UK gal)



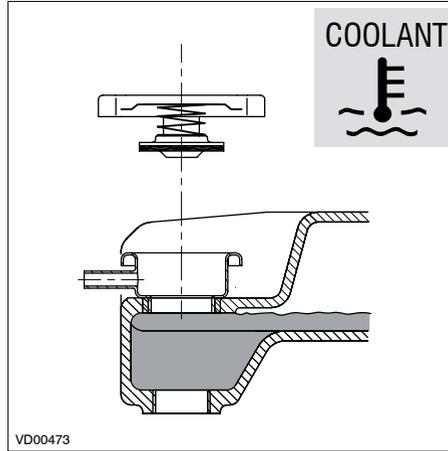
4 Filling the cooling system

Remove the cap of the filler neck on the top of the header tank.

Fill the cooling system.

Use a mixture of 40% antifreeze (ethylene-glycol based) and 60% tap water or use a special coolant.

For specifications see page 72.



The level of the coolant must be at the lower edge of the filler neck.

Replace the filler cap.

Bleeding will take place automatically during filling!

Calorifier

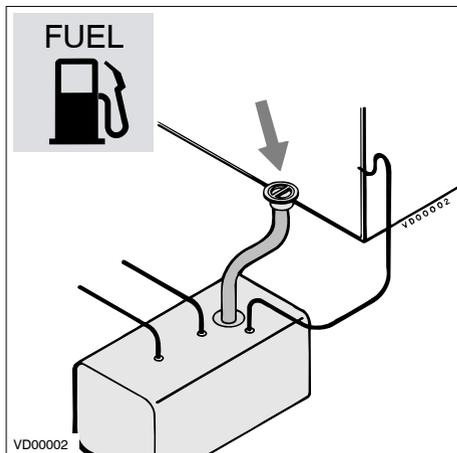
If a calorifier is connected to the engine and this heater is positioned above the upper side of the engine then bleeding of the calorifier will not take place automatically! Fill the calorifier separately to bleed the cooling system completely.

After the engine has run for the first time and has reached operating temperature and has cooled down again to ambient temperature, check the coolant level in the heat exchanger housing. If necessary, add coolant.

Caution!

Never fill the cooling system with sea water or brackish water.

3 Use



5 Fuel

Ensure that the fuel tank is filled with diesel fuel.

Use only clean, water-free, commercial approved diesel fuel.

For fuel grade see page 71.

The fuel system is self-bleeding.

Warning!

Never fill the fuel tank while the engine is running. Do not spill fuel. Prevent unnecessary pollution.

6 Other preparations

- Check battery and cable connections.
- Start the engine, see page 19, and let it run for about 10 minutes without load. Check the engine and all connections (fuel, cooling water and exhaust) for leaks.
- Check tension of the V-belt, see page 36.

First commissioning Running-in

Running-in

In order to ensure a long life for your engine, please observe the following for the first 50 operating hours:

- Allow the engine to reach operating temperature before applying a load.
- Avoid fast acceleration.
- Do not allow the engine to run faster than 3/4 of maximum RPM.

Starting

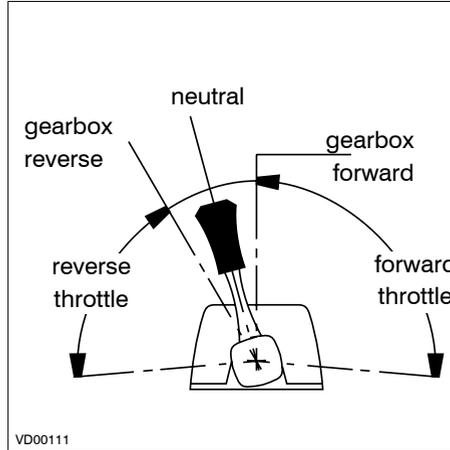
Before starting, **ALWAYS** check the following points:

- Engine oil level.
- Coolant level.
- Sea cock open.
- Main switch 'ON'.
- Gearbox in 'NEUTRAL' position.

After repair work:

Check that all guards have been replaced and that all tools have been removed from the engine.

When starting with pre-heating, do not use any other substance (e.g. injection with 'Easy Start'). Doing so could result in an accident.



1 Starting, preparation

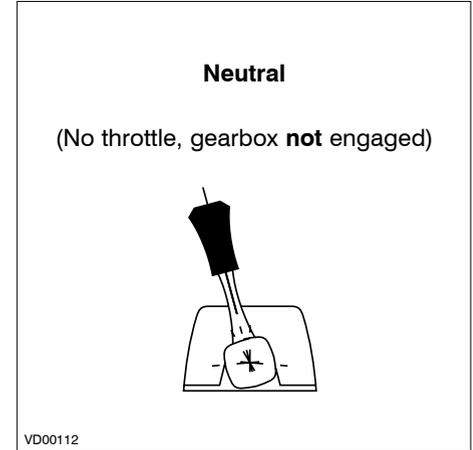
Before starting the engine, always check that the control lever(s) is (are) in the **neutral position**.



Warning!

**Never start the engine with the fuel injection pump removed.
Disconnect battery.**

3 Use

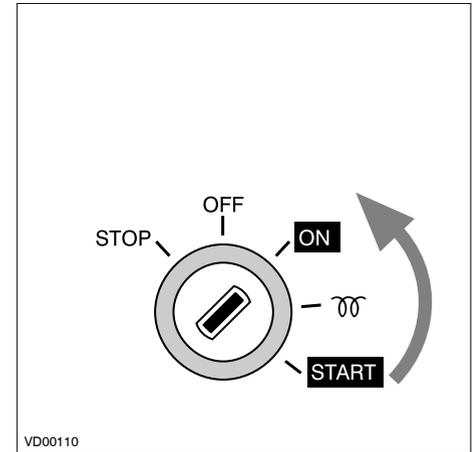
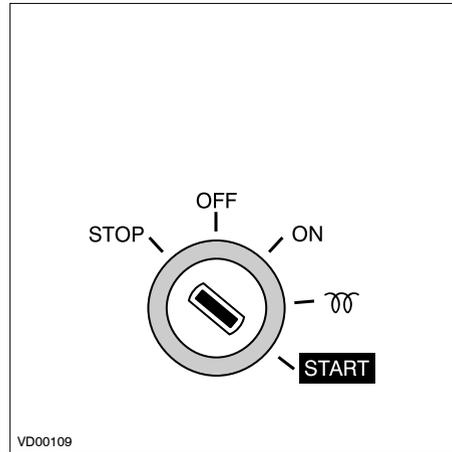
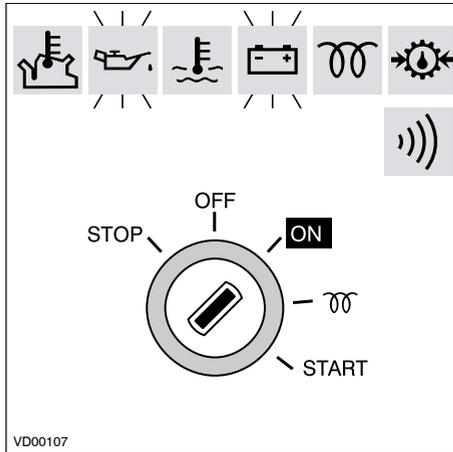


2 Control lever

Leave the control lever in position '**neutral**'.

3 Use

Starting



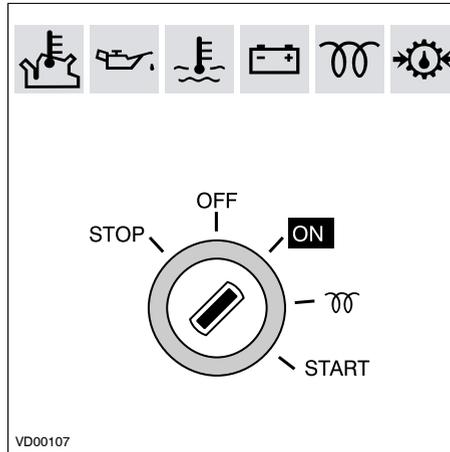
3 Starting

Turn the start key on the instrument panel clock-wise; the warning lights for oil pressure and alternator will now light up and the alarm buzzer will sound.

As standard VETUS DEUTZ engines are not equipped with a pre-heating system, therefore both the pre-heating indication light and the pre-heating position of the the key switch on the operating panel can be ignored.

Now turn the key further to the 'START' position.

Release the key as soon as the engine fires (the key will return to the 'ON' position) and throttle back. Leave the key in this position while the engine is running.



Caution!

Release the key if the engine does not fire within 10 seconds. Wait until the starter motor has stopped running completely before turning the key to the 'START' position again. Never allow the starter motor to run for more than 30 seconds consecutively.

Check that the indicator lights for oil pressure and alternator are off. Cooling water should now flow out of the exhaust; if this is not the case, stop the engine immediately. Before submitting the engine to full load it should be brought up to operating temperature as quickly as possible by running at 3/4 of maximum revs.

NEVER turn the main switch off while the engine is running.

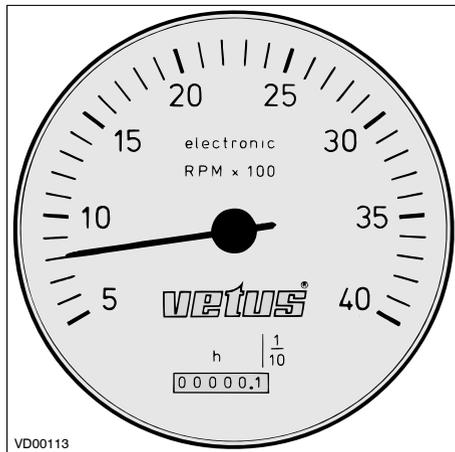
3 Use

The instrument panel is provided with the following instruments (Depending of the type of panel, see page 12 and 13).



Caution!

Never turn the key to the 'START' position while the engine is running. Doing so will damage the starter motor.



4 Tachometer

When the engine reaches operational temperature, exhaust gases should be colourless or light-blue. (In the winter, the low temperatures will turn the exhaust emissions white.)

If black smoke is emitted from the exhaust, this indicates that combustion is incomplete.

If white smoke is emitted, this indicates combustion of oil forced up.

Indicating the number of revolutions per minute of the engine.

Avoid idling for more than 10 minutes.

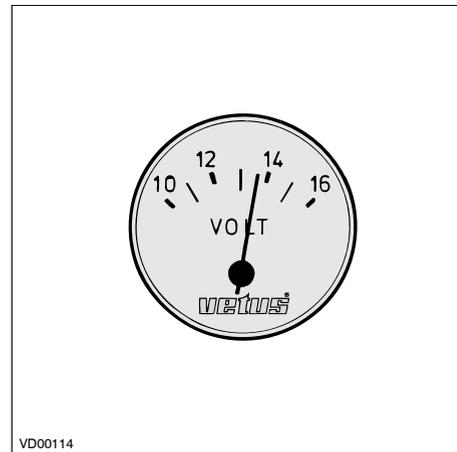
Also the number of running hours is indicated.

Idling speed,

DT44, DTA44 : 800 rpm

DT66, DTA66 : 800 rpm

Cruising

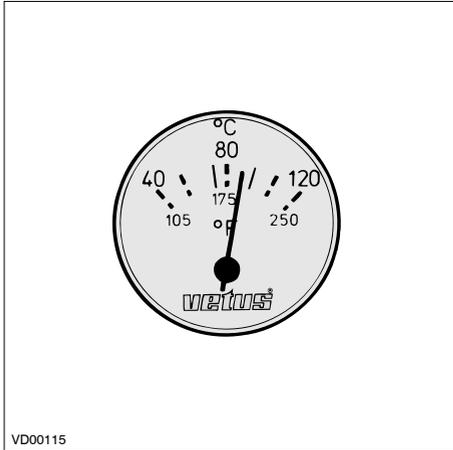


5 Voltmeter

Indicating the battery voltage.

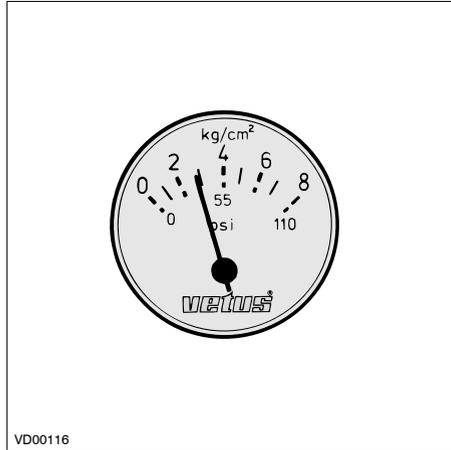
When the engine is running, the battery voltage should be between 12 and 14 Volts resp. between 24 and 28 Volts.

With the engine stopped and the start key in the first position, the voltmeter should indicate 12 Volts resp. 24 Volts.



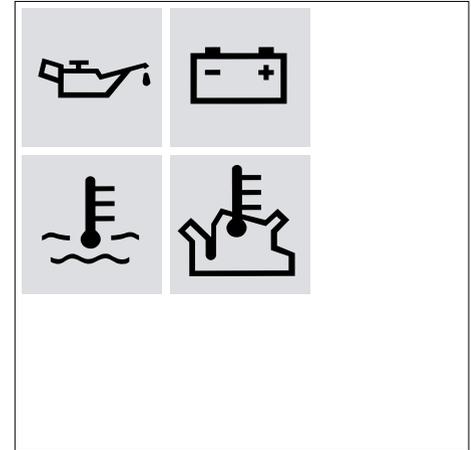
6 Temperature gauge

Indicating the temperature of the internal cooling system.
 The operating temperature is 97°C - 100°C (207°F - 212°F).
 In case the engine is overheated: turn off the engine and establish the cause, see fault finding table, page 59 .. 63.



7 Oil pressure gauge

With the engine at operating temperature, the oil pressure is:
 When idling: at least 0.8 bar (6 psi).
 In case the oil pressure is too low: turn off the engine and establish the cause, see fault finding table, page 59 .. 63.

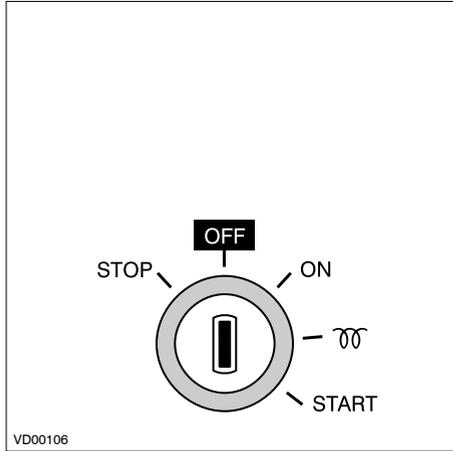


8 Warning lights

None of the four warning lights should light up while the engine is running. Oil pressure, battery charging and temperature indicator lights are all connected to an alarm buzzer. If this alarm buzzer sounds while running, **STOP THE ENGINE IMMEDIATELY!**

3 Use

Stopping

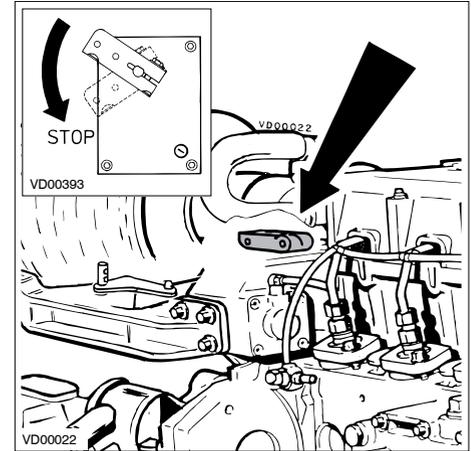
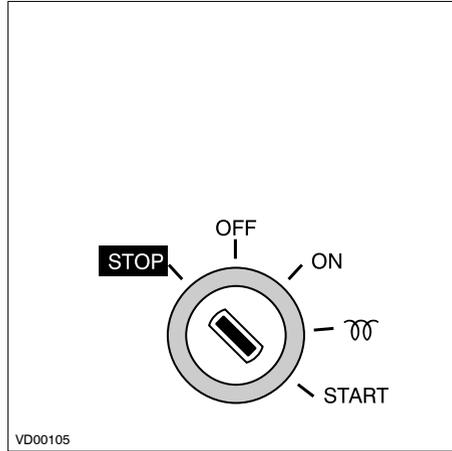


9 Electrical shutdown

Reduce engine speed to idle and shift the gearbox to '**NEUTRAL**'. Turn the key to the left to the '**OFF**' position.

If the engine is not to be used for some time, it is recommended that the sea cock is closed and the battery main switch turned off.

Never stop the engine immediately after it has been in operation for a long time.



10 Mechanical shutdown

On the engine itself stopping is possible by operating the mechanical shutdown lever on the fuel injection pump until the engine comes to a stand-still.

If the fuel supply is not shut off by the electrically operated fuel solenoid, stopping of the engine can be done this way.

Introduction

The following guidelines should be observed for daily and periodic maintenance. Perform each function at the indicated time interval.

The intervals stated are for normal operational conditions. Service the unit more frequently under severe conditions.

Failure to carry out maintenance can result in faults and permanent damage to the engine.

No claim can be made on the Guarantee if maintenance has been neglected.

4 Maintenance

Maintenance schedule

Every 10 hours or daily, before starting

Check engine oil level	page 28
Check coolant level	page 29
Check water strainer	page 30

After the first 50 hours ¹⁾

Drain water from fuel filter	page 31
Engine oil change	page 34
Replace oil filter	page 34
Check V-belts	page 36
Check gearbox oil level	page 40
Replace fuel filter	page 41
Check flexible engine mounts	page 45
Check valve clearance	page 46
Check tightness of all fasteners, bolts and nuts ²⁾	
Controle van de motor op lekkage	

Every 125 hours, at least once every year

Drain water from fuel filter	page 31
Battery, cables and cable connections	page 32

Every 500 hours, at least once every year

Engine oil change	page 34
Replace oil filter	page 34
Check V-belts	page 36
Check gearbox oil level	page 40

Every 1000 hours, at least once every 2 years

Replace fuel filter	page 41
Raw water pump inspection	page 42
Gearbox oil change	page 44
Replace air cleaner	page 45
Check flexible engine mounts	page 45
Check hose connections	page 45

Every 1500 hours, at least once every 2 years

Check valve clearance	page 46
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Every 2000 hours, at least once every 2 years

Replace coolant ³⁾	page 48
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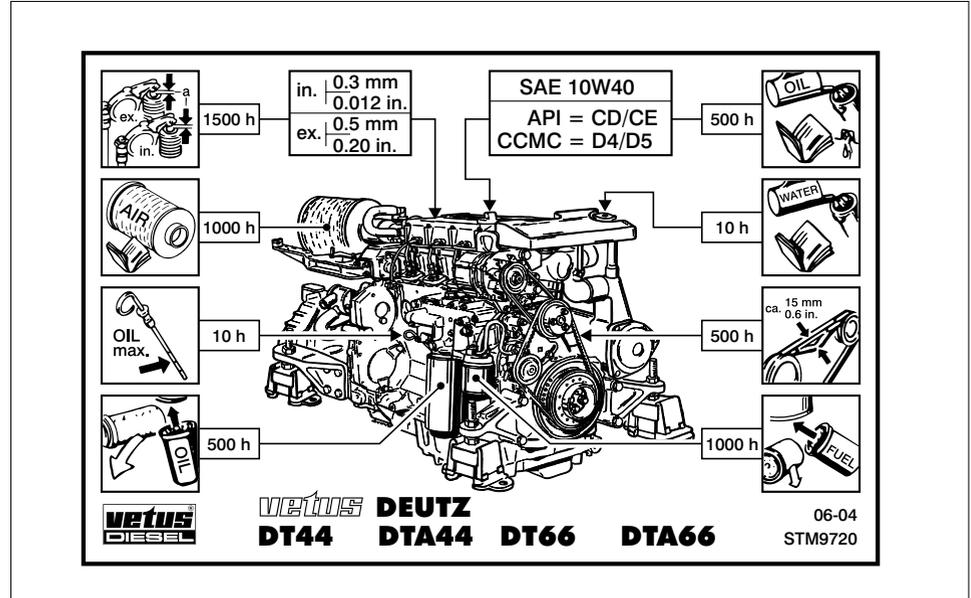
Maintenance chart

The maintenance chart shown here is supplied as self-adhesive label with each engine. It should be affixed on the engine where it can be seen clearly. Check that this is the case.

If necessary, ask your engine supplier for another label.

Routine work should be carried out according to the schedule.

4 Maintenance

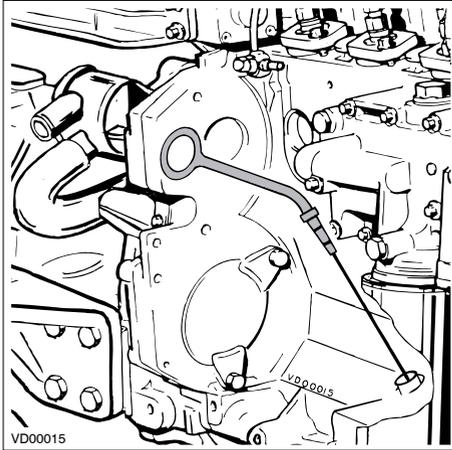


- 1) Commissioning of new or overhauled engine.
- 2) Re-tightening of cylinder head bolts is **not** required!
- 3) Cleaning of heat exchanger and after-cooler (if installed) is **not** required.

Warning!

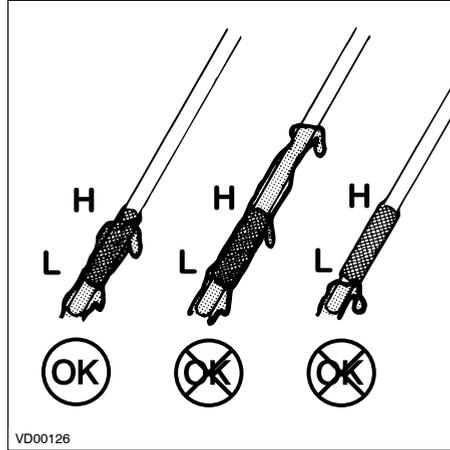
Stop the engine before carrying out any maintenance work.

4 Maintenance



1 Check oil level

Turn the engine off.
The dipstick is located on the starboard side of the engine.



2 Oil level

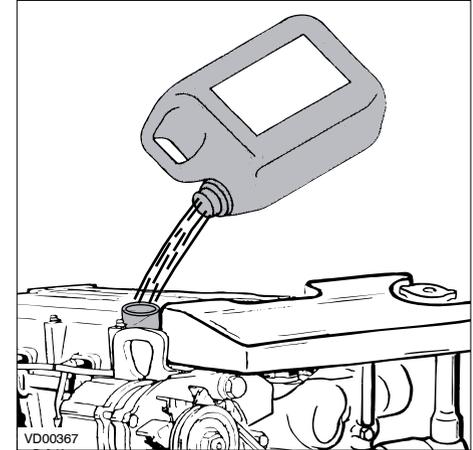
The oil level must be at or near the upper mark on the dipstick*. If necessary top up with the same brand and type of oil.

*) The difference between the two oil level marks is:

- DT44, DTA44 : 1.5 litres (2.6 UK pt)
- DT66, DTA66 : 2 litres (3.5 UK pt)

Checking engine oil level

Daily, before starting.

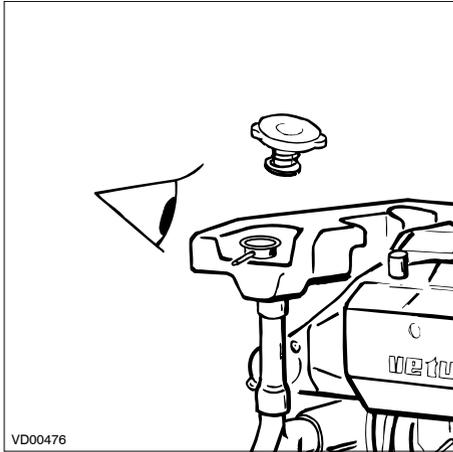


3 Topping up oil

The oil filling cap is on top of the the valve cover.

Checking coolant level

Daily, before starting.



4 Checking coolant level

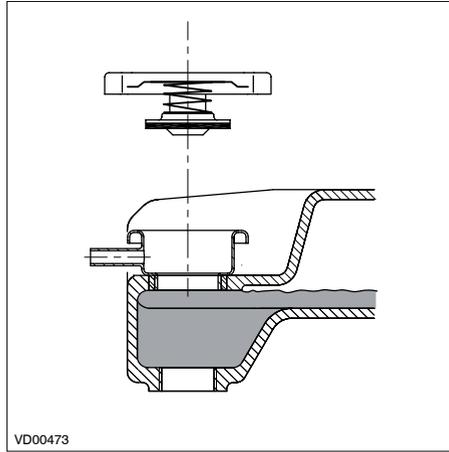
Check the coolant level in the header tank. This has to be checked when the engine is **cold**.

Remove the cap of the filler neck on the heat exchanger.



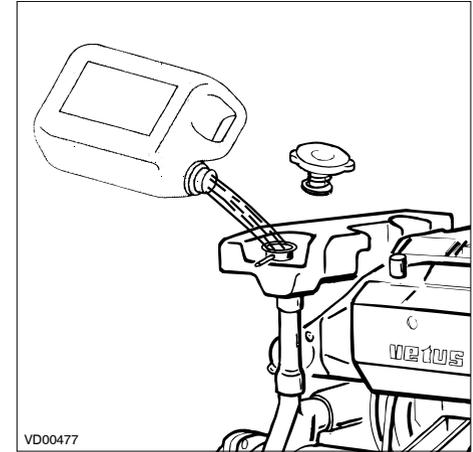
Warning!

Never open the cap on the header tank when the engine is at operating temperature.



5 Coolant level

The level of the coolant must be at the lower edge of the filler neck.



6 Topping up coolant

If necessary, top up.

The internal cooling system can be filled with a mixture of anti-freeze (40 %) and tap water (60 %) or with a special coolant. For specification, see page 72.



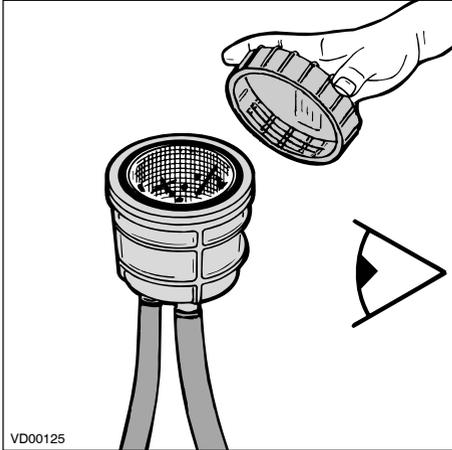
Caution!

Never fill the cooling system with sea water or brackish water.

4 Maintenance

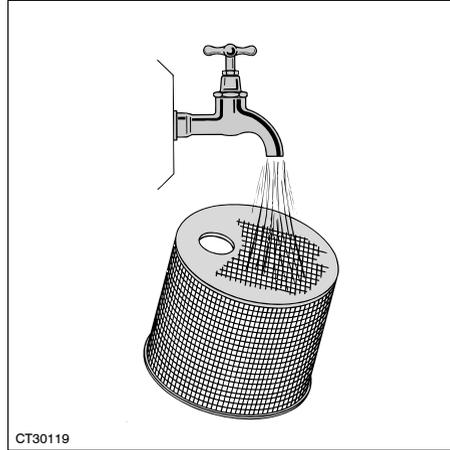
Checking and cleaning the raw water strainer

Daily, before starting.



7 Checking the raw water strainer

Check daily whether there is any dirt in the raw water strainer.



8 Cleaning the strainer

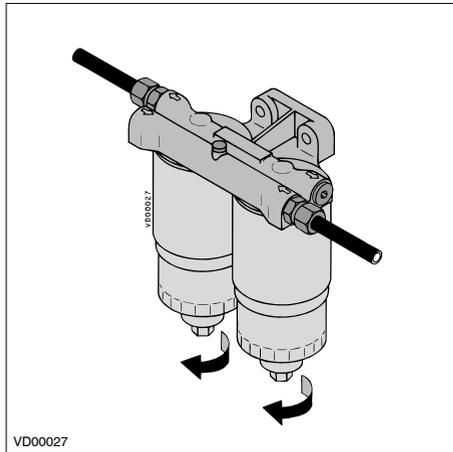
Close the seacock before removing the lid of the water strainer.

Clean the raw water strainer as often as is necessary, depending on the pollution of the waterways, but at least once every 6 months. A clogged raw water strainer will result in excessive temperatures or overheating of the engine coolant.

Check the sealing between the lid and housing after cleaning and re-assembling the strainer. An improperly sealed lid will result in air sucked in by the sea water pump which again will result in overheating of the engine.

Draining of water from the water separator/fuel filter

Every 125 operating hours.



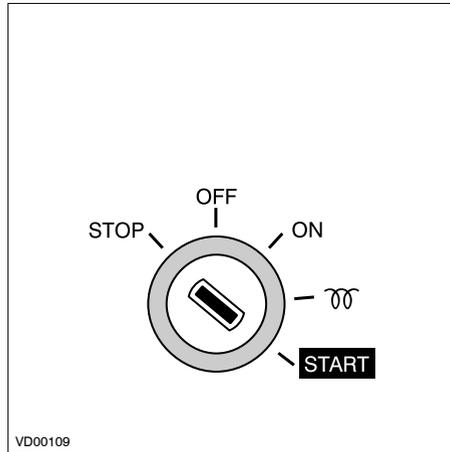
9 Empty fuel filter

Empty the separately installed water separator/fuel filter:

- Open the drain plug at the lower side of the filter.
- Drain the water and close the drain plug.

Waterseparator

The water separator is not within the scope of supply but installation is required!



10 Bleeding

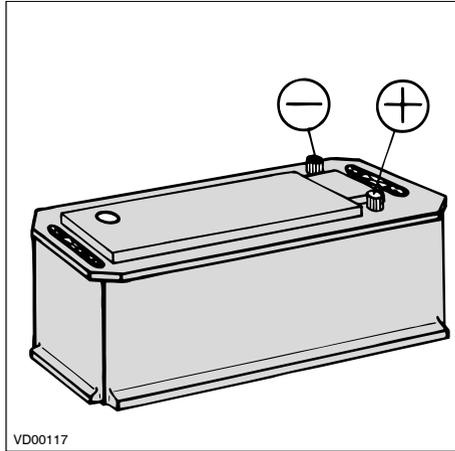
The system doesn't need to be bled after the water separator/fuel filter has been drained.

The fuel system is self-bleeding.

Operate the starter switch until the engine fires; release the starter switch if the engine does not fire within 20 seconds. Wait until the starter motor has stopped before making a new attempt to start the engine.

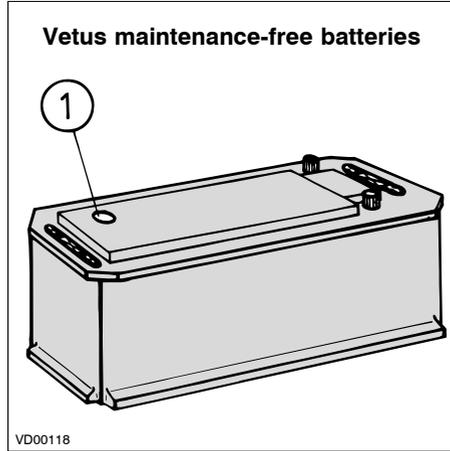
Repeat the above if the engine cuts out after a short time.

4 Maintenance



11 Battery, battery connections

Keep battery clean and dry.
Remove battery cables (negative first).
Clean battery posts (+ and -) and clamps and grease with acid-free and acid-resistant grease.
Ensure that clamps make good contact after reassembling. Hand tighten the bolts only.

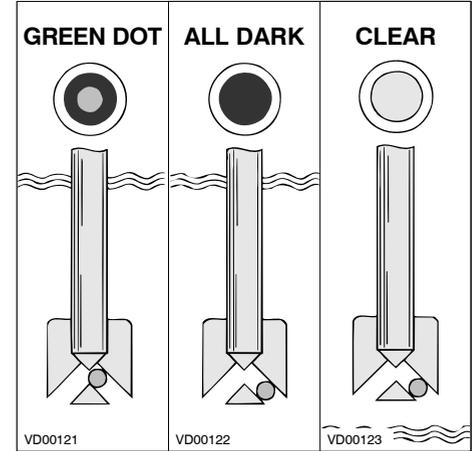


12 Checking specific gravity

Every Vetus Maintenance-free battery has a hydrometer (1) built into the cover. Visual inspection of the hydrometer will show one of three conditions:

Battery, cables and connections

Every 125 operating hours.

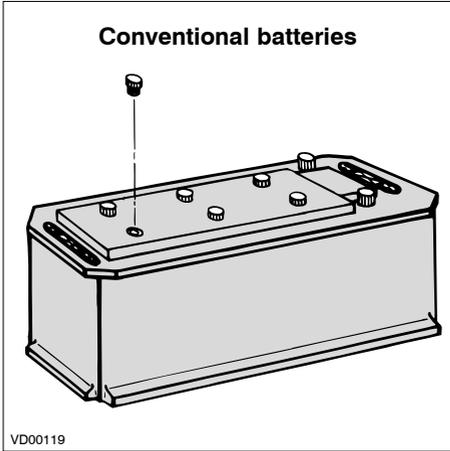


13 Hydrometer operation

- **Green dot visible** - State of charge 65 % or more.
- **Dark** - State of charge less than 65 %. Recharge immediately.
- **Clear or light yellow** - Electrolyte level low.
In case of low level, caused by overcharging the battery for a long period of time with a voltage too high, replace battery. Check alternator and/or voltage regulator.

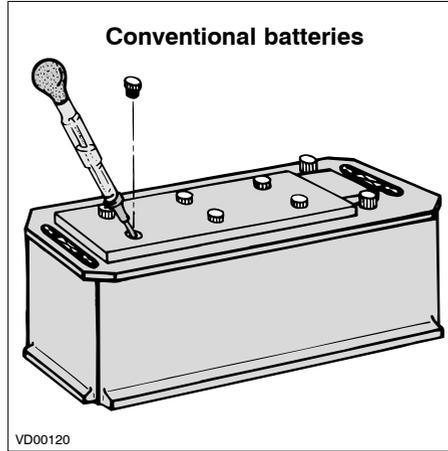
Battery, cables and connections

Every 125 operating hours.



14 Checking electrolyte level

For conventional batteries it is required to check the electrolyte level regularly. Remove vent caps (taking care no spark or open flame is nearby) and inspect the level. Fluid should be 10 to 15 mm (3/8" to 5/8") above top of all plates. If necessary top up with distilled water. Replace vent caps and charge the battery for 15 minutes at 15 - 25 Amps to mix electrolyte.



15 Checking specific gravity

Measure the electrolyte specific gravity of the individual cells with a commercial hydrometer. The hydrometer reading (see table) indicates the state of charge. Hydrometer reading of all cells should be at least 1.200 and show less than 0.050 between high and low. If not, recharge or replace battery. During checking the temperature of the electrolyte should preferably be 20°C (68°F).

4 Maintenance

Specific gravity	State of charge	
1.280	100%	
1.200	50%	recharge
1.120	10%	recharge immediately



Warning!



The gases emitted by the battery are explosive!



Keep sparks and naked flames away from the battery!



Do not allow battery acid to come into contact with skin or clothing!



Wear protective goggles!

Do not rest tools on the battery!

4 Maintenance

Tip

Change the oil with a switched off engine at operation temperature. (Lube oil temperature approx. 80°C (176°F).)

Caution!



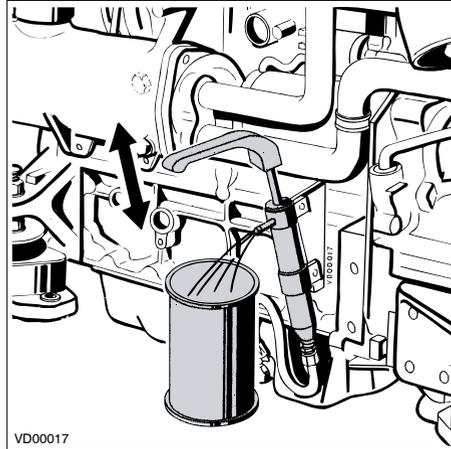
Used oil must be collected in a container for proper disposal according to laws and regulations.

16 Engine oil change

Change the engine oil every 500 hours of operation (together with engine oil filter replacement).

If the engine runs less than 500 hours during the year the oil should be changed at least once a year.

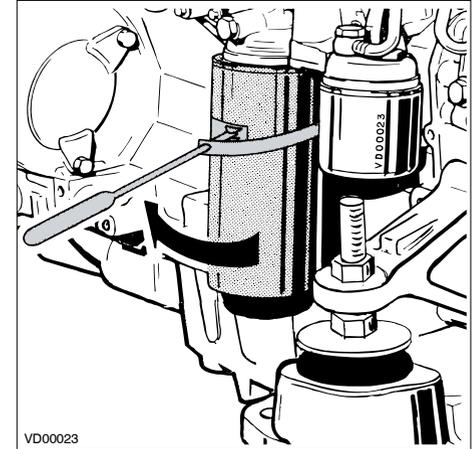
Run the engine for a few minutes before changing the oil; warm oil can be pumped out more easily.



17 Draining the oil

The pump for the oil sump is (normally) located at the heat exchanger side of the engine.

As an option for twin engine installation, the pump may be located on the other side at one of the engines.



18 Removing the oil filter

Unscrew the oil filter, with a commercially available tool, when all the oil has been pumped out.

Catch any dripping oil.

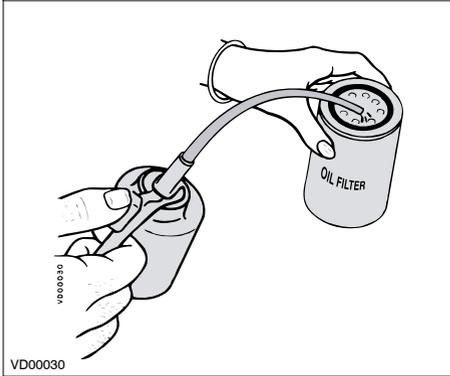
Warning!

Beware of burns from hot oil.

Engine oil change

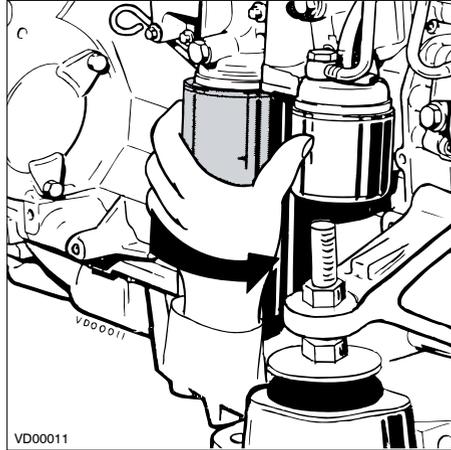
Every 500 operating hours.

OILFILTER: 4 CYL.: ART.CODE: VD20262
6 CYL.: ART.CODE: VD20263



19 Oiling the oil seal

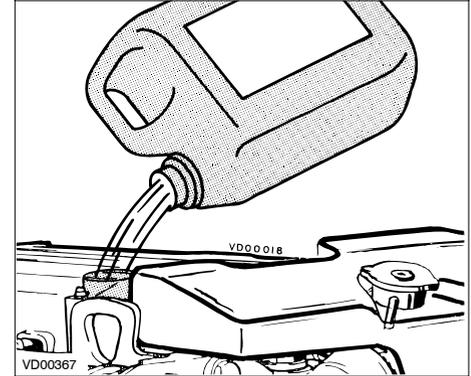
Clean the contact surface of the gasket. Lubricate the oil seal of the new filter element with clean engine oil.



20 Oil filter installation

Install the filter in accordance with the instructions printed on the filter element housing.

AMOUNT OF OIL: 4 CYL.: 8.5 litres (1.9 UK gal)
(OIL FILTER INCL.) 6 CYL.: 14 litres (3.1 UK gal)



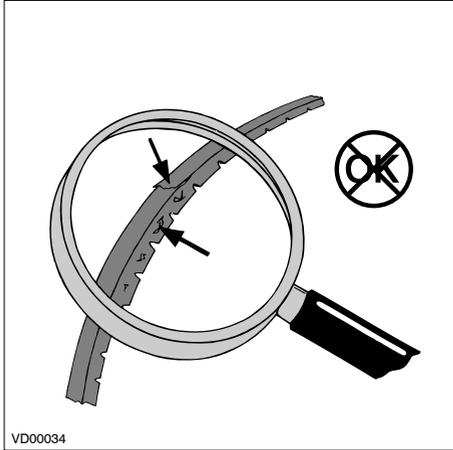
21 Refilling with oil

Refill the engine with new oil (for specification see page 70) through the filler opening in the valve cover.

Operate the engine at idling speed for a short period of time. Check for oil leaks whilst the engine is running.

Stop the engine. Allow 5 minutes for the oil to return to the sump. Check the oil level with the dipstick.

4 Maintenance



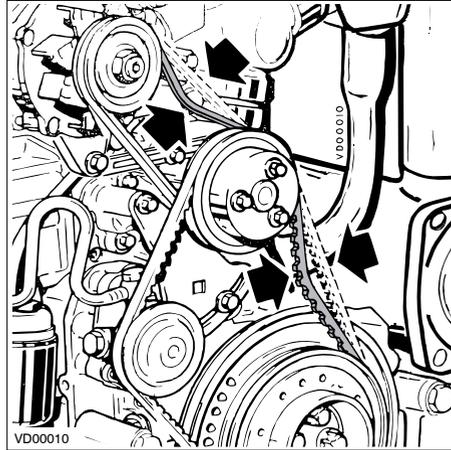
22 Inspection V-belts

Inspect the belts for wear and tear (fraying and cracking). Belts which are in poor condition should be replaced.



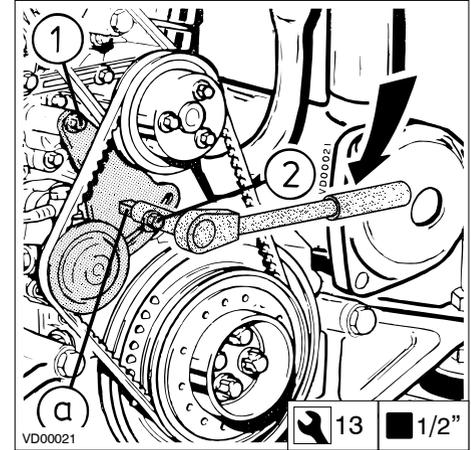
Warning!

Check, tension and change belts only with the engine off. Refit belt guard, if provided.



23 Checking tension V-belt

Check tension of the V-belt by applying moderate finger and thumb pressure. If the deflection of the belt is more than 9 - 11 mm (approx. 3/8"), using about 10 kg (20 lbs) thumb pressure, it should be tensioned.

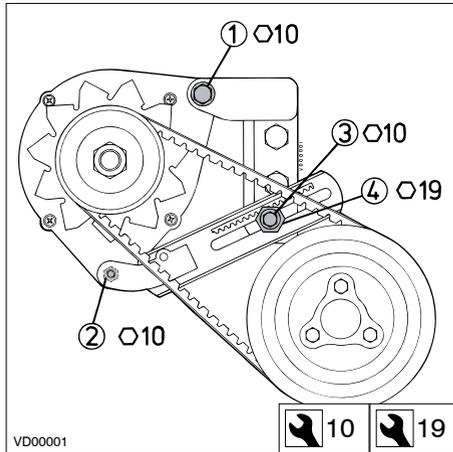


24 Tensioning V-belt of coolant and fuel pump

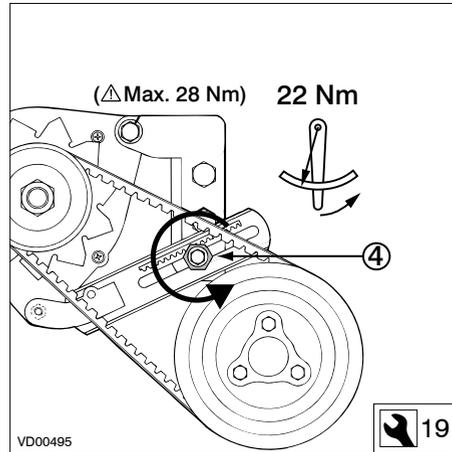
- Loosen bolts (1) and (2).
- Rotate the tension device with the fuel pump in the direction of the arrow using a key in (a), square 1/2", until the tension of the V-belt is correct.
- Re-tighten bolts (1) and (2).

Checking the V-belts

Every 500 operating hours.



25 Tensioning alternator V-belt



- First loosen both the alternator mounting bolts, (1) and (2), then loosen the bolt (3) of the adjustment bracket and simultaneously keep the pinion (4) in the same position.
- Rotate the pinion (4) counter-clockwise until the tension of the belt is correct. Never apply a torque to the pinion of more than 28 Nm! (max. belt force is achieved at about 22 Nm).
- Re-tighten the bolt (3) of the adjustment bracket.
- Then re-tighten both the alternator mounting bolts (1) and (2).

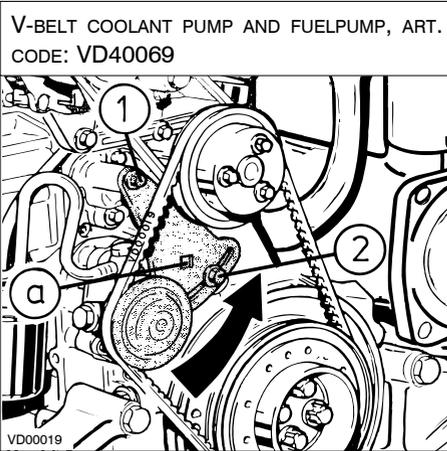


Warning!

Check, tension and change belts only with the engine off. Refit belt guard, if provided.

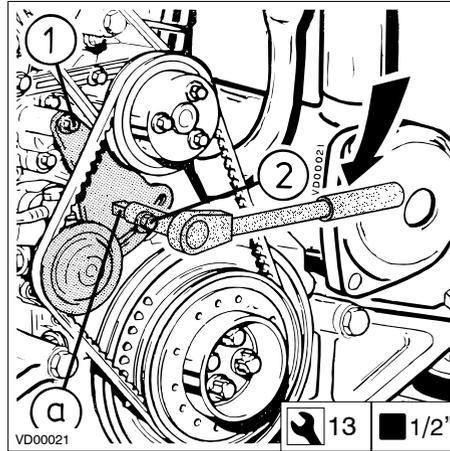
4 Maintenance

Replacing the V-belts



26 Replacing V-belt of coolant and fuel pump

- Loosen bolts (1) and (2).
- Rotate the tension device with the fuel pump in the direction of the arrow using a key in (a), square 1/2".
- Remove and replace belt.
- Rotate the tension device with the fuel pump in the direction of the arrow using a key in (a), square 1/2", until the tension of the V-belt is correct.
- Re-tighten bolts (1) and (2).

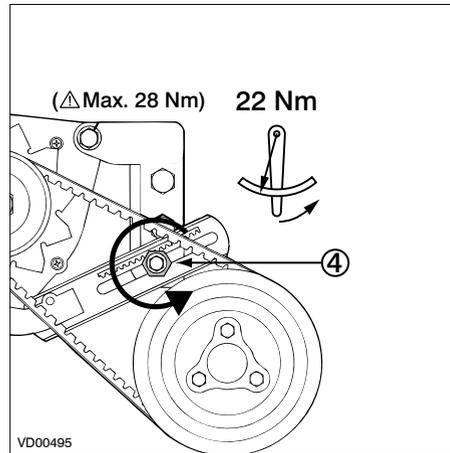
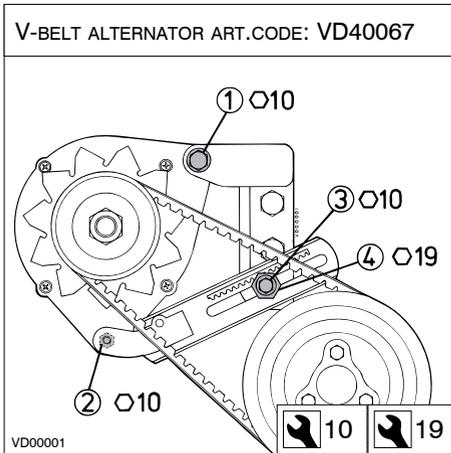


Warning!

Check, tension and change belts only with the engine off. Refit belt guard, if provided.

Replacing the V-belts

4 Maintenance



27 Replacing alternator V-belt

- First loosen both the alternator mounting bolts, (1) and (2), then loosen the bolt (3) of the adjustment bracket and rotate the pinion (4) clockwise.
- Remove and replace belt.
- Tension the belt by rotating the pinion (4) counter-clockwise until the tension of the belt is correct.

- Never apply a torque to the pinion of more than 28 Nm! (max. belt force is achieved at about 22 Nm).
- Re-tighten the bolt (3) of the adjustment bracket.
- Then re-tighten both the alternator mounting bolts (1) and (2).



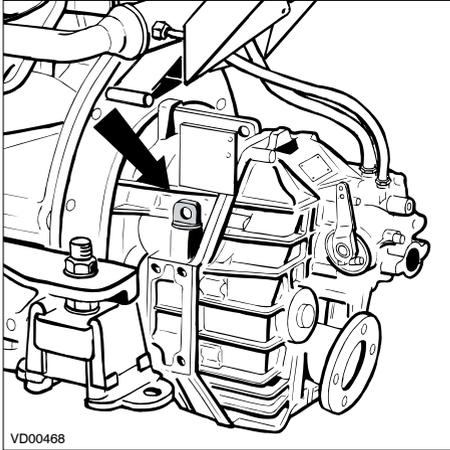
Warning!

Check, tension and change belts only with the engine off. Refit belt guard, if provided.

4 Maintenance

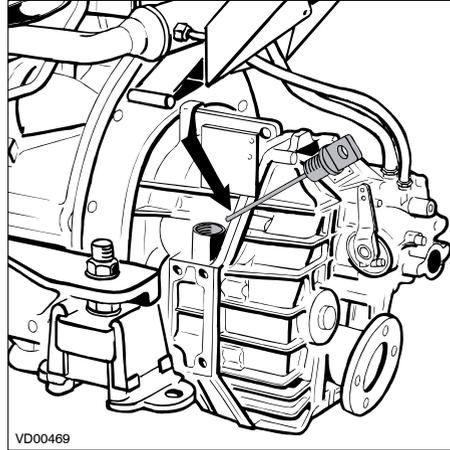
Gearbox oil level check

Every 500 operating hours.



28 Unscrewing the dipstick

- Unscrew the dipstick out of the gearbox housing.



29 Oil level check

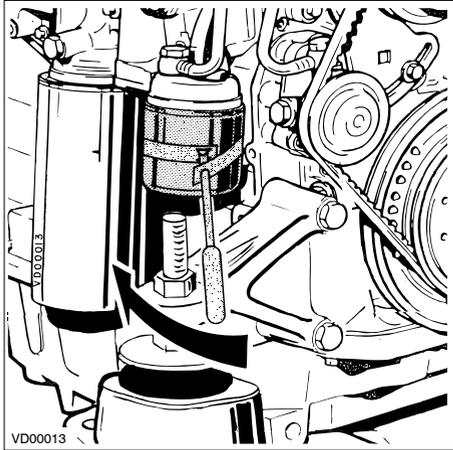
- Check the oil level by cleaning the dipstick and lowering it into the hole, without screwing it in.
The oil level must be between the two marks on the dipstick.
If necessary top up by pouring oil in the dipstick hole.

For oil type and specification see page 70.

Vetus engines are normally equipped with ZF-Hurth gearboxes. Consult the supplied Owners Manual for more details about care and maintenance. In case your engine is equipped with another brand of gearbox follow the instructions given in the supplied owners manual for changing oil and other care and maintenance.

Fuel filter replacement

Every 1000 operating hours.



30 Fuel filter removal

The fuel filter is to be replaced as a unit.

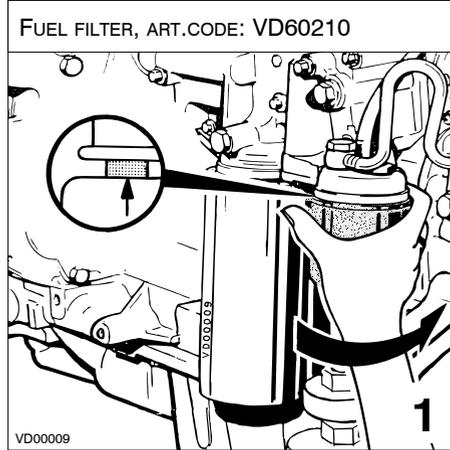
- Close the fuel stopcock.
- Remove the fuel filter, use a filter wrench. Catch any fuel.



Warning!

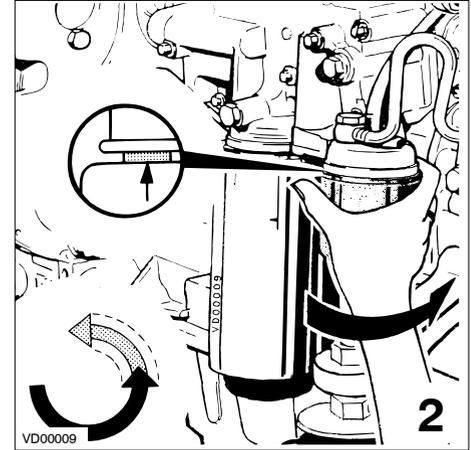


Keep naked flames away when working on the fuel system. Do not smoke!



31 Fuel filter installation

- Clean any debris from the filter carrier rim.
- Lubricate the rubber gasket sparingly with clean engine oil.
- Fill the new filter with clean diesel fuel.
- Install the filter. When the rubber gasket touches the housing, apply another tightening of a half to three quarters of



a turn by hand.

- Open the fuel stop cock.
- Check for leakage.

32 Bleeding

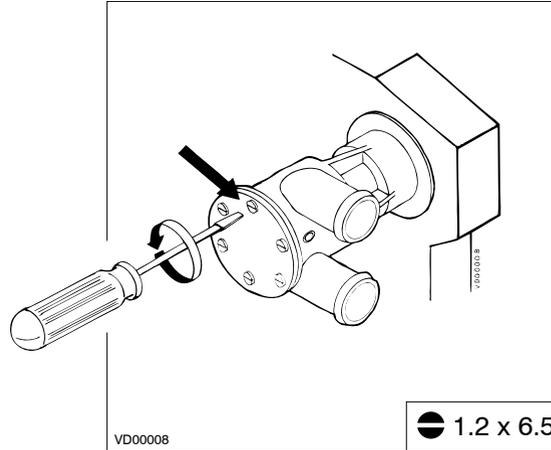
After replacing the fuel filter, the system doesn't need to be bled. The fuel system is self-bleeding. See page 31, 10 Bleeding.

4 Maintenance

4 Maintenance

Raw water pump inspection

Every 1000 operating hours.



33 Raw water pump inspection



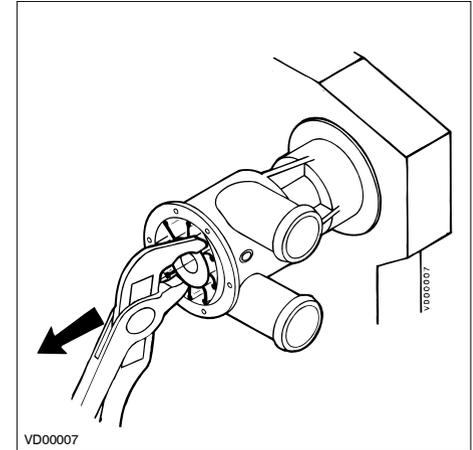
Caution!

The rubber impeller of the raw water pump is not proof against running dry. If the water supply has been blocked, it may be necessary to replace the impeller. Always carry a spare impeller on board.

34 Pump cover removal

Inspection where appropriate changing is as follows:

- Close the sea cock.
- Remove the cover of the pump by unscrewing the screws out of the housing.



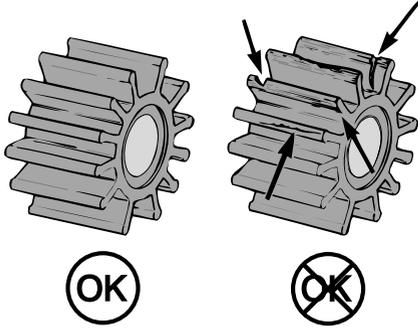
35 Impeller removal

- Slide the impeller off of the shaft using a waterpump plier.
- Mark the impeller to ensure correct re-installation if it is to be re-used. The impeller must be installed in the same position as removed.

Raw water pump inspection

Every 1000 operating hours.

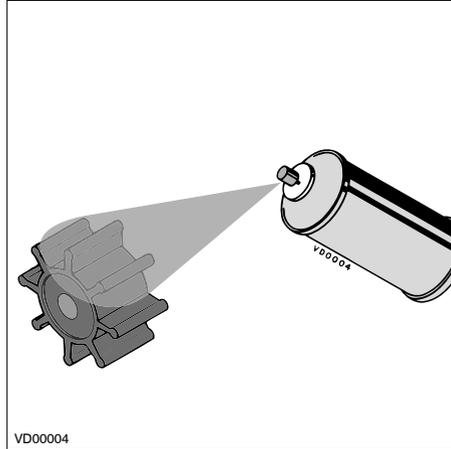
IMPELLER, ART.CODE: STM8246



VD00127

36 Impeller inspection

- Inspect the impeller for damage.
- Replace the impeller if necessary.



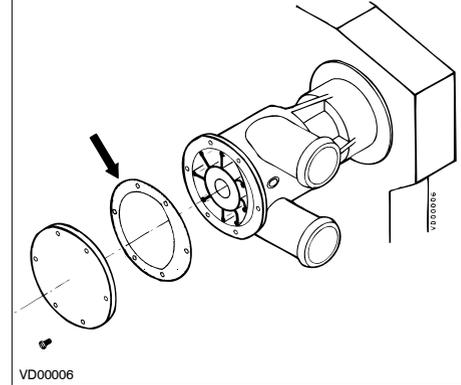
VD00004

37 Re-install the impeller

- The impeller should be lubricated with glycerin or a non-petroleum based lubricant such as a silicone spray before fitting it into the impeller housing.
- Fit the impeller to the pump shaft. (if an existing impeller is re-used, install it in the same position as removed).

4 Maintenance

GASKET, ART.CODE: STM8235



VD00006

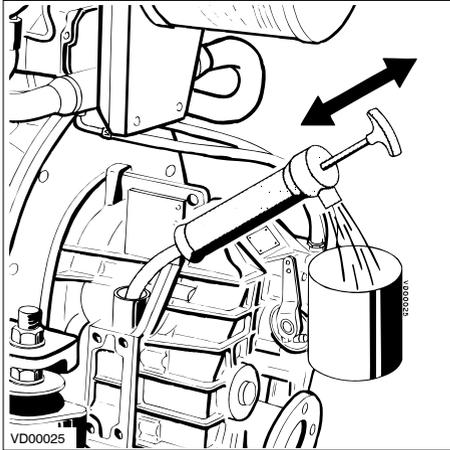
38 Replacing the pump cover

- Replace the cover with a **new** gasket.
- Check the water filter and open the sea cock.

4 Maintenance

Changing the gearbox oil

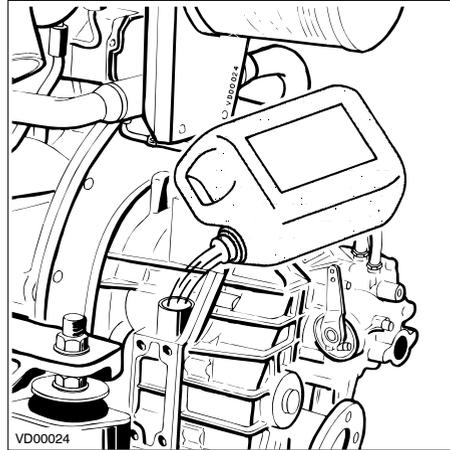
Every 1000 operating hours.



39 Draining the oil

Drain the oil with the aid of a separate sump pump.

- Remove the dipstick.
- Insert the suction hose of the sump pump in the dipstick hole. Push down the pump handle quickly and pull it up slowly.
- Remove the sump pump when all the old oil has been pumped out.



40 Filling with new oil

- Refill the gearbox to the correct level via the dipstick opening.

For oil specification see page 66.

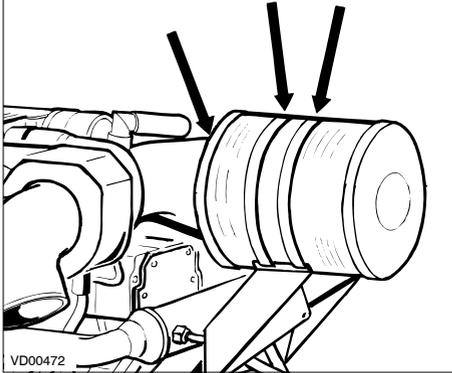
Vetus engines are normally equipped with ZF-Hurth gearboxes. Consult the supplied Owners Manual for more details about care and maintenance. In case your engine is equipped with another brand of gearbox follow the instructions given in the supplied owners manual for changing oil and other care and maintenance.

Combustion air intake, Flexible engine mounts, Hose connections

4 Maintenance

Every 1000 operating hours.

AIR FILTER: 4 CYL.: ART.CODE: CT30053
6 CYL.: ART.CODE: CT30108



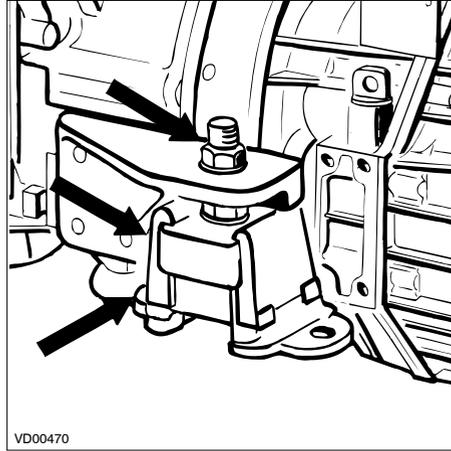
41 Air cleaner replacement

- The air cleaner is to be replaced as a unit.
- Loosen the 2 plastic cable ties securing the cleaner housing and loosen the hose clamp at the air intake.
- Install a new air cleaner and tighten the clamp and the cable ties again.



Warning!

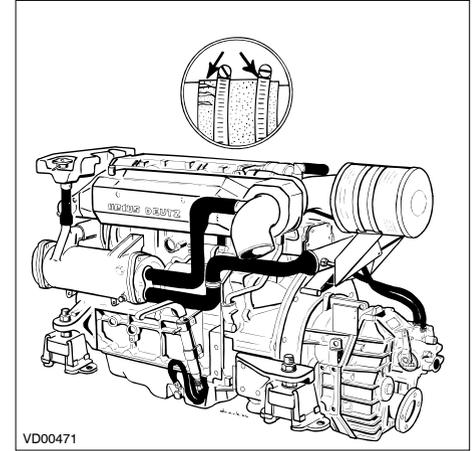
Never clean the air cleaner with petrol (gasoline) or hot fluids.



42 Check flexible engine mounts

Check the bolts which secure the damper element, the mounting bolts to engine bed and the nuts at the adjustment spindle for tightness.

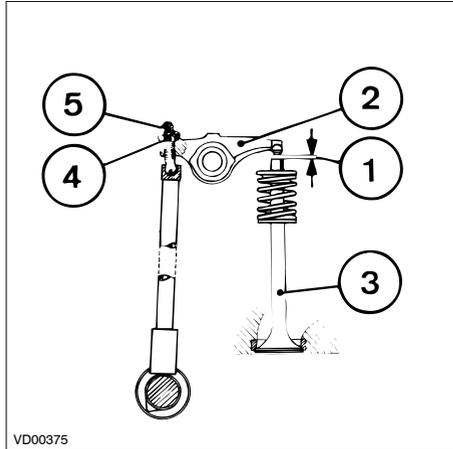
Also check the deflection of the damper element, the deflection influences the alignment of engine and propshaft! Re-align engine in case of doubt.



43 Inspection hose connections

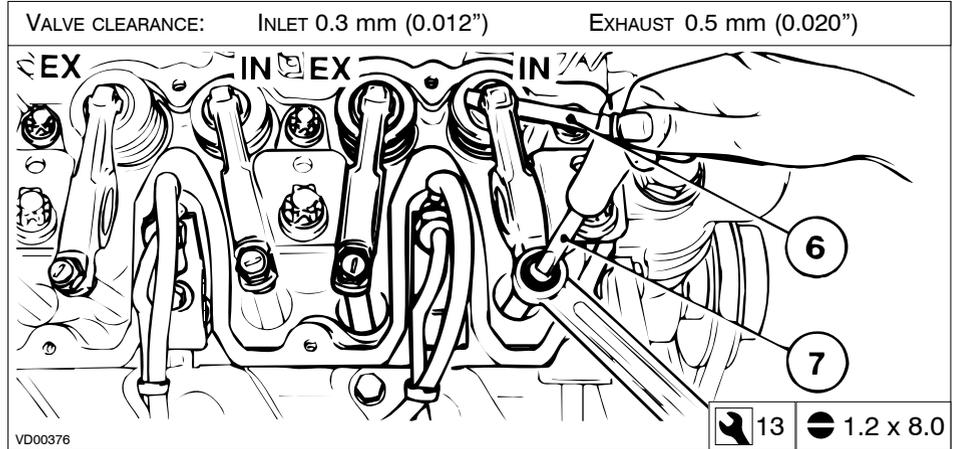
- Inspect all hose connections of the coolingsystem. (Cracked hoses, loose hose clamps)

4 Maintenance



44 Checking / adjusting valve clearance

- Remove the two bolts out off the breather valve and swing the breather valve aside. (For convenience first remove the air cleaner).
- Remove the air intake from after cooler (if installed).
- Remove rocker cover.
- Position crankshaft as per schematic.
- Before adjusting the valve clearance allow the engine to cool down for at least 30 minutes. The oil temperature



- should be below 80°C (176°F).
- Check the valve clearance (1) between the rocker lever (2) and valve stem (3) with feeler gauge (6).
Note the clearance is correct if some resistance is felt when the feeler gauge is slipped between the valve stem and rocker lever
 - Adjust valve clearance if necessary:
 - Release locknut (4)
 - Use screwdriver (7) to turn setscrew

Checking valve clearance

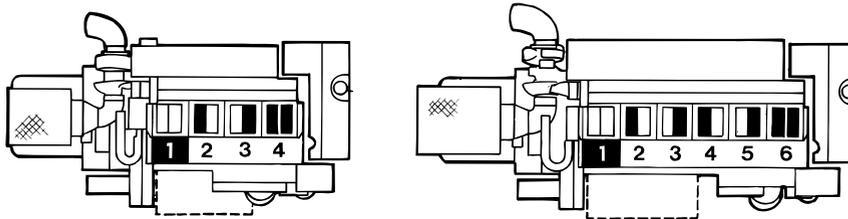
Every 1500 operating hours.

- (5) so that the correct clearance is obtained after the locknut has been tightened.
- Check and adjust valve clearance on all remaining cylinders.
- Re-install rocker cover (use a new gasket if needed).
- Re-install air intake from aftercooler.
- Re-install breather valve.

Valve Clearance Adjustment Schematic

4 Maintenance

1

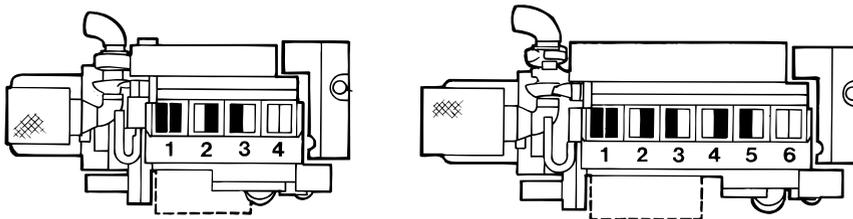


• Crankshaft Position 1

Bar crankshaft until both valves in cylinder 1 overlap (exhaust valve about to close, inlet valve about to open).

Adjust clearance of valves **marked in black** on schematic. Mark respective rocker arm with chalk to show that adjustment has been done

2



• Crankshaft Position 2

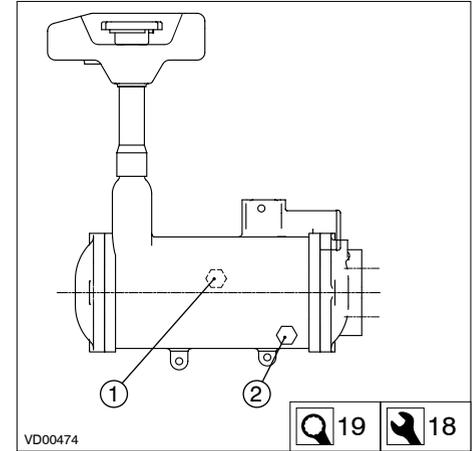
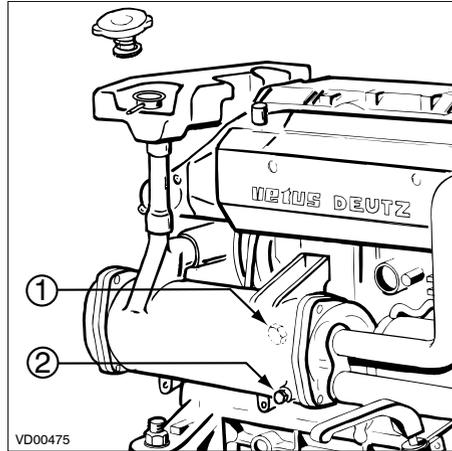
Bar crankshaft one full revolution (360°).

Adjust clearance of valves **marked in black** on schematic.

4 Maintenance

Coolant replacement

Every 2000 operating hours.



45 Coolant replacement

The coolant has to be replaced every 2000 operating hours or at least once every two years.

N.B. Replacing the coolant may also be necessary as part of the winter storage procedure; in case that the coolant present in the cooling system offers insufficient protection for the winter.

46 Draining of coolant

Remove the drain plugs from the engine block (1) and heat exchanger (2). Remove the filler cap to vent the cooling system and check that all the coolant has been drained. After draining replace the drain plugs.



Warning!

Be aware of the risk of skin burning during draining the hot coolant!



Caution!

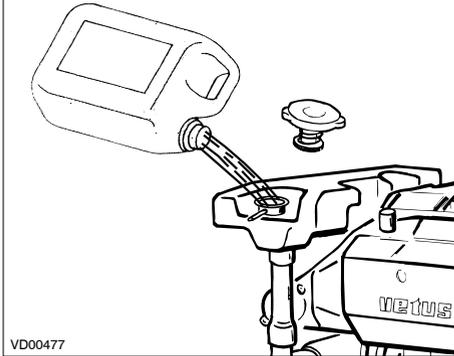
Used coolant must be collected in a container for proper disposal according to laws and regulations.



Coolant replacement

Every 2000 operating hours.

COOLANT 4 CYL.: 8.5 litres (1.9 UK gal)
QUANTITY : 6 CYL.: 12 litres (2.6 UK gal)



47 Filling the cooling system

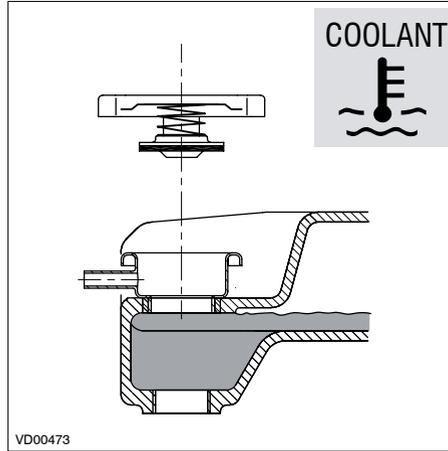
Remove the cap of the filler neck on the top of the header tank.

Fill the cooling system.

Replace plug A as soon as coolant flows out.

Use a mixture of 40% antifreeze (ethylene-glycol based) and 60% tap water or use a special coolant.

For specifications see page 72.



The level of the coolant must be at the lower edge of the filler neck.

Replace the filler cap.

Bleeding will take place automatically during filling!

3 Maintenance



Calorifier

If a calorifier is connected to the engine and this heater is positioned above the upper side of the engine then bleeding of the calorifier will not take place automatically! Fill the calorifier separately to bleed the cooling system completely.

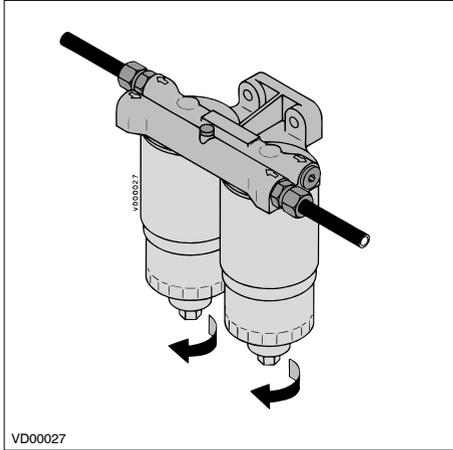
After the engine has run for the first time and has reached operating temperature and has cooled down again to ambient temperature, check the coolant level in the heat exchanger housing. If necessary, add coolant.



Caution!

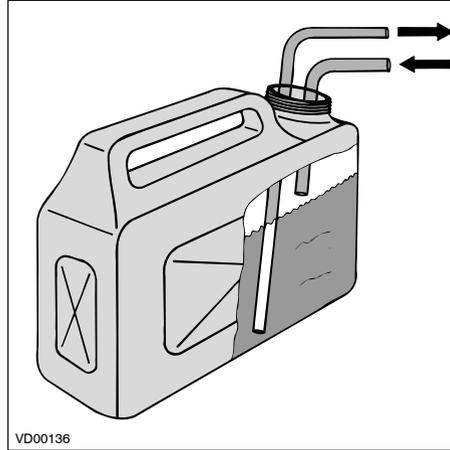
Never fill the cooling system with sea water or brackish water.

5 Winter storage procedure



1 Fuel system

Drain the water from the water separator/fuel filter and the fuel tank. Ensure that the tank is completely filled with fuel.



Running with protective fuel mixture

Connect the fuel supply pipe to a can filled with a mixture of one (1) part of engine oil* to nine (9) parts of clean fuel**. Use this mixture to run the engine at **no load** for approx. 10 minutes.

Stop the engine.

* Engine oil with protective properties.
E.g. Shell Super Diesel T 10W40

** Preferably water-free fuel.

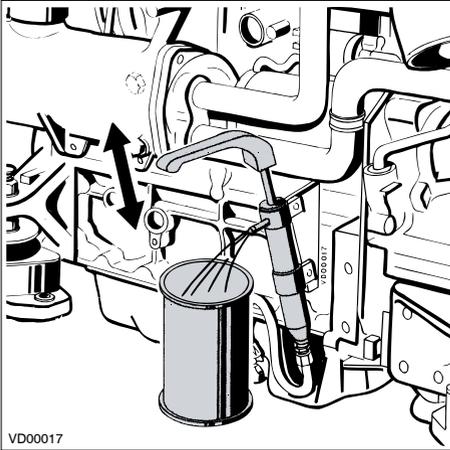
Collect some fuel from the return pipe, while engine is running.



Caution!

Never run the engine under load with this mixture of fuel and oil.

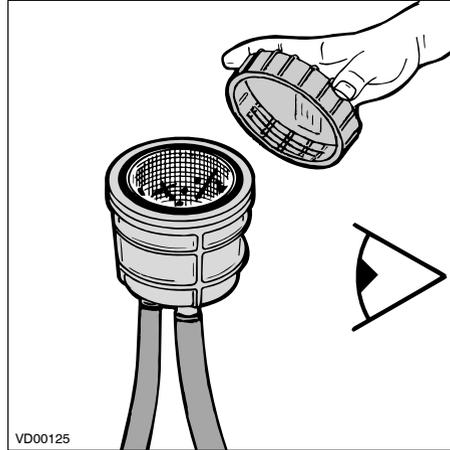
5 Winter storage procedure



2 Lubrication system

With the engine still at operating temperature: (If not, run the engine until warm, then turn off.)

Replace the oil filter and change the engine oil; use oil with protective properties. See page 70.



3 Raw water cooling system

Close the seacock before removing the lid of the water strainer. If necessary, clean the raw water strainer.

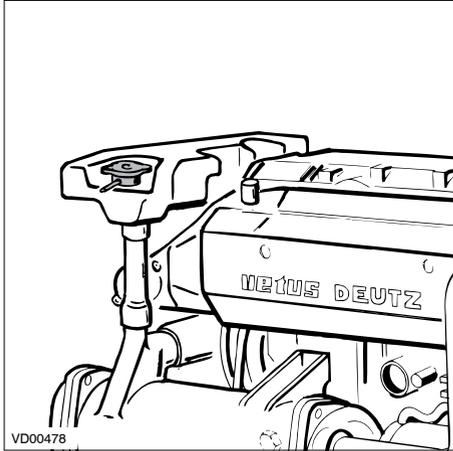
Pour 1 litre (2 UK pt) of anti-freeze into the water strainer and run the engine until the anti-freeze has disappeared into the cooling system.

Take care that no anti-freeze is spilled into the waterway (anti-freeze is poisonous).

Check the seal between the lid and housing after cleaning and re-assembling the strainer.

An improperly sealed lid will result in air sucked in by the raw water pump which again will result in overheating of the engine.

5 Winter storage procedure

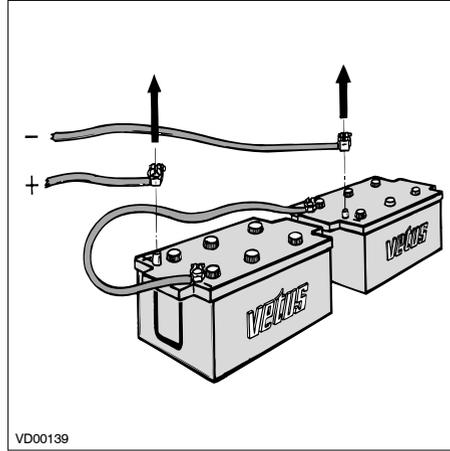


4 Fresh water cooling system

To avoid corrosion during winter storage the cooling system must be filled with an antifreeze/water mixture (or a coolant). For specifications see page 72.

N.B. Replacing the coolant is only necessary if the coolant present in the cooling system offers insufficient protection for the winter.

For coolant replacement see page 48.

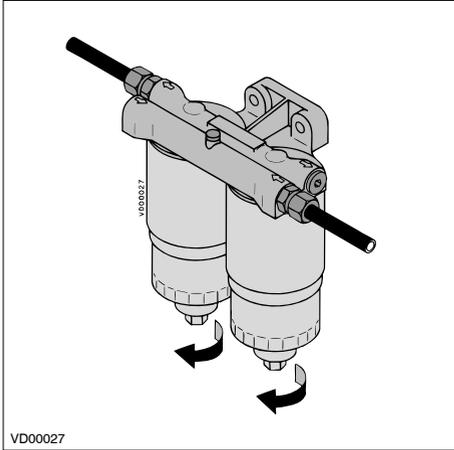


5 Electrical system

Disconnect the battery cables.

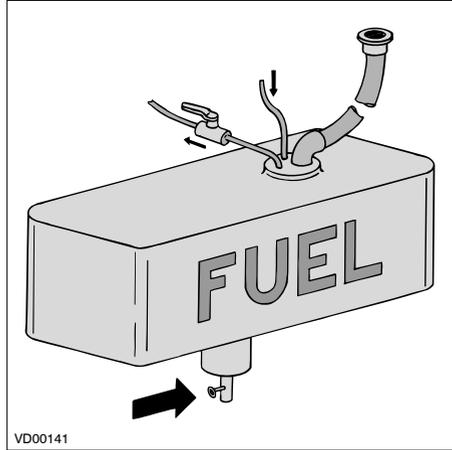
Charge batteries during winter lay-up regularly if required!

6 Recommissioning after winter storage

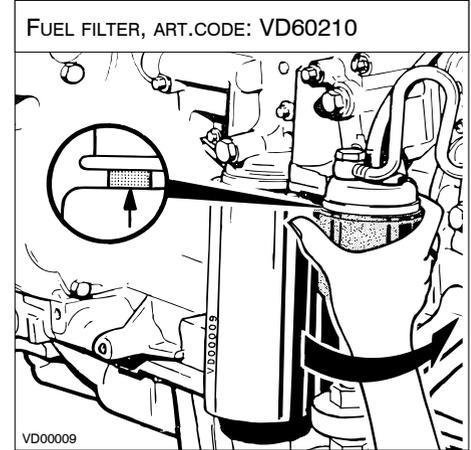


1 Fuel system

Drain the water from the water separator/
fuel filter. (page 31)



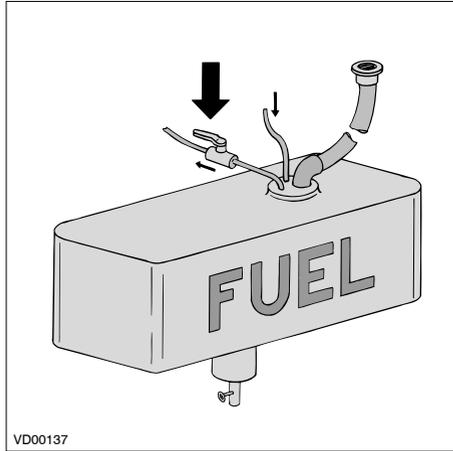
Drain the water from the fuel tank.



Install a new fuel filter. (page 41)

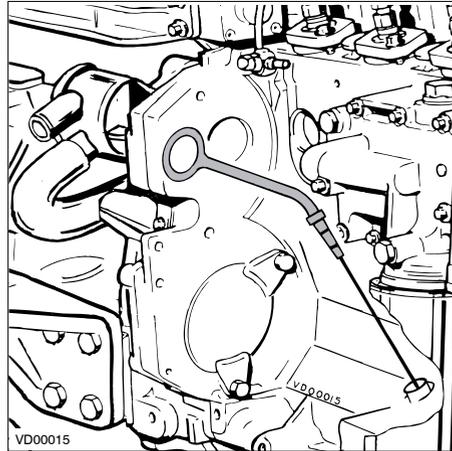


6 Recommissioning after winter storage



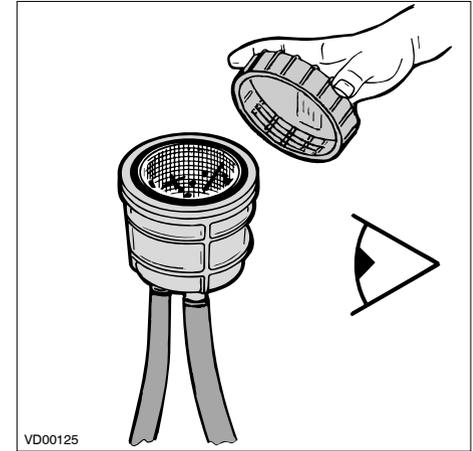
➞ Fuel system

Open the fuel valve.



2 Lubrication system

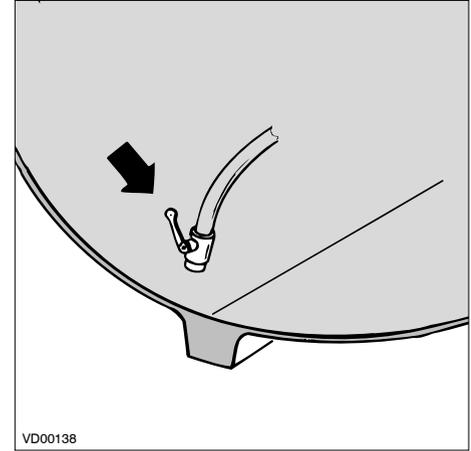
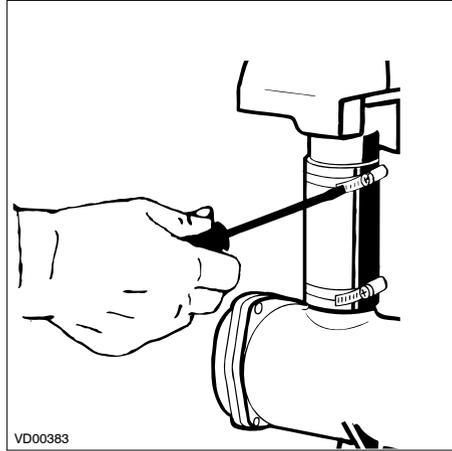
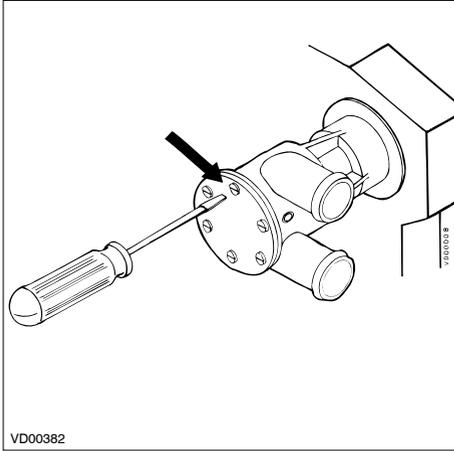
Check the engine oil level. (page 28)



3 Raw water cooling system

Check that the lid of the raw water strainer is reinstalled.

6 Recommissioning after winter storage

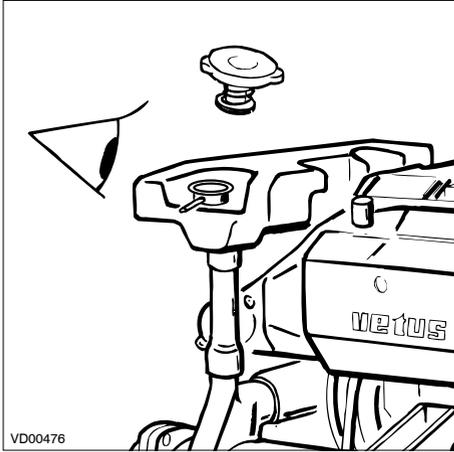


Check that the lid of the raw water pump and drain plugs are reinstalled. (pages 42, 43)

Re-tighten possible loose hose clamps.

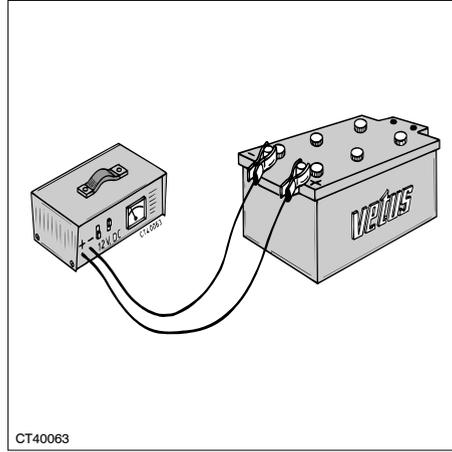
Open the sea cock.

6 Recommissioning after winter storage



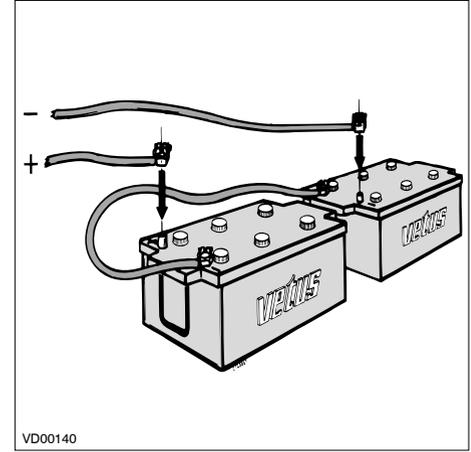
4 Fresh water cooling system

Check the coolant level. (page 29)



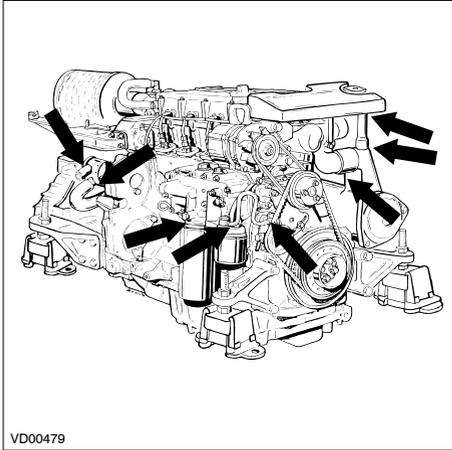
5 Electrical system

Make sure that the batteries are fully charged. (pages 32, 52)



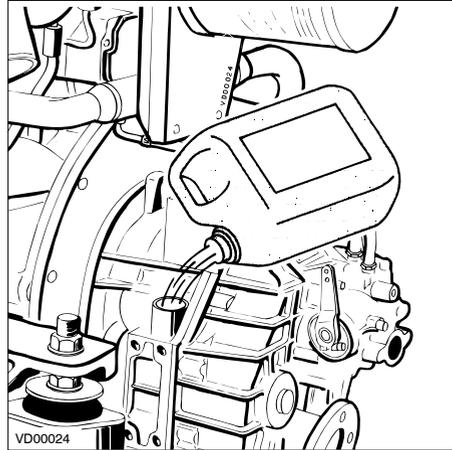
Connect the batteries.

6 Recommissioning after winter storage



6 Check for leakages

Start the engine.
Check the fuel system, the cooling system and the exhaust for leakage.



7 Changing the gearbox oil

Stop the engine and change the oil of the gearbox. (page 44)



8 Checking instruments and remote controls

Check the operation of the instruments, the remote control and the gearbox.

7 Troubleshooting

General

Engine faults are in most cases caused by improper operation or insufficient maintenance.

In case of a fault, always check first that the operation and maintenance instructions have been followed.

In the following tables information is given about the possible causes of faults and suggested remedies. Please note that these tables can never be complete.

If you are unable to identify the cause of the fault or to rectify it yourself, then contact the nearest service representative.



Warning!

Before starting, make sure that nobody is in the immediate vicinity of the engine.

When carrying out repair, **never** start the engine with the fuel injection pump removed removed.

Disconnect battery!

Fault finding table

7 Troubleshooting

1 Engine will not crank

Possible fault	Remedy
A Faulty or discharged battery.	A Check / recharge battery and check engine alternator and/or battery charger.
B Loose or corroded connections in starting circuit.	B Clean and tighten connections.
C Faulty starter-switch or faulty starter-relay.	C Check / replace.
D Faulty starter-motor or pinion does not engage.	D Check / replace starter-motor.

2 Engine cranks but will not start, no smoke from exhaust

Possible fault	Remedy
A Fuel stop valve closed.	A Open.
B (Nearly) Empty fuel tank.	B Refill.
C Air in fuel system.	C Check and bleed.
D Fuel filter clogged with water and/or contamination.	D Check or replace.
E Leaking fuel supply line or fuel injection line.	E Check / replace.
F Faulty injector/injection pump.	F Check, replace if required.
G Engine shut down lever in stop position.	G Check / replace.
H Faulty V-belt fuel pump.	H Replace V-belt.
I Vent line of fuel supply tank clogged.	I Check / clean.
J Exhaust restricted.	J Check.

7 Troubleshooting

Fault finding table

3 Engine cranks but will not start, smoke from exhaust

Possible fault	Remedy
A Air in fuel system.	A Check and bleed.
B Faulty injector/injection pump.	B Check, replace if required.
C Faulty glow plugs (if installed) or below starting limit temperature.	C Check / replace.
D Incorrect valve clearance.	D Adjust.
E Incorrect injection timing after overhauling of engine.	E Check / adjust.
F Insufficient intake air.	F Check.
G Wrong fuel quality or contaminated fuel.	G Check fuel. Drain and flush fuel tank. Replace with new fuel.
H Incorrect lube oil SAE class or quality for ambient temperature.	H Replace.

4 Engine starts but runs unevenly (rough idling) or stalls

Possible fault	Remedy
A (Nearly) Empty fuel tank.	A Refill.
B Air in fuel system.	B Check and bleed.
C Fuel filter clogged with water and/or contamination.	C Check or replace.
D Leaking fuel supply line or fuel injection line.	D Check / replace.
E Faulty injector/injection pump.	E Check, replace if required.
F Faulty V-belt fuel pump.	F Replace V-belt.
G Vent line of fuel supply tank clogged.	G Check / clean.
H Fuel supply line restricted.	H Check / clean.
I Incorrect valve clearance.	I Adjust.
J Idle setting too low.	J Check/ adjust.
K Exhaust restricted.	K Check.
L Wrong fuel quality or contaminated fuel.	L Check fuel. Drain and flush fuel tank. Replace with new fuel.

Fault finding table

7 Troubleshooting

5 Engine does not reach maximum rpm under load

Possible fault	Remedy
A Air in fuel system.	A Check and bleed.
B Fuel filter clogged with water and/or contamination.	B Check or replace.
C Leaking fuel supply line or fuel injection line.	C Check / replace.
D Faulty injector/injection pump.	D Check, replace if required.
E Engine shut down lever in stop position, faulty fuel valve.	E Check / replace.
F Faulty V-belt fuel pump.	F Replace V-belt.
G Oil level too high.	G Lower level.
H Incorrect valve clearance.	H Adjust.
I Exhaust restricted.	I Check / clean.
J Charge air (after)-cooler contaminated.	J Check / clean.
K Insufficient intake air.	K Check.
L Faulty 'charge air pressure operated max. power output device'.	L Check / replace.
M Leaking air intake manifold.	M Check / replace.
N Wrong fuel quality or contaminated fuel.	N Check fuel. Drain and flush fuel tank. Replace with new fuel.
O Engine overloaded.	O Check size of propeller.

6 Engine overheats

Possible fault	Remedy
A Faulty injector/injection pump.	A Check, replace if required.
B Oil level too high.	B Lower level.
C Oil level too low.	C Increase level.
D Faulty oil filter.	D Replace.
E Faulty turbocharger	E Check / clean.
F Coolant pump defective.	F Check / clean.
G Heat exchanger dirty or clogged as a result of rubber particles from a worn impeller.	G Clean
H Vent pipe blocked.	H Check / clean
I Coolant level too low.	I Check / top up.
J Sea cock closed.	J Open.
K Raw water strainer clogged.	K Check / clean.
L Leaking raw water intake system.	L Check / replace.
M Faulty thermostat.	M Check / replace.
N Faulty impeller raw water pump.	N Check / replace.
O Insufficient intake air.	O Check / replace air intake filter.
P Leaking air intake manifold.	P Check / replace.
Q Motor becomes apparently overheated as a result of faulty temperature switch, sensor or meter.	Q Check / replace.

7 Troubleshooting

Fault finding table

7 Engine not firing on all cylinders

Possible fault	Remedy
A Air in fuel system.	A Check and bleed.
B Fuel filter clogged with water and/or contamination.	B Check or replace.
C Leaking fuel supply line or fuel injection line.	C Check / replace.
D Faulty injector/injection pump.	D Check, replace if required.
E Faulty V-belt fuel pump.	E Replace V-belt.
F Fuel supply line restricted.	F Check / clean.
G Faulty glow plugs (if installed) or below starting limit temperature.	G Check / replace.
H Incorrect valve clearance.	H Adjust.

8 Engine has little or no oil pressure

Possible fault	Remedy
A Oil level too low.	A Increase level.
B Excessive inclination of engine.	B Check / Adjust.
C Incorrect lube oil SAE class or quality for ambient temperature.	C Replace.

9 Engine oil consumption excessive

Possible fault	Remedy
A Oil level too high.	A Lower level.
B Excessive inclination of engine.	B Check / Adjust.
C Incorrect lube oil SAE class or quality for ambient temperature.	C Replace.
D Excessive wear of cylinder/piston.	D Check compression; overhaul engine.
E Insufficient intake air.	E Check.
F Engine overloaded.	F Check size of propeller.

Fault finding table

7 Troubleshooting

10A Blue exhaust smoke (idling)

Possible fault	Remedy
A Oil level too high.	A Lower level.
B Excessive inclination of engine.	B Check / Adjust.
C Leaking turbocharger oil seal.	C Check / replace oil seal.

10B Black exhaust smoke (at load)

Possible fault	Remedy
A Faulty turbocharger.	A Check / replace.
B Charge air (after)-cooler contaminated.	B Check / clean.
C Insufficient intake air.	C Check / replace air intake filter.
D Faulty 'charge air pressure operated max. power output device'.	D Check / replace.
E Leaking air intake manifold.	E Check / replace.
F Faulty injector / injection pump.	F Check / replace if required.
G Engine overloaded, max. rpm is not reached.	G Check sizes of propeller.

10C White exhaust smoke (at full load)

Possible fault	Remedy
A Air in fuel system.	A Check and bleed.
B Faulty injector/injection pump.	B Check, replace if required.
C Water in fuel system.	C Check water separator.
D Faulty glow plugs (if installed) or below starting limit temperature.	D Check / replace.
E Incorrect valve clearance.	E Adjust.
F Incorrect injection timing.	F Check / adjust.
G Wrong fuel quality or contaminated fuel.	G Check fuel. Drain and flush fuel tank. Replace with new fuel.
H Vapour in exhaust gases condenses as a result of very low ambient temperature.	H -

8 Technical data

Engine specifications

Model	DT44	DTA44	DT66	DTA66
General				
Make	Vetus Deutz			
Number of cylinders	4	4	6	6
Based on	BF4M2012	BF4M2012C	BF6M2012	BF6M2012C
Type	4-stroke diesel, in-line			
Injection	Direct			
Aspiration	Turbo-charged	Turbo-charged/ After cooled	Turbo-charged	Turbo-charged/ After cooled
Bore	101 mm	101 mm	101 mm	101 mm
Stroke	126 mm	126 mm	126 mm	126 mm
Total displacement	4038 cm ³	4038 cm ³	6057 cm ³	6057 cm ³
Compression ratio	18.4 : 1	18.4 : 1	18.4 : 1	18.4 : 1
Idling speed	800 ⁺⁵⁰ ₋₀ rpm	800 ⁺⁵⁰ ₋₀ rpm	800 ⁺⁵⁰ ₋₀ rpm	800 ⁺⁵⁰ ₋₀ rpm
Max. no. of revolutions at no load	2950 rpm	2950 rpm	2950 rpm	2950 rpm
Valve Clearances (cold)	Inlet 0.3 ^{+0.1} mm (0.012") Exhaust 0.5 ^{+0.1} mm (0.020")			
Weight (with standard gearbox)	513 kg (1131 lbs)	532 kg (1173 lbs)	652 kg (1437 lbs)	657 kg (1448 lbs)

Engine specifications

8 Technical data

Model	DT44	DTA44	DT66	DTA66
Maximum output				
Light Duty Commercial (ISO 3046/IOFN) at no. of revolutions of	76 kW (103 hp) 2500 rpm	93 kW (126 hp) 2500 rpm	112 kW (153 hp) 2500 omw/min	139 kW (189 hp) 2500 rpm
Special Light Duty (ISO 3046/IOFN) at no. of revolutions of	84 kW (114 hp) 2500 rpm	103 kW (140 hp) 2500 rpm	125 kW (170 hp) 2500 omw/min	155 kW (210 hp) 2500 rpm
Fuel consumption				
At max. power and max. rpm	208 g/kW.h	202 g/kW.h	202 g/kW.h	202 g/kW.h

8 Technical data

Engine specifications

Model	DT44	DTA44	DT66	DTA66
Fuel System (Self-bleeding)				
Injection pump		Bosch		
Injectors		Bosch		
Opening pressure		250 bar (kgf/cm ³) (3625 psi)		
Firing order	1-3-4-2	1-3-4-2	1-5-3-6-2-4	1-5-3-6-2-4
Injection timing	4° BTDC	4° BTDC	4° BTDC	4° BTDC
Fuel filter element	VD60210	VD60210	VD60210	VD60210
Fuel lift pump	Suction height max.	max. 1.5 m (5 ft)		
	Pressure loss	max. 0.15 bar (kgf/cm ³) (2.2 psi)		
Fuel supply connection		for hose 12 mm I.D.		
Length fuel line		max. 6 m (20 ft)		
Fuel return connection		for hose 10 mm I.D.		
Return flow		max. 9 l/min (2 UK gal/min)		
Oil lubrication system				
Oil capacity, max.	without oil filter	7.5 litres (1.65 UK gal)	7.5 litres (1.65 UK gal)	12.5 litres (2.75 UK gal)
	with oil filter	8.5 litres (1.9 UK gal)	8.5 litres (1.9 UK gal)	14 litres (3.1 UK gal)
Oil Filter		VD20262	VD20262	VD20263
Oil pressure with warm oil (120°C, 248°F) and low idle		min. 0.8 bar (11.6 psi)		
Oil temperature in sump		max. 120°C (248°F)		

Engine specifications

8 Technical data

Model		DT44	DTA44	DT66	DTA66
Cooling system					
Capacity,	Intercooler version	8.5 litres (1.9 UK gal)	8.5 litres (1.9 UK gal)	12 litres (2.6 UK gal)	12 litres (2.6 UK gal)
	Keelcooler version	6.1 litres (1.35 UK gal)	— —	8.8 litres (1.94 UK gal)	— —
Thermostat		opening at 83°C (181°F), fully opened at 95°C (203°F)			(VD20833)
Coolant pump,	Flow	170 l/min (37.4 UK gal/min)	170 l/min (37.4 UK gal/min)	180 l/min (39.6 UK gal/min)	180 l/min (39.6 UK gal/min)
	Total head	0.23 bar (3.3 psi)	0.23 bar (3.3 psi)	0.26 bar (3.8 psi)	0.26 bar (3.8 psi)
Raw water pump,	Flow at max. engine rpm	98 l/min (21.6 UK gal/min)	98 l/min (21.6 UK gal/min)	123 l/min (27 UK gal/min)	123 l/min (27 UK gal/min)
	Total head at max. flow	0.5 bar (7 psi)	0.5 bar (7 psi)	0.5 bar (7 psi)	0.5 bar (7 psi)
	Impeller	STM8246	STM8246	STM8246	STM8246
	Inlet connection	for hose 32 mm I.D.			
Calorifier connection		M26 x 1.5 (Kit no. STM9738)			
Combustion air system / Exhaust					
Air intake filter		CT30053	CT30053	CT30108	CT30108
Intake vacuum pressure			max. 25 mbar (0.74 in Hg)		
Exhaust diameter		90 mm	100 mm	125 mm	125 mm
Exhaust back pressure		at specified output max. 120 mbar (3.5 in Hg) absolute maximum 120 mbar (3.5 in Hg)			

8 Technical data

Engine specifications

Model

DT44

DTA44

DT66

DTA66

Electrical system

Voltage

12 Volt / 24 Volt, see alternator data tag

Alternator

14 Volt, 95 A / 28 Volt, 55 A, see alternator data tag

Battery capacity

min. 88 Ah, max. 176 Ah (at 12 Volt) / min. 2x 66 Ah, max. 2x 110 Ah (at 24 Volt)

Protection

Circuitbreaker, 10 A

V-belts

Alternator

VD40067

VD40067

VD40067

VD40067

Tension

Pre-tension 400 N (90 lbf) / Re-tension 250^{±50} N (56^{±11} lbf)

Fuel pump / Coolant pump

VD40069

VD40069

VD40069

VD40069

Tension

Pre-tension 400 N (90 lbf) / Re-tension 250^{±50} N (56^{±11} lbf)

Engine installation

Max. installation angle

15 degrees backwards

Max. athwartships angle

25 degrees continuously, 30 degrees intermittent

Gearbox, standard

ZF-Hurth type

ZF45

ZF45

ZF45

ZF63

Reduction ratio

2.2/2.5/3.0:1

2.2/2.5/3.0:1

2.2/2.5/3.0:1

1.51/1.93/2.5/2.78:1

Torque wrench settings

Screw connection	Size	Class	Torque [Nm]	Angle
Oil pan	M8x16		30	
Oil drain plug	M18x1.5		50	
Cylinder head,				
- long bolts	M12x200	10.9	40/70	180°
- short bolts	M12x120	10.9	40/70	180°
Lifting eye / Cyl. head	M10x30	8.8	40±10%	
Rocker cover	M6x75	10.9	8.5±10%	
Rocker arm set-screw	M8x60	8.8	21	
Flange injection pump	M8x30	10.9	30	
Injector holder (Torx)	M8x50	10.9	16+5	
Fuel lift pump /				
clamping strap	M8x20	10.9 A4C	21±2	
Pulley fuel lift pump	M8x20	8.8	21±2	
Screw, banjo connector				
fuel line	M14x1.5		39±10%	
Injection line mounting	M14x1.5		25±3.5	
Exhaust insulator	M8	8.8	21±10%	
Air intake manifold (AIM)	M6x75	10.9	11±10%	
Cover (AIM),				
- pre-tightening	M6x25		15±10%	
- re-tightening	M6x25		15±10%	
Plugs (AIM)	M10x1		13±10%	
Plugs (AIM)	M16x1.5		38±10%	
Plugs (AIM)	M18x1.5		50	

8 Technical data

Screw connection	Size	Class	Torque [Nm]	Angle
Exhaust manifold / Cyl. head				
- Stud	M10		15	
- Locknut	M8		25±10%	
Turbocharger / Exhaust manifold				
- Bolt - 4 Cyl.	M8		21±10%	
- 6 Cyl.	M10		22±10%	
Turbo-oplader / Uitlaatinjectiebocht				
- Stud - 4 Cyl.	M8		22±10%	
- 6 Cyl.	M10		22±10%	
- Nut - 4 Cyl.	M8		21±10%	
- 6 Cyl.	M10		21±10%	
Alternator mounting	M8x80	10.9	21±10%	
Starter	M10x55	10.9	70	
Engine bracket front	M16x75	8.8	187±10%	
Engine bracket rear	M12x40	8.8	80±10%	
Flywheel housing	M12x150	10.9	99±10%	
Flywheel housing	M16x140	10.9	243±10%	
Gear-wheel raw water pump shaft	M12		80	

Nm to ft.lb conversion:

Torque in ft.lb = 0.74 x Torque in Nm

9 Operating media

Lubricating oil

Engine Lubricating Oil

Only use a recognised brand of oil for lubricating the engine.

Lube oils are differentiated according to their performance and quality class. In common use are specifications named after API (American Petroleum Institute) and CCMC (Committee of Common Market Automobile Constructors).

Approved API Oils : CD, CE, CF and CF4
Approved CCMC Oils : D4, D5

As the viscosity of lube oil is dependent on temperature, the oil viscosity (SAE grade) should be selected according to the ambient temperature when the the engine is started.

To avoid oil changes dictated by the seasons we advise one of the following multi-grade oils.

- SAE 10W40 for temperatures of -25°C up to +30°C
(-13°F up to +86°F)
- SAE 15W40 for temperatures of -20°C up to +35°C
(-4°F up to +95°F)

For example: Vetus Marine Inboard Motor Oil
Shell Super Diesel T

Gearbox Lubricating Oil

Only use a recognised brand of oil for lubricating the gearbox.

ZF Hurth:

AutomaticTransmission Fluid; type A, Suffix A.

For example : Vetus Marine Gearbox Oil
Shell Donax T6
Gulf Dextron

model ZF45 (HSW450H2) : 2.0 liter (3.5 UK pt)
model ZF45A (HSW450A) : 3.0 liter (5.3 UK pt)
model ZF63 (HSW630H1) : 3.8 liter (6.7 UK pt)
model ZF63A (HSW630A) : 4.0 liter (7 UK pt)

Other brands of gearboxes:

See supplied owners manual for oil type and quantities.

Fuel

Fuel Quality Grade

Use commercially available diesel fuel with less than 0.5% sulfur content.

If the sulfur content is higher than 0.5%, the intervals between oil changes should be halved e.g. change oil every 250 hours.

Don't use fuel with more than 1% sulfur!

The following fuel specifications / standards are approved:

- CEN EN 590 or DIN/EN 590 (under development)
- DIN 51 601 (Feb. 1986)
- BS 2869 (1988): A1 and A2
- ASTM D975-88: D1 and D2
- NATO Code F-54 and F75

The exhaust emission levels determined during certification by the supervising authority are always based on the reference fuel described by law.

Winter-grade fuel

Waxing may occur at low temperatures, clogging the fuel system and reducing engine efficiency.

If the ambient temperature is less than 0°C (+32°F), winter-grade fuel -suitable down to -15°C (+5°F) - should be used. This fuel is usually available from filling stations well in advance of the cold months. Diesel fuel containing additives (Super Diesel) is often on sale as well, for use down to -20°C (-4°F).

9 Operating media

Coolant

Coolant fluid

The preparation and monitoring of coolant in inter-cooled engines is especially important because corrosion, cavitation and freezing can lead to engine damage. Use as coolant a mixture of a cooling system protective liquid (anti-freeze, ethylene glycol based) and tap water.

In tropical climates, where anti-freeze availability may be limited, use a corrosion inhibitor to protect the engine cooling system.

The concentration of the cooling system protective liquid in the coolant should not fall below/exceed the following limits:

Cooling system protective liquid (Anti-freeze)	Water	Protection against freezing to
35 vol.%	65 vol. %	-22°C (-8°F)
40 vol.%	60 vol.%	-28°C (-18°F)
45 vol.%	55 vol.%	-35°C (-31°F)

The protective liquid concentration must be maintained under all circumstances. Therefore if coolant must be added always use the same mixture of anti-freeze and tap water.

Coolingsystem protective liquidl (Anti-freeze)

As cooling system protective liquid use a ethylene-glycol based anti-freeze. This will give an adequate protection against corrosion, cavitation and frost damage.

For example:

ARAL	Antifreeze Extra
ESSO	ESSO Antifreeze Extra
Mobil	Mobil Antifreeze Extra
Shell	GlycoShell
TOTAL	ELF Glacelf MDX
BP	BP Antifrost Code No. X2270 A

In tropical climates, where anti-freeze availability may be limited, use a corrosion inhibitor to protect the engine cooling system.



Caution!

Cooling system protective liquids must be disposed of in accordance with environmental regulations.



Coolant

9 Operating media

Water quality for coolant preparation

Use preferably tap water.

If an other available fresh water is used; the values given below must not be exceeded.

Water quality	min.	max.
pH-value at 20°C (68°F)	6.5	8.5
Chloride ion content [mg/dm ³]	—	100
Sulfate ion content [mg/dm ³]	—	100
Total hardness [degrees]	3	20

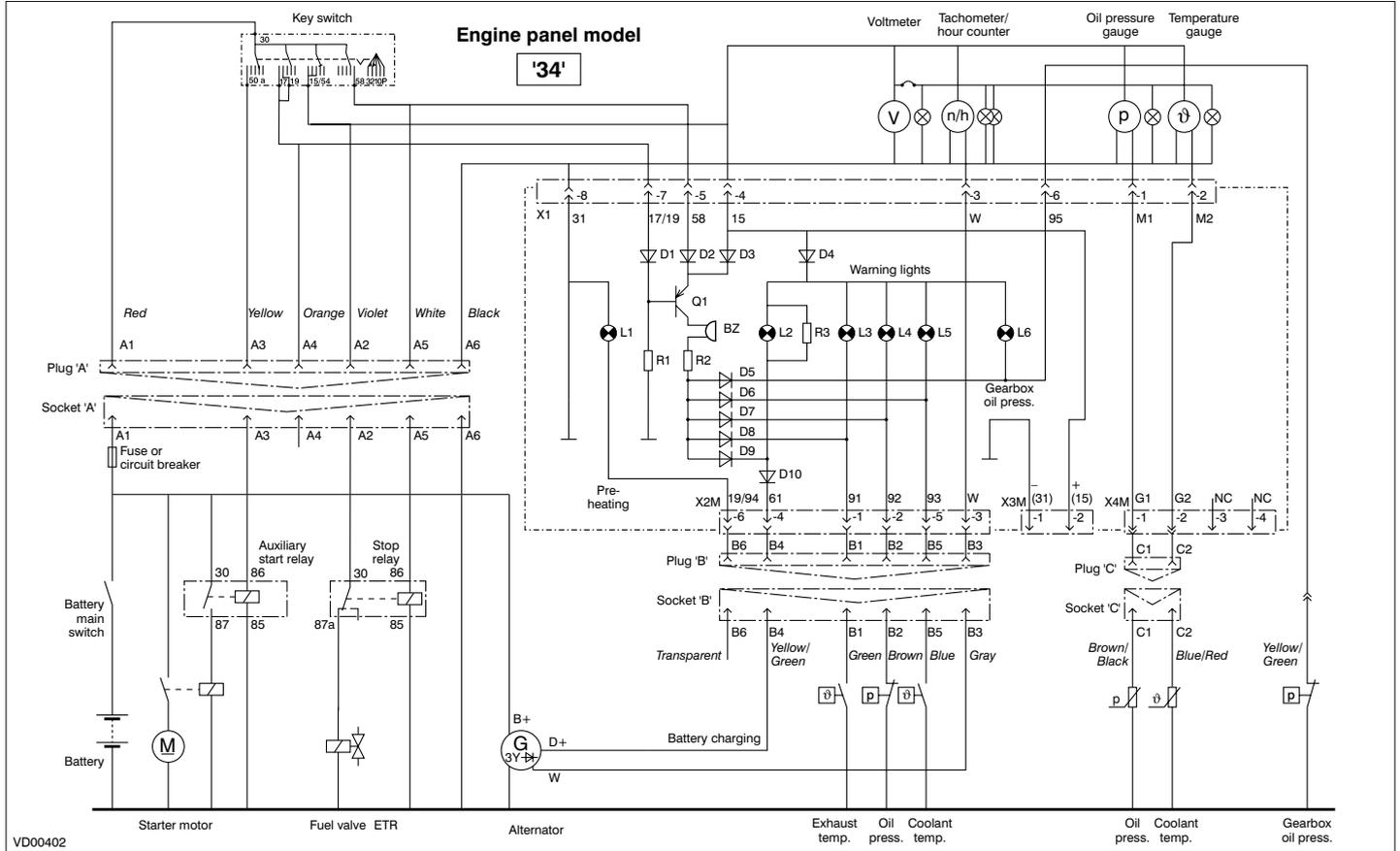


Caution!

Never use sea-water or brackish water.

10 Wiring diagram

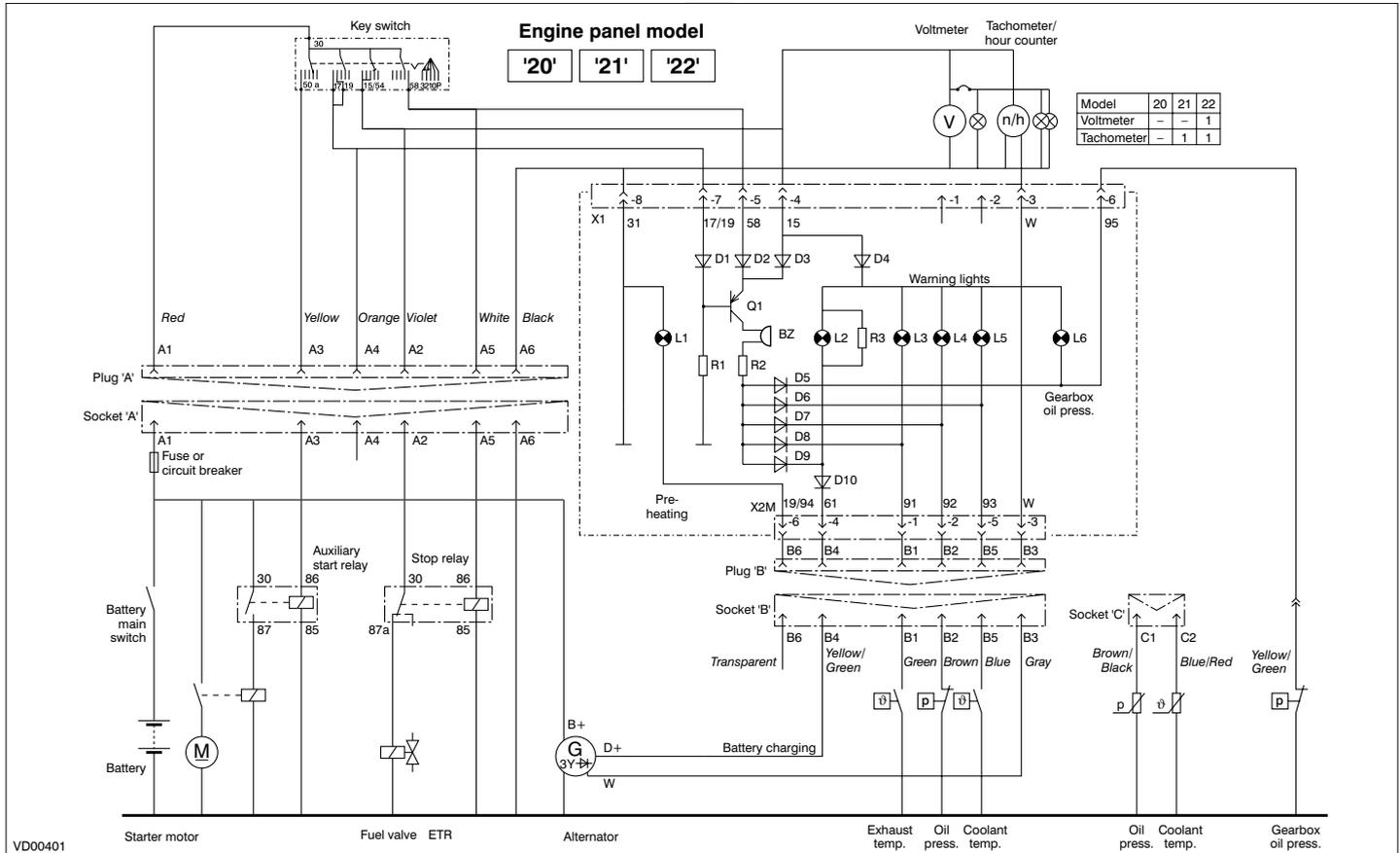
Options, panel model '34'



VD00402

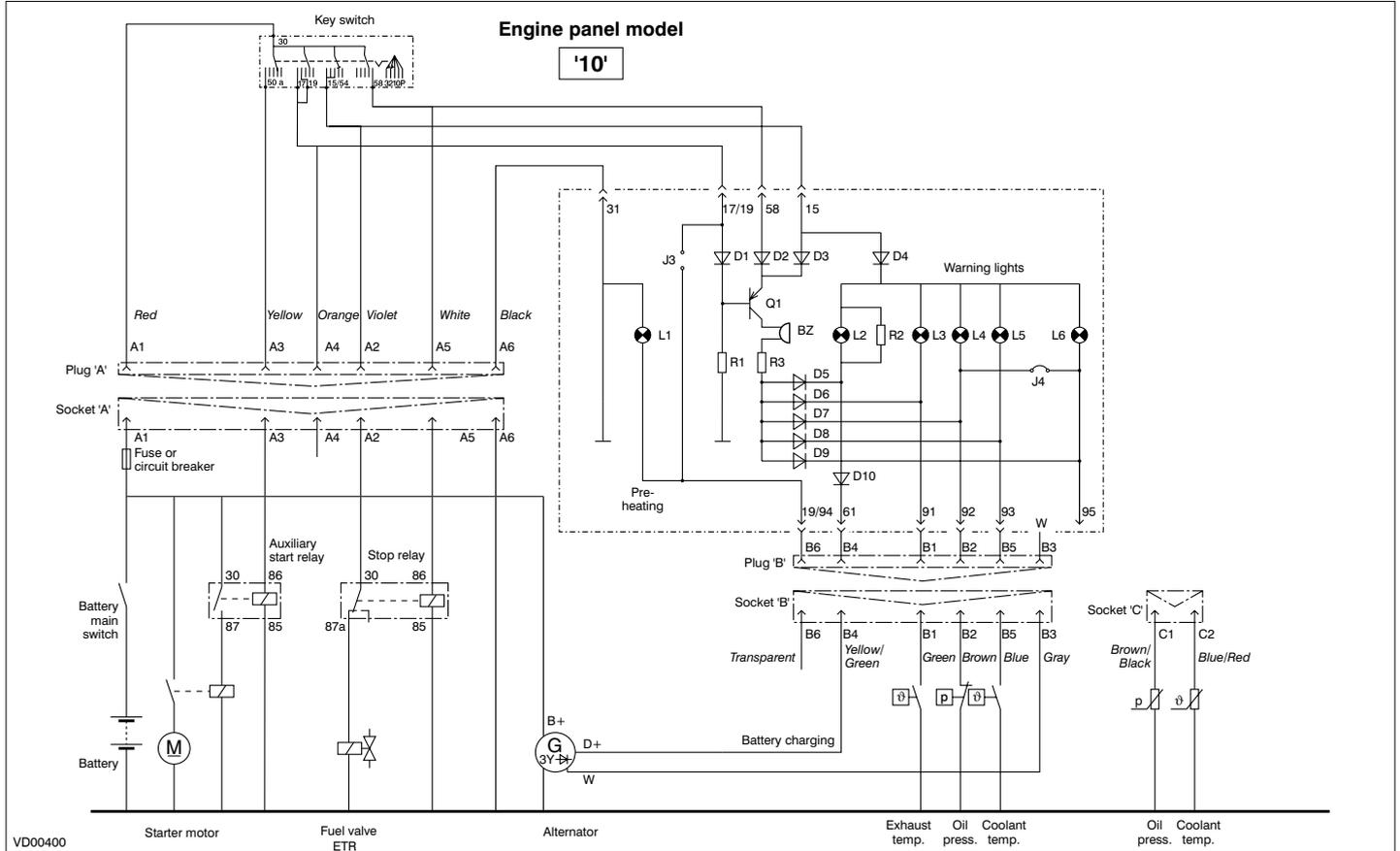
Options, panel model '22'

10 Wiring diagram



10 Wiring diagram

Options, panel model '10'

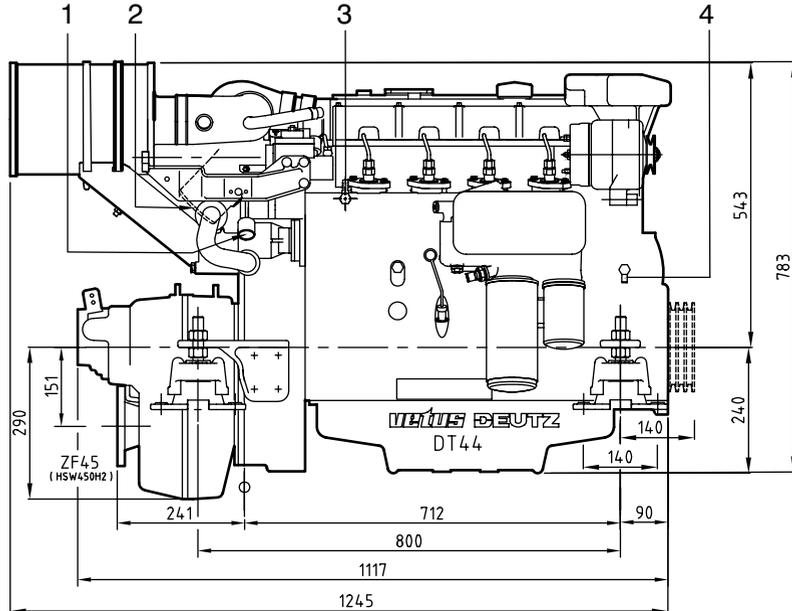


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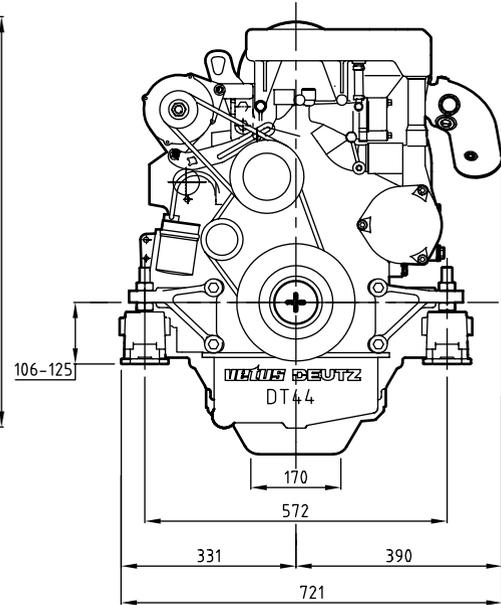
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11 Overall Dimensions

DT44



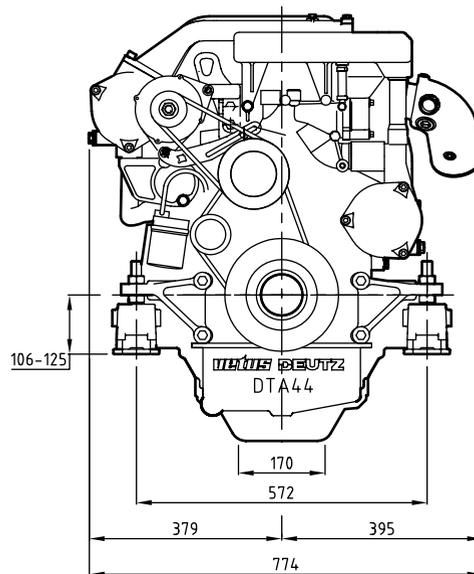
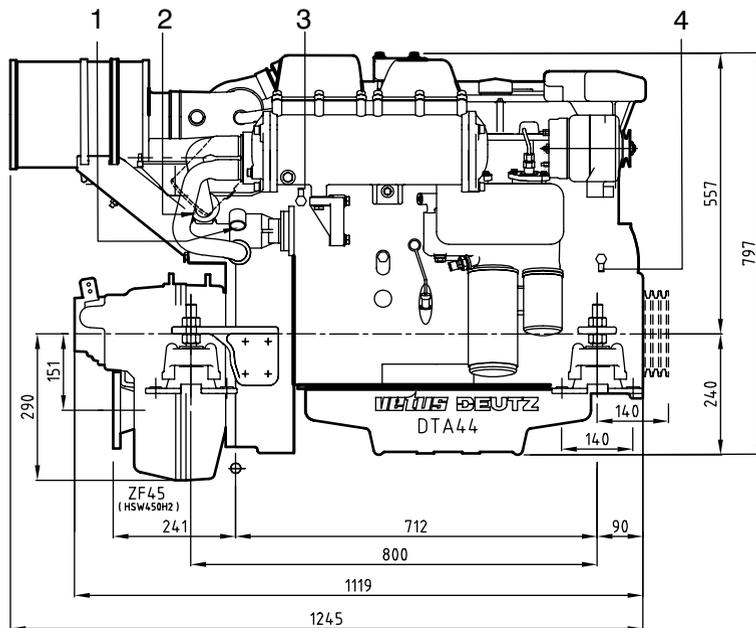
A RESERVATION IS MADE FOR MODIFICATIONS
DO NOT SCALE



- 1 Sea water intake 32 mm dia.
- 2 Exhaust 90 mm dia.
- 3 Fuel return 10 mm dia.
- 4 Fuel supply: 12 mm dia.

DTA44

11 Overall Dimensions

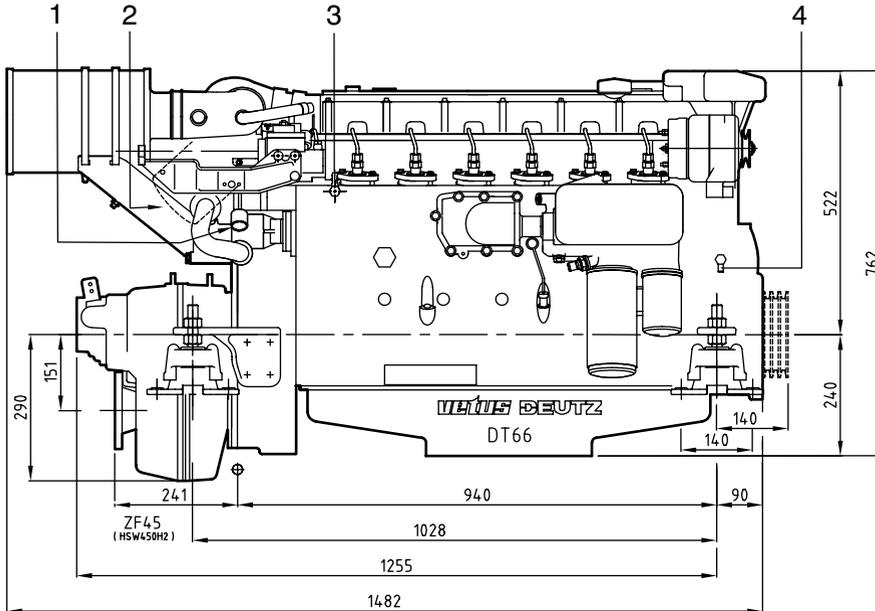


A RESERVATION IS MADE FOR MODIFICATIONS
DO NOT SCALE

- 1 Sea water intake 32 mm dia.
- 2 Exhaust 100 mm dia.
- 3 Fuel return 10 mm dia.
- 4 Fuel supply: 12 mm dia.

11 Overall Dimensions

DT66



A RESERVATION IS MADE FOR MODIFICATIONS
DO NOT SCALE

- 1 Sea water intake 32 mm dia.
- 2 Exhaust 125 mm dia.
- 3 Fuel return 10 mm dia.
- 4 Fuel supply: 12 mm dia.

VD00481

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360302.01	Operation manual	DT44 / DTA44 / DT66 / DTA66	(English)
360303.01	Betriebsanleitung	DT44 / DTA44 / DT66 / DTA66	(Deutsch)
STM9709	Manuel d'utilisation	DT44 / DTA44 / DT66 / DTA66	(Français)
STM9710	Manual de operacion	DT44 / DTA44 / DT66 / DTA66	(Español)
STM9711	Istruzioni per l'uso	DT44 / DTA44 / DT66 / DTA66	(Italiano)
STM9717	Bruksanvisning	DT44 / DTA44 / DT66 / DTA66	(Norsk)
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STM9729	Käyttöopas	DT44 / DTA44 / DT66 / DTA66	(Suomeksi)
361431.02	Onderdelenboek / Parts manual	DT44 / DTA44 / DT66 / DTA66	(Nederlands / English)
362333.01	Werkstatthandbuch / Workshop Manual / Manuel d'Atelier / Manual de Taller	DT44 / DTA44 / DT66 / DTA66	(Deutsch / English / Français / Español)
320199.06	Service- en Garantieboek / Service and Warranty Manual / Service- und Garantieheft / Livret Garantie et Service / Manual de servicio y garantía / Libretto di assistenza e garanzia Service- og garantibog / Service- och garantihäfte Service- og garantibok / Huolto- ja takuukirja		(Nederlands / English / Deutsch / Français / Español / Italiano / Dansk / Svenska / Norsk / Suomeksi)

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