



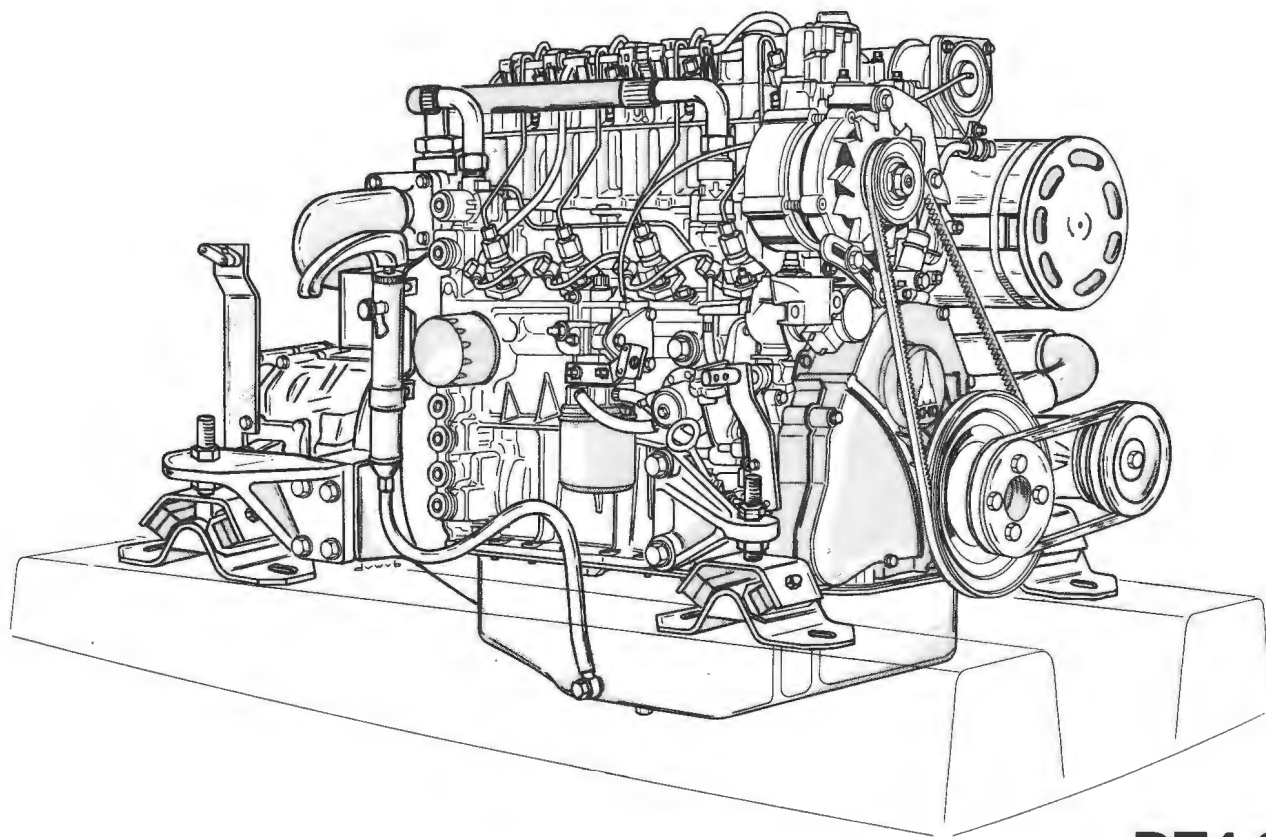
Operation manual

VETUS[®]

DEUTZ

D4.29

DT4.29



DT4.29

Operation manual

Vetus[®]

DEUTZ

D4.29

DT4.29

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.

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Introduction

1

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 endeavored 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.

Safety measures



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.

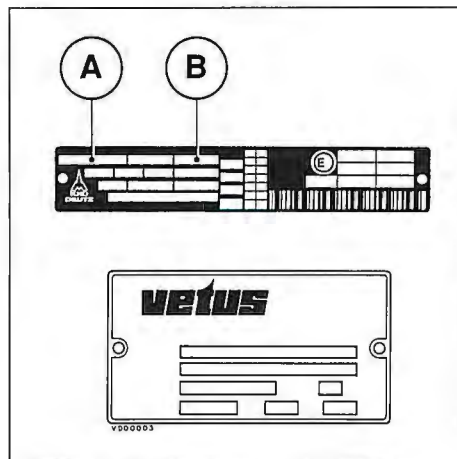
General regulations and laws for safety and accident prevention must also be observed.

- 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.
Ensure that the engine can not be started by accident.
- With this engine oil is used as coolant in the internal cooling system.
- Always stop the engine before checking or topping up the oil.
- Always carry out maintenance safely by only using tools well matched in size.

Engine description

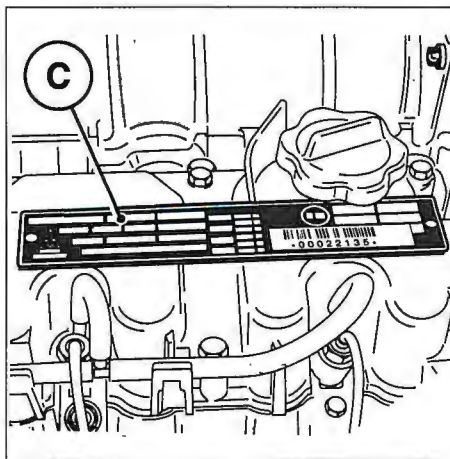
Model

2



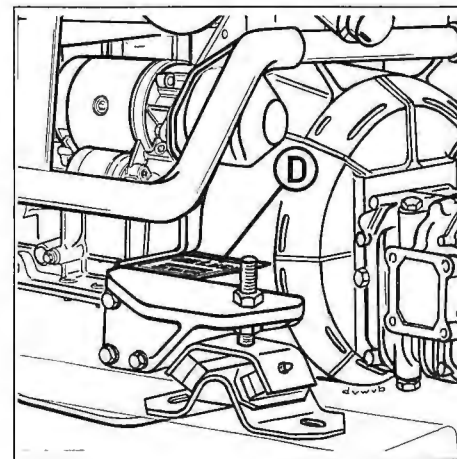
Engine data tag

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.



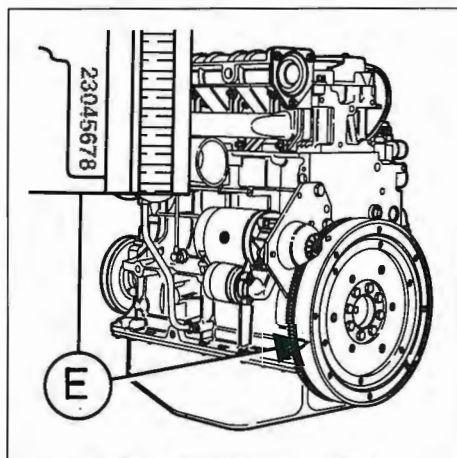
Engine data tag location

The Deutz engine data tag (C) is attached to the valve cover.



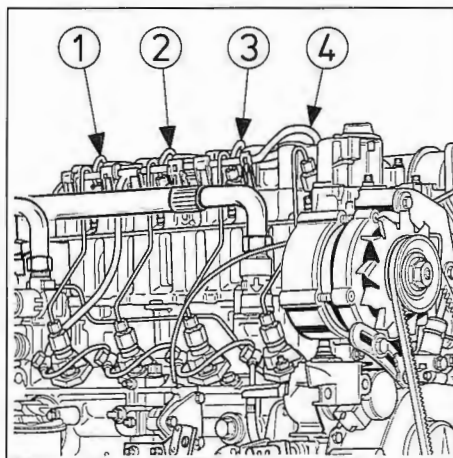
The Vetus engine data tag (D) is attached to the flywheel housing.

Model



Engine serial number

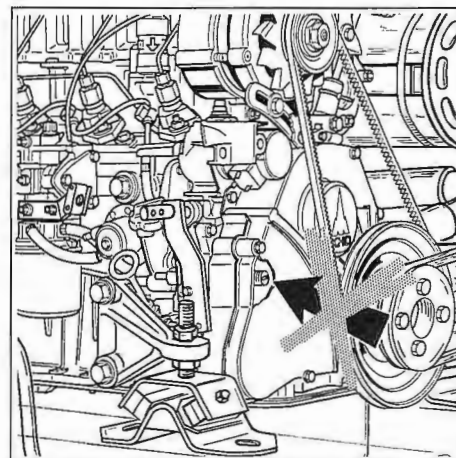
The Deutz engine serial number is also stamped on the crankcase itself (E).



Cylinder numbering

Cylinders are numbered consecutively, beginning at the flywheel end.

Engine description



Fuel delivery lock

The manufacturer shall not be held liable for damages resulting from adjustments made to the regulator by the operator. The lock screws are protected with locking paint in order to prevent this.



Adjustments to the regulator are to be carried out by authorized VETUS-DEUTZ Service specialists only.

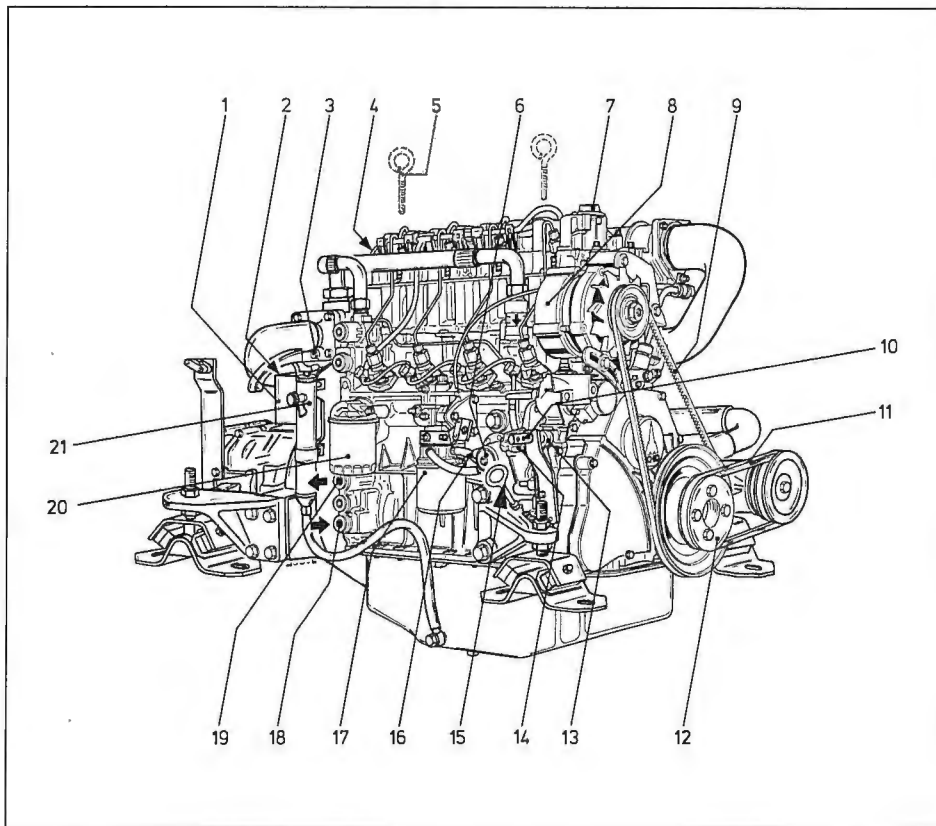
Engine description

Identification of engine parts

Service side D4.29

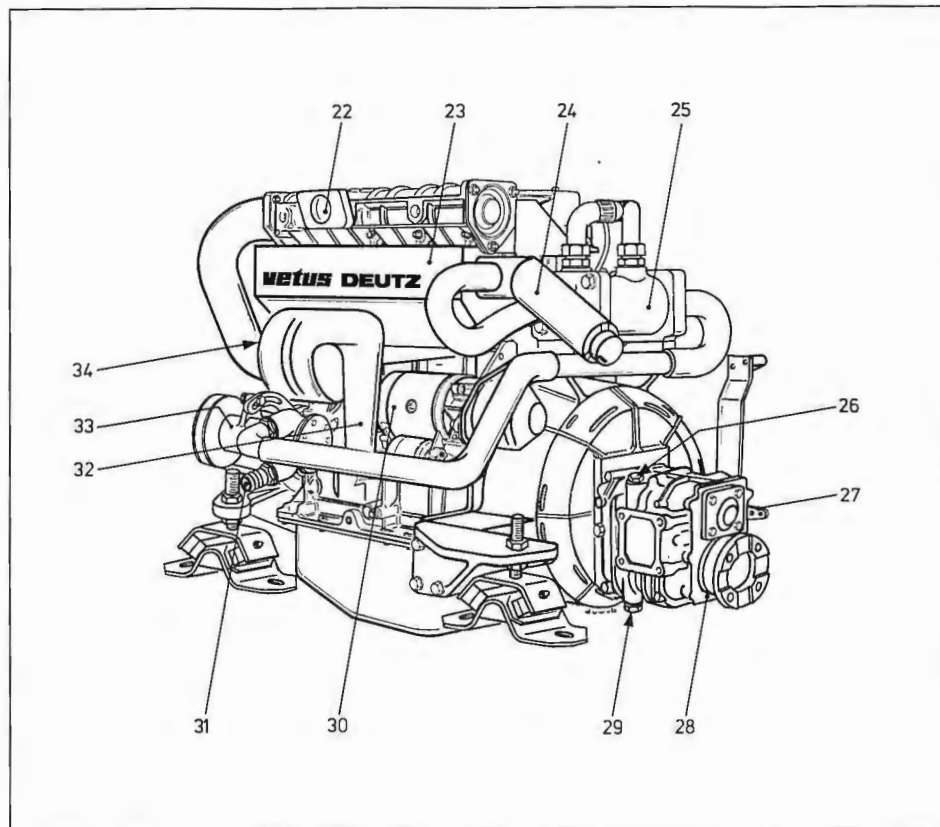
2

- 1 Electrical system connector
- 2 Circuitbreaker
- 3 Raw water drain plug, heat exchanger
- 4 Fuel return pipe connection 8 mm diam.
- 5 Lifting eye
- 6 Fuel lift pump
- 7 Oil filler cap
- 8 Alternator
- 9 V-belt alternator
- 10 Connection for throttle push-pull cable
- 11 V-belt raw water pump
- 12 P.T.O. (Mounting facility for extra belt pulley)
- 13 Manual operated stop
- 14 Oil filler cap
- 15 Oil dipstick
- 16 Fuel supply pipe connection 8 mm diam.
- 17 Fuel filter
- 18 Water heater connection 'IN'
- 19 Water heater connection 'OUT'
- 20 Lube Oil filter
- 21 Oil sump drain pump



Identification of engine parts

Starter side D4.29



Engine description

- 22 Air intake manifold
- 23 Exhaust manifold
- 24 Exhaust injection bend
- 25 Heat exchanger, oil cooler
- 26 Gearbox oil dipstick/filler cap
- 27 Connection for gearbox push-pull cable
- 28 Gearbox
- 29 Gearbox drain plug
- 30 Starter motor
- 31 Raw water inlet 25 mm diam.
- 32 Air intake
- 33 Raw water pump
- 34 Air intake filter

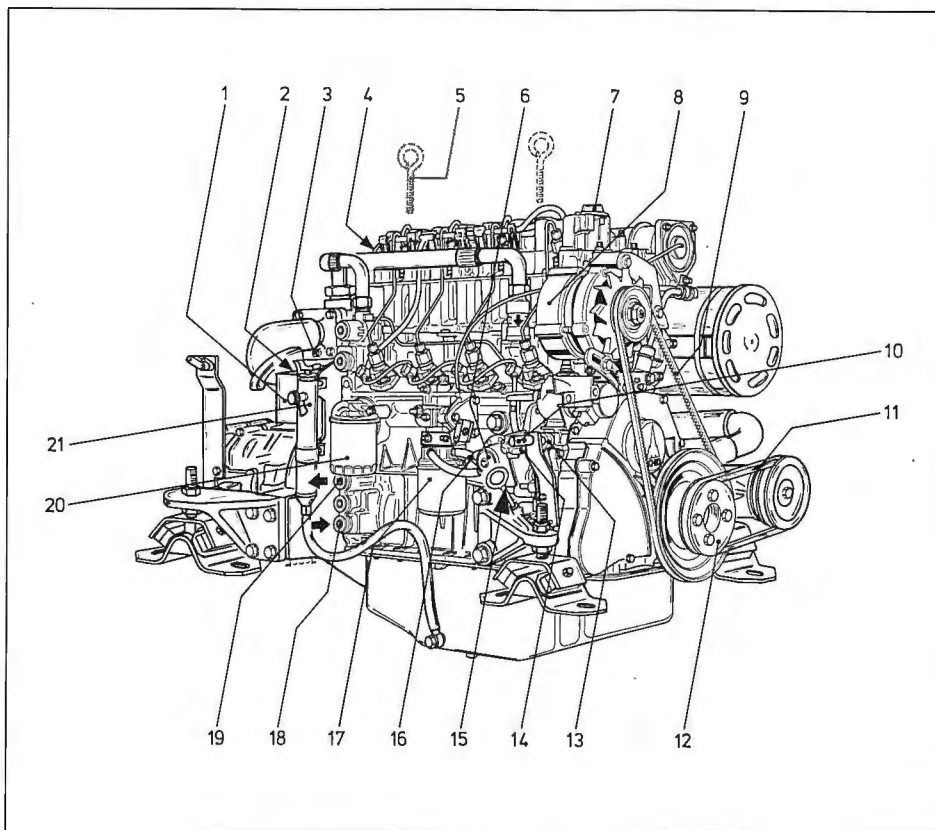
Engine description

Identification of engine parts

Service side *DT4.29*

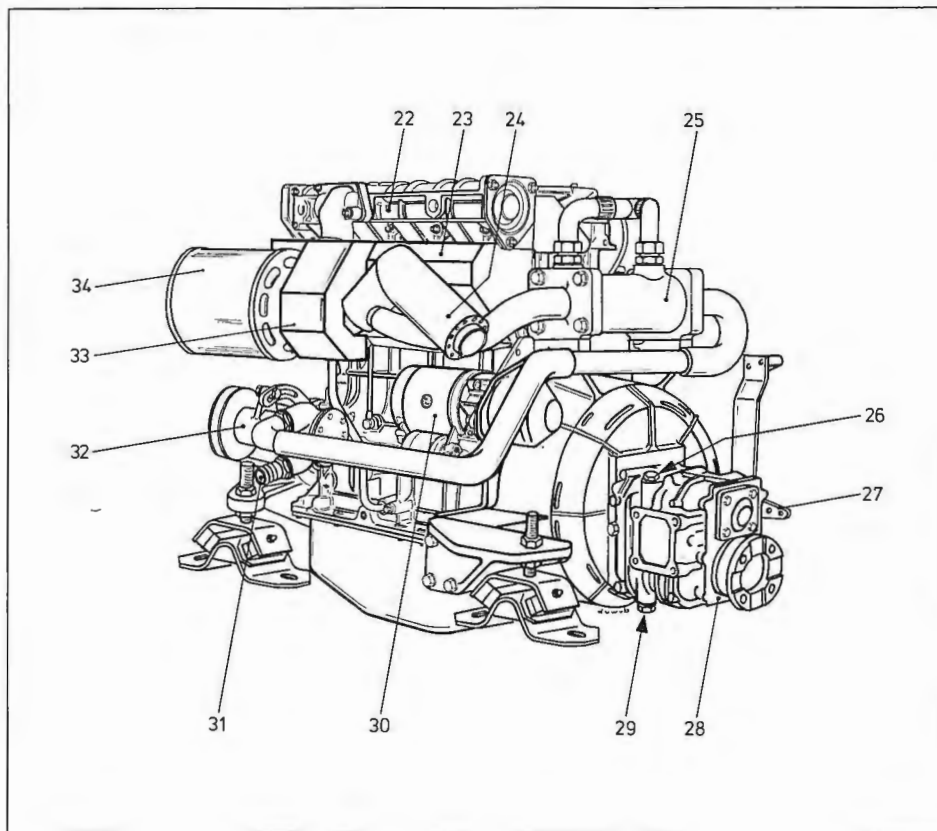
2

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Identification of engine parts

Starter side *DT4.29*

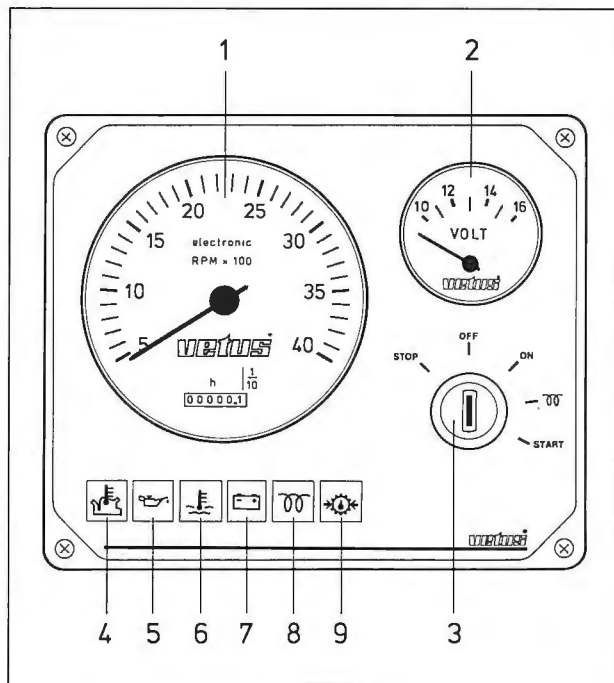


- 22 Air intake manifold
- 23 Exhaust manifold
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- 27 Connection for gearbox push-pull cable
- 28 Gearbox
- 29 Gearbox drain plug
- 30 Starter motor
- 31 Raw water inlet 25 mm diam.
- 32 Raw water pump
- 33 Turbocharger
- 34 Air intake filter

Engine description

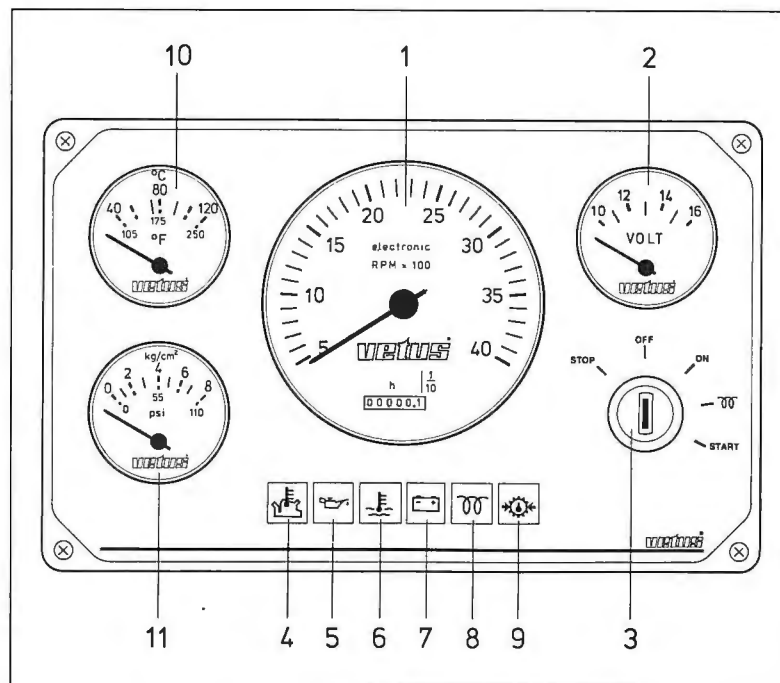
Control panels

2



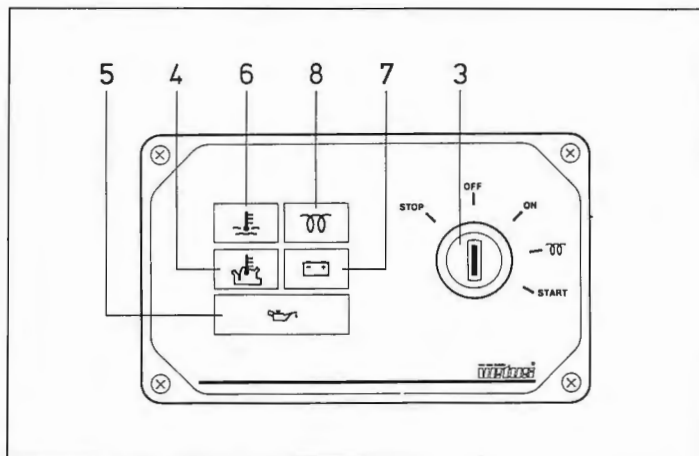
Basic panel (model 22)

Fly-bridge panel (excl. voltmeter, model 21)



Extended panel (model 34)

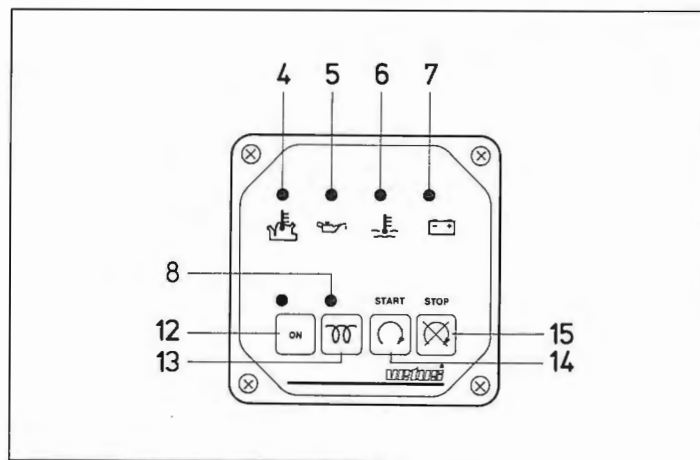
Control panels



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 oil temperature
- 7 Warning light battery charging
- 8 Indicator light pre-heating
- 9 Warning light gearbox low oil pressure *

Engine description



Push button panel (model 00)

- 10 Oil temperature gauge
- 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

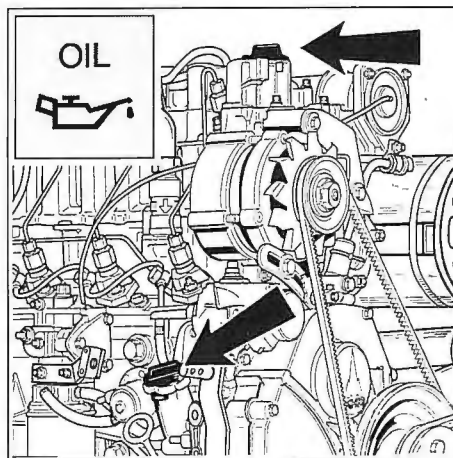
Implementing the following recommendations will result in longer life and better performance and more economical operation of your engine.

- Carry out the maintenance described regularly, including the 'Daily procedures before starting'.
- Never run the engine without a thermostat.
- Use a good quality lubricating oil. For specifications see page 64.
- 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 oil temperature, high raw water temperature or battery charging lights up.

Preparation

Preparation the engine for use

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



Filling with engine oil

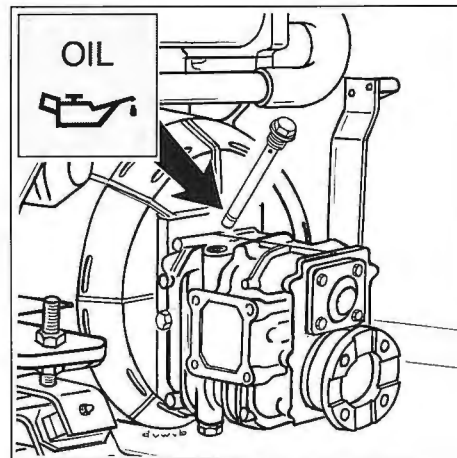
As a rule engines are delivered empty of oil.

Fill the engine with oil through the filler neck on top of the valve cover or the filler cap next to the dipstick, for quantity and specification see page 64.

Check the oil level with the dipstick*, see page 26.

* The dipstick must be calibrated see installation manual.

Use



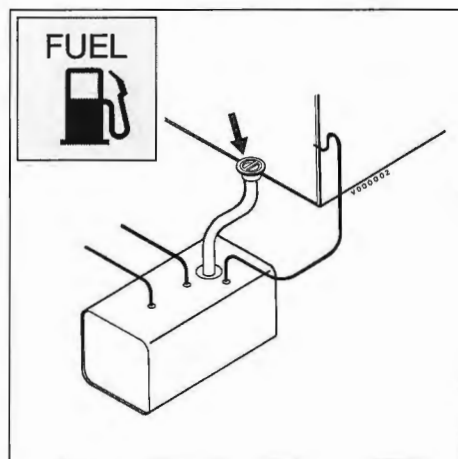
Filling gearbox with oil

Fill the gearbox with oil, for quantity and specification, see page 64.

Check the oil level with the dipstick, see page 38.

Use

Preparation Running-in



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 65.

The fuel system is self-bleeding.



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

Other preparations

- Check battery and cable connections.
- Start the engine, see page 17, and let it run for about 10 minutes without load.
Check the engine and all connections (fuel, cooling water and exhaust) for leaks.

Running-in

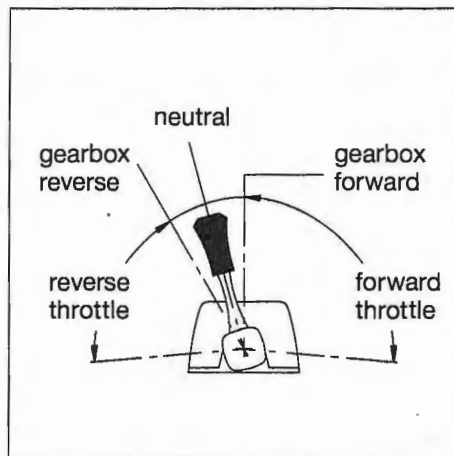
In order to ensure a long life for your engine, please observe the following for the first 50 operating hours:

- 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
- Sea cock open
- Main switch 'ON'
- Gearbox in 'NEUTRAL' position.



Electric starting

After repair work:

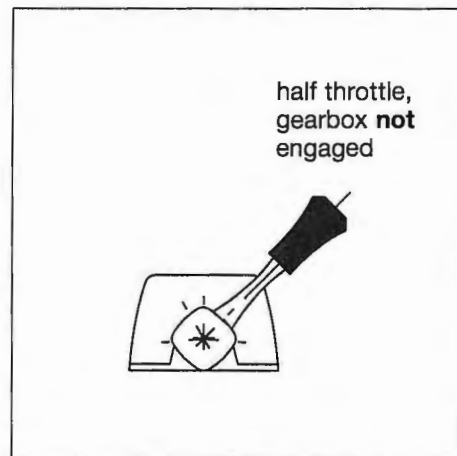
Check that all guards have been replaced and that all tools have been removed from the engine.

When starting with glow plugs, do not use any other substance (e.g. injection with start pilot). Doing so could result in an accident.

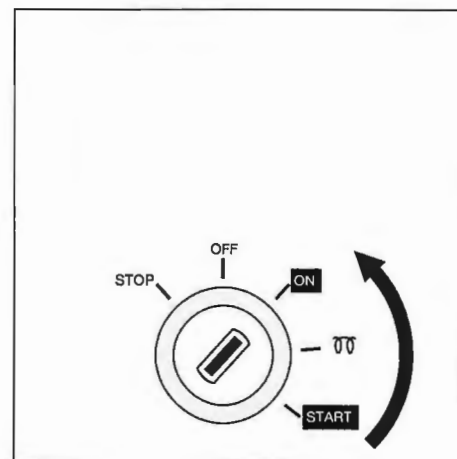
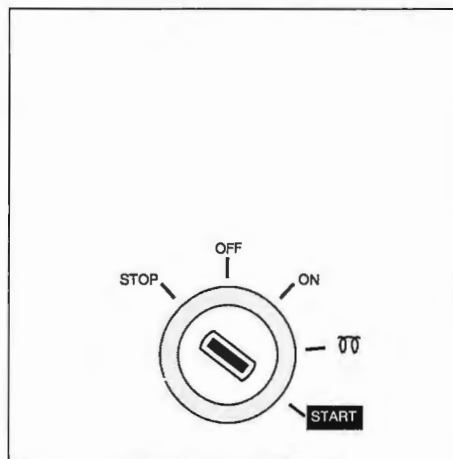
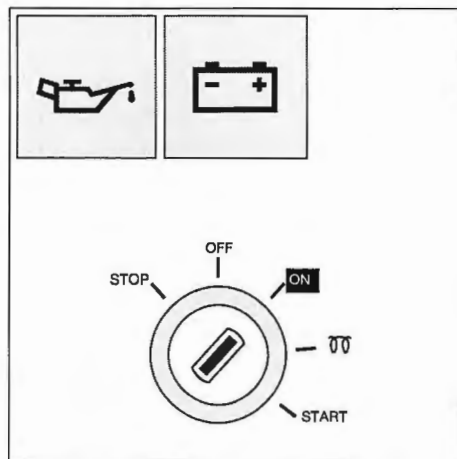


Never start the engine with the speed governor removed. Disconnect battery.

Use



Set the control lever to 'half throttle' without engaging the gearbox.



Starting, without pre-heating

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 indicator light and the pre-heating position of 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.

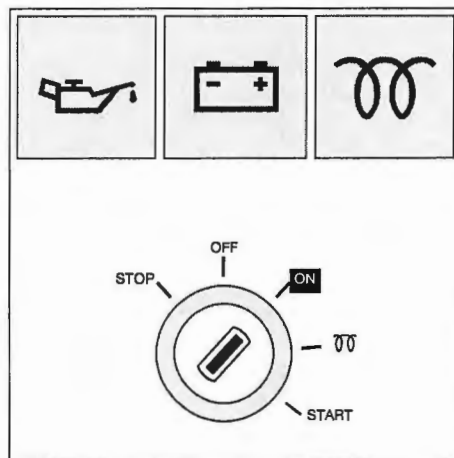
Starting

WARNING

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 20 seconds consecutively.



Starting, with pre-heating

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.

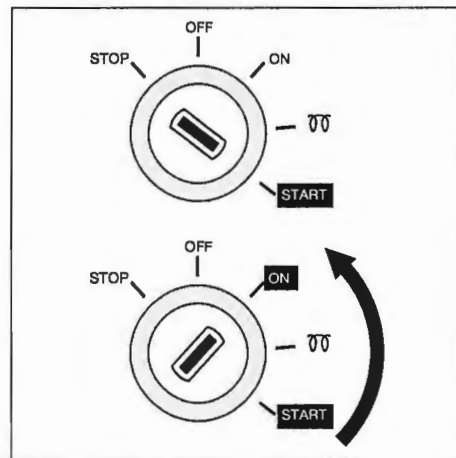
Before submitting the engine to full load it should be brought up to operating temperature as quickly as possible by running at 3/4 of maximum revs.

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

In case your Vetus Deutz engine is equipped with the optional automatic pre-heating system:

Turn the start key on the instrument panel clock-wise; the warning lights for oil pressure and alternator will now light up and the pre-heating indicator light will be lit now.

Leave to pre-heat until the pre-heating indicator light goes out.



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

Due to the automatic timer of the pre-heating system the pre-heating position of the key switch on the operating panel can be ignored.

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.

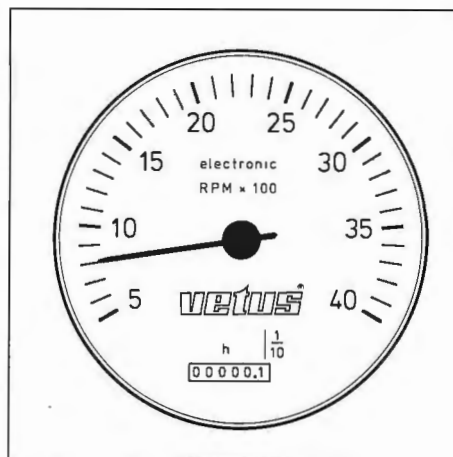
Use

Use

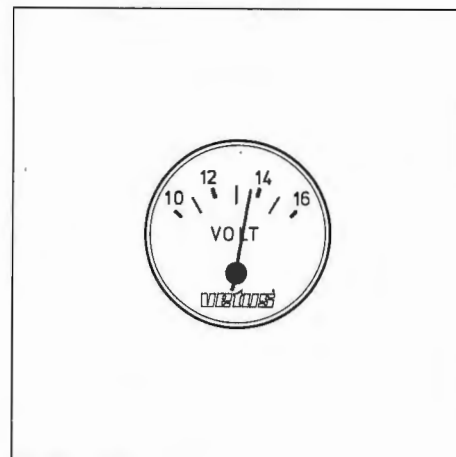
The instrument panel is provided with the following instruments (Depending of the type of panel, see page 12 and 13).

Cruising

3



Tachometer



Voltmeter



WARNING

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

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,

D4.29 : 750 - 800 rpm

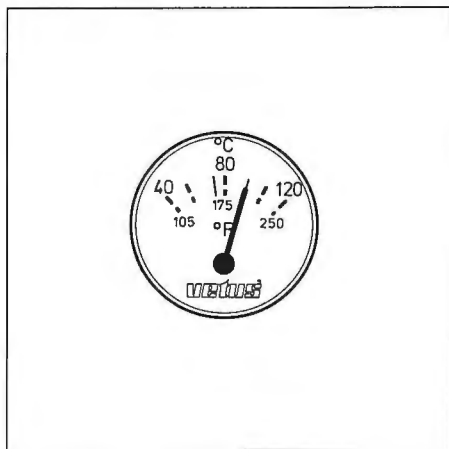
DT4.29 : 750 - 800 rpm

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.

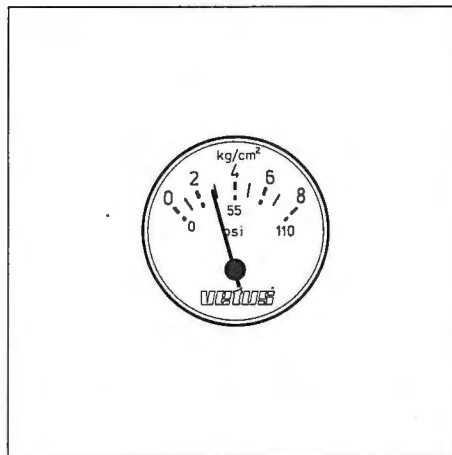
Cruising



Temperature gauge

Indicating the temperature of the, filled with oil, internal cooling system. The operating temperature is 93 – 98 °C.

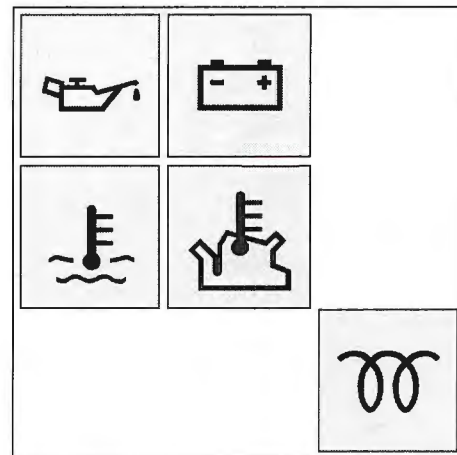
In case the engine is overheated; turn off the engine and establish the cause, see fault finding table, page 55 .. 59.



Oil pressure gauge

With the engine at operating temperature the oil pressure is:
When idling: at least 1.4 bar (10 psi).
In case the oil pressure is too low; turn off the engine and establish the cause, see fault finding table, page 55 .. 59.

Use

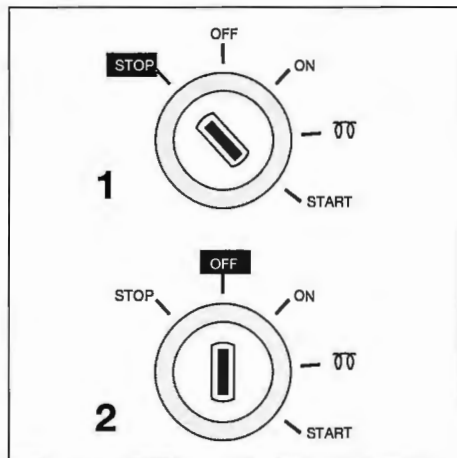


Warning lights

None of the five 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 sound while running, STOP THE ENGINE IMMEDIATELY!

Use

Stopping



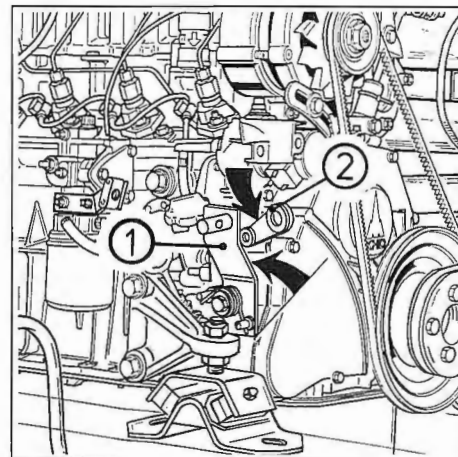
Electrical shutdown

Reduce engine speed to idle and shift the gearbox to 'NEUTRAL'.

- 1 Turn the key **entirely** to the left **through** the 'OFF' position to the 'STOP' position.
- 2 When the engine has stopped, turn the key 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 main switched off.

Never stop the engine immediately after it has been in operation for a long time. Allow the engine to idle for a few minutes before stopping.



Mechanical shutdown

Move the speed control lever ① to low idle.

Operate the mechanical shutdown lever ② 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

Routine Maintenance

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. Neglecting maintenance can result in faults and permanent damage to the engine.

4

Routine Maintenance

Page

Every 10 operating hours or daily, before starting	
Check engine oil level	26
Check water strainer	28

After the first 50 – 125 operating hours 1)	
Drain water from fuel filter	29
Engine oil change	32
Check V-belts	34
Check flexible engine mounts	37
Gearbox oil change	38
Replace fuel filter	40
Check valve clearance	44
Check tightness of all fasteners, bolts and nuts 2)	
Check engine for leaks	
Check glow plugs (if installed)	

Every 125 hours, at least once every year	
Drain water from fuel filter	29
Battery, cables and cable connections	30

Maintenance schedule

Page

Every 500 operating hours, at least once every year	
Engine oil change	32
Replace oil filter	32
Check V-belts	34
Check flexible engine mounts	37
Gearbox oil change	38

Every 1000 operating hours, at least once every 2 years	
Replace fuel filter	40
Clean fuel pump strainer	41
Raw water pump inspection 3)	42
Check valve clearance	44
Replace air cleaner	46
Inspect hose connections	47
Check glowplugs (if installed), replace if required	

Every 5000 operating hours, at least once every 5 years	
Replacing the toothed belt	47

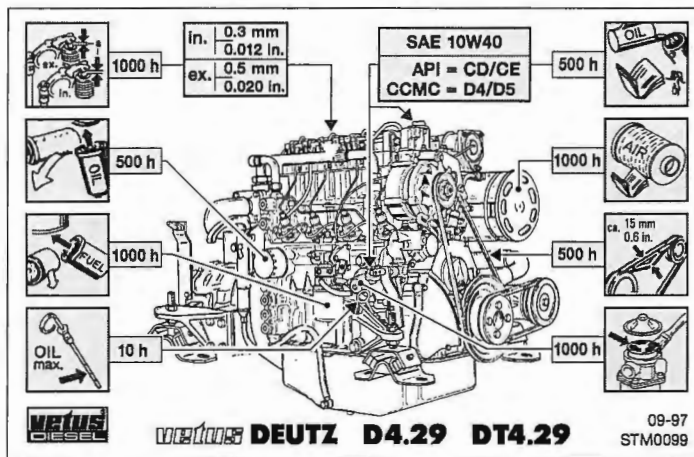
Maintenance chart

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.

Routine Maintenance

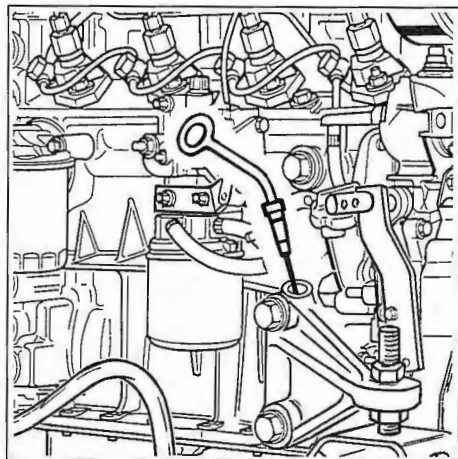


- 1) Commissioning new or overhauled engine
- 2) Re-tightening of cylinder head bolts is **not** required!
- 3) Cleaning of heat exchanger is **not** required.



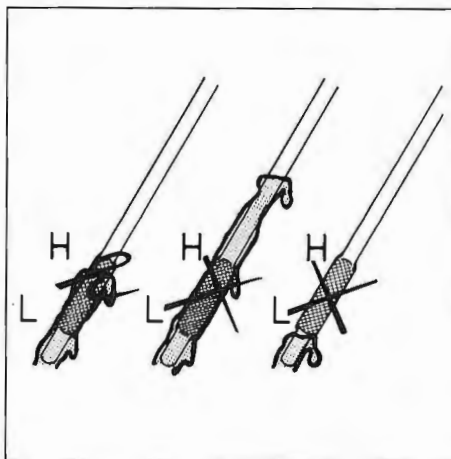
Stop the engine before carrying out any maintenance work.

Maintenance



Check oil level

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



Oil level

The oil level must be between the two marks on the dipstick*. If necessary top up with the same brand and type of oil.

Checking engine oil level

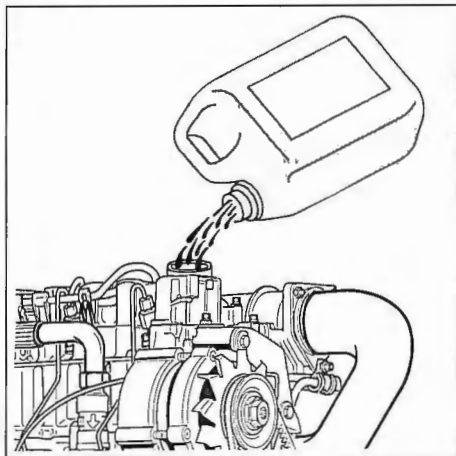
Daily, before starting.

* The difference between the two oil level marks is :

- D4.29 : 1.5 litre
- DT4.29 : 1.5 litres

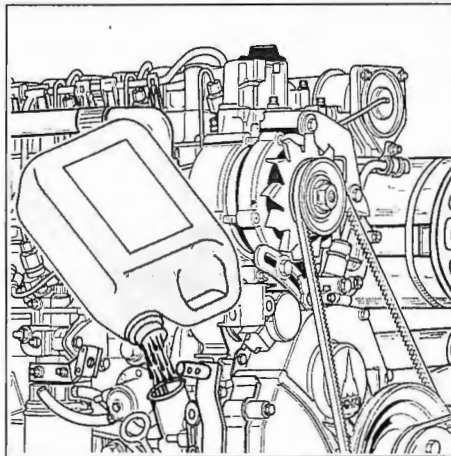
Checking engine oil level

Daily, before starting.



Topping up oil

One oil filling cap is on top of the valve cover, a second oil filling cap is located at the starboard side of the engine next to the dipstick.



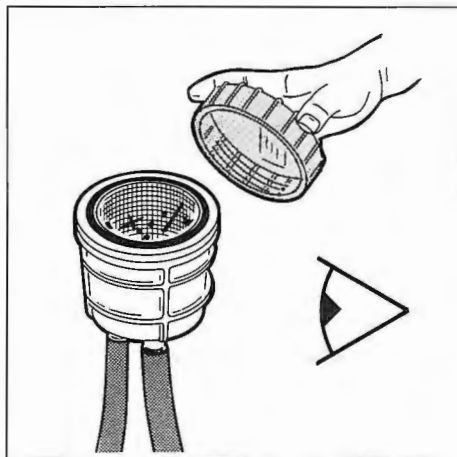
Maintenance

Maintenance

Checking and cleaning the raw water strainer

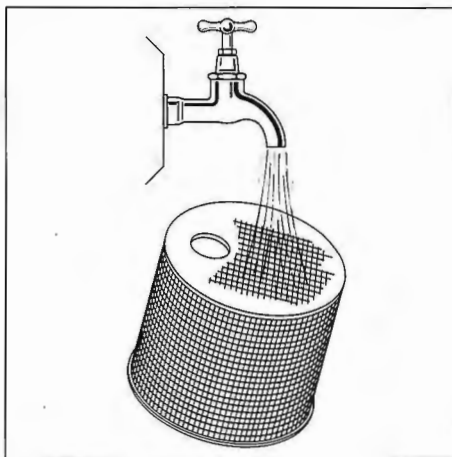
Daily, before starting.

15



Checking the raw water strainer

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



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.

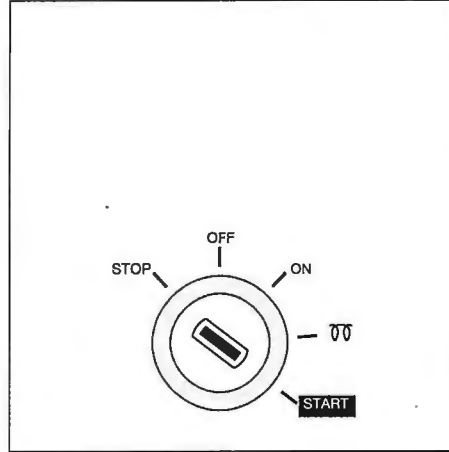


Empty water separator

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.

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



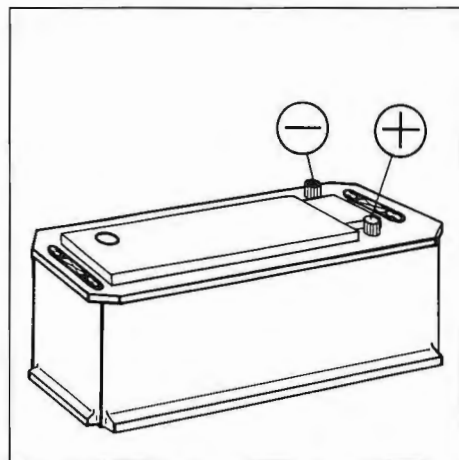
Bleeding

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.

Maintenance



Battery, battery connections

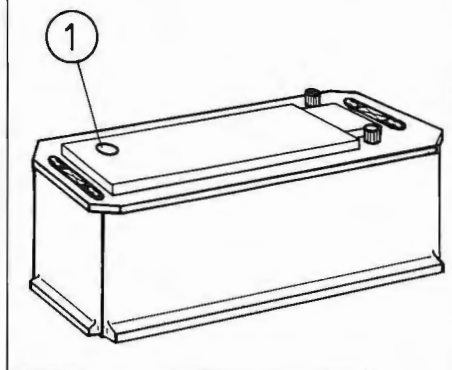
Keep battery clean and dry.

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.

Vetus maintenance-free batteries



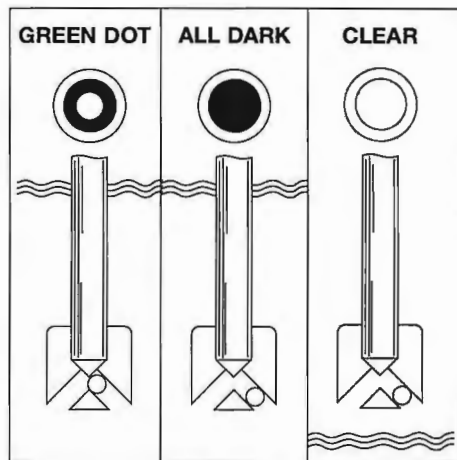
Checking specific gravity

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.

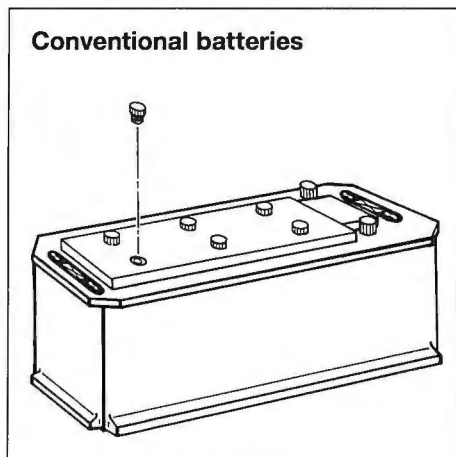


Hydrometer operation

- **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 over-charging 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

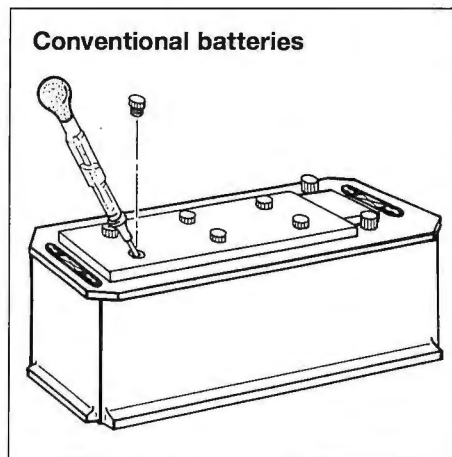
Every 125 operating hours.



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 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.



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 kg/l and show less than 0.050 kg/l between high and low. If not, recharge or replace battery.

During checking the temperature of the electrolyte should preferably be 20°C (68°F).

Maintenance

Specific gravity	State of charge	
1.28 kg/l	100 %	
1.20 kg/l	50 %	recharge
1.12 kg/l	10 %	recharge immediately



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!

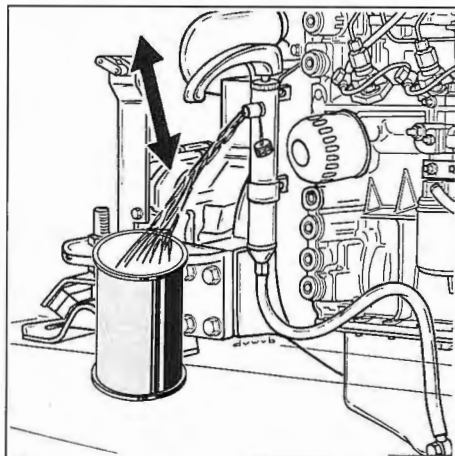
Maintenance

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.



Draining the oil

Change the oil with a switched off engine at operation temperature. (Lube oil temperature approx. 95°C.)

The pump for the oil sump is located at the starboard side of the engine.

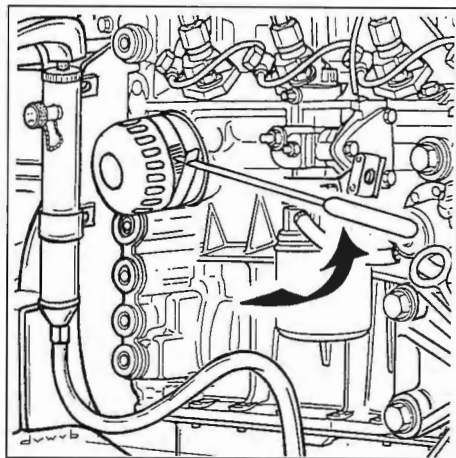


Be aware of the risk of skin burning during draining the hot oil!

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

Engine oil change

Every 500 operating hours.



Removing the oil filter

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

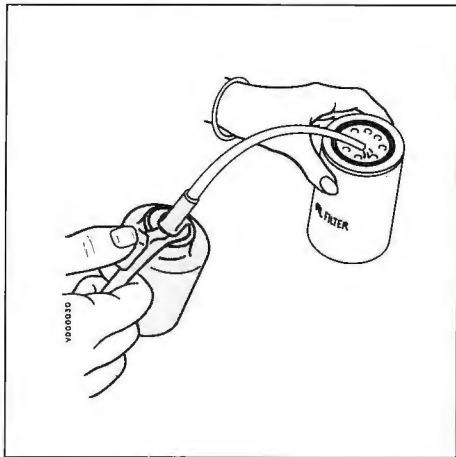
Catch any dripping oil.



Beware of burns from hot oil.

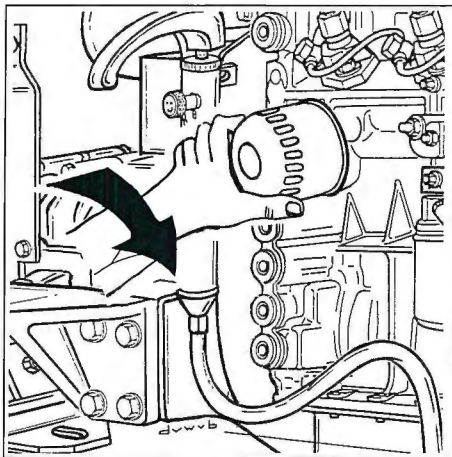
Engine oil change

Every 500 operating hours.



Oiling the oil seal

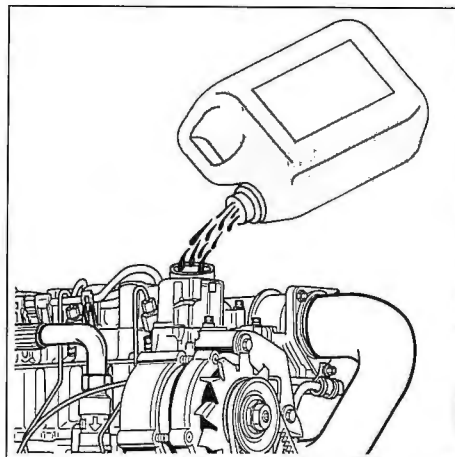
Clean the contact surface of the gasket. Lubricate the oil seal of the new filter element with clean engine oil.



Oil filter installation

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

Maintenance



Refilling with oil

Refill the engine with new oil (for specification see page 64) through the filler opening in the valve cover or the filler cap next to the dipstick. For required amount of oil (oil filter included) see page 61.

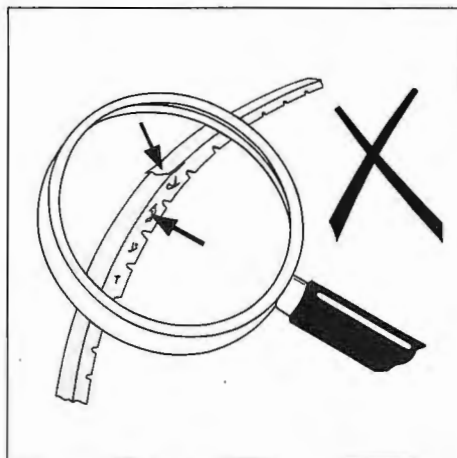
Operate the engine at idling speed for a short period of time. Check for oil leaks whilst the engine is running. Stop the engine. Allow 5 minutes for the oil to return to the sump. Check the oil level with the dipstick.

Maintenance

Checking the V-belts

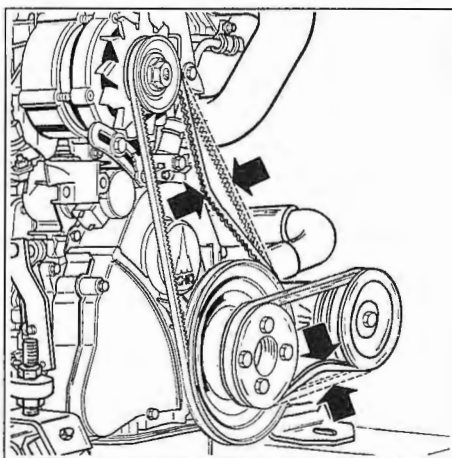
Every 500 operating hours.

15



Inspection V-belt

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



Checking tension

Check tension of the V-belts by applying moderate finger and thumb pressure.

Alternator V-belt:

If the deflection of the belt is more than approx. 15 mm ($\frac{9}{16}$ "), using about 10 kg (20 lbs) thumb pressure, it should be tensioned.

Raw water pump V-belt:

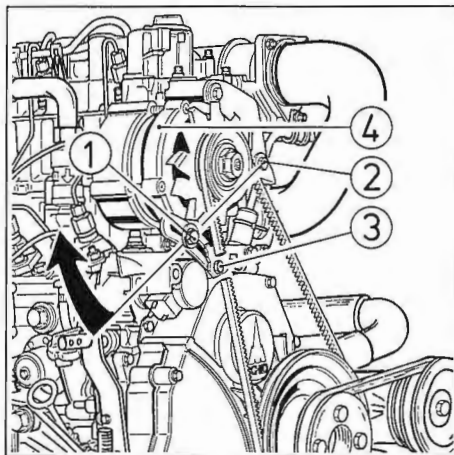
If the deflection of the belt is more than approx. 10 mm ($\frac{3}{8}$ "), using about 10 kg (20 lbs) thumb pressure, it should be tensioned.



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

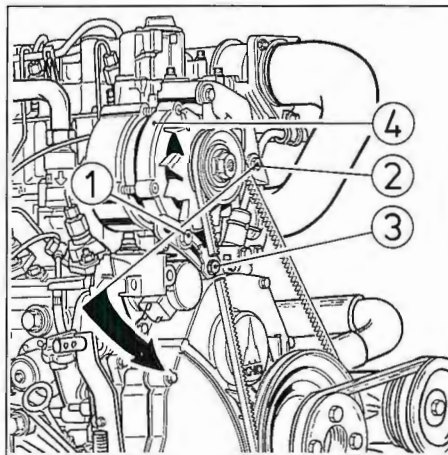
Checking the V-belts

Every 500 operating hours.



Tensioning alternator V-belt

- Loosen the bolt of the adjustment bracket ① and both the alternator mounting bolts ② and ③.
- Now push the alternator outwards until the belt tension is correct.
- First re-tighten the lower mounting bolt ③ of the alternator.
- Then re-tighten the adjustment bracket bolt ① and the upper mounting bolt ②.



Replacing alternator V-belt

- Loosen the bolt of the adjustment bracket ① and both the alternator mounting bolts ② and ③ .
- Now push the alternator towards the mounting bracket.
- Remove and replace belt.
- Tension the belt. Push the alternator outwards until the belt tension is correct.

- First re-tighten the lower mounting bolt ③ of the alternator.
- Then re-tighten the adjustment bracket bolt ① and the upper mounting bolt ②.



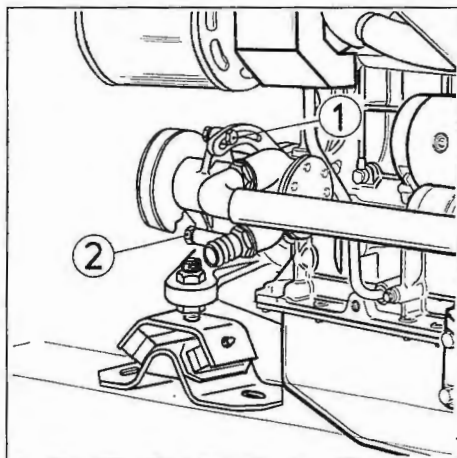
Check, tension and change belts only with the engine off. Refit belt guard, if provided.

Maintenance

Checking the V-belts

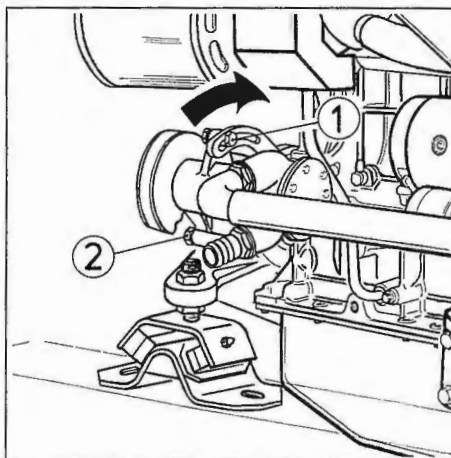
Every 500 operating hours.

5



Tensioning V-belt of raw water pump

- Loosen both the upper bolt ① and the lower bolt ② of the raw water pump.
- Now push the raw water pump outwards until the belt tension is correct.
- First re-tighten the upper mounting bolt ①.
- Then re-tighten the lower mounting bolt ②.



Changing V-belt of raw water pump

- Loosen both the upper bolt ① and the lower bolt ② of the raw water pump.
- Now push the raw water pump towards the engine.
- Remove and replace belt.
- Tension the belt. Push the raw water pump outwards until the belt tension is correct.

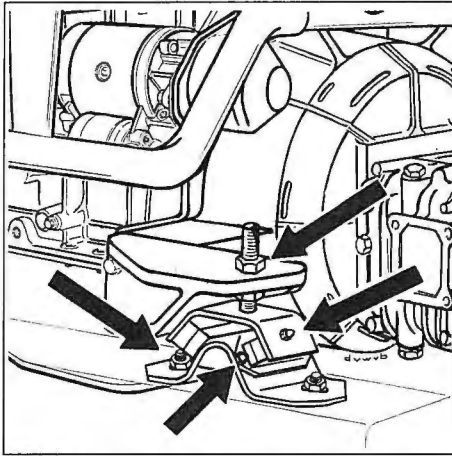
- Re-tighten the mounting bolts ① and ②.



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

Flexible engine mounts

Every 500 operating hours.



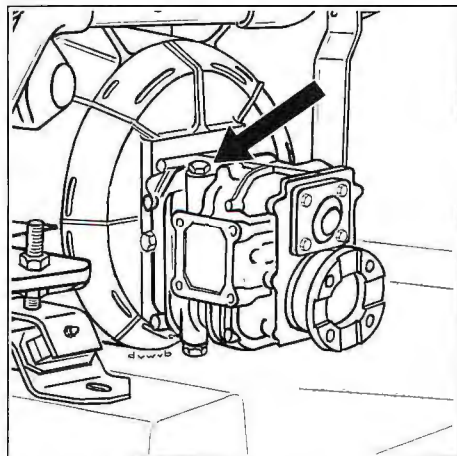
Check flexible engine mounts

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

Inspect the rubber element of the engine support for cracks.

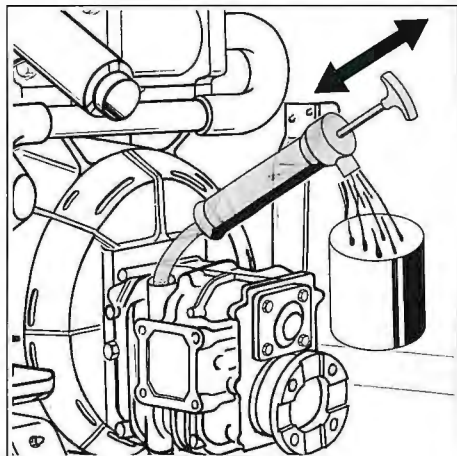
Also check the deflection of the damper element, the deflection influences the alignment of engine and propshaft! Re-align engine in case of doubt.

Maintenance



Unscrewing the dipstick

- Unscrew the dipstick out of the gearbox housing.

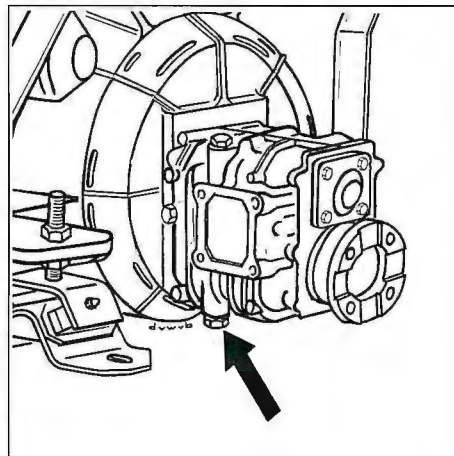


Draining the oil

- Remove the dipstick.
- Drain the oil with the aid of a separate sump pump. 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.

Changing the gearbox oil

Every 500 operating hours.

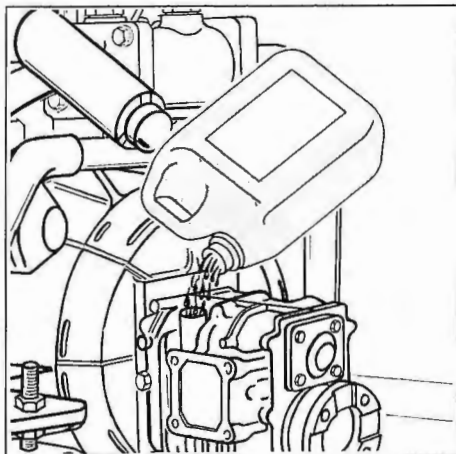


Alternatively:

- Drain the oil by removing the drain plug. Also remove the dipstick to allow air into the gearbox housing.
- Refit the drain plug when all used oil has drained out.

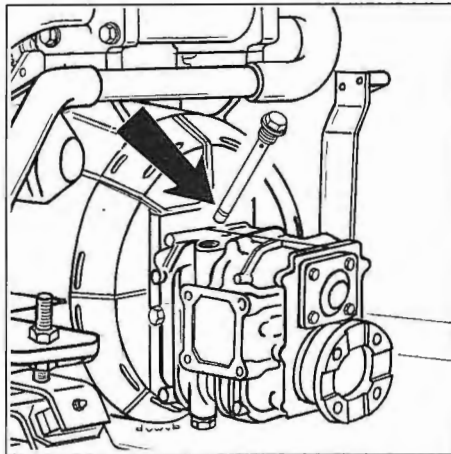
Changing the gearbox oil

Every 500 operating hours.



Filling with new oil

- Refill the gearbox to the correct level via the dipstick opening. For oil specification see page 64.



Checking the oil level

- Check the oil level by cleaning the dipstick and lowering it into the hole, without screwing it in. The oil level should be between the end and the notch in the dipstick. If necessary top up by pouring oil in the dipstick hole.

For oil type and specification, see page 64.

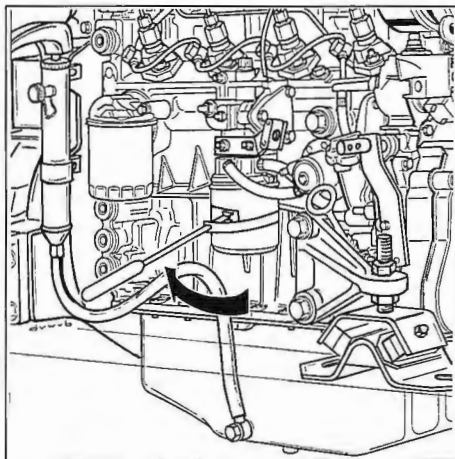
As standard Vetus engines are equipped with Hurth gearboxes.

Consult the Hurth 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.

Maintenance

15



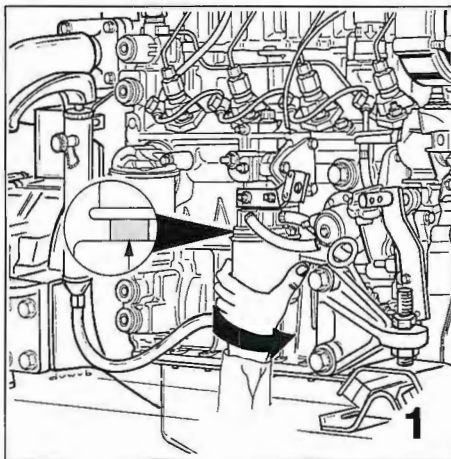
Fuel filter removal

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.



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

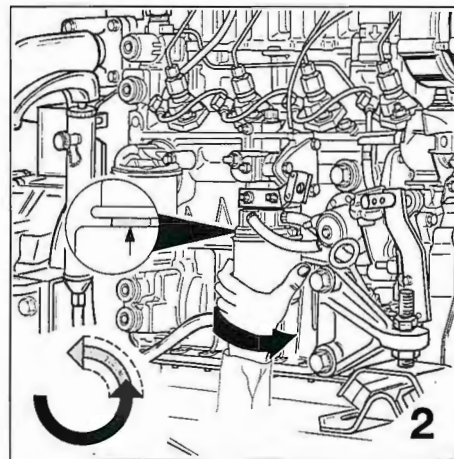


Fuel filter installation

- 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.

Fuel filter replacement

Every 1000 operating hours.

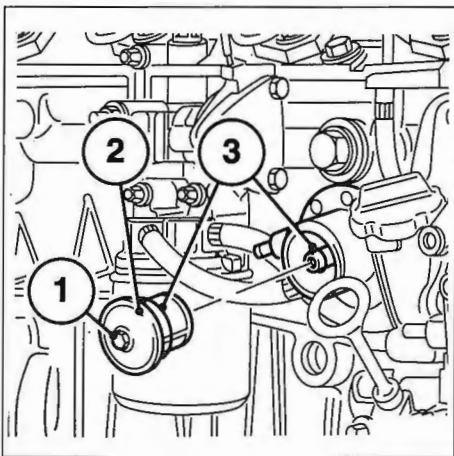


Bleeding

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

Cleaning fuel pump strainer

Every 1000 operating hours.



Cleaning the strainer

- Close the fuel stopcock.
- Loosen and unscrew the hexagon bolt ①.
- Remove the fuel strainer cover ② (cover and strainer, one unit).
- Clean the fuel strainer with diesel fuel. Replace if necessary.
- Place seal ③ in position.
- Mount the fuel strainer cover ②.
- Tighten the hexagon bolt ①.
- Check for leaks.

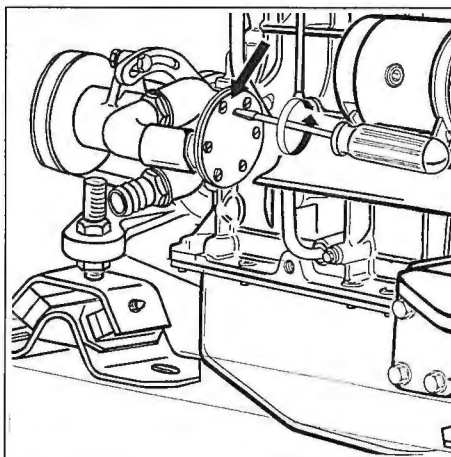


Keep naked flames away when working on the fuel system. Do not smoke!

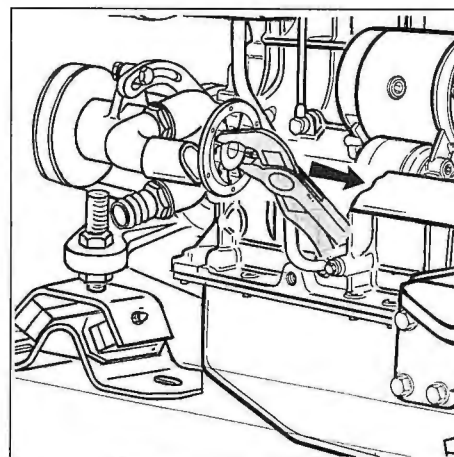
Maintenance

Raw water pump inspection

Every 1000 operating hours.



Pump cover removal



Impeller removal

Raw water pump inspection



The rubber impeller of the out-board water pump is **not** proof against running dry.

If the water supply has been blocked, it may be necessary to replace the impeller.

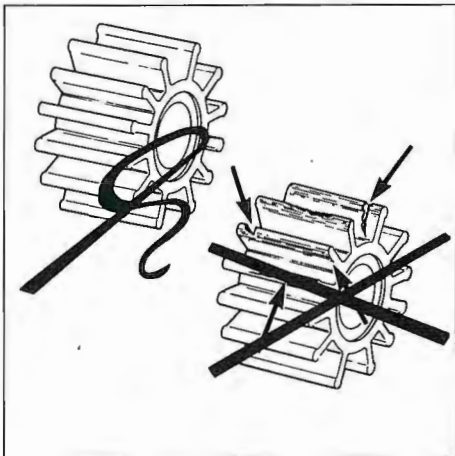
Always carry a spare impeller on board.

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.
- 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.

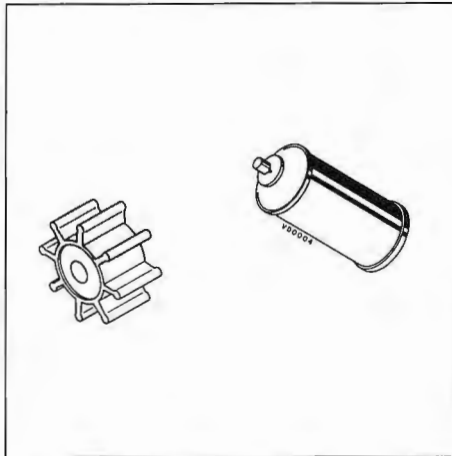
Raw water pump inspection

Every 1000 operating hours.



Impeller inspection

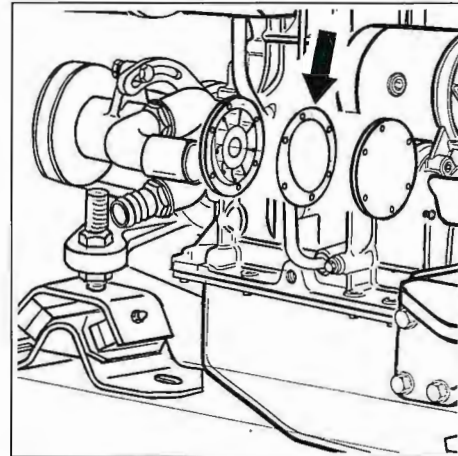
- Inspect the impeller for damage.
- Replace the impeller if necessary.



Re-install the impeller

- Fit the impeller to the pump shaft. (if an existing impeller is re-used, install it in the same position as removed).
- 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.

Maintenance



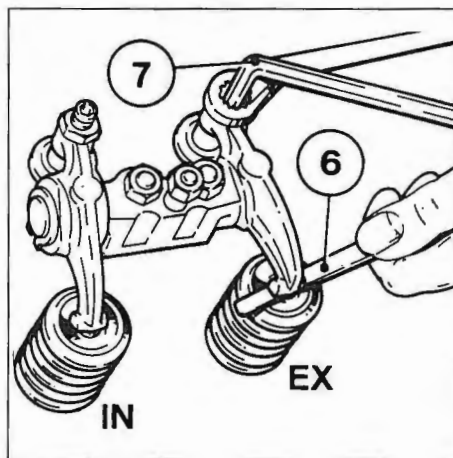
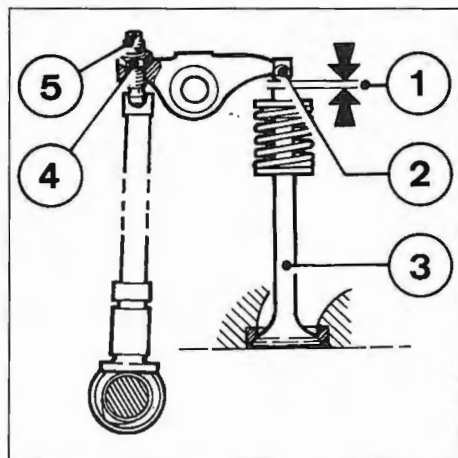
Replacing the pump cover

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

Maintenance

Checking/adjusting valve clearance

Every 1000 operating hours.



Checking/adjusting valve clearance

- 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 valve clearance ① between 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 in between the valve

stem and rocker lever.

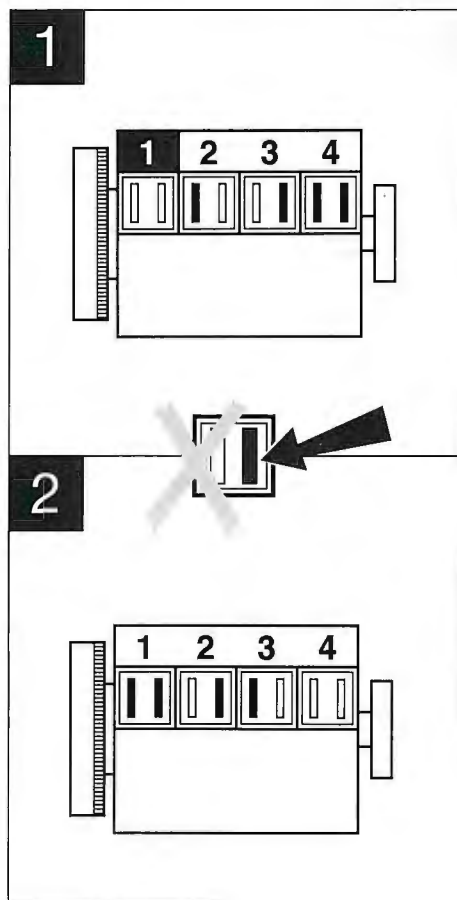
Valve clearance: Inlet 0.3 ^{+0.1} mm
Exhaust 0.5 ^{+0.1} mm

- Adjust valve clearance if necessary:
 - Release locknut ④.
 - Use allen key ⑦ to turn setscrew ⑤ so that the correct clearance is obtained after locknut ④ has been tightened.

- Check and adjust valve clearance on all remaining cylinders.
- Re-install rocker cover (use new gasket if needed).

Valve Clearance Adjustment Schematic

Maintenance



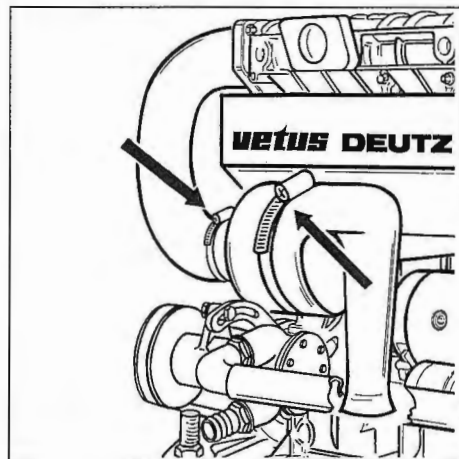
• Crankshaft Position 1

Turn 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.

• Crankshaft Position 2

Turn crankshaft one full revolution (360°). Adjust clearance of valves **marked in black** on schematic.

Maintenance

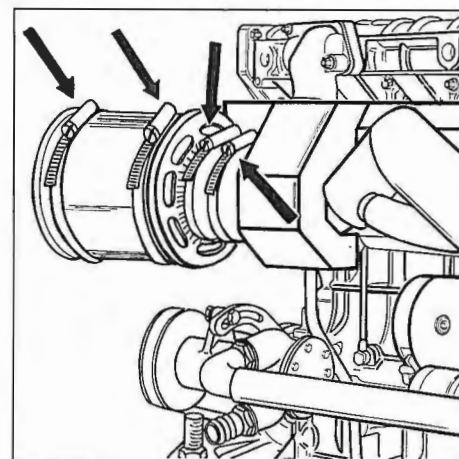
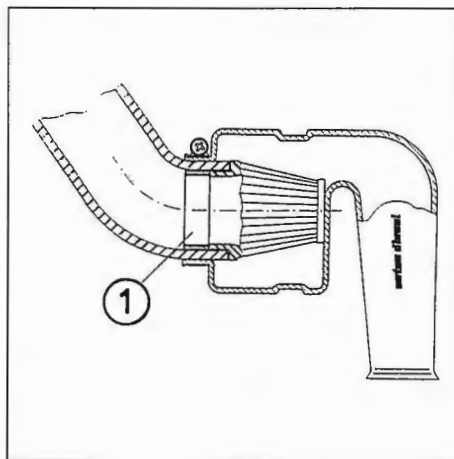


Air cleaner replacement D4.29

- The air cleaner is to be replaced as a unit.
- Loosen the clamp, securing the air cleaner housing, and loosen the hose-clamp at the air intake hose. Remove the housing from the air intake hose.



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



Air cleaner replacement DT4.29

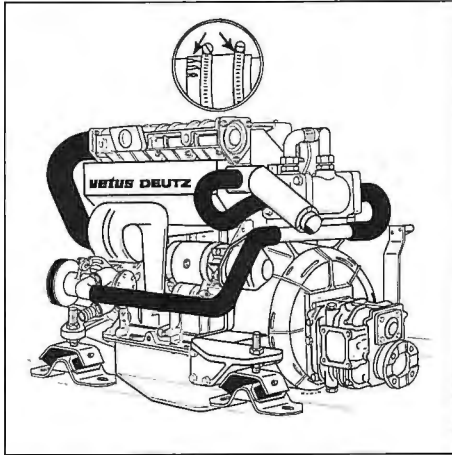
- Install a new air cleaner into the air intake hose, as indicated in the drawing. Make sure that bushing (1), positioned inside the air intake hose to reinforce it, is in its correct position.
- Re-install the housing and re-tighten both the hose-clamps.

- The air cleaner is to be replaced as a unit.
- Loosen both the hose-clamps, securing the air cleaner housing, and loosen the hose-clamps at the air intake.
- Install a new air cleaner and re-tighten all hose-clamps.

Combustion air intake
Every 1000 operating hours.

Hose connections

Every 1000 operating hours.



Inspection hose connections

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

Replacing the timing belt

Every 5000 operating hours.

**Consult a Vetus-Deutz
service specialist!**

Timing belt replacement

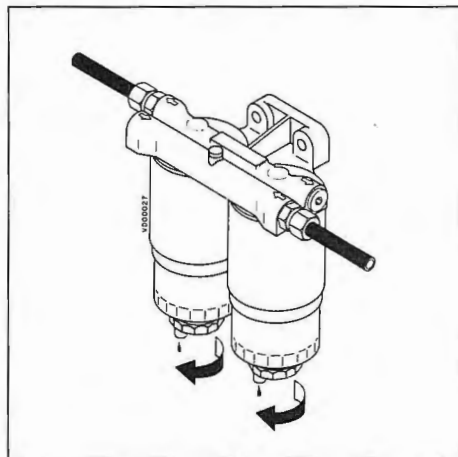
Both the timing belt and the sprocket must be replaced.

How to replace the timing belt and sprocket is explained in detail in the 'Workshop Manual'.

Special tooling is required!

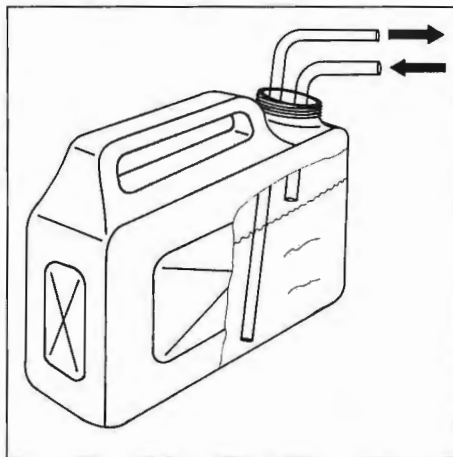
Therefore it is recommended to consult a Vetus-Deutz service specialist to carry out the timing belt replacement.

Winter lay-up



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.

Winter storage procedure

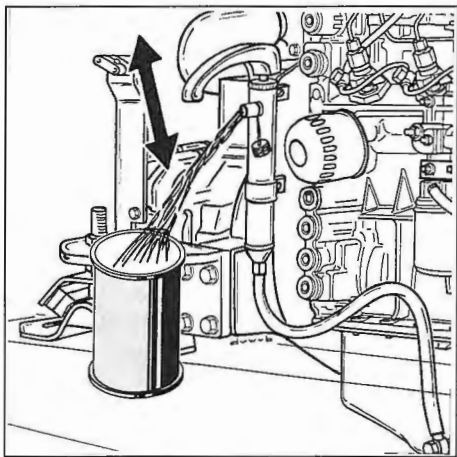
* Engine oil with protective properties.
E.g. Shell Super Diesel T 10W40

** Preferably water-free fuel.
Collect some fuel from the return pipe, while engine is running.



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

Winter storage procedure

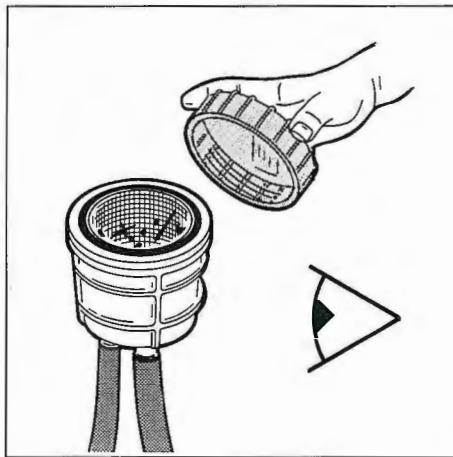


Lubrication system

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 64.



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 (1/4 Imp.gal.) of anti-freeze into the water strainer and run the engine until the anti-freeze has disappeared into the cooling system.

Note: This will take only about 10 seconds. Immediately stop the engine to prevent that the impeller of the raw water pump will be damaged.

Take care that no anti-freeze is spilled in-

to the waterway (anti-freeze is poisonous).

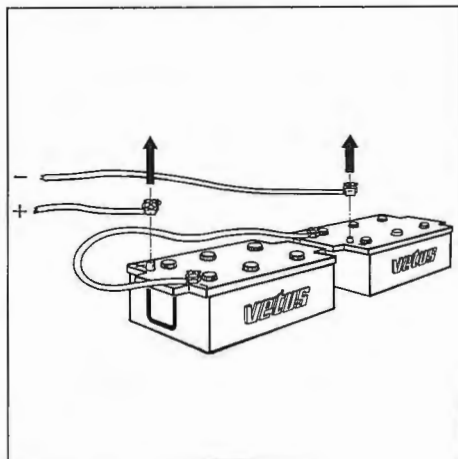
Check the seal between the lid and housing after cleaning and re-assembling the strainer.

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

Winter lay-up

Winter lay-up

Winter storage procedure

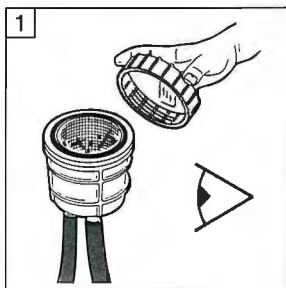


Electrical system

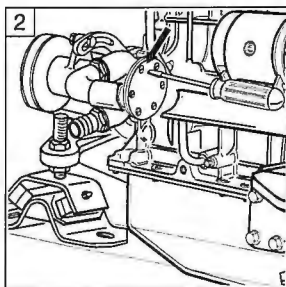
Disconnect the battery cables.

Charge batteries during winter lay-up regularly if required!

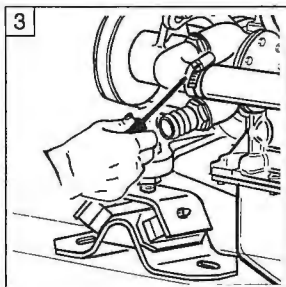
Recommissioning after winter storage



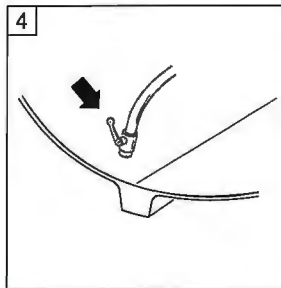
Check that the lid of the raw water strainer is reinstalled.



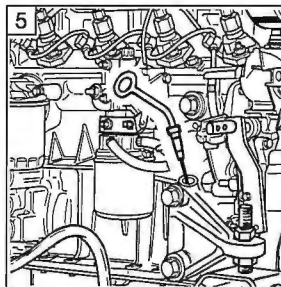
Check that the lid of the raw water pump and drain plugs are reinstalled. (pages 42, 43)



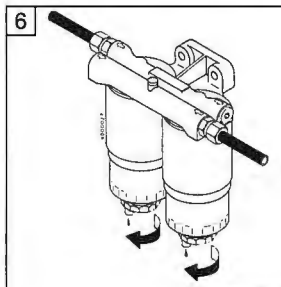
Re-tighten possible loose hose clamps.



Open the sea cock.

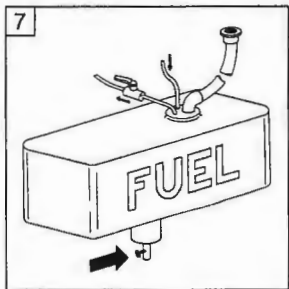


Check the engine oil level. (page 26)

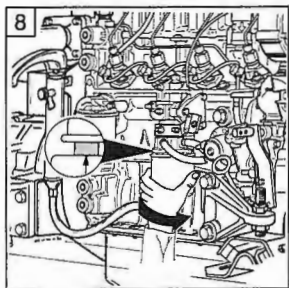


Drain the water from the water separator/fuel filter. (page 29)

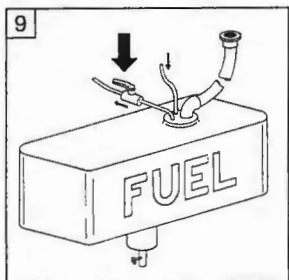
Winter lay-up



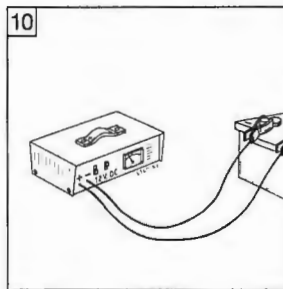
Drain the water from the fuel tank.



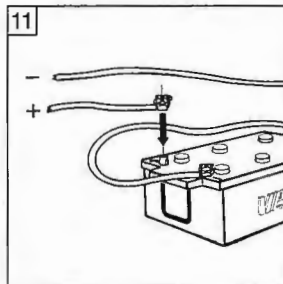
Install a new fuel filter. (page 40)



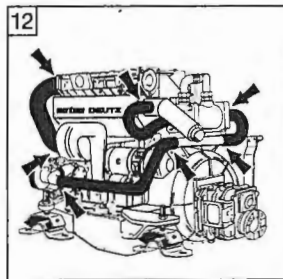
Open the fuel valve.



Make sure that the batteries are fully charged. (page 30)



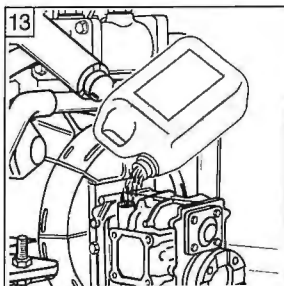
Connect the batteries.



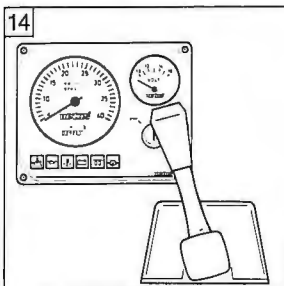
Start the engine.
Check the fuel system and the exhaust for leakage.

Recommissioning after winter storage

Winter lay-up



Stop the engine and change the oil of the gearbox. (page 38)



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

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 is information given about the possible causes of faults and suggested remedies. Please note that this 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.



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

When carrying out repair, **never** start the engine with speed governor removed.

Disconnect battery!

Fault finding table

1 Engine will not crank

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

Troubleshooting

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

Possible fault	Remedy
· Fuel stop valve closed.	· Open.
· (Nearly) Empty fuel tank.	· Refill.
· Air in fuel system.	· Check and bleed.
· Fuel filter clogged with water and/or contamination.	· Check or replace.
· Leaking fuel supply line or fuel injection line.	· Check / replace.
· Faulty injector/injection pump.	· Check, replace if required.
· Engine shutdown lever in stop position, faulty fuel solenoid.	· Check / replace.
· Vent line of fuel supply tank clogged.	· Check / clean.
· Exhaust restricted.	· Check.

Troubleshooting

Fault finding table

3 Engine cranks but will not start, smoke from exhaust

Possible fault	Remedy
<ul style="list-style-type: none">• Air in fuel system.• Faulty injector/injection pump.	<ul style="list-style-type: none">• Check and bleed.• Check, replace if required.
<ul style="list-style-type: none">• Faulty glow plugs (if installed) or below starting limit temperature.	<ul style="list-style-type: none">• Check / replace.
<ul style="list-style-type: none">• Incorrect valve clearance.• Incorrect injection timing.• Insufficient intake air.	<ul style="list-style-type: none">• Adjust.• Check / adjust.• Check / replace air intake filter.
<ul style="list-style-type: none">• Wrong fuel quality or contaminated fuel.	<ul style="list-style-type: none">• Check fuel. Drain and flush fuel tank. Replace with new fuel.
<ul style="list-style-type: none">• Incorrect lube oil SAE class or quality for ambient temperature.	<ul style="list-style-type: none">• Replace.

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

Possible fault	Remedy
<ul style="list-style-type: none">• (Nearly) Empty fuel tank.• Air in fuel system.• Fuel filter clogged with water and/or contamination.• Leaking fuel supply line or fuel injection line.• Faulty injector/injection pump.	<ul style="list-style-type: none">• Refill.• Check and bleed.• Check or replace.• Check / replace.• Check, replace if required.
<ul style="list-style-type: none">• Vent line of fuel supply tank clogged.• Fuel supply line restricted.• Incorrect valve clearance.• Idle setting too low.• Exhaust restricted.• Wrong fuel quality or contaminated fuel.	<ul style="list-style-type: none">• Check / clean.• Check / clean.• Adjust.• Check/ adjust.• Check.• Check fuel. Drain and flush fuel tank. Replace with new fuel.

Fault finding table

5 Engine not developing full power

Possible fault	Remedy
<ul style="list-style-type: none"> • Air in fuel system. • Fuel filter clogged with water and/or contamination. • Leaking fuel supply line or fuel injection line. • Faulty injector/injection pump. 	<ul style="list-style-type: none"> • Check and bleed. • Check or replace. • Check / replace.
<ul style="list-style-type: none"> • Engine shutdown lever in stop position, faulty fuel solenoid. • Oil level too high. • Incorrect valve clearance. • Exhaust restricted. • Insufficient intake air. 	<ul style="list-style-type: none"> • Check, replace if required. • Check / replace. • Lower level. • Adjust. • Check / clean. • Check/replace air intake filter.
<ul style="list-style-type: none"> • Faulty 'charge air pressure operated max. power output device'. • Leaking air intake manifold. • Wrong fuel quality or contaminated fuel. 	<ul style="list-style-type: none"> • Check / replace. • Check / replace. • Check fuel. Drain and flush fuel tank. Replace with new fuel.

Troubleshooting

6 Engine overheats

Possible fault	Remedy
<ul style="list-style-type: none"> • Faulty injector/injection pump. • Oil level too high. • Oil level too low. • Faulty oil filter. • Faulty turbocharger. • Oil cooler (heat exchanger) dirty. • Sea cock closed. • Raw water strainer clogged. • Leaking raw water intake system. • Faulty thermostat. • Faulty impeller raw water pump. • Insufficient intake air. • Leaking air intake manifold. 	<ul style="list-style-type: none"> • Check, replace if required. • Lower level. • Increase level. • Replace. • Check / replace. • Clean. • Open. • Check / clean. • Check / replace. • Check / replace. • Check / replace. • Check / replace air intake filter. • Check / replace.

Troubleshooting

Fault finding table

7 Engine not firing on all cylinders

Possible fault	Remedy
<ul style="list-style-type: none">• Air in fuel system.• Fuel filter clogged with water and/or contamination.• Leaking fuel supply line or fuel injection line.• Faulty injector/injection pump.	<ul style="list-style-type: none">• Check and bleed.• Check or replace.• Check / replace.• Check, replace if required.
<ul style="list-style-type: none">• Fuel supply line restricted.• Faulty glow plugs (if installed) or below starting limit temperature.	<ul style="list-style-type: none">• Check / clean.• Check / replace.
<ul style="list-style-type: none">• Incorrect valve clearance.	<ul style="list-style-type: none">• Adjust.

8 Engine has little or no oil pressure

Possible fault	Remedy
<ul style="list-style-type: none">• Oil level too low.• Excessive inclination of engine.• Incorrect lube oil SAE class or quality for ambient temperature.	<ul style="list-style-type: none">• Increase level.• Check / Adjust.• Replace.

9 Engine oil consumption excessive

Possible fault	Remedy
<ul style="list-style-type: none">• Oil level too high.• Excessive inclination of engine.• Incorrect lube oil SAE class or quality for ambient temperature.• Engine overload.	<ul style="list-style-type: none">• Lower level.• Check / Adjust.• Replace.• Reduce load / Check propeller size.

Fault finding table

10A Blue exhaust smoke (idling)

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

10B Black exhaust smoke (at load)

Possible fault	Remedy
· Faulty turbocharger.	· Check / replace.
· Insufficient intake air.	· Check / replace air intake filter.
· Faulty 'charge air pressure operated max. power output device'.	· Check / replace.
· Leaking air intake manifold.	· Check / replace.
· Engine overload, max. rpm cannot be reached.	· Check propeller size.

Troubleshooting

10C White exhaust smoke (at full load)

Possible fault	Remedy
· Air in fuel system.	· Check and bleed.
· Faulty injector/injection pump.	· Check, replace if required.
· Water in fuel system.	· Check water separator.
· Faulty glow plugs (if installed) or below starting limit temperature.	· Check / replace.
· Incorrect valve clearance.	· Adjust.
· Incorrect injection timing.	· Check / adjust.
· Wrong fuel quality or contaminated fuel.	· Check fuel. Drain and flush fuel tank. Replace with new fuel.

Technical data

Model	D4.29	DT4.29
General		
Make	Vetus Deutz	
Number of cylinders	4	4
Based on	F4M 1011 F	BF4M 1011 F
Type	4-stroke diesel, in-line	
Injection	Direct	
Aspiration	Naturally	Turbo-charged
Bore	91 mm	91 mm
Stroke	112 mm	112 mm
Total displacement	2912 cm ³	2912 cm ³
Compression ratio	18.5 : 1	17 : 1
Idling speed	750 ⁺⁵⁰ ₋₀ rpm	750 ⁺⁵⁰ ₋₀ rpm
Max. no. of revolutions at no load	3200 rpm	3000 rpm
Valve Clearances (cold)	Inlet 0.3 ^{+0.1} mm Exhaust 0.5 ^{+0.1} mm	
Weight (with standard gearbox)	299 kg	335 kg

Engine specifications

Model	D4.29	DT4.29
Maximum Output		
Heavy Duty (ISO 3046/ICFN)	44 kW (59 hp)	—
at no. of revolutions	3000 rpm	—
Light Duty Commercial (ISO 3046/IOFN)	46 kW (63 hp)	58 kW (78 hp)
at no. of revolutions	3000 rpm	2800 rpm
Special Light Duty (ISO 3046/IOFN)	48 kW (66 hp)	61 kW (82 hp)
at no. of revolutions	3000 rpm	2800 rpm
Fuel consumption		
At max. power and max. rpm for Heavy Duty	230 g/kWh	230 g/kWh

Engine specifications

Model	D4.29	DT4.29
Fuel System (Self-bleeding)		
Injection pump	Bosch	
Injectors	Bosch	
Injector opening pressure	210 / 250 bar (kgf/cm ²)	
Firing order	1-3-4-2	1-3-4-2
Injection timing	9° BTDC	4° BTDC
Fuel filter element	VD60092	
Fuel lift pump		
Suction height	max. 1.5 bar (kgf/cm ²)	
Pressure loss	max. 0.5 bar (kgf/cm ²)	
Filter element	VD60332	
Fuel supply connection	for hose 8 mm I.D.	
Fuel return connection	for hose 8 mm	
Return flow	max. 0.5 l/min	

Oil Lubrication System

Oil capacity, max.		
without oil filter	9.75 litres	9.75 litres
with oil filter	10 litres	10 litres
Oil Filter	VD20290	
Oil pressure with warm oil (120°C) and low idle	min. 1.4 bar	
Oil temperature in oil pan	max. 130°C	

Technical data

Model	D4.29	DT4.29
Cooling system		
Thermostat	opening at 93°C, fully opened at 98°C	
Raw water pump,		
Flow at max. engine rpm	70 l/min	60 l/min
Total head at max. flow	0.5 bar	0.5 bar
Impeller	STM8608	STM8608
Inlet connection	for hose 25 mm I.D.	
Combustion air system / Exhaust system		
Intake vacuum pressure	max. 65 mbar	
Turbo pressure at full load	max. 1.4 bar	
Exhaust diameter	60 mm	75 mm
Exhaust back pressure	at specified output max. 75 mbar absolute maximum 150 mbar	

Technical data

Engine specifications

Model	D4.29	DT4.29
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Electrical System

Voltage	12 Volts / 24 Volts, see alternator data plate	
Alternator	14 Volts, 95A / 28 Volts, 55 A, see alternator data plate.	
Battery capacity	min. 88 Ah, max. 176 Ah (at 12 Volts) / min. 2 x 66 Ah, max. 2 x 110 Ah (at 24 Volts)	
Protection	Circuit breaker, 10 A	

V-belts

Alternator	VD40070	
Tension	Pre-tension 400 ^{±20} N / Re-tension 300 ^{±20} N	
Raw water pump	STM8533	
Tension	Pre-tension 400 ^{±50} N / Re-tension 250 ^{±50} N	

Engine installation

Max. installation angle	15 degrees backwards	
Max. athwartships angle	25 degrees continuously, 30 degrees intermittend	

Gearbox, standard

Hurth type	HBW250	HSW250A	HBW250	HSW250A
Gear ratio	1.88 / 2.74 :1	1.47 / 2.07 / 2.29 / 2.71 :1	1.88 :1	1.47 / 2.07 / 2.29 / 2.71 :1

Torque wrench settings

Technical data

Screw connection	Size	Class	Torque Angle [Nm]
Oil pan			21
Oil drain plug			50
Rocker cover			8.5 ±10%
Rocker arm set-screw			21
Injector holder (Torx)			16
Injection line mounting	M14x1.5		30
Air Intake Manifold			8.5 ±10%
Exhaust manifold			21
Engine bracket front	M16x40	8.8	187 ±10%
Engine bracket rear	M16x40	8.8	80 ±10%

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).

D4.29

Approved API Oils : CC, CD/CE

Approved CCMC Oils : D4

DT4.29

Approved API Oils : CF4

Approved CCMC Oils : 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 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 $+30^{\circ}\text{C}$
- SAE 15W40 for temperatures of -20°C up to $+35^{\circ}\text{C}$

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.

Hurth:

Transmission Oil Type A, Suffix A ATF (Automatic Transmission Fluid).

For example: Vetus Marine Gearbox Oil

Shell Donax T6

Gulf Dextron

Hurth type HBW250 : 0.75 litres

Hurth type HSW250A : 1.8 litres

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.

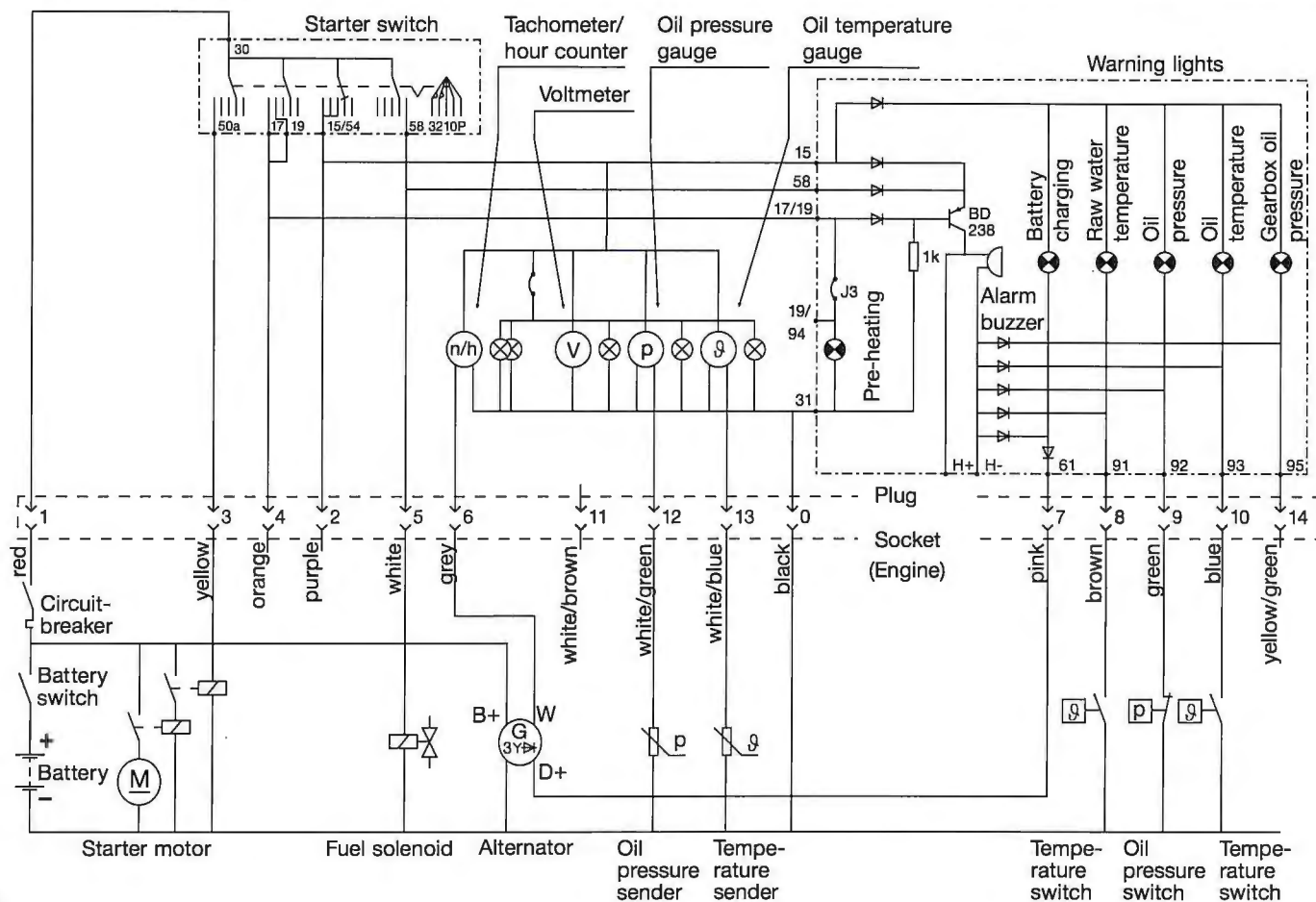
Operating media

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).

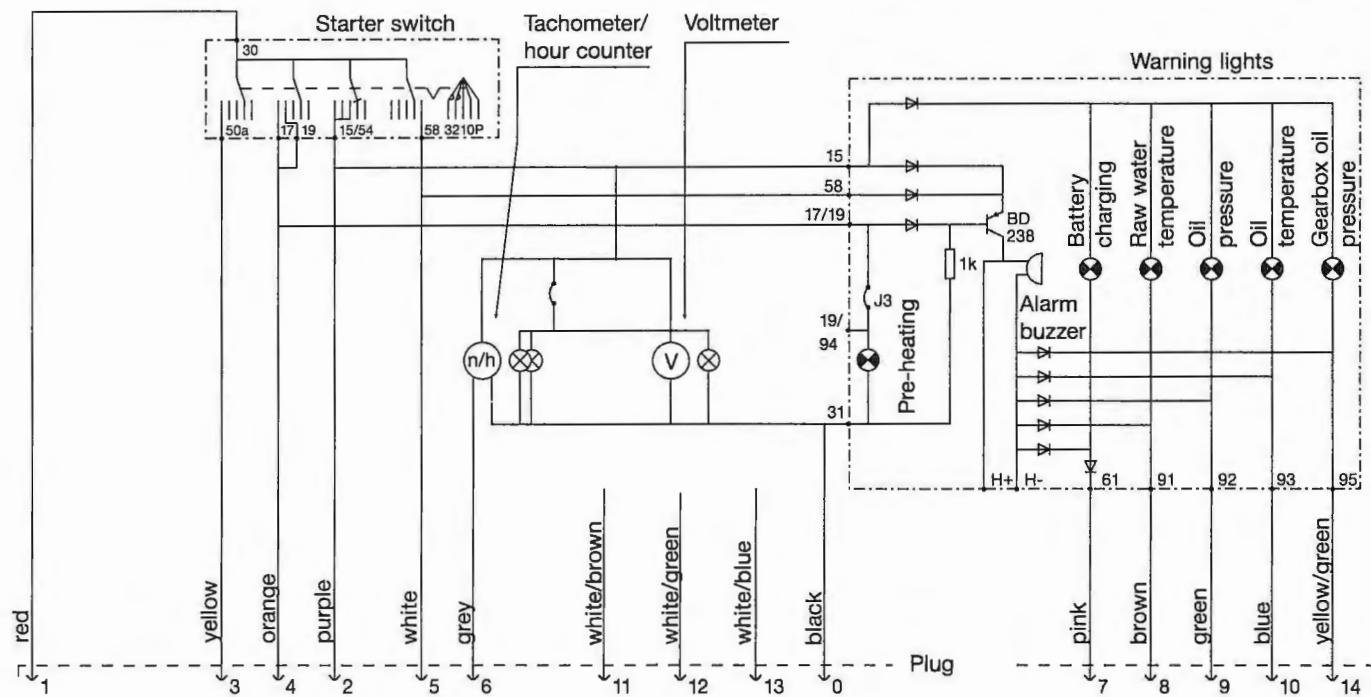
Electrical Circuit Diagram

Engine with panel 'model 34'



Options, panel 'model 22'

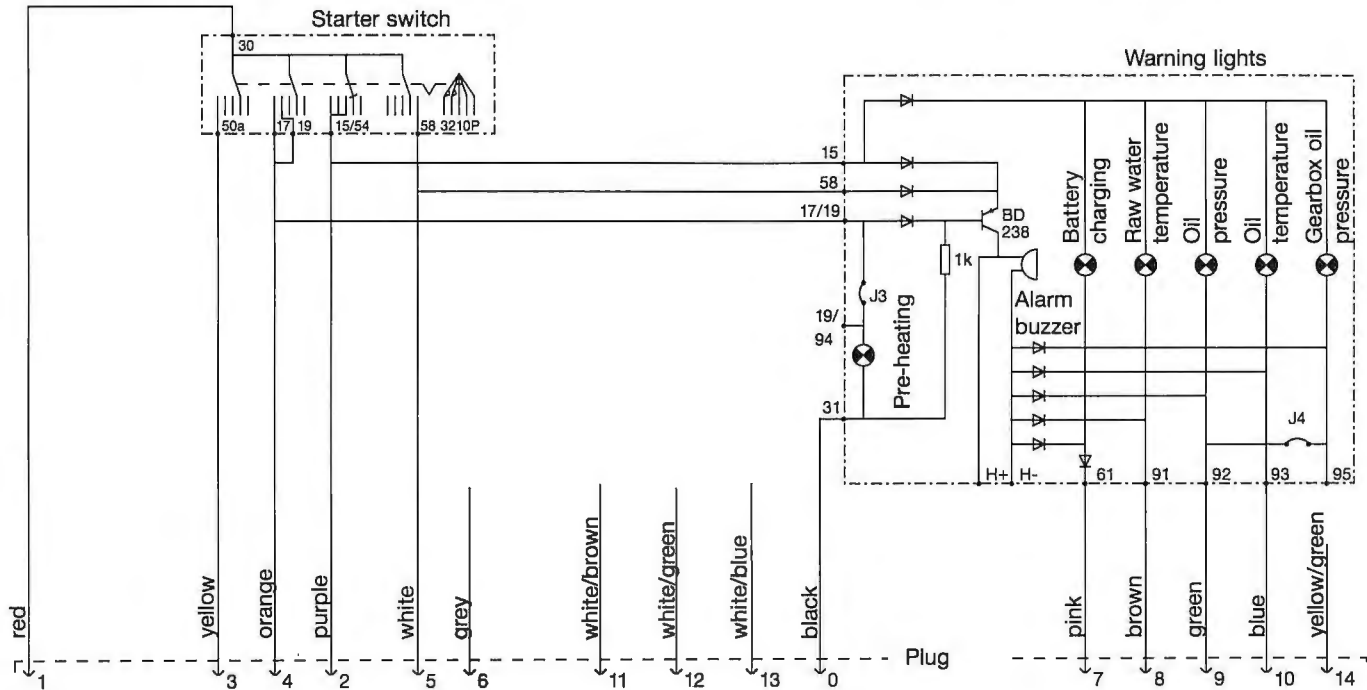
Electrical Circuit Diagram



Electrical Circuit Diagram

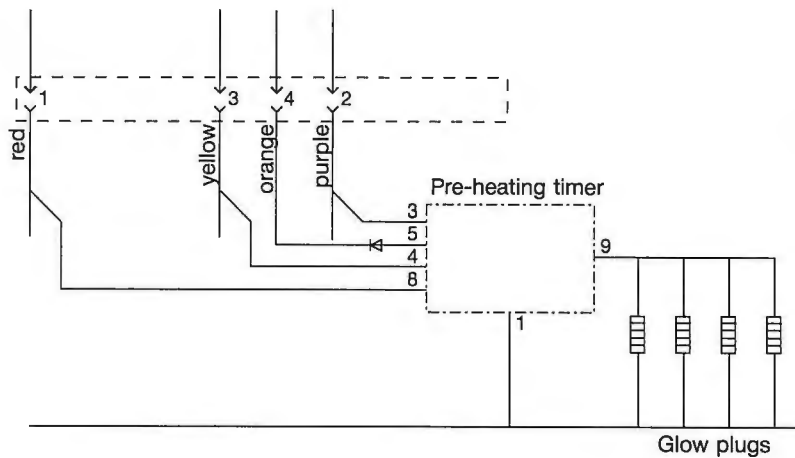
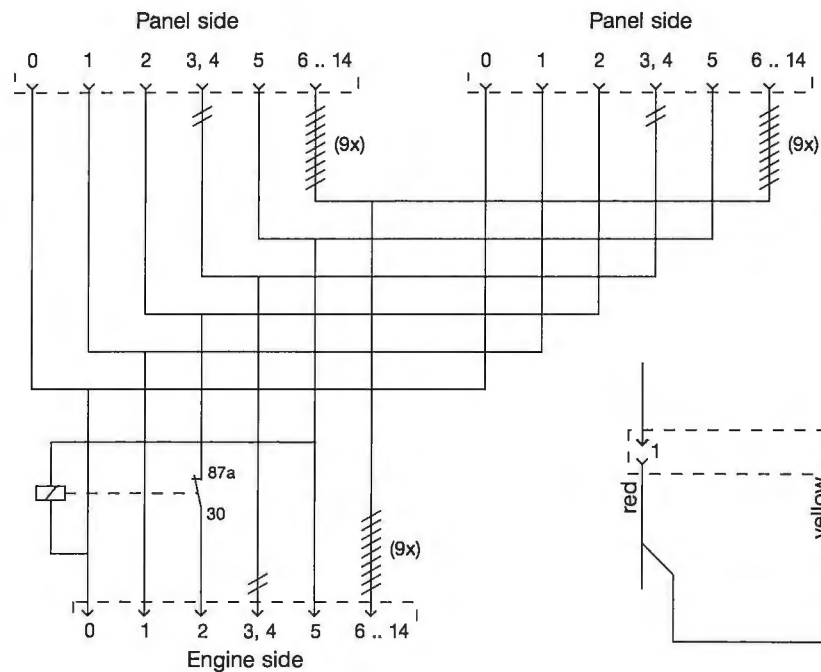
Options, panel 'model 10'

10

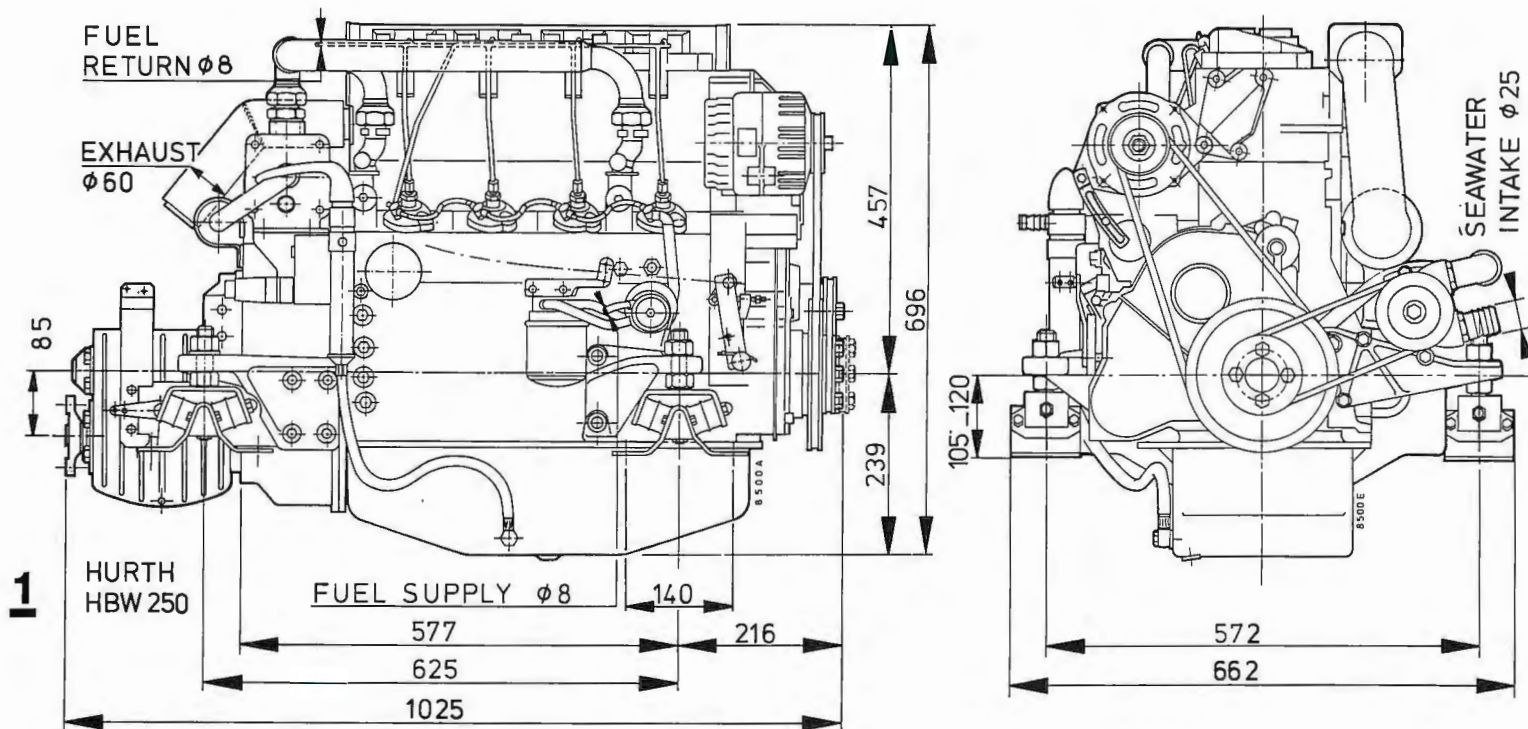


Options, T-Connector & Cold Start Aid

Electrical Circuit Diagram



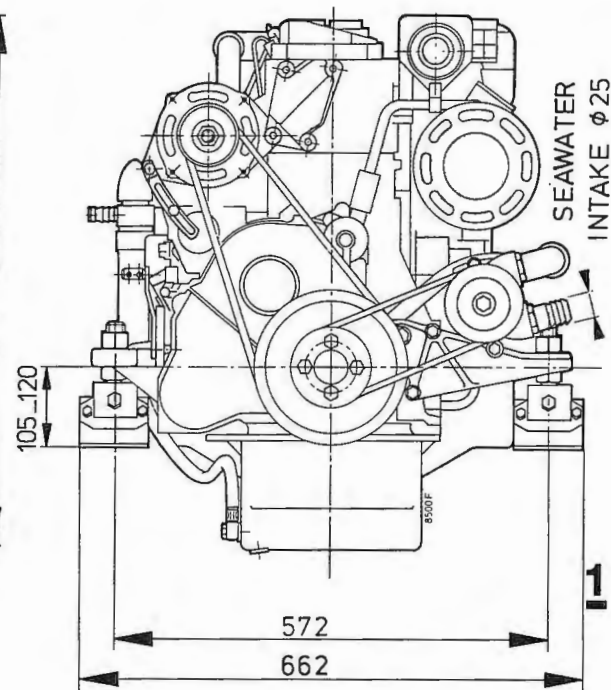
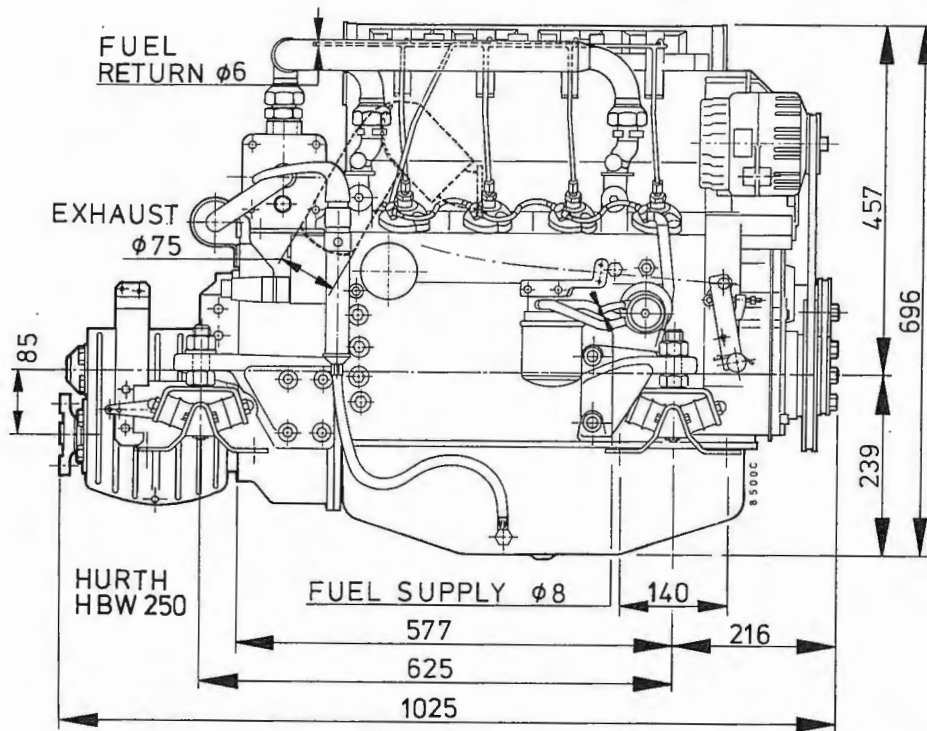
Overall Dimensions



D4.29

1 : 10

Overall Dimensions



DT4.29

1 : 10

vetus den ouden n.v.

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