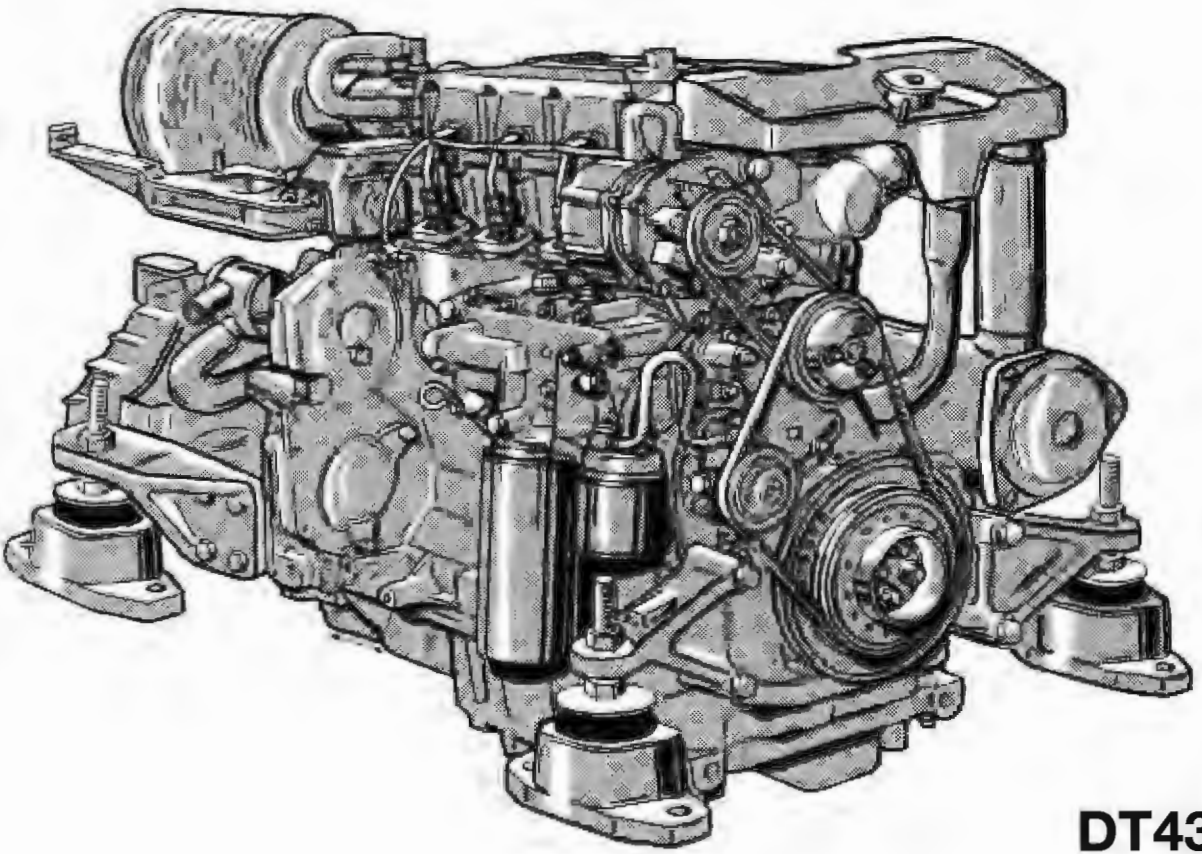
Operation manual

vetus®

DEUTZ

DT43 DTA43
DT64 DTA64
DT67 DTA67



DT43

Operation manual

vetus® DEUTZ

DT43 DTA43
DT64 DTA64
DT67 DTA67

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 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 relevent 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.

Contents

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 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

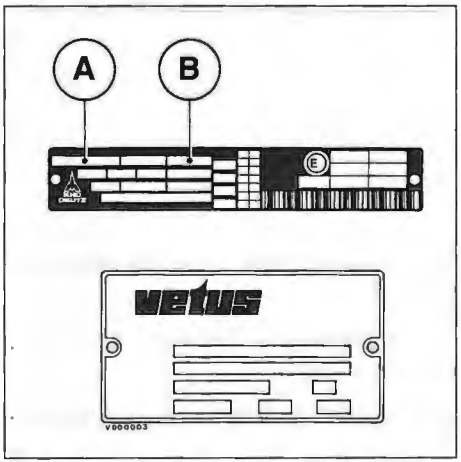
All safety instructions in this manual are designated by the accompanying symbol. Please follow them carefully.

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.

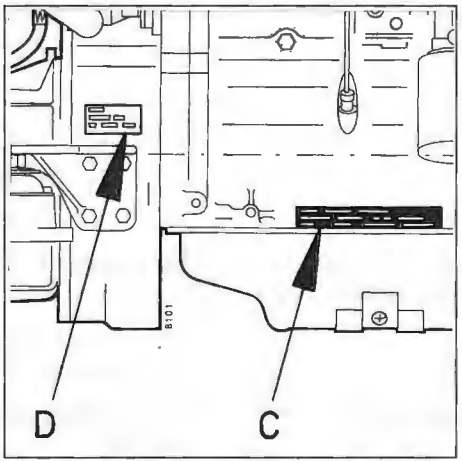
- Never attempt to touch moving parts when the engine is running.
- Never touch hot parts of the engine, and keep flammable materials well away from the engine.
- Always stop the engine before checking or adjusting components.

  Ensure that the engine can not be started by accident.
- 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.



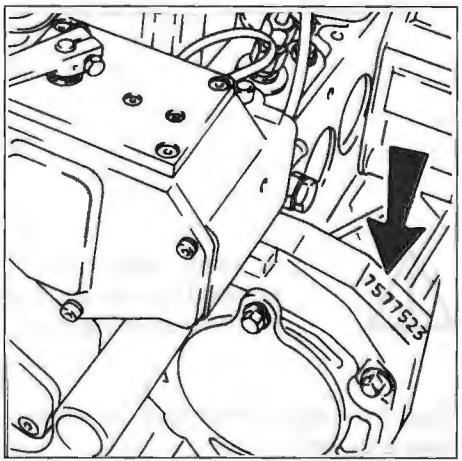
Engine data tag

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.



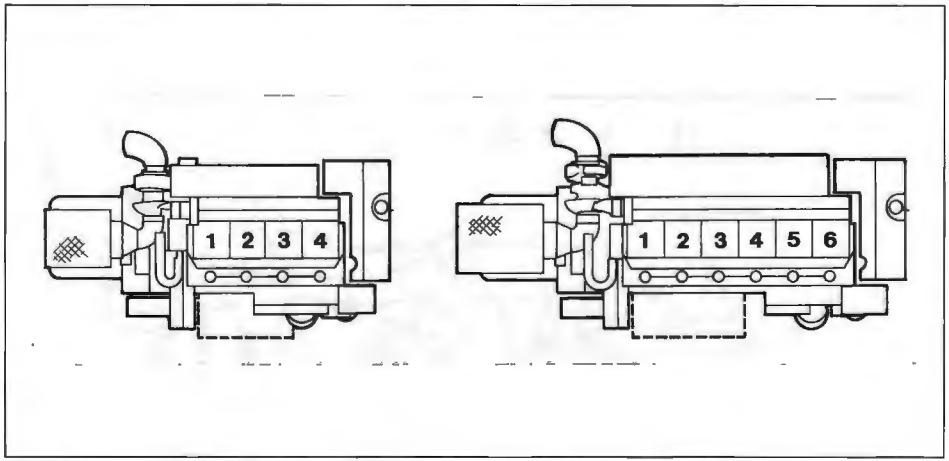
Engine data tag location

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



Engine serial number

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



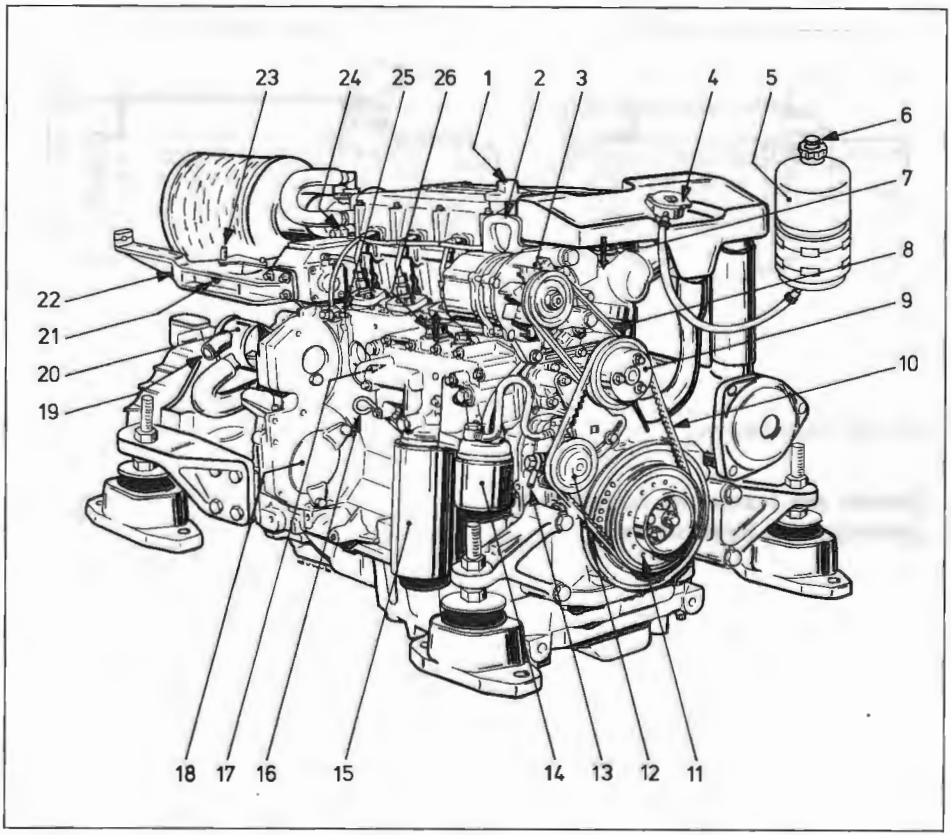
Cylinder numbering

Cylinders are numbered consecutively, beginning at the flywheel end.

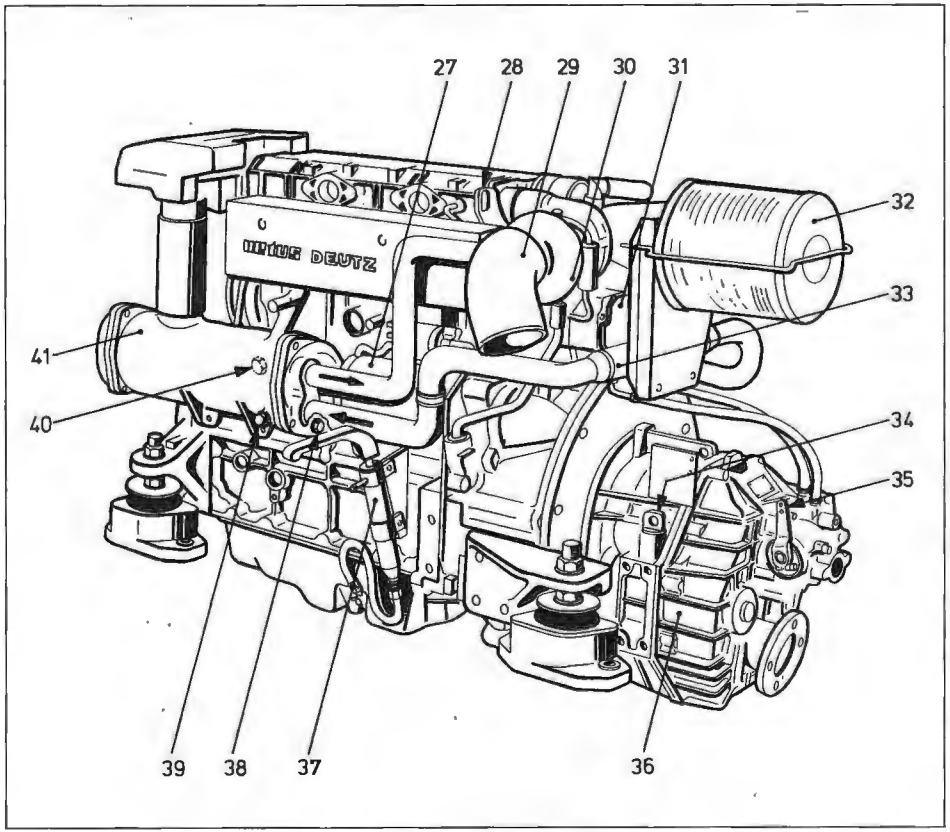
Service side *DT43, DT64*

2

1 Oil filler cap
2 Lifting eye
3 Alternator
4 Pressure filler cap for cooling system
5 Expansion tank
6 Filler cap for cooling system
7 Water heater connection 'IN'
8 V–belt alternator
9 Coolant pump
10 V–belt fuel pump / coolant pump
11 P.T.O. (Mounting facility for extra belt pulley)
12 Fuel lift pump
13 Fuel supply pipe connection 12 mm diam.
14 Fuel filter
15 Lube Oil filter
16 Oil dipstick
17 Lube oil cooler
18 P.T.O. (Mounting facility for hydraulic pumps)
19 Raw water inlet 32 mm diam.
20 Raw water pump
21 Circuitbreaker
22 Electrical system connector
23 Connection for throttle push–pull cable



Starter side *DT43, DT64*

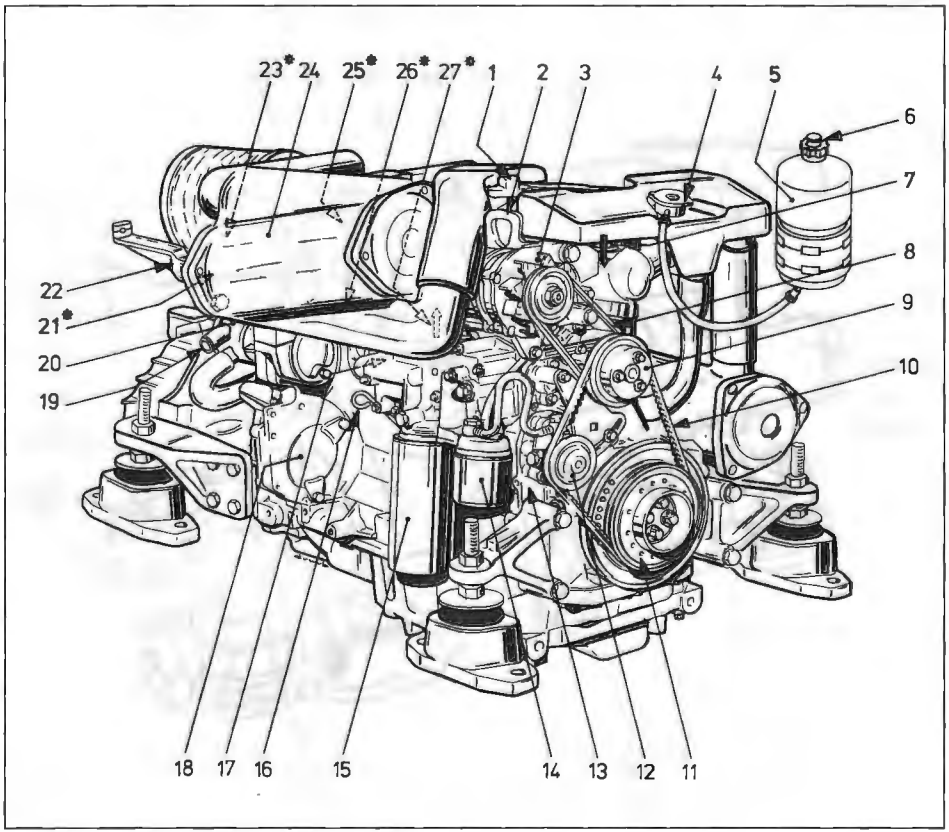


24 Manual operated stop
25 Fuel return pipe connection 10 mm diam.
26 Water heater connection 'OUT'
27 Starter motor
28 Lifting eye
29 Exhaust injection bend
30 Turbocharger
31 Speed governor
32 Air intake filter
33 Gearbox lube oil cooler
34 Gearbox oil dipstick/filler cap
35 Connection for gearbox push–pull cable
36 Gearbox
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, block
41 Heat exchanger

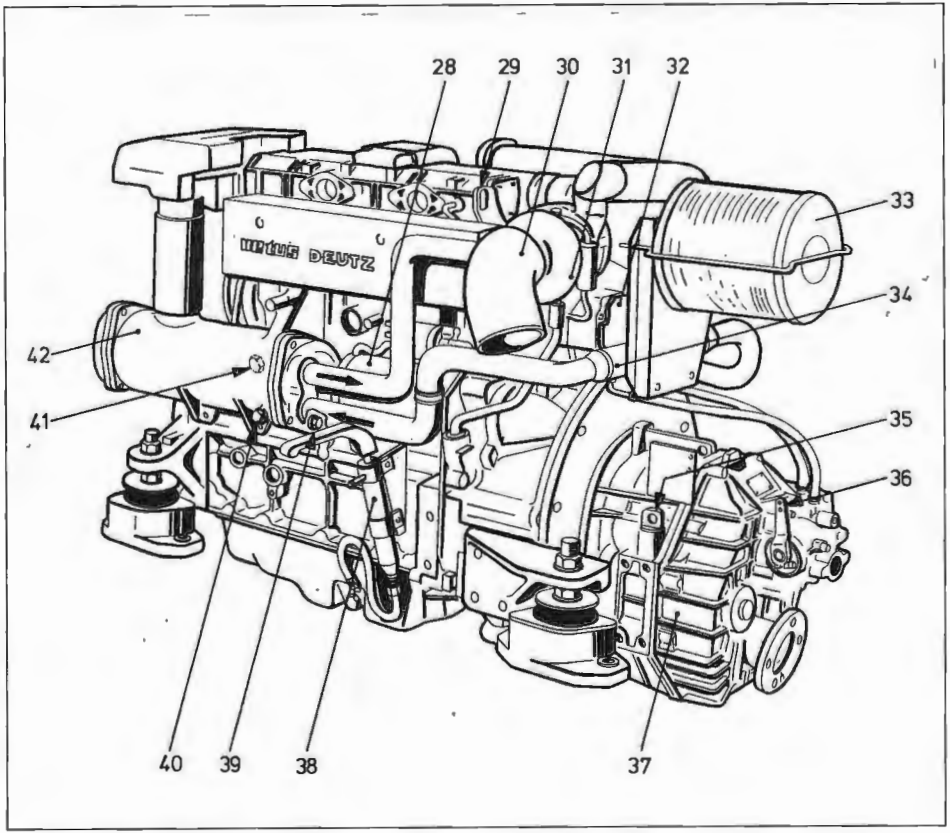
Service side *DTA43, DTA64*

2

1 Oil filler cap
2 Lifting eye
3 Alternator
4 Pressure filler cap for cooling system
5 Expansion tank
6 Filler cap for cooling system
7 Water heater connection 'IN'
8 V–belt alternator
9 Coolant pump
10 V–belt fuel pump / coolant pump
11 P.T.O. (Mounting facility for extra belt pulley)
12 Fuel lift pump
13 Fuel supply pipe connection 12 mm diam.
14 Fuel filter
15 Lube Oil filter
16 Oil dipstick
17 Lube oil cooler
18 P.T.O. (Mounting facility for hydraulic pumps)
19 Raw water inlet 32 mm diam.
20 Raw water pump
21 Circuitbreaker
22 Electrical system connector
23 Connection for throttle push–pull cable



Starter side *DTA43, DTA64*

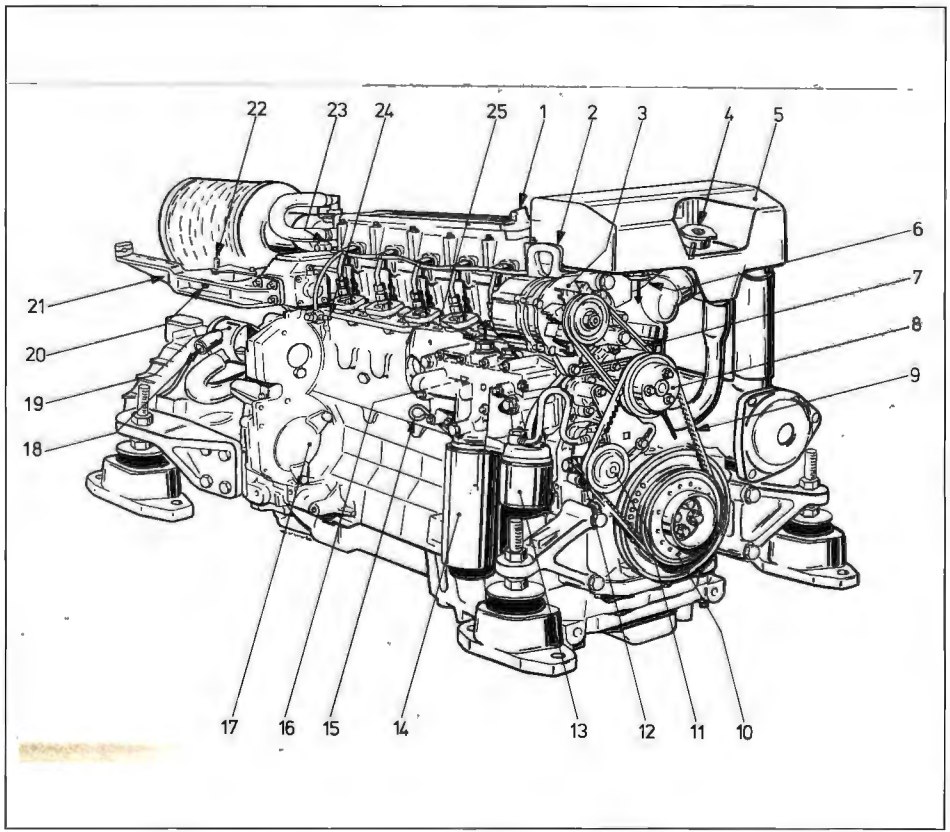


24 Aftercooler
25 Manual operated stop
26 Fuel return pipe connection 10 mm diam.
27 Water heater connection 'OUT'
28 Starter motor
29 Lifting eye
30 Exhaust injection bend
31 Turbocharger
32 Speed governor
33 Air intake filter
34 Gearbox lube oil cooler
35 Gearbox oil dipstick/filler cap
36 Connection for gearbox push–pull cable
37 Gearbox
38 Oil sump drain pump
39 Cooling system drain plug, heat exchanger cover
40 Cooling system drain plug, heat exchanger
41 Cooling system drain plug, block
42 Heat exchanger

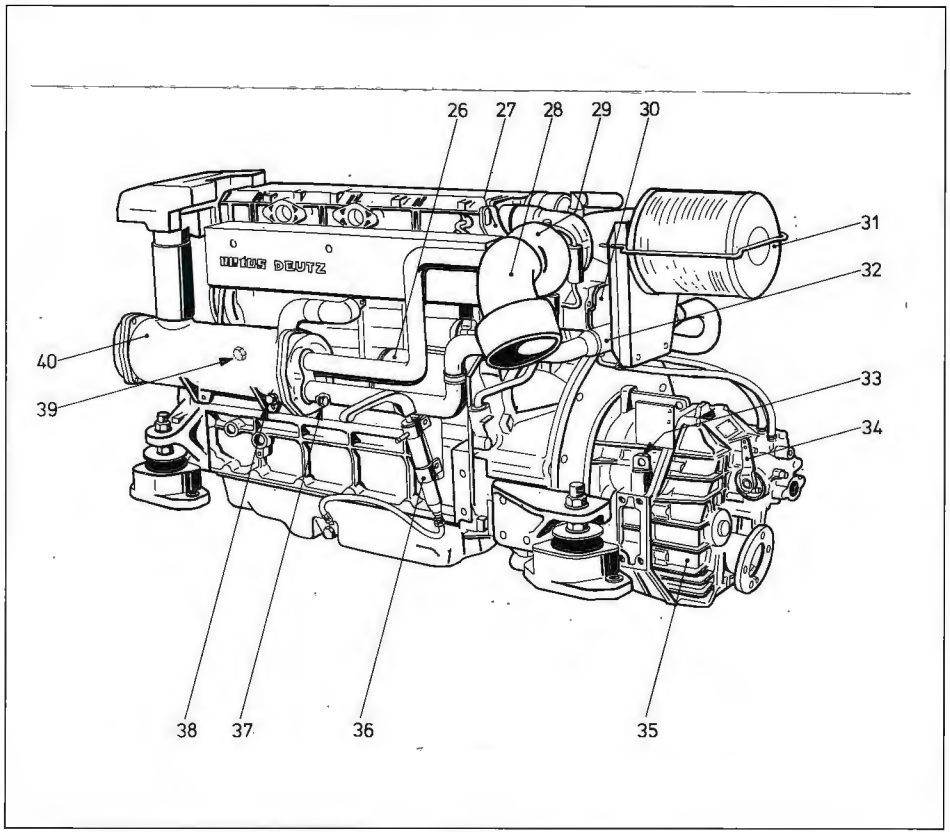
* See drawing on page 8 for identification; part numbers are identical.

Service side *DT67*

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



Starter side *DT67*

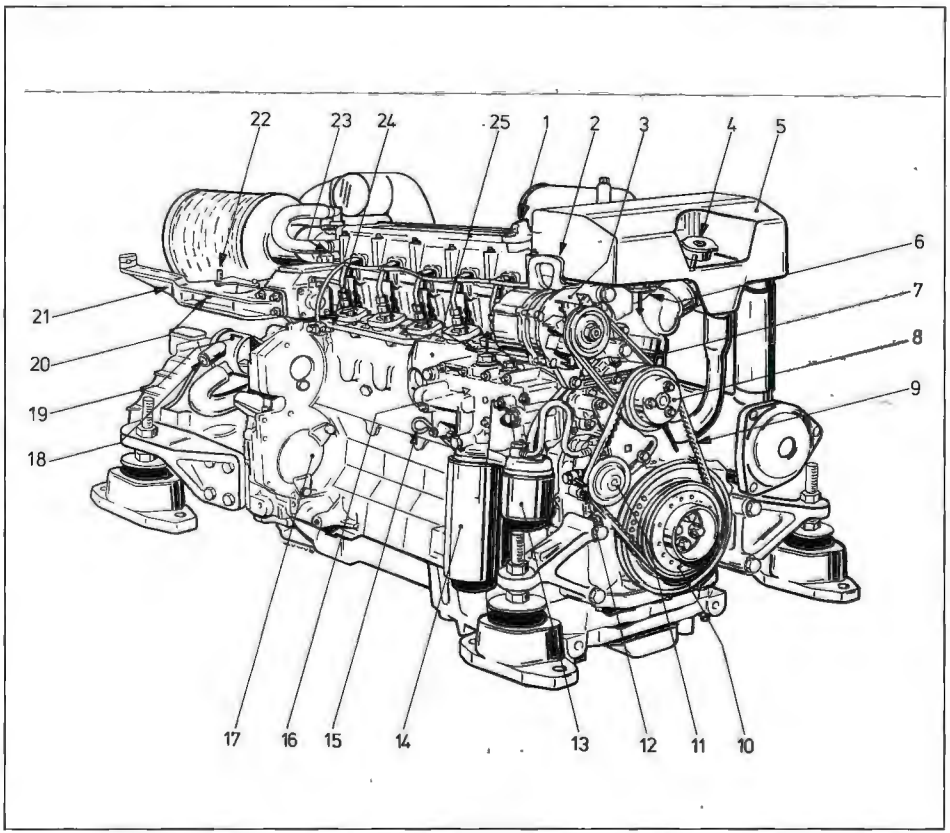


24 Fuel return pipe connection 10 mm diam.
25 Water heater connection 'OUT'
26 Starter motor
27 Lifting eye
28 Exhaust injection bend
29 Turbocharger
30 Speed governor
31 Air intake filter
32 Gearbox lube oil cooler
33 Gearbox oil dipstick/filler cap
34 Connection for gearbox push–pull cable
35 Gearbox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

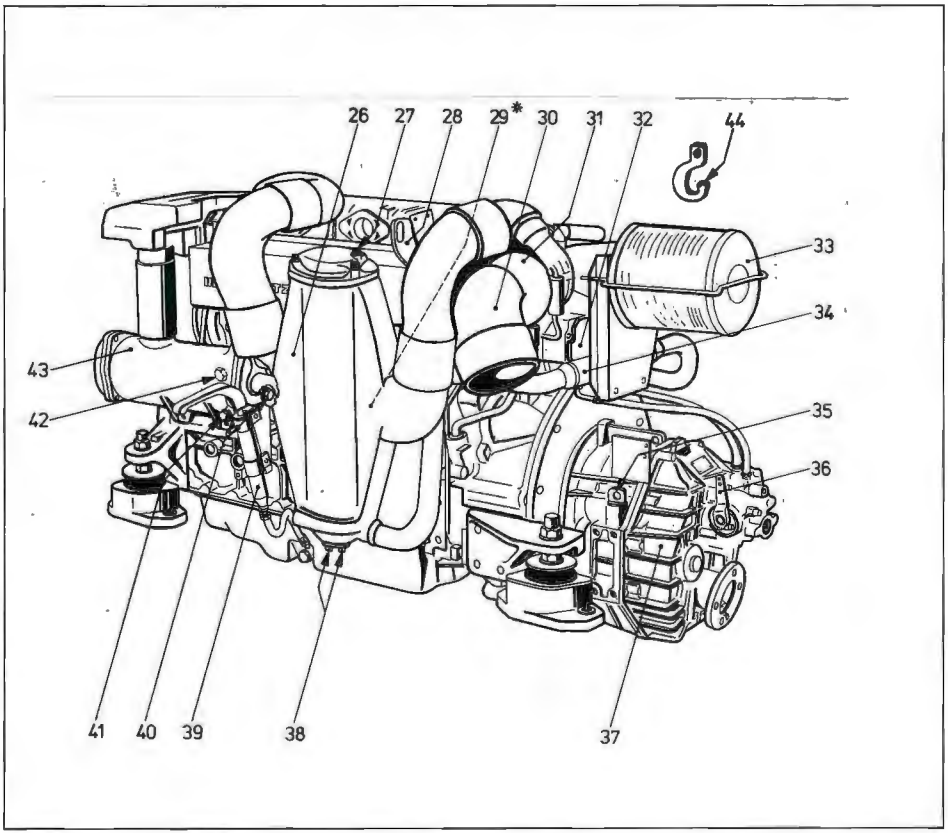
Identification of engine parts

Service side *DTA67*

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

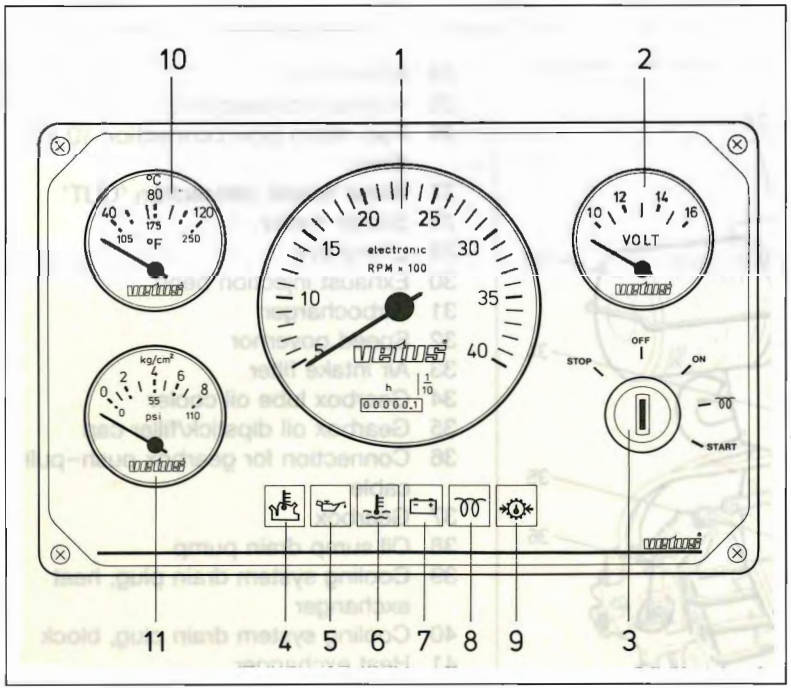


Starter side *DTA67*

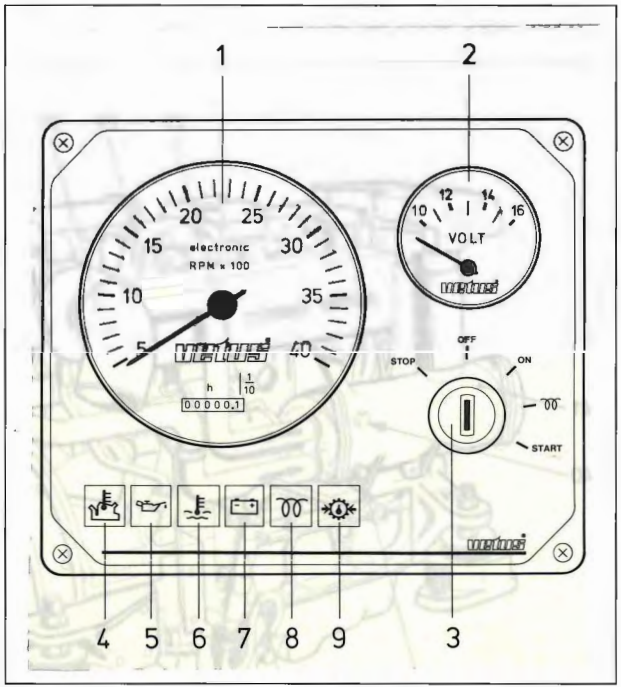


24 Fuel return pipe connection 10 mm diam.
25 Water heater connection 'OUT'
26 After-cooler
27 Vent plug after-cooler
28 Lifting eye
29 Starter motor
30 Exhaust injection bend
31 Turbocharger
32 Speed governor
33 Air intake filter
34 Gearbox lube oil cooler
35 Gearbox oil dipstick/filler cap
36 Connection for gearbox push–pull cable
37 Gearbox
38 Drain plugs raw water after-cooler
39 Oil sump drain pump
40 Cooling system drain plug, heat exchanger cover
41 Cooling system drain plug, heat exchanger
42 Cooling system drain plug, block
43 Heat exchanger
44 Lifting hook

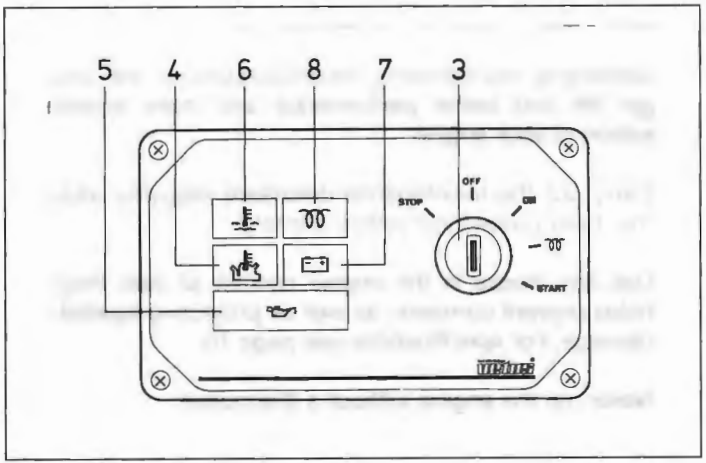
* See drawing on page 13, part number 27, for identification.



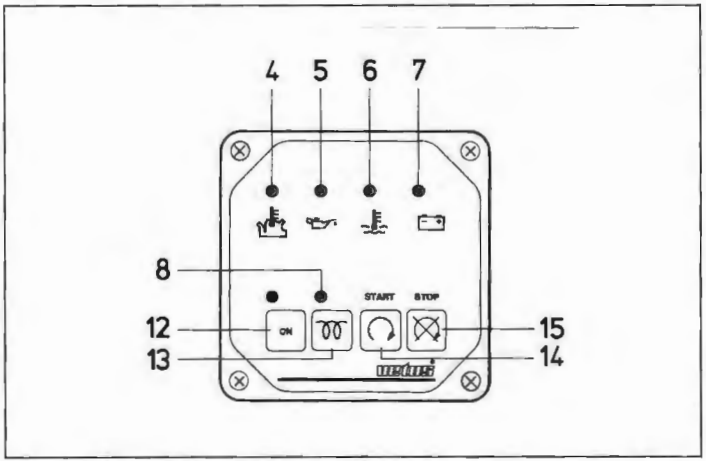
Basic panel (model 34)



Fly–bridge panel (model 22)



Sailingboat panel (model 10)



Push button panel (model 00)

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 *
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.

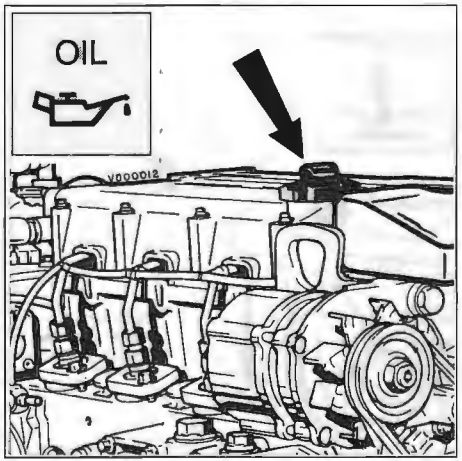
General guidelines for use

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 corrosion as well as protecting against frost damage. For specifications see page 78.
- Never run the engine without a thermostat.
- Use a good quality lubricating oil. For specifications see page 76.
- 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.

Preparation the engine for use

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

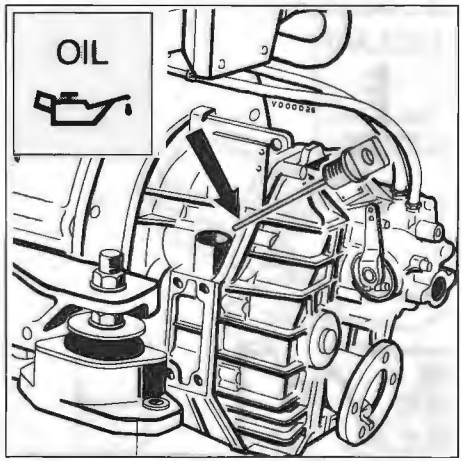


Filling with engine oil

As a rule engine 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 76.

Check the oil level with the dipstick*, see page 32.

* The dipstick must be calibrated see installation manual.

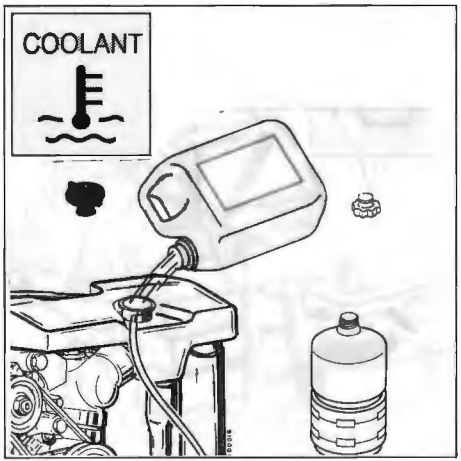


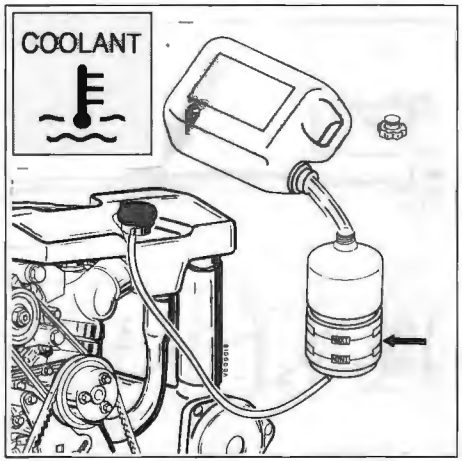
Filling gearbox with oil

Fill the gearbox with oil, for quantity and specification, see page 76.

Check the oil level with the dipstick, see page 46.

3





Filling the cooling system ***DT43, DTA43, DT64, DTA64***

Remove both the cap of the filler neck on the top of the header tank and the cap on top of the expansion tank.
Fill the cooling system up to the lower edge of filler neck.
Use a mixture of 40% antifreeze (ethylene–glycol based) and 60% tap water or use a special coolant.
For specifications see page 78.
Replace filler cap on header tank.

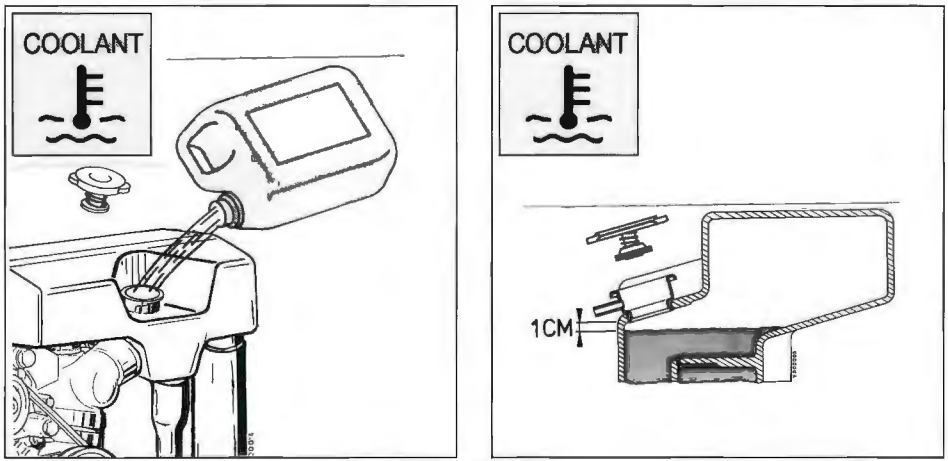
Continue filling into expansion tank; fill up to the 'MAXI' mark.
Replace the filler cap on expansion tank.
Bleeding will take place automatically during filling!

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 expansion tank. If necessary, add coolant.

Water heater

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

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



Filling the cooling system ***DT67, DTA67***

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 78.

The level of the coolant must be approx. 1 cm (3/8´´) below the lower edge of the filler neck on the header tank.
Replace the filler cap on header tank.
Bleeding will take place automatically during filling!

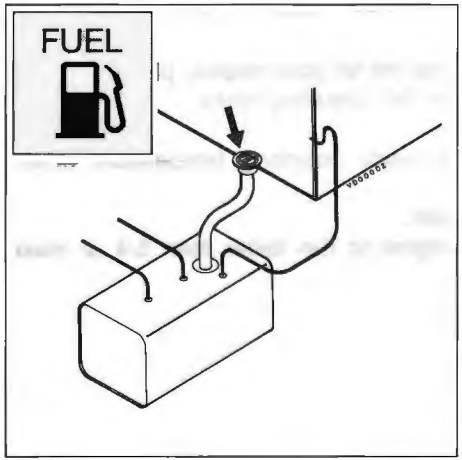
After the engine has run for the first time and has reached operating temperature and has cooled down again to ambient temperature, check the coolant level in the header tank. If necessary, add coolant.

Water heater

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

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

3



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 77.
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 23, 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

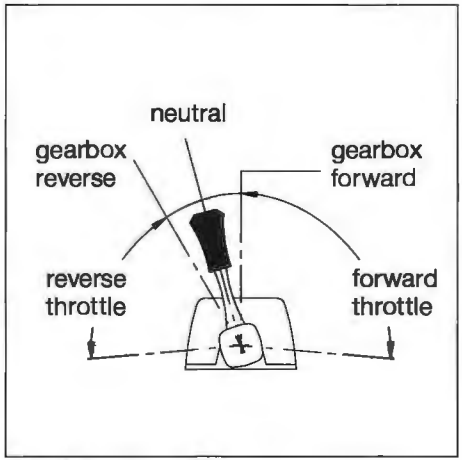
In order to ensure a long life for your engine, please observe the following for the first 50 operating hours:

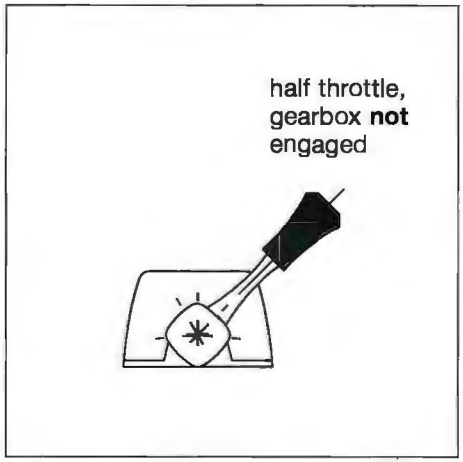
- Allow the engine to reach operating temperature before applying a load.
- Avoid fast acceleration.
- Do not allow the engine to run faster than 3/4 of maximum RPM.

Starting

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

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





Electric starting

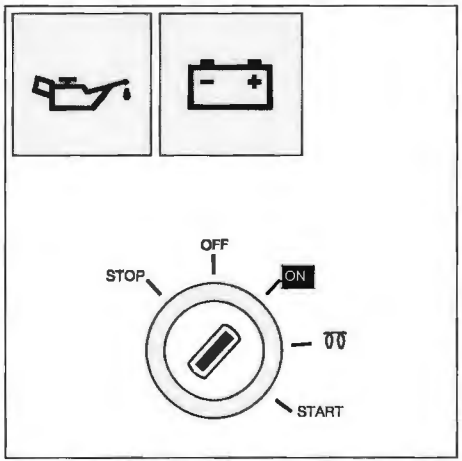
After repair work:
Check that all guards have been replaced and that all tools have been removed from the engine.
When starting with glow plugs, do not use any other substance (e.g. injection with start pilot). Doing so could result in an accident.

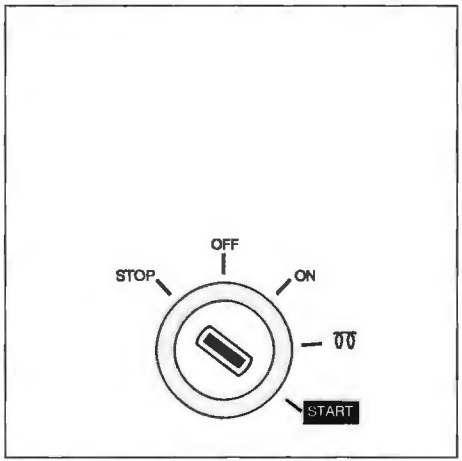
Before starting the engine, always check that the control lever(s) is (are) in the **neutral position.**

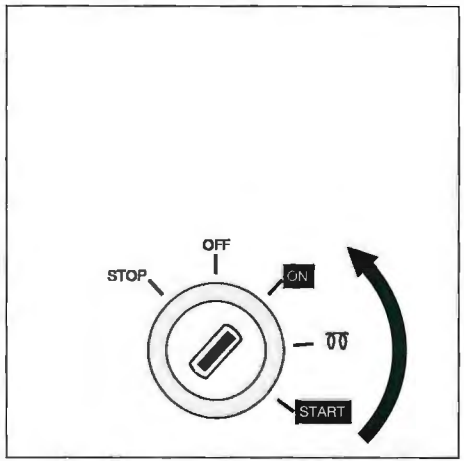
Set the control lever to **'half throttle'** without engaging the gearbox.

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

3







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.

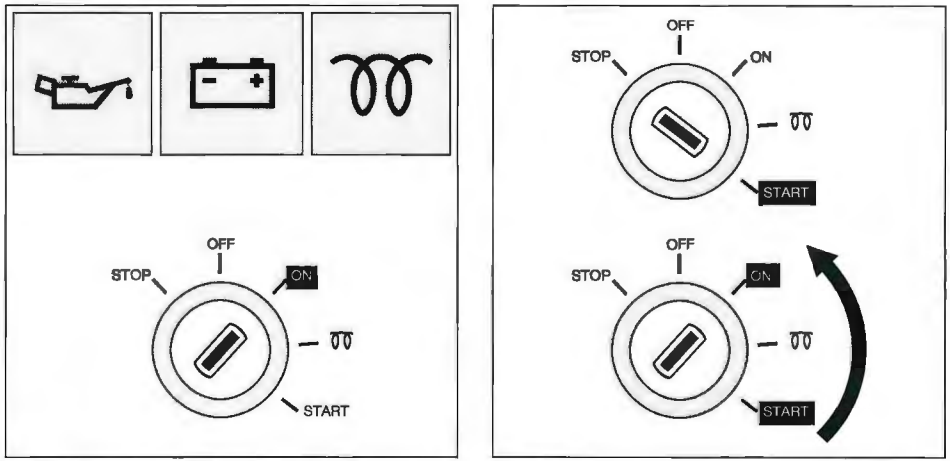
As standard Vetus Deutz engines are not equiped with a pre-heating system, therefore both the pre–heating indicator light and the pre–heating position of the key switch on the operating panel can be ignored.

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.

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.

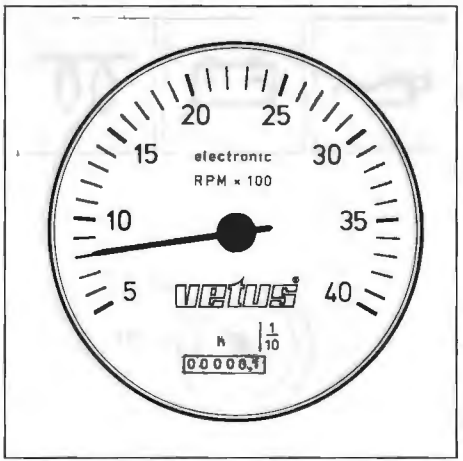
In case your Vetus Deutz engine is equiped with the optional automatic pre–heating system:
Turn the start key on the instrument panel clock–wise; the warning lights for oil pressure and alternator will now light up and the pre–heating indicator light will be lit now.
Leave to pre–heat until the pre–heating 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.

3

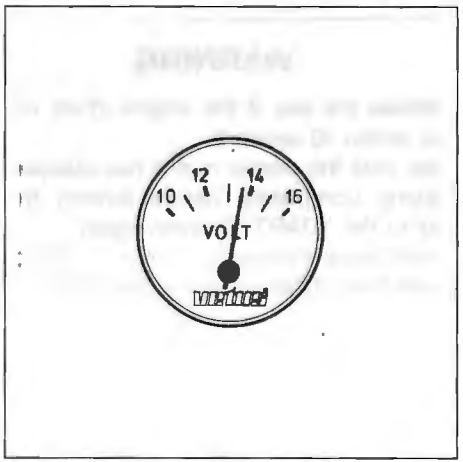
The instrument panel is provided with the following instruments (Depending of the type of panel, see page 16 and 17).



Tachometer

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,
DT43, DTA43: 720 - 770 rpm
DT64, DTA64: 650 - 700 rpm
DT67, DTA67: 600 - 650 rpm



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.

WARNING

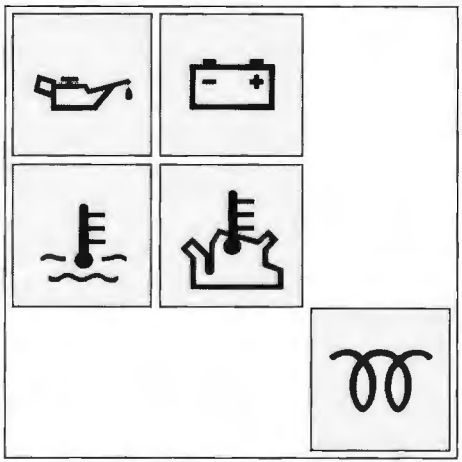
NEVER turn the key to the 'START' position while the engine is running.
Doing so will damage the starter motor.

Temperature gauge

Indicating the temperature of the internal cooling system.
The operating temperature is 83 – 85 °C.
In case the engine is overheated; turn off the engine and establish the cause, see fault finding table, page 65 .. 69.

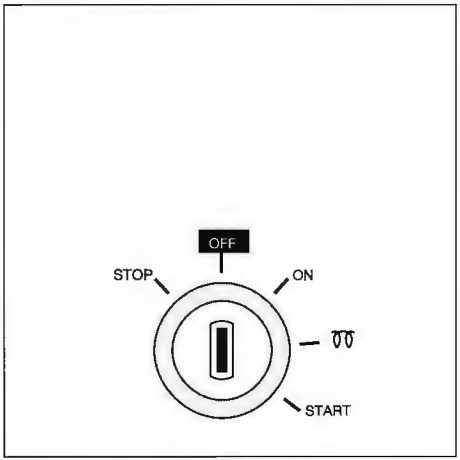
Oil pressure gauge

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 65 .. 69.

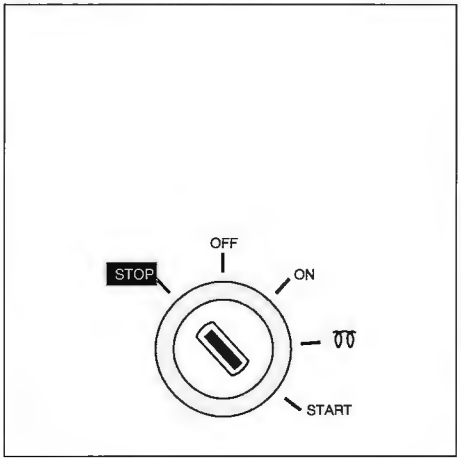


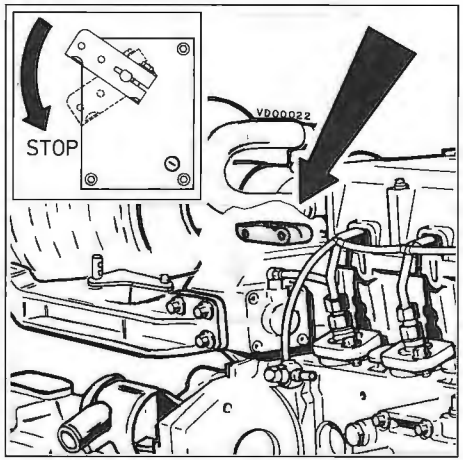
Warning lights

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!



Electrical shutdown





Mechanical 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 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.

N.B. The 'STOP' position, left of the 'OFF' position on the control panel, has normally no function for this engine.
When 2 control panels are connected to one engine, the engine can always be stopped by turning the key to the 'STOP' position, no matter what the position is of the key on the other panel.

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.

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

Every 10 hours or daily, before starting	Page
Check engine oil level	32
Check coolant level	34
Check water strainer	36

After the first 50 hours 1)	Page
Drain water from fuel filter	37
Engine oil change	40
Replace oil filter	40
Check V–belts	42
Check flexible engine mounts	45
Check gearbox oil level	46
Replace fuel filter	47
Check valve clearance	52
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	Page
Drain water from fuel filter	37
Battery, cables and cable connections	38

Every 500 hours, at least once every year	Page
Engine oil change	40
Replace oil filter	40
Check V–belts	42
Check flexible engine mounts	45
Check gearbox oil level	46

Every 1000 hours, at least once every 2 years	
Replace fuel filter	47
Raw water pump inspection	48
Gearbox oil change	50
Replace air cleaner	51
Check glowplugs (if installed), replace if required	

Every 1500 hours, at least once every 2 years	
Check valve clearance	52

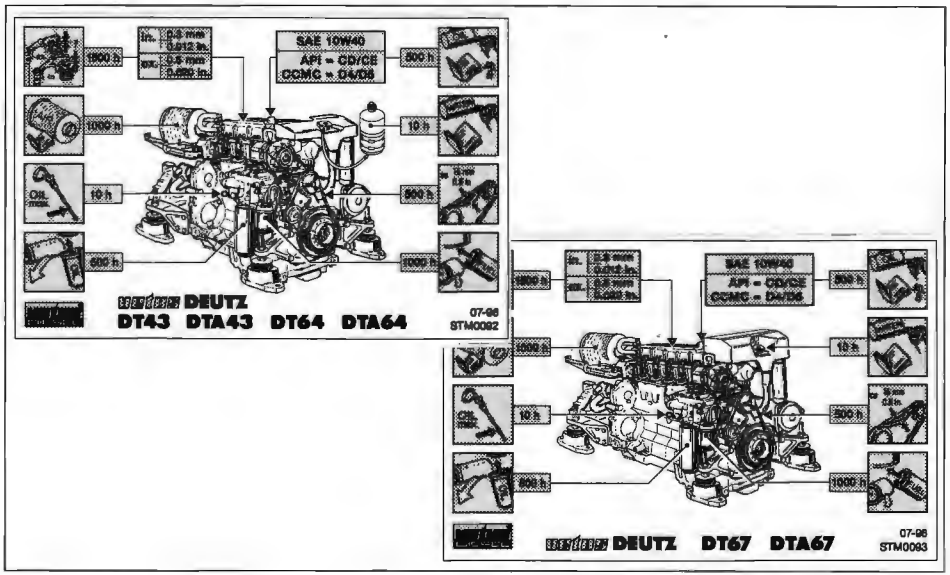
Every 2000 hours, at least once every 2 years	
Replace coolant 3)	54

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.



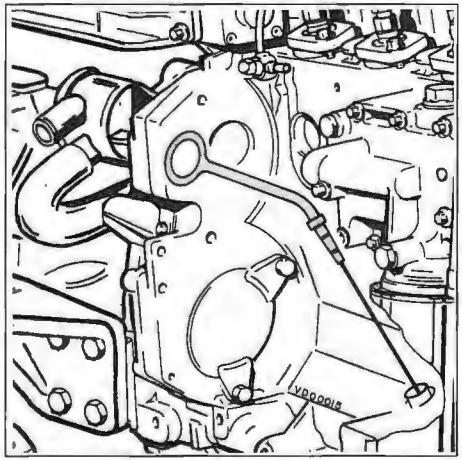
1) Commisioning new or overhauled engine
2) Re-tightening of cylinder head bolts is **not** required!
3) Cleaning of heat exchanger and aftercooler (if installed) is **not** required.

Stop de engine before carrying out any maintenance work.

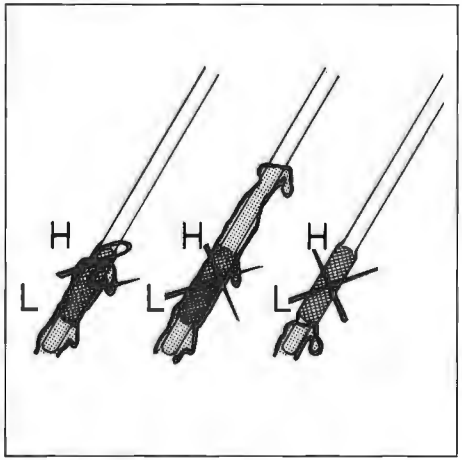
Checking engine oil level

Daily, before starting.

5



Check oil level



Oil level

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

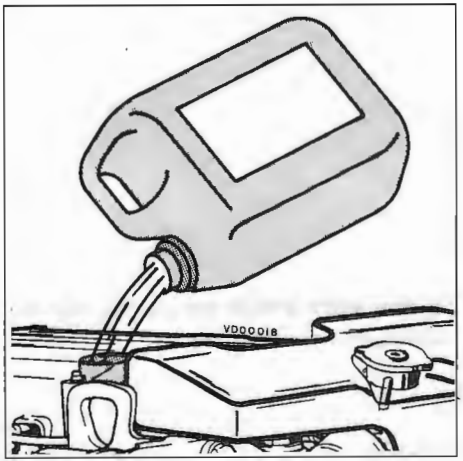
The oil level must be between the two marks on the dipstick*. If necessary top up with the same brand and type of oil.

* The difference between the two oil level marks is :

- DT43, DTA43 : 1.5 litre
- DT64, DTA64 : 2 litres
- DT67, DTA67 : 3 litres

Checking engine oil level

Daily, before starting.

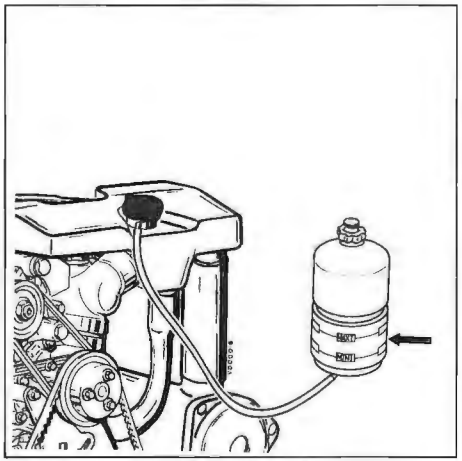


Topping up oil

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

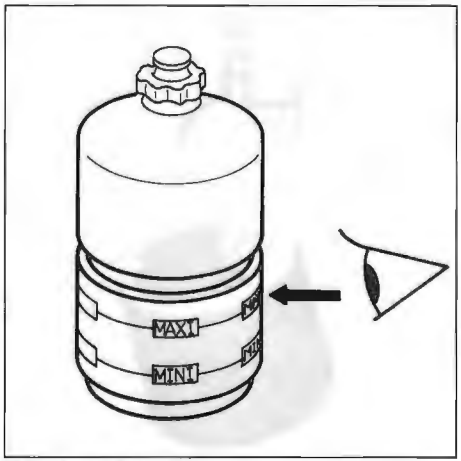
Checking coolant level *DT43, DTA43, DT64, DTA64*

Daily, before starting.



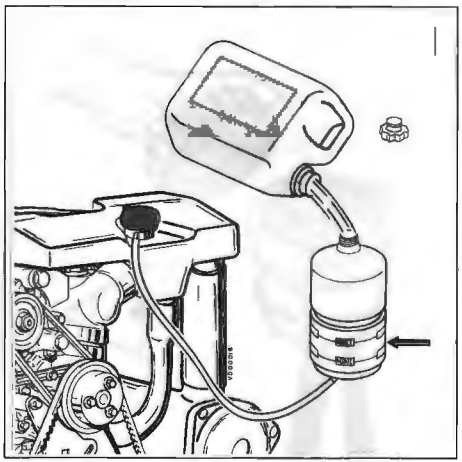
Checking coolant level

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



Coolant level

The level of the coolant must be between the two marks 'MAXI' and 'MINI'.



Topping up coolant

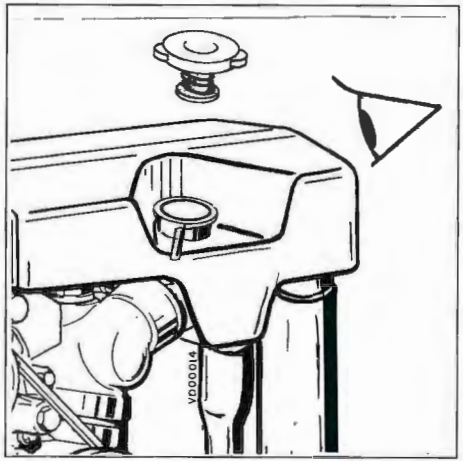
If necessary, top up.
The internal cooling system can be filled with a mixture of anti-freeze (40 %) and tap water (60 %) or with a special coolant. For specification, see page 78

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

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

Checking coolant level *DT67, DTA67*

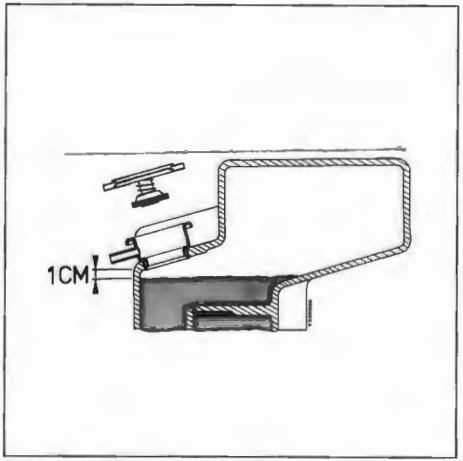
Daily, before starting.



Checking coolant level

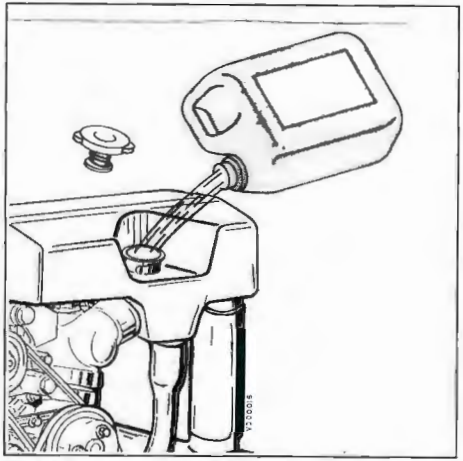
Check the coolant level in the header tank.
This has to be checked when the engine is **cold**.
Remove the cap of the filler neck on the header tank.

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



Coolant level

The level of the coolant must be approx. 1 cm (3/8˝) below the lower edge of the filler neck.



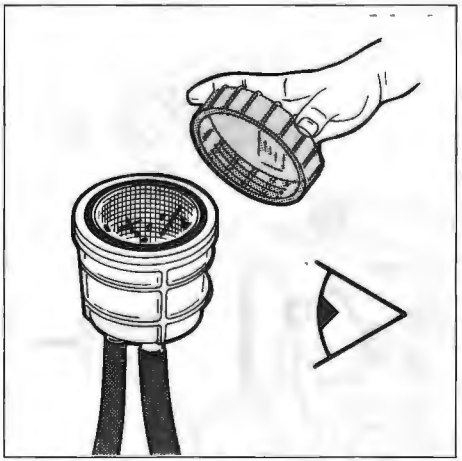
Topping up coolant

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 78.

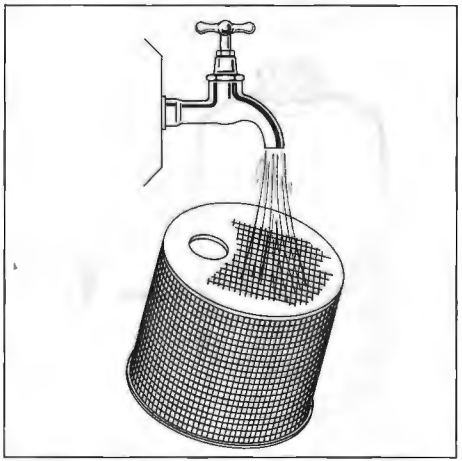
Never fill the cooling system with sea water or brackish water.

Checking and cleaning the raw water strainer

Daily, before starting.



Checking the raw water strainer



Cleaning the strainer

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

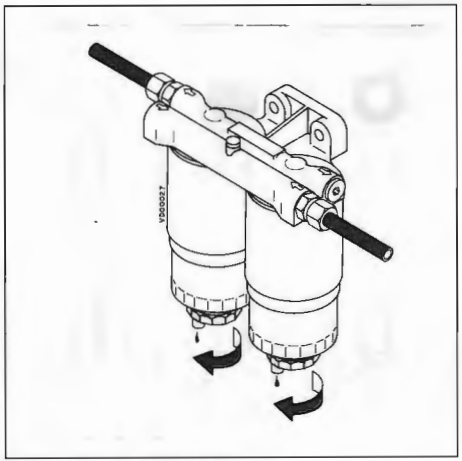
Close the seacock before removing the lid of the water strainer.

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.

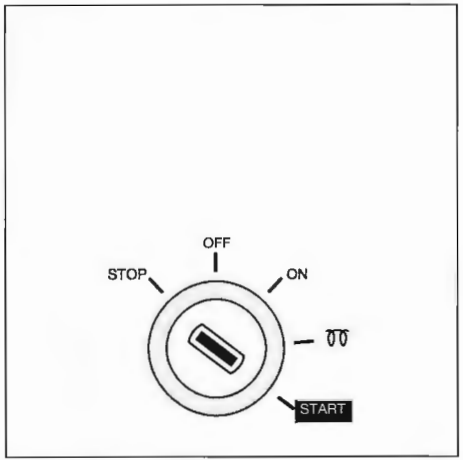
Check the sealing between the lid and housing after cleaning and re-assembling the strainer.
An improperly sealed lid will result in air sucked in by the sea water pump which again will result in overheating of the engine.

Draining of water from the water separator/fuel filter

Every 125 operating hours.



Empty water separator



Bleeding

Empty the separately installed water separator/fuel filter:

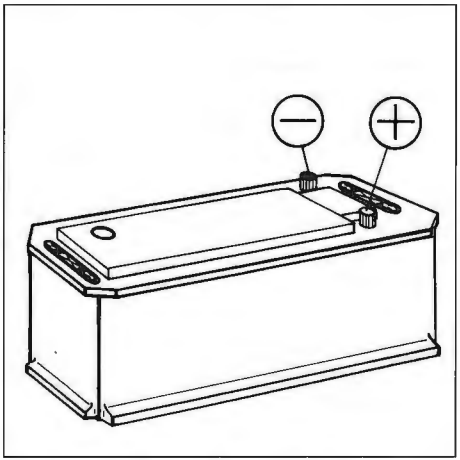
- Open the drain plug at the lower side of the filter.
- Drain the water and close the drain plug.

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

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.

Battery, cables and connections

Every 125 operating hours.



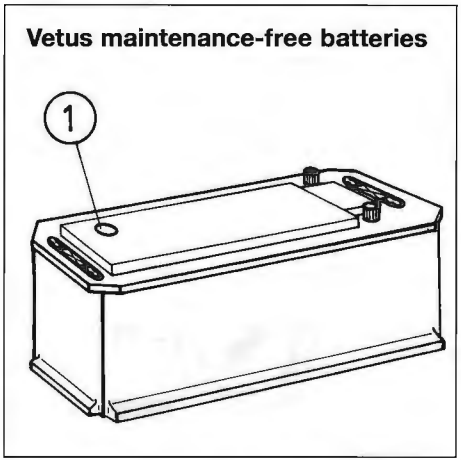
Battery, battery connections

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.

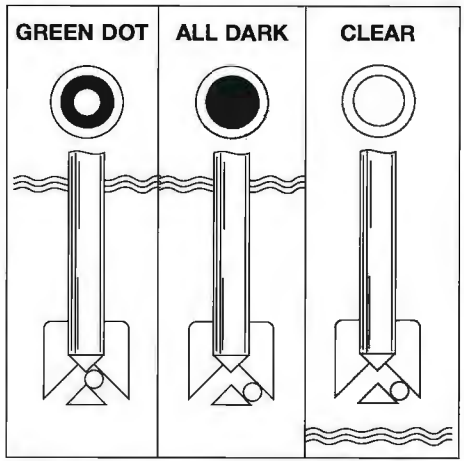
Ensure that clamps make good contact after reassembling. Hand tighten the bolts only.



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:

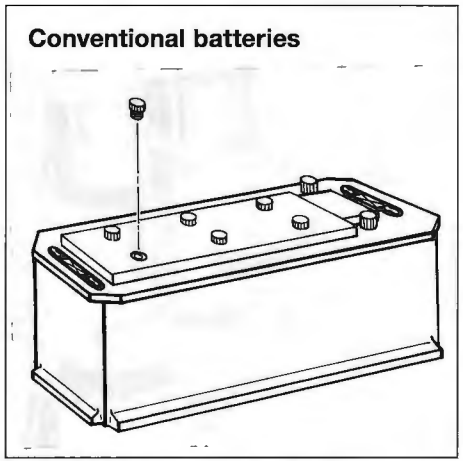


Hydrometer operation

- **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

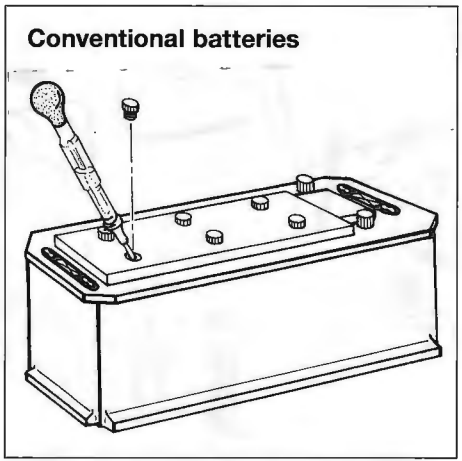
Battery, cables and connections

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).

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

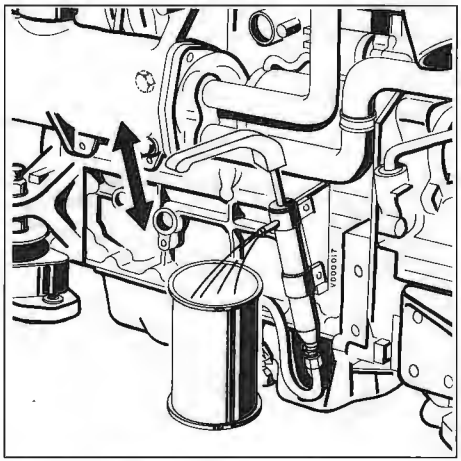
The gases emitted by the battery are explosive! Keep sparks and naked flames away from the battery!
Do not allow battery acid to come into contact with skin or clothing!
Wear protective goggles!
Do not rest tools on the battery!

Engine oil change

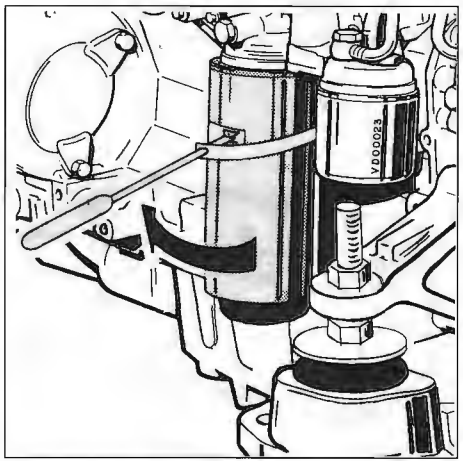
Change the engine oil every 500 hours of operation (together with engine oil filter replacement).

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



Removing the oil filter

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

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.

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

Catch any dripping oil.

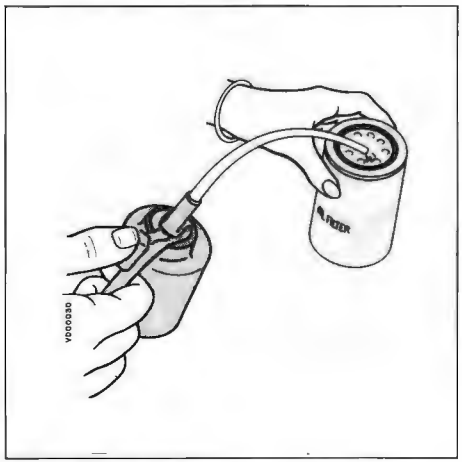
Be aware of the risk of skin burning during draining the hot oil!

Beware of burns from hot oil.

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

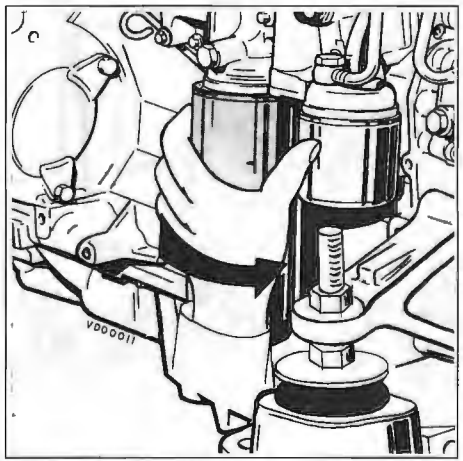
Engine oil change

Every 500 operating hours.



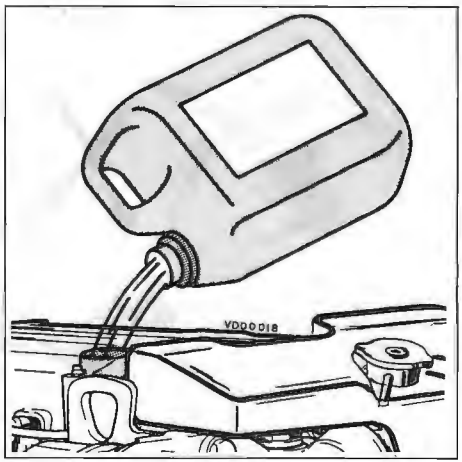
Oiling the oil seal

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.



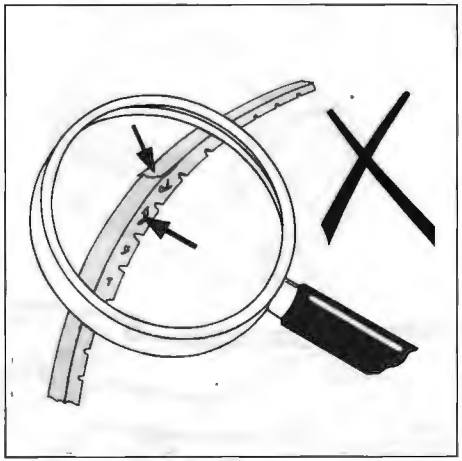
Refilling with oil

Refill the engine with new oil (for specification see page 76) through the filler opening in the valve cover.
For required amount of oil (oil filter included) see page 72.

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.

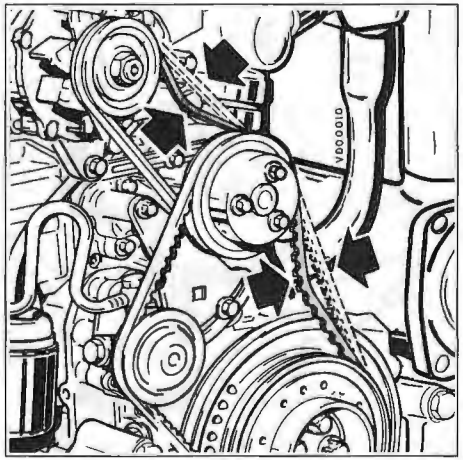
Checking the V–belts

Every 500 operating hours.



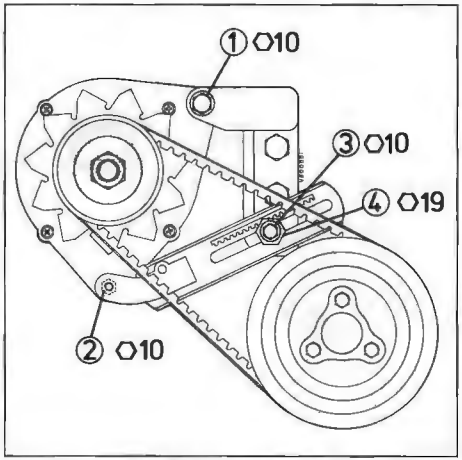
Inspection V–belt

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–belt by applying moderate finger and thumb pressure. If the deflection of the belt is more than 9 – 11 mm (± 3/8″), using about 10 kg (20 lbs) thumb pressure, it should be tensioned.



Tensioning alternator V–belt

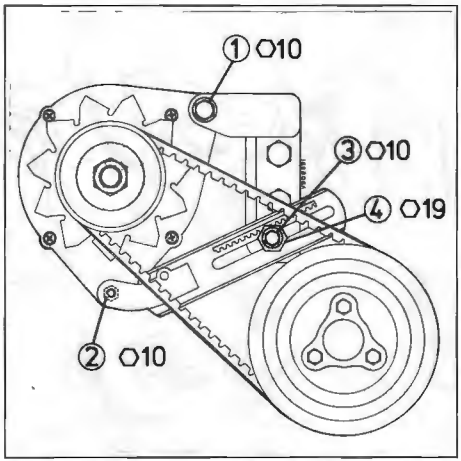
- First loosen both the alternator mounting bolts ① and ②; then loosen the bolt ③ of the adjustment bracket and simultaneously keep the pinion ④ in the same position.

- 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).

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

Checking the V–belts

Every 500 operating hours.



Replacing alternator V–belt

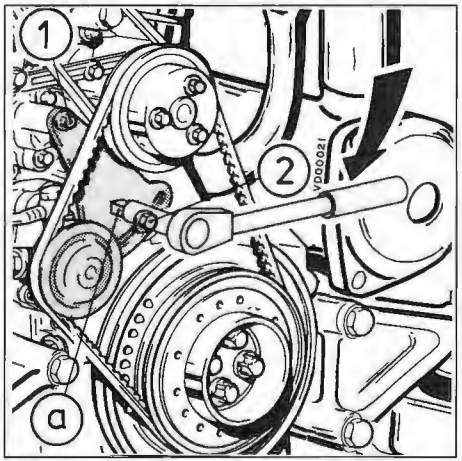
- Re–tighten the bolt ③ of the adjustment bracket.
- Then re–tighten both the alternator mounting bolts ① and ②.

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

- First loosen both the alternator mounting bolts ① and U; 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.

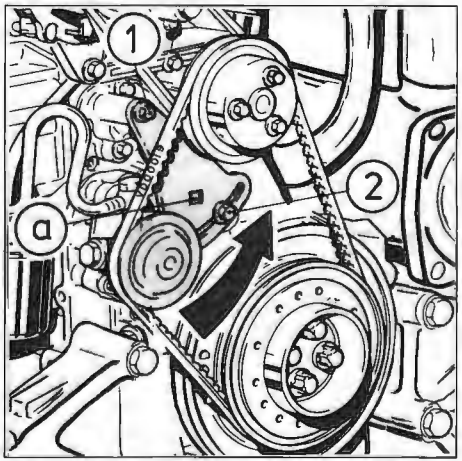
Checking the V–belts

Every 500 operating hours.



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 ⓐ, square $^1/_2{}''$, until the tension of the belt is correct.
- Re–tighten bolts ① and ②.



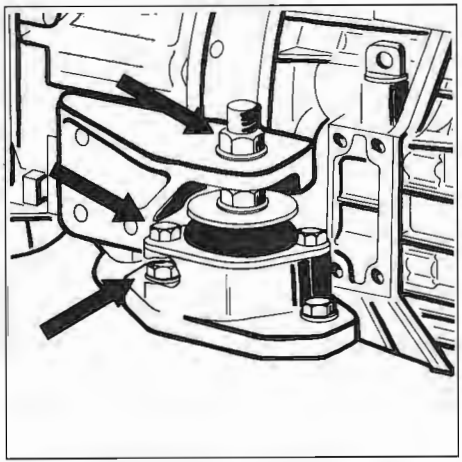
Changing V–belt of coolant and fuel pump

- Loosen bolts ① and ②.
- Turn the tension device with the fuel pump in the direction of the arrow using a key in ⓐ, square $^1/_2{}''$.
- Remove and replace belt.
- Rotate the tension device with the fuel pump in the opposite direction of the arrow using a key in ⓐ, square $^1/_2{}''$, until the tension of the belt is correct.
- Re–tighten 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.



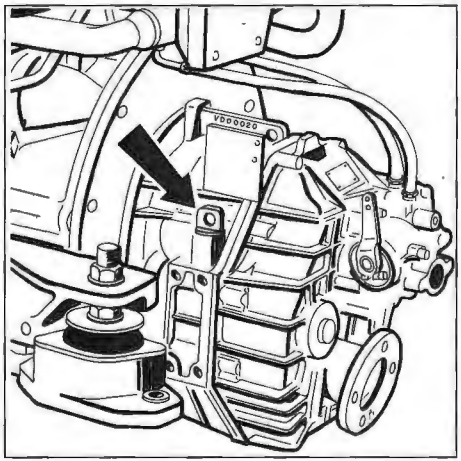
Check flexible engine mounts

Check the bolts which secure the damper element, de mouting 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! Realign engine in case of doubt.

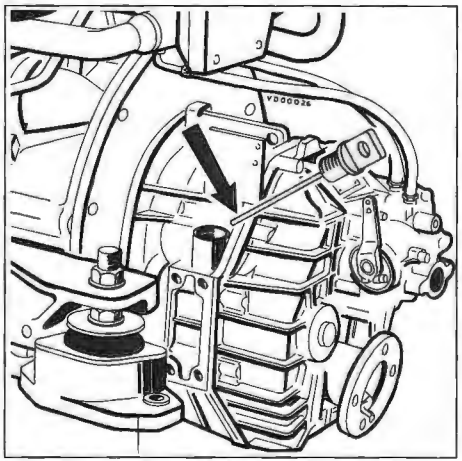
Gearbox oil level check

Every 500 operating hours.



Unscrewing the dipstick

Unscrew the dipstick out of the gearbox housing.



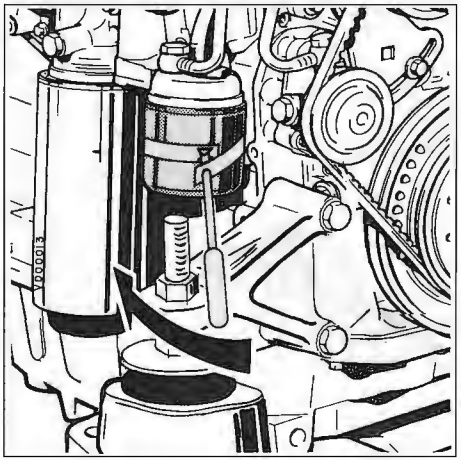
Checking the oil level

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 76.

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 checking the oil level and other care and maintenance.

Fuel filter replacement

Every 1000 operating hours.

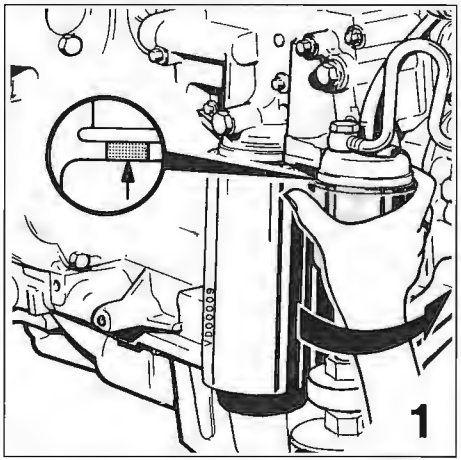


Fuel filter removal

The fuel filter is to be replaced as a unit.

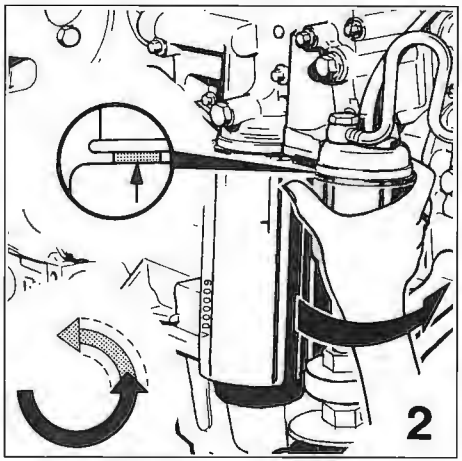
- Close the fuel stopcock.
- Remove the fuel filter, use a filter wrench.
- Catch any fuel.

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.



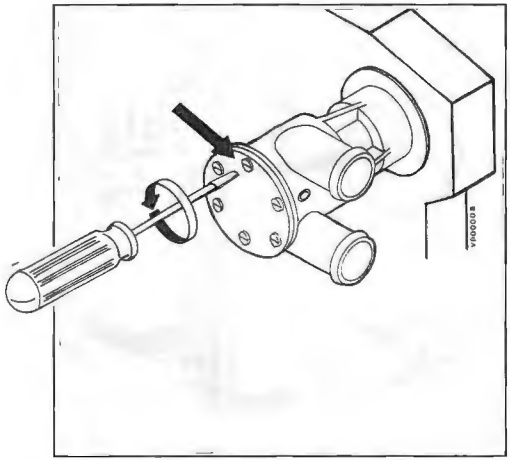
- Open fuel stopcock.
- Check for leaks.

Bleeding

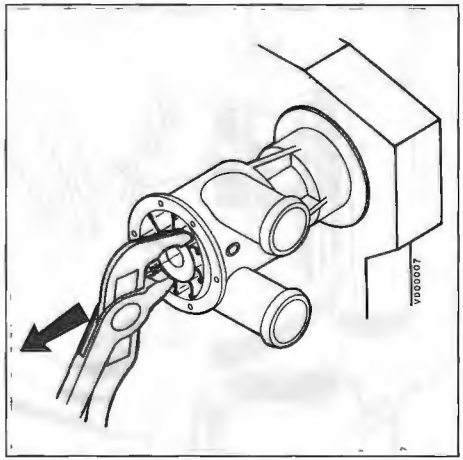
After replacing the fuel filter, the system doestn't need to be bled.
The fuel system is self–bleeding.

Raw water pump inspection

Every 1000 operating hours.



Pump cover removal



Impeller removal

Raw water pump inspection

The rubber impeller of the outboard water pump is **not** proof against running dry.

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

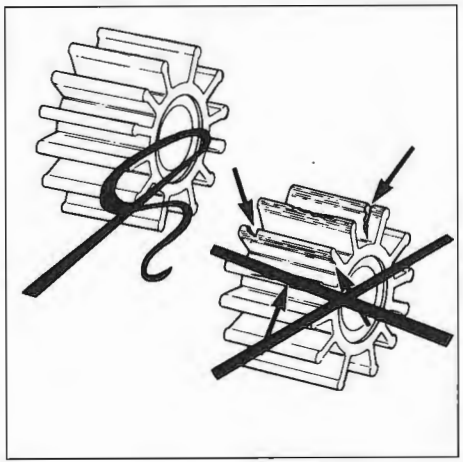
Always carry a spare impeller on board.

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.

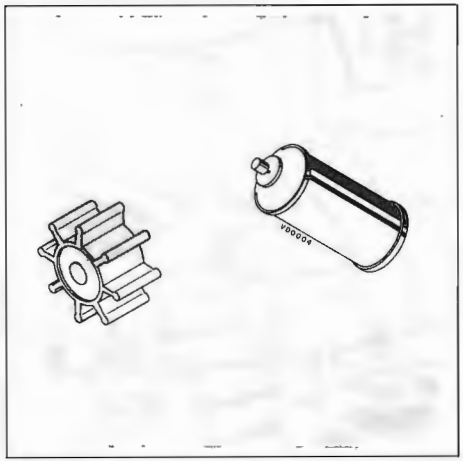
Raw water pump inspection

Every 1000 operating hours.



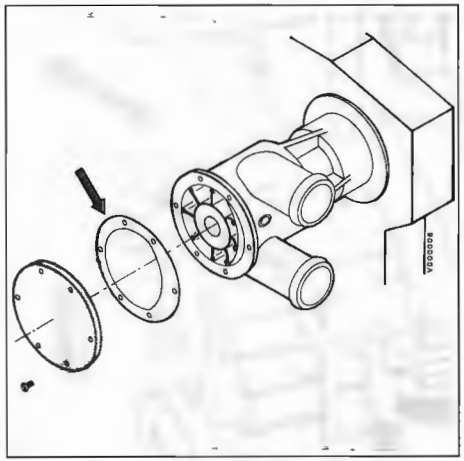
Impeller inspection

- 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.

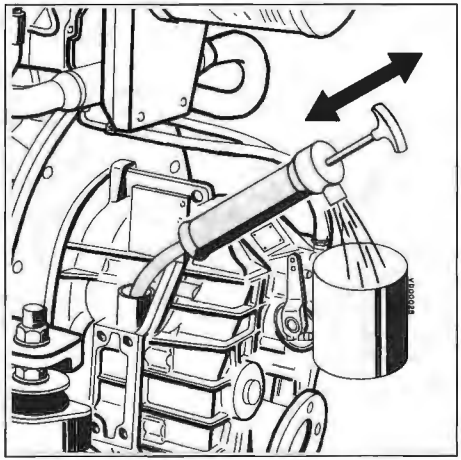


Replacing the pump cover

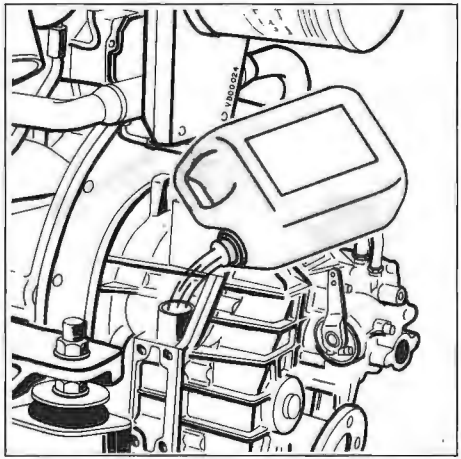
- Replace the cover with a **new** gasket.
- Check the water filter and open the sea cock.

Changing the gearbox oil

Every 1000 operating hours.



Draining the oil



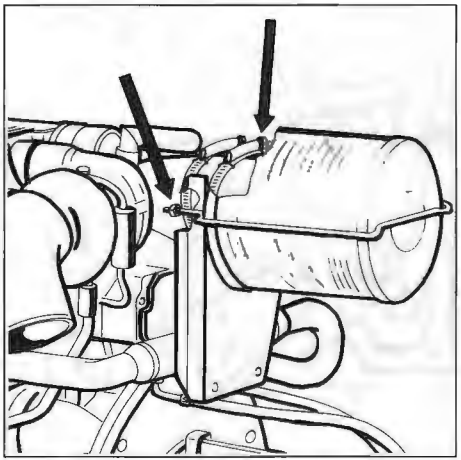
Filling with new oil

- Remove the dipstick.
- Drain te 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.
- Refill the gearbox to the correct level via the dipstick opening. For oil specification see page 76.

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.

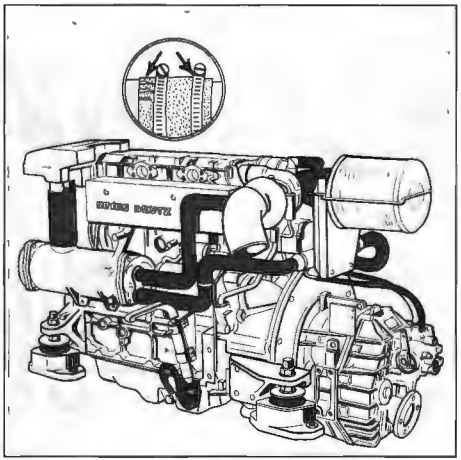
Combustion air intake

Every 1000 operating hours.



Air cleaner replacement

- 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.
- Install a new air cleaner and tighten the clamp again.



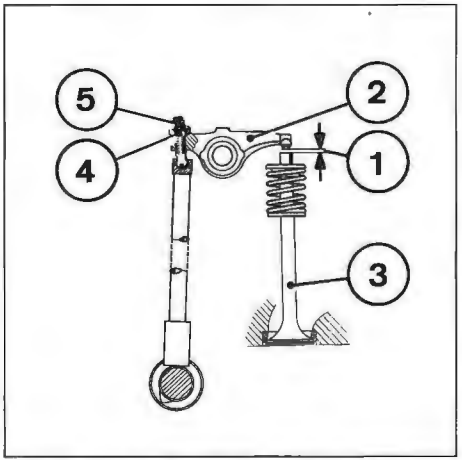
Inspection hose connections

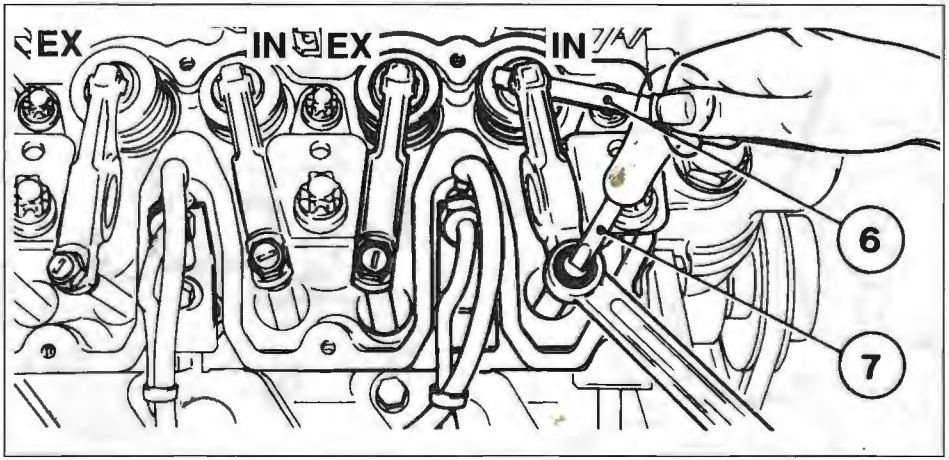
- Inspect all hose connections of the air intake system.
  (Cracked hoses, loose hose clamps)

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

Checking/adjusting valve clearance

Every 1500 operating hours.





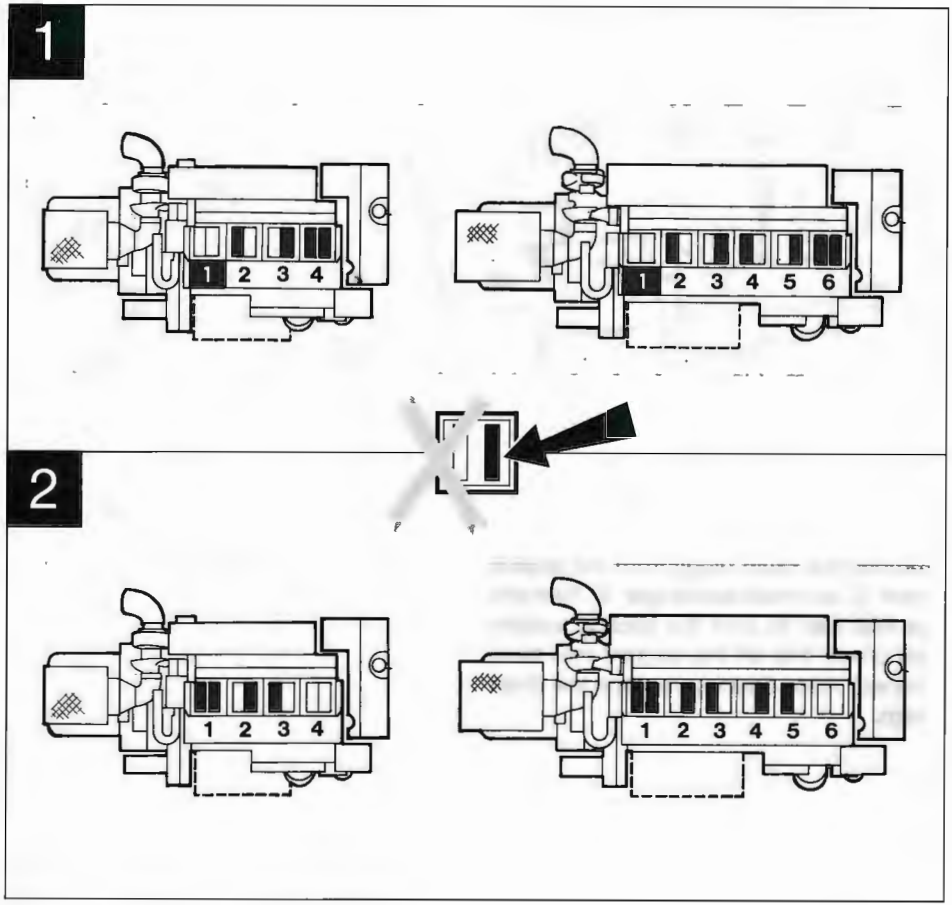
Checking/adjusting valve clearance

- Remove the two bolts out off the breather valve and swing the breather valve aside. (For convienance 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 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 screwdriver 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 cover if needed).
- Re-install air intake from aftercooler.
- Re-install breather valve.

Valve Clearance Adjustment Schematic



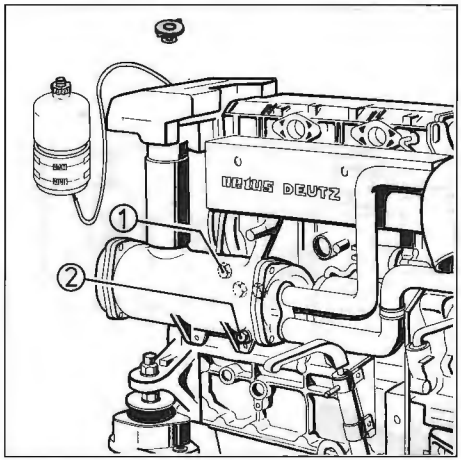
- **Crankshaft Position 1**
  Turn crankshaft until both valves in cylinder 1 overlap (exhaust valve about to close, inlet valve about to open).
  Adjust clearance of valves **marked in black** on schematic. Mark respective rocker arm with chalk to show that adjustment has been done.

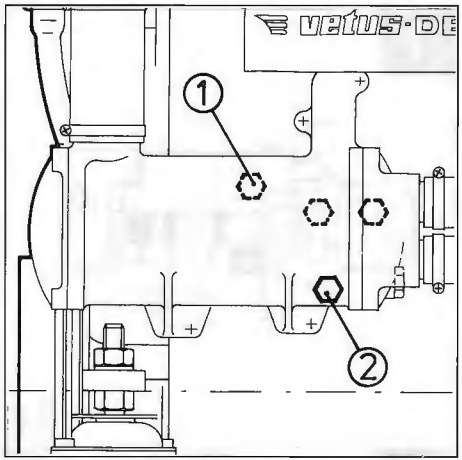
- **Crankshaft Position 2**
  Turn crankshaft one full revolution (360°).
  Adjust clearance of valves **marked in black** on schematic.

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.





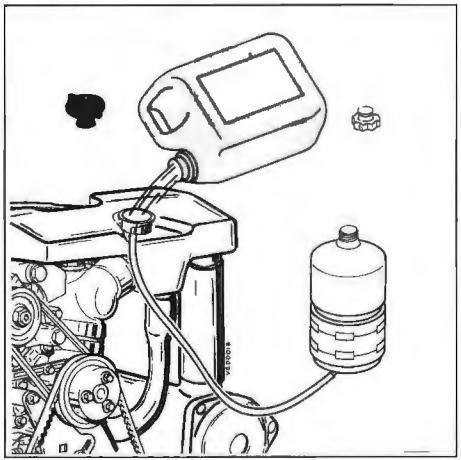
Draining of coolant

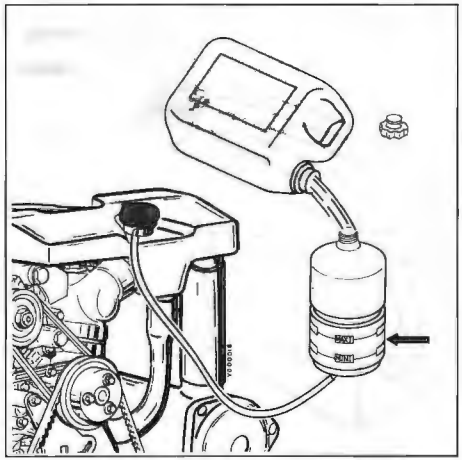
Remove the drain plugs from the engine block ① and heat exchanger ②. Remove the filler cap to vent the cooling system and check that all the coolant has been drained. After draining replace the drain plugs.

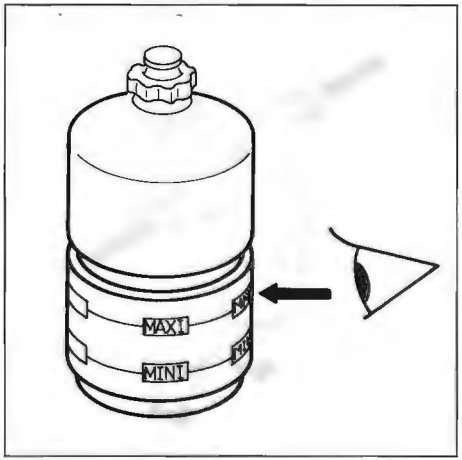
Be aware of the risk of skin burning during draining the hot coolant! Used coolant must be collected in a container for proper disposal according to laws and regulations.

Coolant replacement *DT43, DTA43, DT64, DTA64*

Every 2000 operating hours.







Filling the cooling system

Remove both the cap of the filler neck on the top of the header tank and the cap on top of the expansion tank.
Fill the cooling system up to the lower edge of filler neck.
Use a mixture of 40% antifreeze (ethylene–glycol based) and 60% tap water or use a special coolant.
For specifications see page 78.
Replace filler cap on header tank.

Continue filling into expansion tank; fill up to the 'MAXI' mark.
Replace the filler cap on expansion tank.
Bleeding will take place automatically during filling!

Water heater

If a water heater is connected to the engine and this heater is positioned above the upper side of the engine than bleeding of the heater will not take place automatically! Fill the heater 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 expansion tank. If necessary, add coolant.

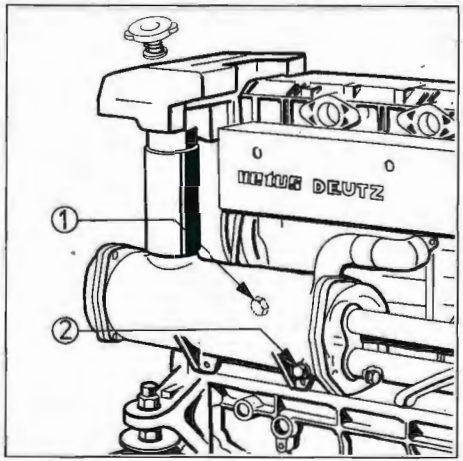
Never fill the cooling system with sea-water or brackish water.

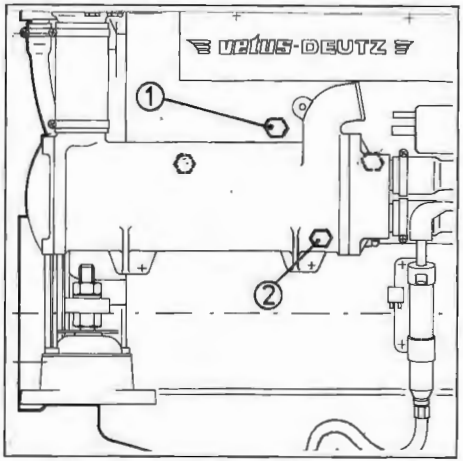
Coolant replacement

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

5

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.





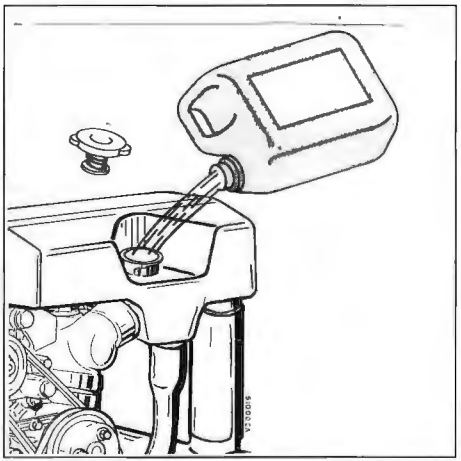
Draining of coolant

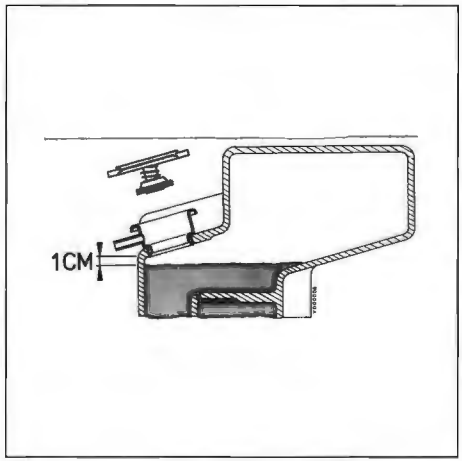
Remove the drain plugs from the engine block ① and heat exchanger ②. Remove the filler cap to vent the cooling system and check that all the coolant has been drained. After draining replace the drain plugs.

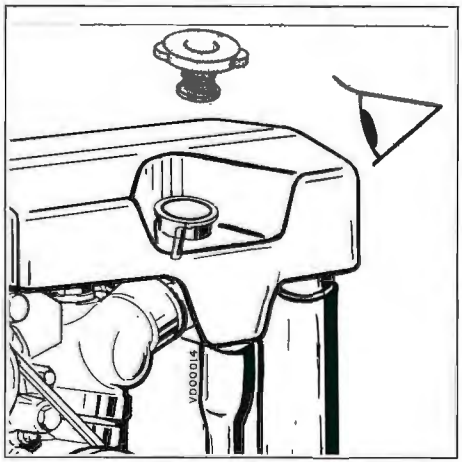
Be aware of the risk of skin burning during draining the hot coolant! Used coolant must be collected in a container for proper disposal according to laws and regulations.

Coolant replacement *DT67, DTA67*

Every 2000 operating hours.







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 78.

The level of the coolant must be approx. 1 cm (3/8˝) below the lower edge of the filler neck on the header tank.
Replace filler cap on header tank.
Bleeding will take place automatically during filling!

Water heater

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

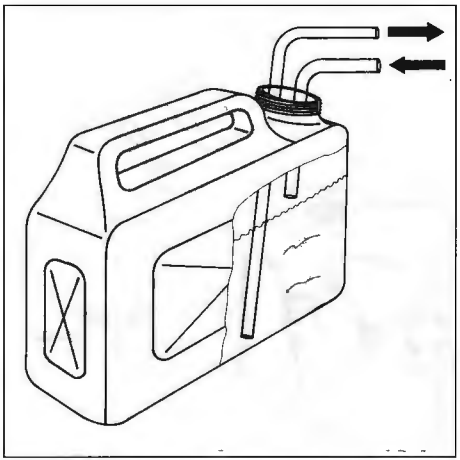
After the engine has run for the first time and has reached operating temperature and has cooled down again to ambient temperature, check the coolant level in the header tank. If necessary, add coolant.

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

6

Fuel system

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

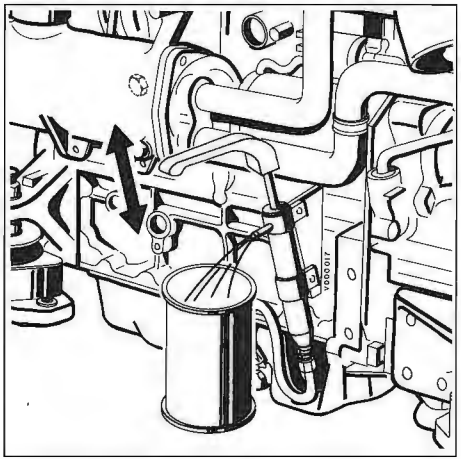


Running with protective fuel mixture

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.

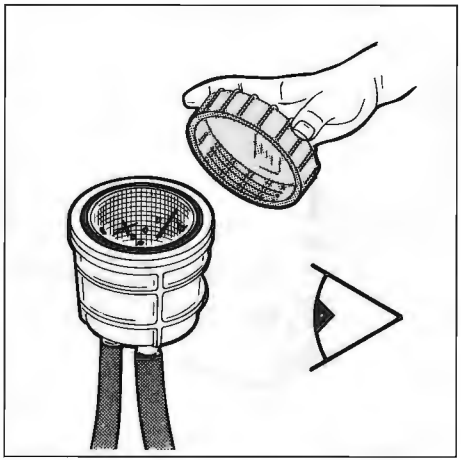
Never run the engine under load with this mixture of fuel and oil .



Lubrication system

With the engine still at operating tempeture:
(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 76.

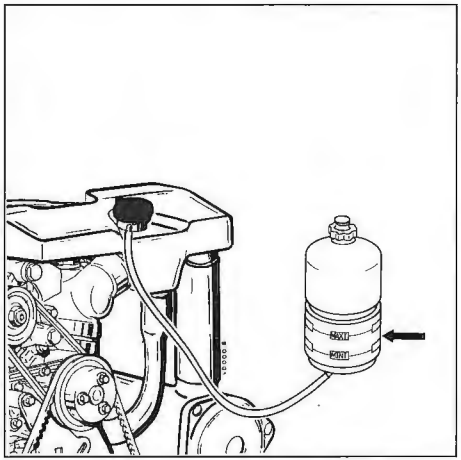


Raw water cooling system

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. 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.

Winter lay-up

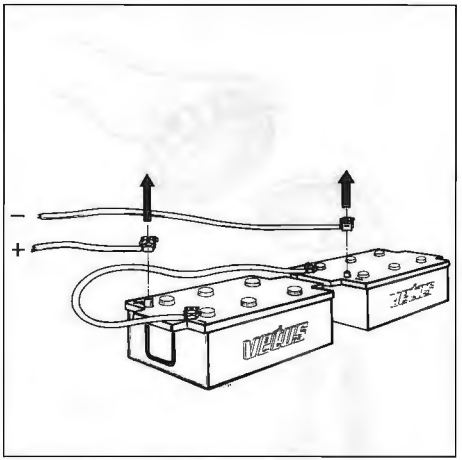


Fresh water cooling system

To avoid corrosion during winter storage the cooling system must be filled with an antifreeze/water mixture (or a coolant). For specifications see page 78.

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 54.

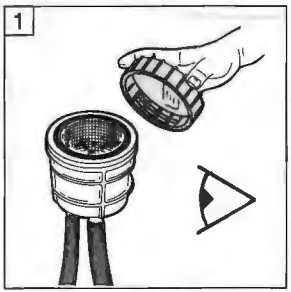


Electrical system

Disconnect the battery cables.

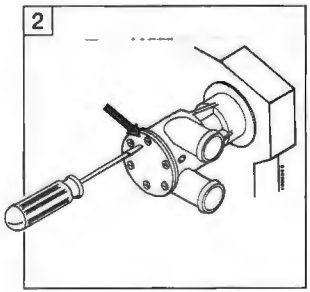
Charge batteries during winter lay-up regularly if required!

1



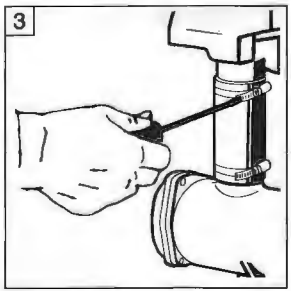
Check that the lid of the raw water strainer is reinstalled.

2



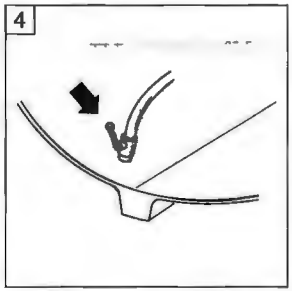
Check that the lid of the raw water pump and drain plugs are reinstalled. (pages 48, 49)

3



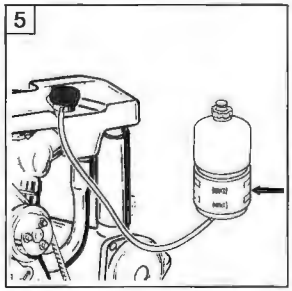
Re-tighten possible loose hose clamps.

4



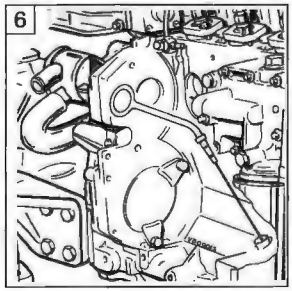
Open the sea cock.

5



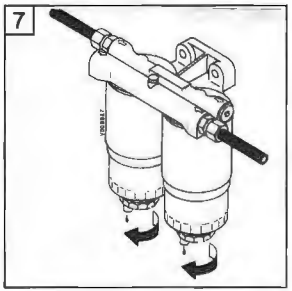
Check the coolant level. (page 34)

6



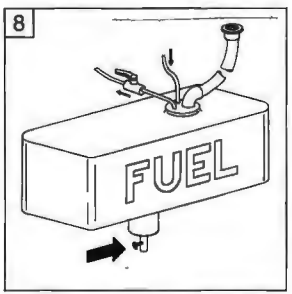
Check the engine oil level. (page 32)

7



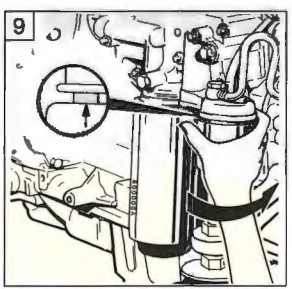
Drain the water from the water separator/fuel filter. (page 37)

8



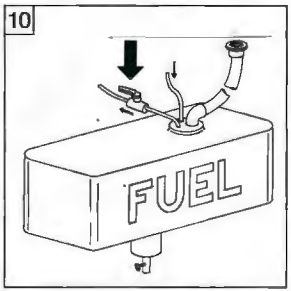
Drain the water from the fuel tank.

9



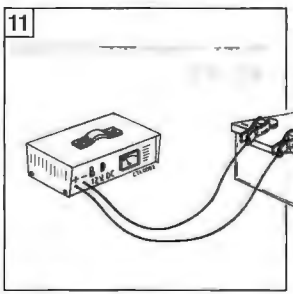
Install a new fuel filter. (page 47)

10



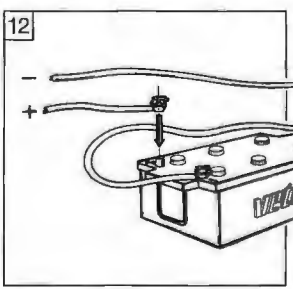
Open the fuel valve.

11



Make sure that the batteries are fully charged. (page 38)

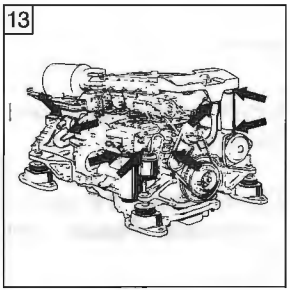
12



Connect the batteries.

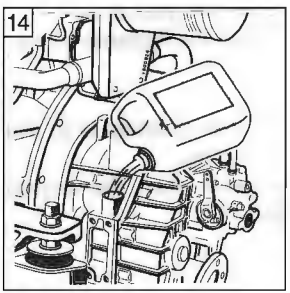
Recommissioning after winter storage

13



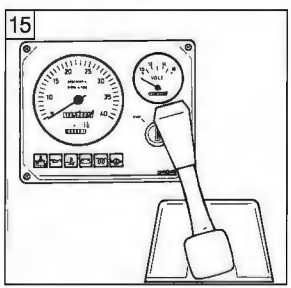
Start the engine.
Check the fuel system, the cooling system and the exhaust for leakage.

14



Stop the engine and change the oil of the gearbox. (page 50)

15



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

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 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 vincinity of the engine.
When carrying out repair, **never** start the engine with speed governor removed.
Disconnect battery!

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.

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.
· Faulty V–belt fuel pump.	· Replace V–belt.
· Vent line of fuel supply tank clogged.	· Check / clean.
· Exhaust restricted.	· Check.

3 Engine cranks but will not start, smoke from exhaust

Possible fault	Remedy
· Air in fuel system.	· Check and bleed.
· Faulty injector/injection pump.	· Check, replace if required.
· Faulty glow plugs (if installed) or below starting limit temperature.	· Check / replace.
· Incorrect valve clearance.	· Adjust.
· Incorrect injection timing.	· Check / adjust.
· Insufficient intake air.	· Check / replace air intake filter.
· Wrong fuel quality or contaminated fuel.	· Check fuel. Drain and flush fuel tank. Replace with new fuel.
· Incorrect lube oil SAE class or quality for ambient temperature.	· Replace.

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

Possible fault	Remedy
· (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.
· Faulty V–belt fuel pump.	· Replace V–belt.
· Vent line of fuel supply tank clogged.	· Check / clean.
· Fuel supply line restricted.	· Check / clean.
· Incorrect valve clearance.	· Adjust.
· Idle setting too low.	· Check/ adjust.
· Exhaust restricted.	· Check.
· Wrong fuel quality or contaminated fuel.	· Check fuel. Drain and flush fuel tank. Replace with new fuel.

5 Engine not developing full power

Possible fault	Remedy
· 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.
· Faulty V-belt fuel pump.	· Replace V–belt.
· Oil level too high.	· Lower level.
· Incorrect valve clearance.	· Adjust.
· Exhaust restricted.	· Check / clean.
· Charge air (after)–cooler contaminated.	· Check / clean.
· 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.
· Wrong fuel quality or contaminated fuel.	· Check fuel. Drain and flush fuel tank. Replace with new fuel.

6 Engine overheats

Possible fault	Remedy
· Faulty injector/injection pump.	· Check, replace if required.
· Oil level too high.	· Lower level.
· Oil level too low.	· Increase level.
· Faulty oil filter.	· Replace.
· Faulty turbocharger.	· Check / replace.
· Coolant pump defective.	· Check / clean.
· Coolant heat exchanger dirty.	· Clean.
· Vent pipe blocked.	· Check / clean.
· Coolant level too low.	· Check / top up.
· Sea cock closed.	· Open.
· Raw water strainer clogged.	· Check / clean.
· Leaking raw water intake system.	· Check / replace.
· Faulty thermostat.	· Check / replace.
· Faulty impeller raw water pump.	· Check / replace.
· Insufficient intake air.	· Check / replace air intake filter.
· Leaking air intake manifold.	· Check / replace.

7 Engine not firing on all cylinders

Possible fault	Remedy
· 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.
· Faulty V–belt fuel pump.	· Replace V–belt.
· Fuel supply line restricted.	· Check / clean.
· Faulty glow plugs (if installed) or below starting limit temperature.	· Check / replace.
· Incorrect valve clearance.	· Adjust.

8 Engine has little or no oil pressure

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

9 Engine oil consumption excessive

Possible fault	Remedy
· Oil level too high.	· Lower level.
· Excessive inclination of engine.	· Check / Adjust.
· Incorrect lube oil SAE class or quality for ambient temperature.	· Replace.

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.
· Charge air (after)–cooler contaminated.	· Check / clean.
· 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.

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	DT43	DTA43	DT64	DTA64	DT67	DTA67
General						
Make	Vetus Deutz					
Number of cylinders	4	4	6	6	6	6
Based on	BF4M 1012 E	BF4M 1012 EC	BF6M 1012 E	BF6M 1012 EC	BF6M 1013 E	BF6M 1013 EC
Type	4-stroke diesel, in-line					
Injection	Direct					
Aspiration	Turbo-charged	Turbo-charged/ After cooled	Turbo-charged	Turbo-charged/ After cooled	Turbo-charged	Turbo-charged/ After cooled
Bore	94 mm	94 mm	94 mm	94 mm	108 mm	108 mm
Stroke	115 mm	115 mm	115 mm	115 mm	130 mm	130 mm
Total displacement	3192 cm^3	3192 cm^3	4788 cm^3	4788 cm^3	7146 cm^3	7146 cm^3
Compression ratio	17.5 : 1	17.5 : 1	17.5 : 1	17.5 : 1	17.6 : 1	17.6 : 1
Idling speed	720 $^{+50}_{-0}$ rpm	720 $^{+50}_{-0}$ rpm	650 $^{+50}_{-0}$ rpm	650 $^{+50}_{-0}$ rpm	600 $^{+50}_{-0}$ rpm	600 $^{+50}_{-0}$ rpm
Max. no. of revolutions at no load	2950 rpm	2950 rpm	2950 rpm	2950 rpm	2900 rpm	2900 rpm
Valve Clearances (cold)	Inlet 0.3 $^{+0.1}$ mm Exhaust 0.5 $^{+0.1}$ mm					
Weight (with standard gearbox)	480 kg	505 kg	605 kg	630 kg	695 kg	755 kg

Engine specifications

Model	DT43	DTA43	DT64	DTA64	DT67	DTA67
Maximum Output						
Heavy Duty (ISO 3046/ICFN)	58 kW (78 hp)	72 kW (97 hp)	85 kW (114 hp)	106 kW (142 hp)	123 kW (165 hp)	148 kW (198 hp)
at no. of revolutions	2500 rpm	2500 rpm	2500 rpm	2500 rpm	2300 rpm	2300 rpm
Light Duty Commercial (ISO 3046/IOFN)	65 kW (87 hp)	78 kW (105 hp)	98 kW (131 hp)	118 kW (158 hp)	141 kW (189 hp)	174 kW (233 hp)
at no. of revolutions	2500 rpm	2500 rpm	2500 rpm	2500 rpm	2444 rpm	2444 rpm
Special Light Duty (ISO 3046/IOFN)	78 kW (105 hp)	94 kW (126 hp)	117 kW (157 hp)	141 kW (189 hp)	170 kW (228 hp)	210 kW (282 hp)
at no. of revolutions	2650 rpm	2650 rpm	2650 rpm	2650 rpm	2600 rpm	2600 rpm
Fuel consumption						
At max. power and max. rpm for Heavy Duty	230 g/kWh	225 g/kWh	230 g/kWh	225 g/kWh	220 g/kWh	215 g/kWh

Model	DT43	DTA43	DT64	DTA64	DT67	DTA67
Fuel System (Self–bleeding)						
Injection pump	Bosch					
Injectors	Bosch					
Injector opening pressure	250 bar (kgf/cm^3)					
Firing order	1-3-4-2	1-3-4-2	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4
Injection timing	11° BTDC	11° BTDC	9° BTDC	11° BTDC	9° BTDC	9° BTDC
Fuel filter element	VD60092	VD60092	VD60092	VD60092	VD60210	VD60210
Fuel lift pump						
Suction height	max. 1.5 bar (kgf/cm^2)					
Pressure loss	max. 0.5 bar (kgf/cm^2)					
Fuel supply connection	for hose 12 mm I.D.					
Length fuel line	max. 6 m					
Fuel return connection	for hose 10 mm					
Return flow	max. 9 l/min					
Oil Lubrication System						
Oil capacity, max.						
without oil filter	8.5 litres	8.5 litres	14 litres	14 litres	16 litres	16 litres
with oil filter	9.5 litres	9.5 litres	15.5 litres	15.5 litres	17.5 litres	17.5 litres
Oil Filter	VD20262	VD20262	VD20263	VD20263	VD20263	VD20263
Oil pressure with warm oil (120°C) and low idle	min. 0.8 bar					
Oil temperature in oil pan	max. 125°C					

Engine specifications

Model	DT43	DTA43	DT64	DTA64	DT67	DTA67
Cooling system						
Capacity,						
with heat exchanger	8 litres	8 litres	10.5 litres	10.5 litres	13.5 litres	13.5 litres
engine only (keelcooler version)	5.6 litres	—	7.3 litres	—	9.8 litres	—
Thermostat	opening at 83°C, fully openened at 95°C					
Coolant pump,						
Flow	195 l/min	206 l/min	213 l/min	216 l/min	241 l/min	275 l/min
Total head	1.2 bar	1.3 bar	1.2 bar	1.2 bar	1.2 bar	2.0 bar
Raw water pump,						
Flow at max. engine rpm	85 l/min	85 l/min	105 l/min	105 l/min	125 l/min	125 l/min
Total head at max. flow	0.5 bar	0.6 bar	0.5 bar	0.6 bar	0.5 bar	0.6 bar
Impeller	STM8246	STM8246	STM8246	STM8246	STM8246	STM8246
Inlet connection	for hose 32 mm I.D.					
Heater connection	M26 x 1.5					
Combustion air system / Exhaust system						
Intake vacuum pressure	max. 65 mbar					
Turbo pressure at full load	max. 1.6 bar					
Exhaust diameter	90 mm	90 mm	100 mm	125 mm	125 mm	150 mm
Exhaust back pressure	at specified output max. 75 mbar absolute maximum 150 mbar					

Technical data

Model	DT43	DTA43	DT64	DTA64	DT67	DTA67
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	VD40067	VD40067	VD40067	VD40067	VD40067	VD40067
Tension	Pre-tension 400 N / Re-tension 250 $^{\pm 50}$ N					
Fuel pump – Coolant pump	VD40069	VD40069	VD40069	VD40069	VD40068	VD40068
Tension	Pre-tension 400 N / Re-tension 250 $^{\pm 50}$ N					
Engine installation						
Max. installation angle	15 degrees backwards					
Max. athwartships angle	25 degrees continuously, 30 degrees intermittend					
Gearbox, standard						
Hurth type	HSW450	HSW450	HSW450	HSW630	HSW630	HSW800
Gear ratio	1.25/1.5/2.0 :1	1.25/1.5/2.0 :1	1.25/1.5/2.0 :1	1.2/1.6/2.0/2.5 :1	1.2/1.6/2.0 : 1	1.57/1.96 : 1

Torque wrench settings

Screw connection	Size	Class	Torque [Nm]	Angle
Oil pan	M8x16		21	
Oil drain plug	M18x1.5		50	
Cylinder head,				
- long bolts	M12x200	10.9	30/80	90°
- short bolts	M12x120	10.9	30/80	90°
Lifting eye / Cyl.head	M8x20	8.8	40.5	±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		30	
Thermostat housing	M8x35	10.9	21	±10%
Air Intake Manifold (AIM)	M6x75	10.9	8.5	±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	

Screw connection	Size	Class	Torque [Nm]	Angle
Exhaust manifold / Cyl. head				
- Stud	M10		15	
- Lock nut	M8		25	±10%
Turbocharger / Exhaust manifold				
- 4 cyl.	M8 nuts		21	±10%
- 6 cyl.	M8x35 heat resistant		21	±10%
Turbocharger / Exhaust injection bend	M8 heat resistant		22	±10%
Alternator mounting	M8x80	10.9	21	±10%
Starter	M10x55	10.9	60	
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%

Operating media

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

As the viscosity of lube oil is dependent on temperature, the oil vicosity (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
- SAE 15W40 for temperatures of –20°C up to +35°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 HSW450 : 2.0 litres
Hurth type HSW630 : 2.5 litres
Hurth type HSW800 : 4.0 litres

Other brands of gearboxes:
See supplied owners manual for oil type and quantities.

Fuel Quality Grade

Use commercially available diesel fuel with less than 0.5% sulfer 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).

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.
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
max. 45 vol%	55%
min. 35 vol%	65%

Cooling system protection

Cooling system protective liquid (Anti-freeze)	Protection against freezing to
35 vol%	–22 °C
40 vol%	–28 °C
45 vol%	–35 °C

Cooling system protective liquid

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

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

The level of the cooling system must be monitored continuously, see page 34.

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

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

Water quality for coolant preparation

Use preferably tap water.

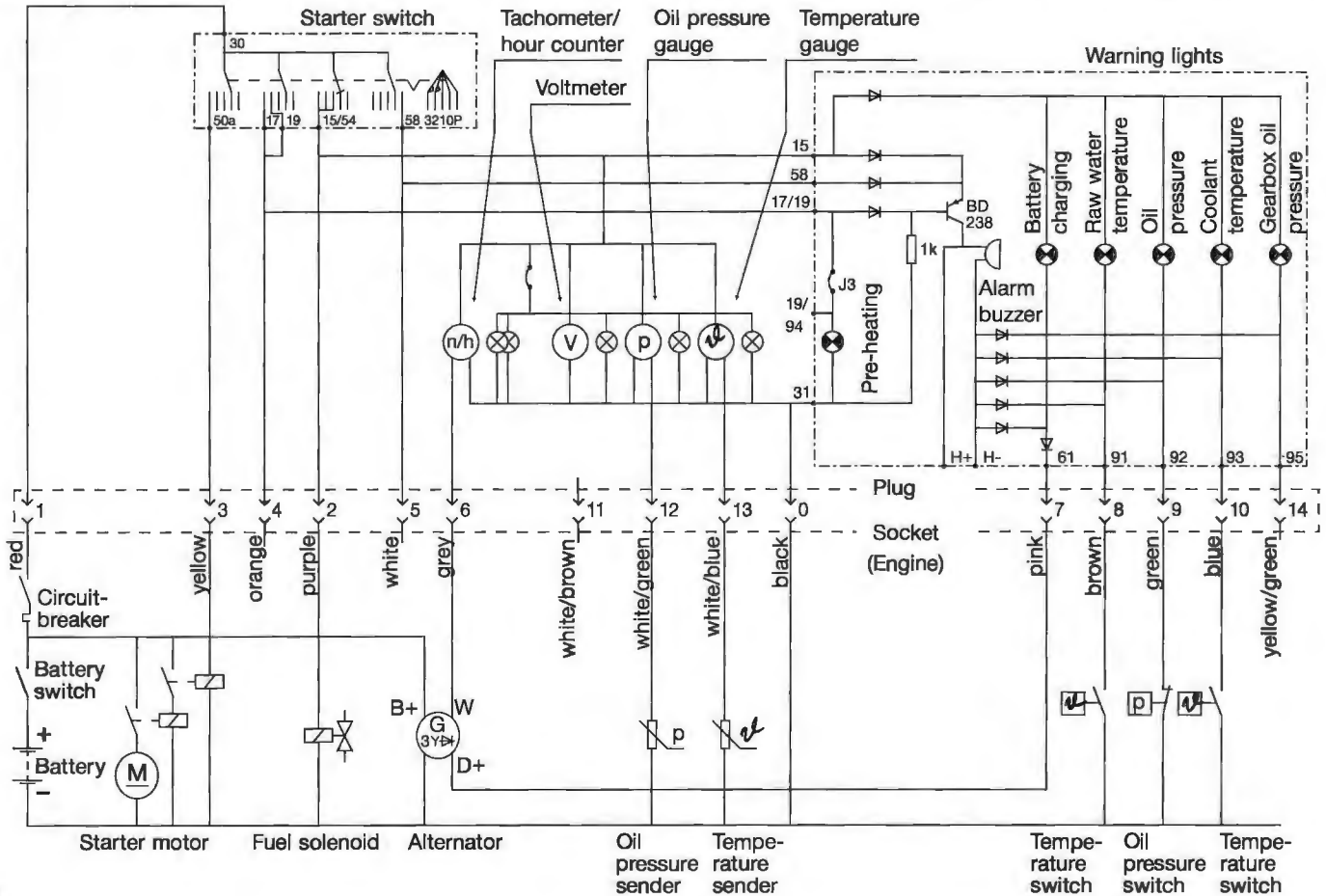
If an other available fresh water is used; the values given below must not be exceeded.

Water quality		min.	max.
pH–value at 20°C (68°F)		6.5	8.5
Chloride ion content	[mg/dm³]	–	100
Sulfate ion content	[mg/dm³]	–	100
Total hardness	[degrees]	3	12

Never use sea-water or brackish water.

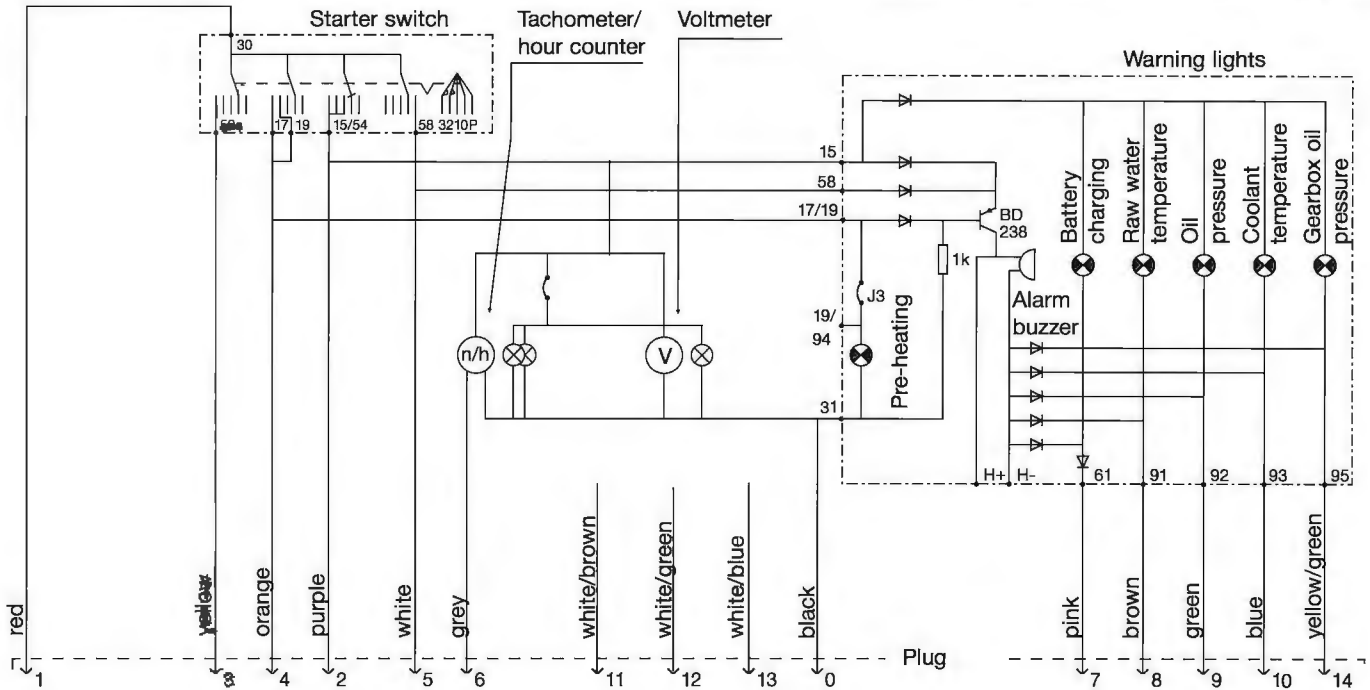
Electrical Circuit Diagram

Engine with panel 'model 34'



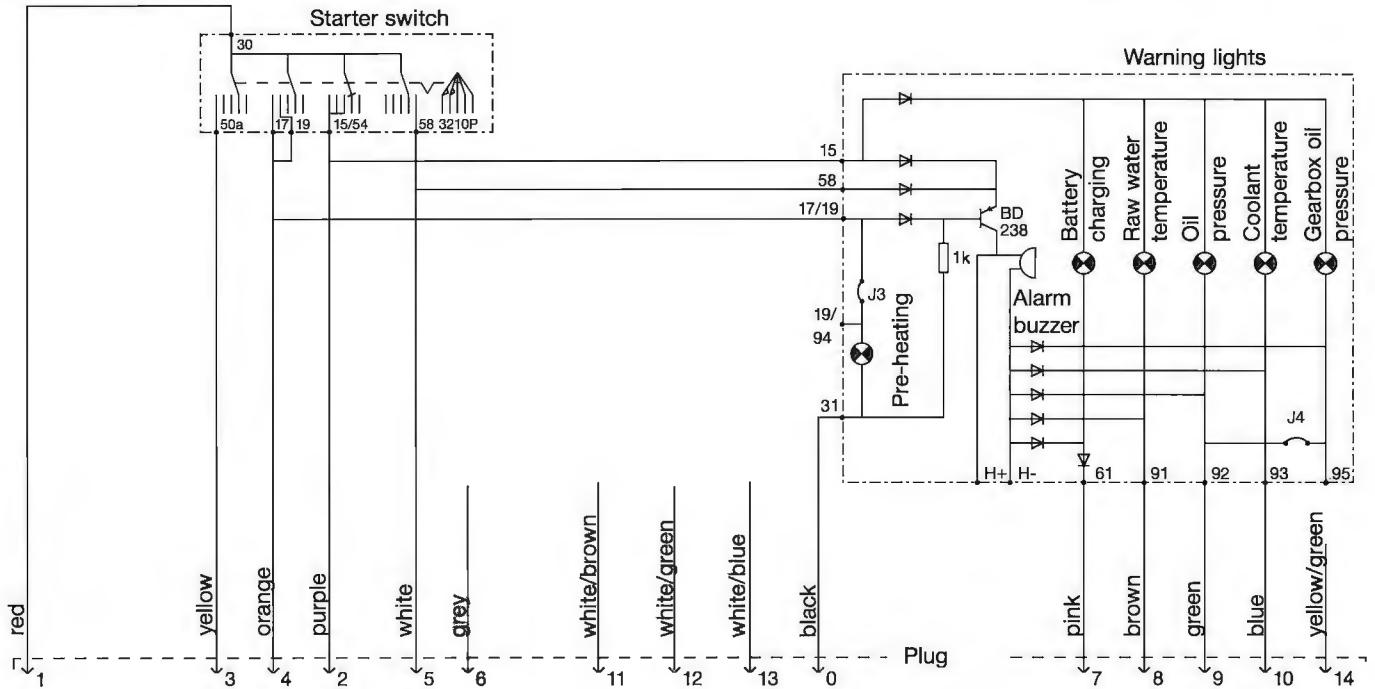
Options, panel 'model 22'

Electrical Circuit Diagram



Electrical Circuit Diagram

Options, panel 'model 10'



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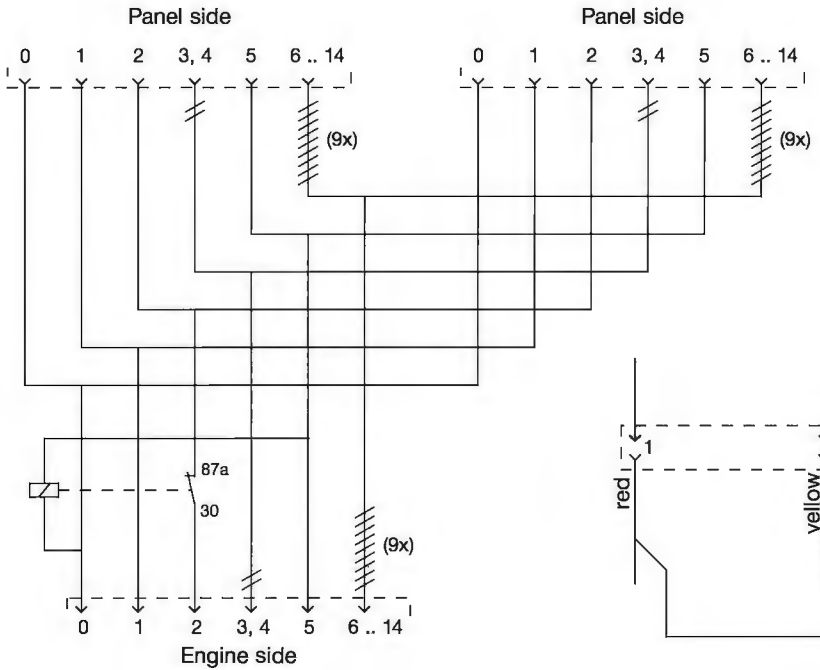
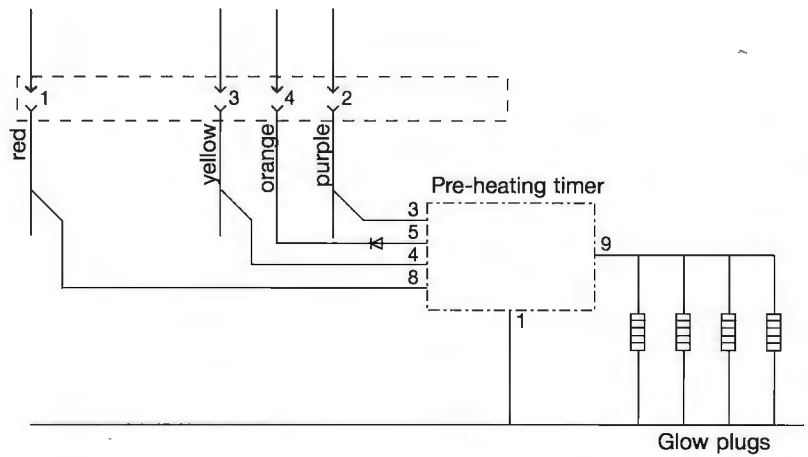
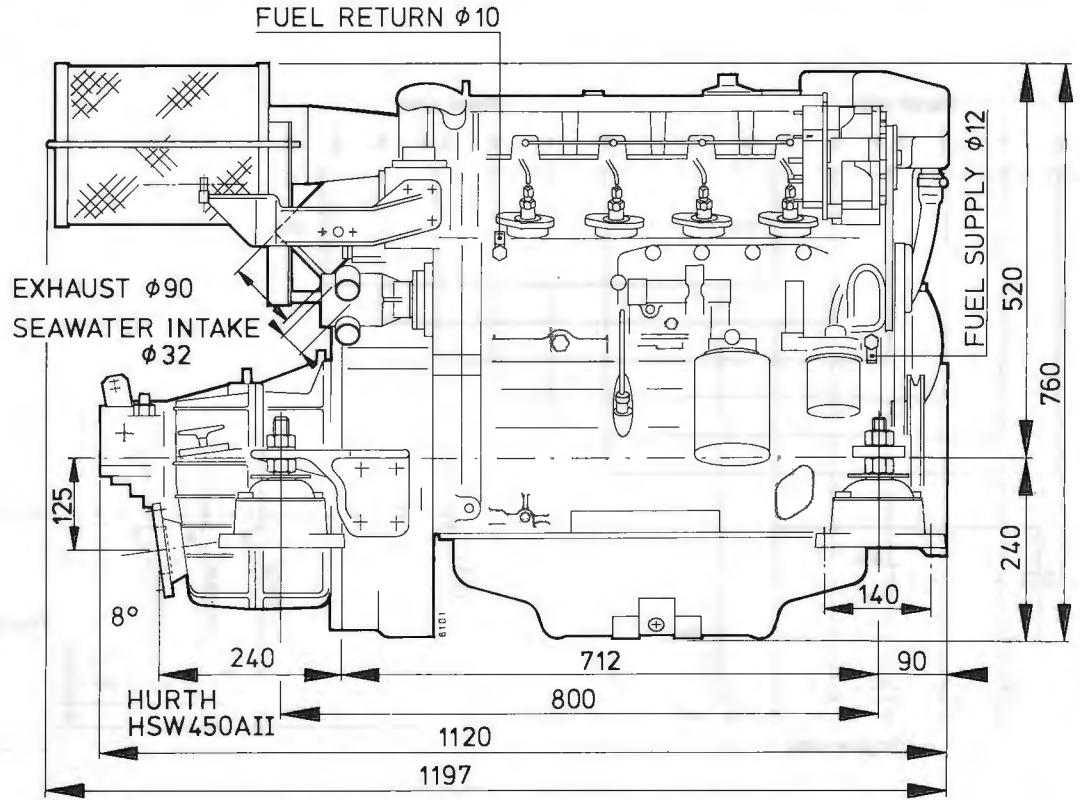
Electrical Circuit Diagram





Overall Dimensions



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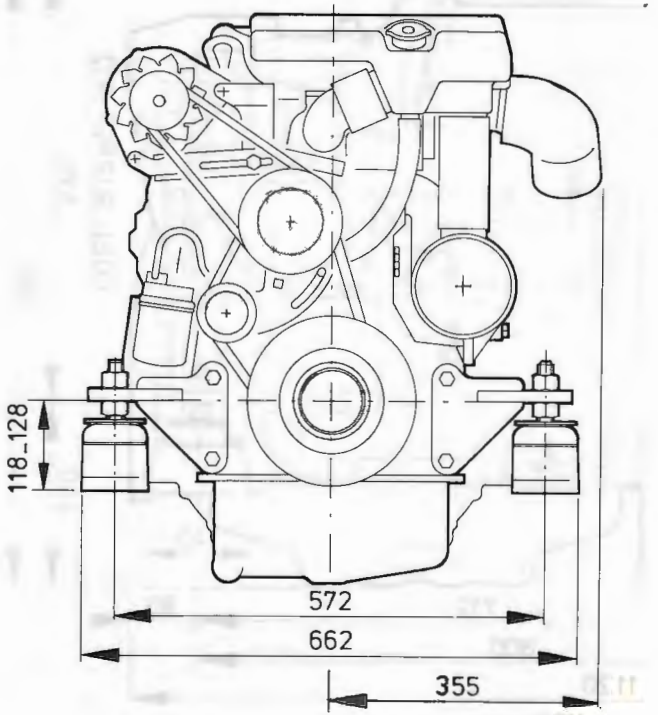
DT43

Overall Dimensions



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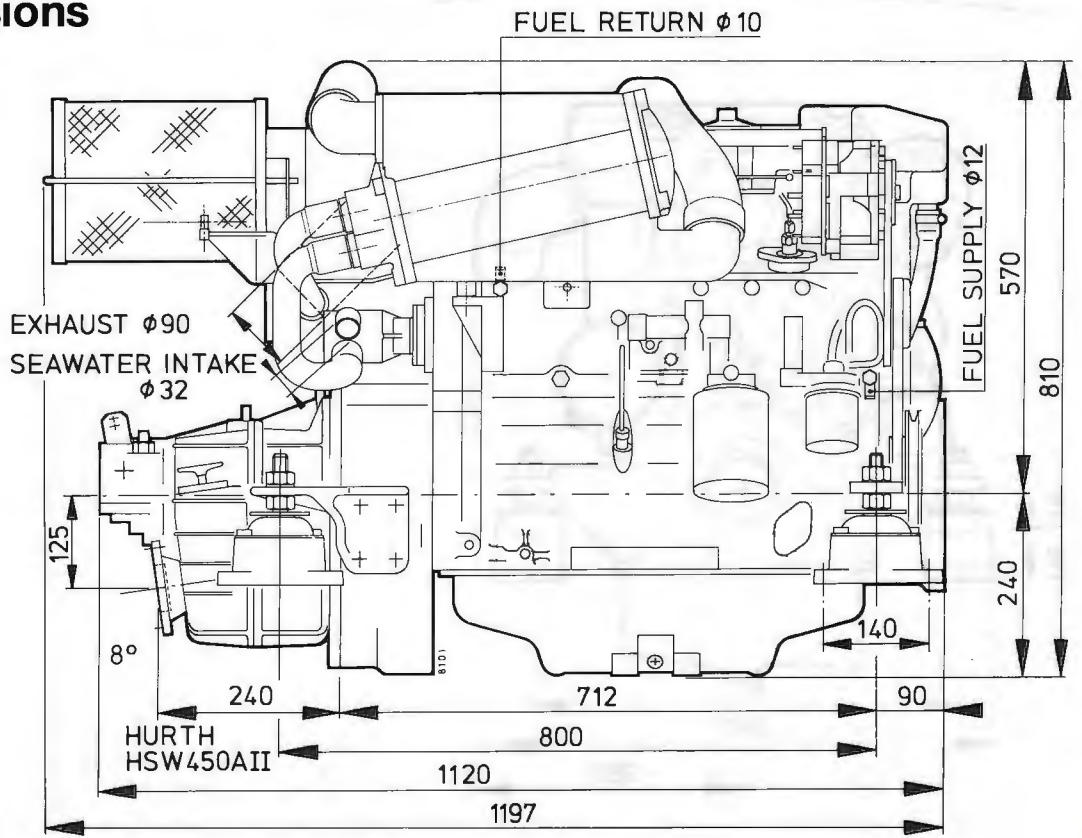
Overall Dimensions



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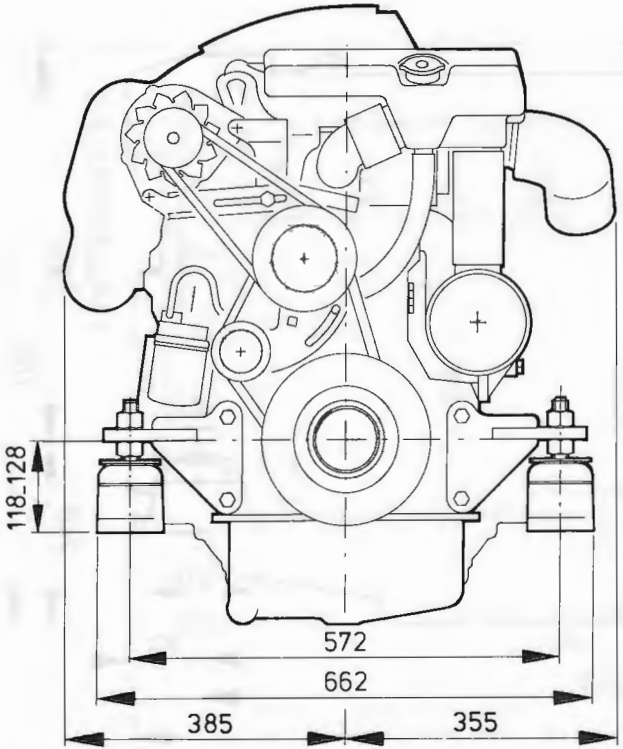
DTA43

Overall Dimensions



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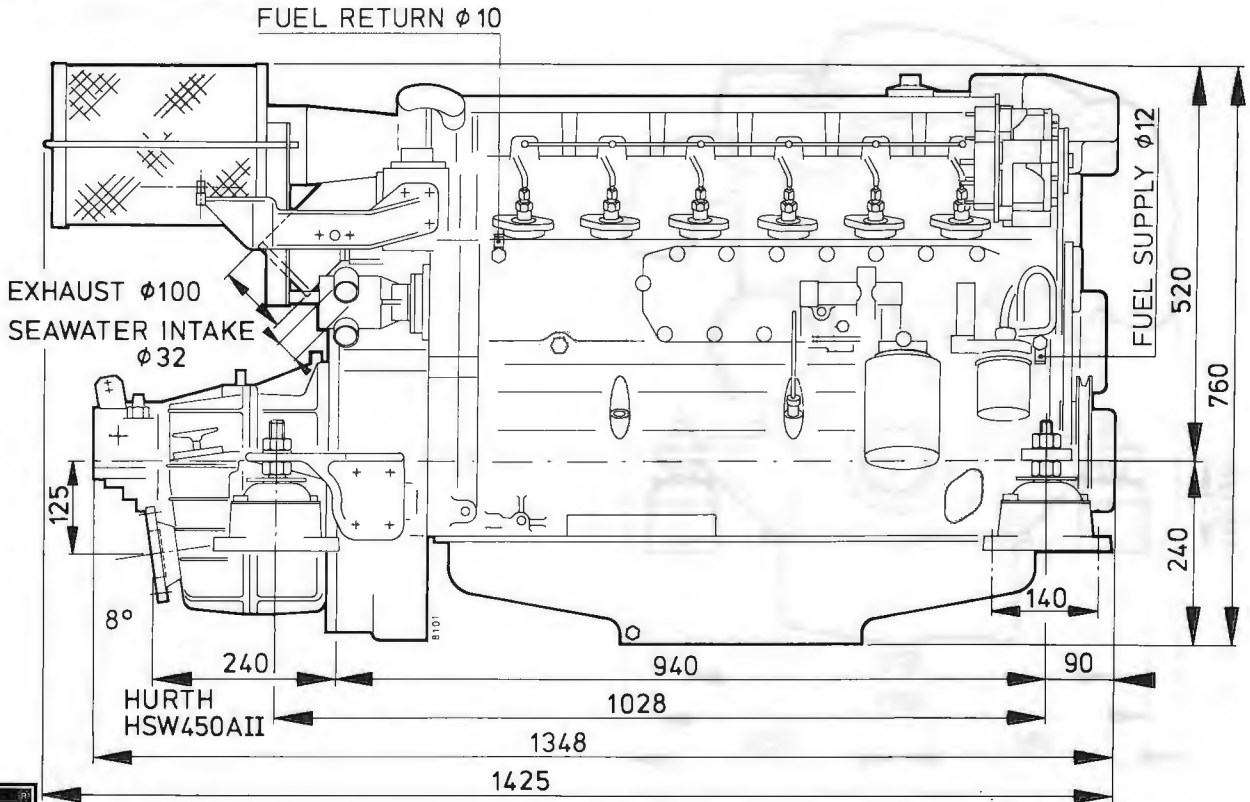

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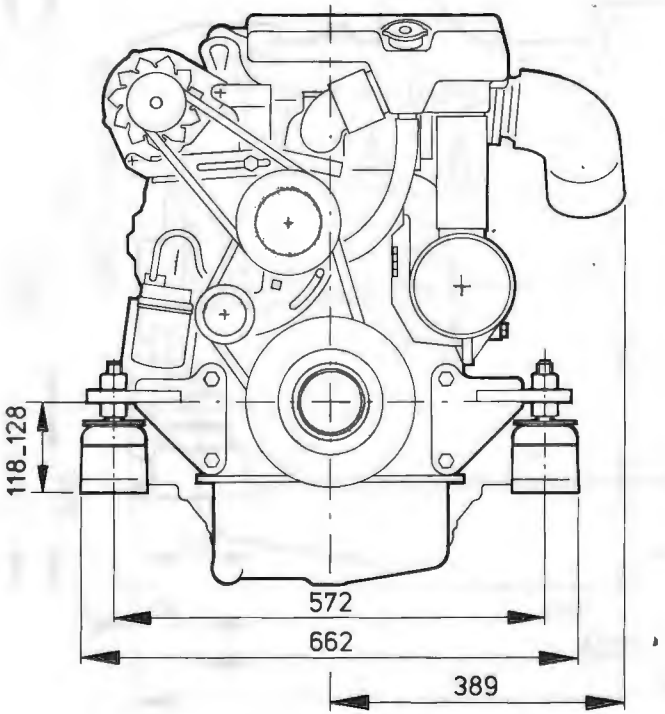
DT64



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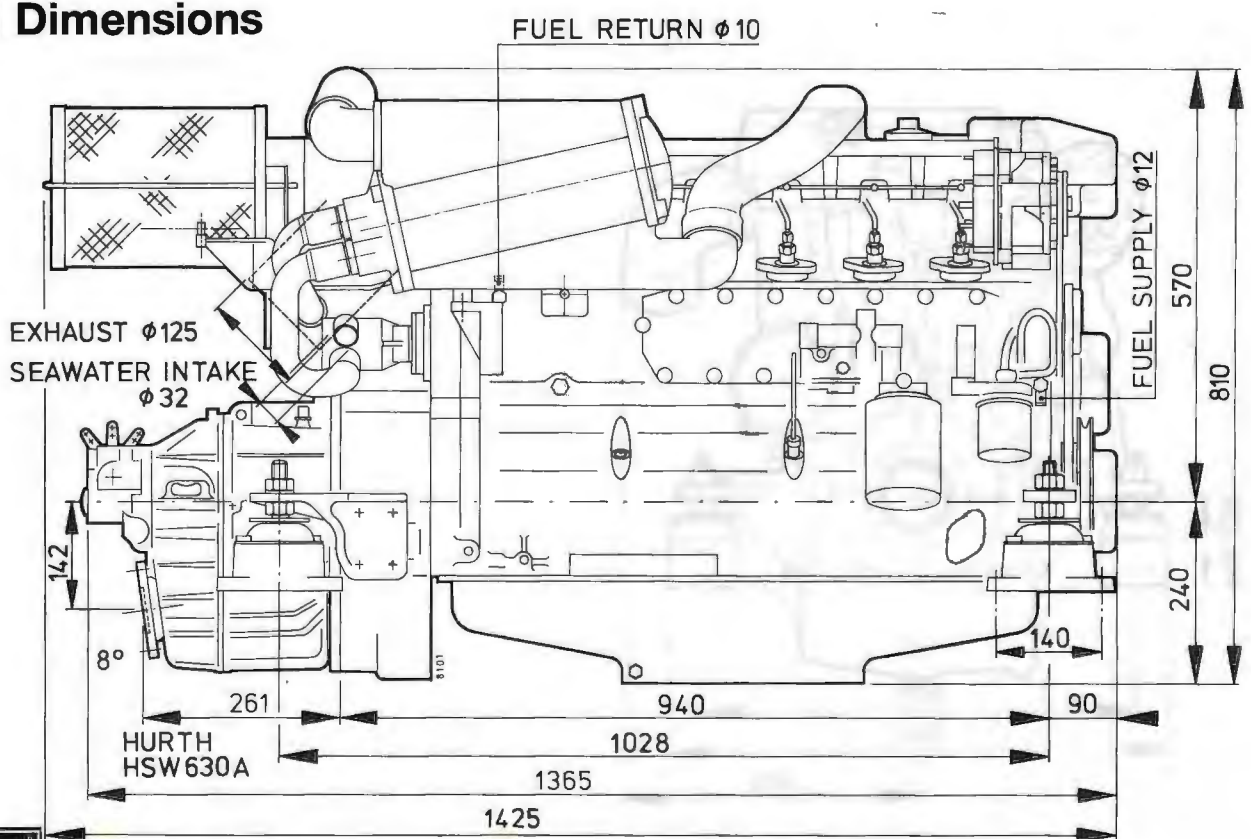

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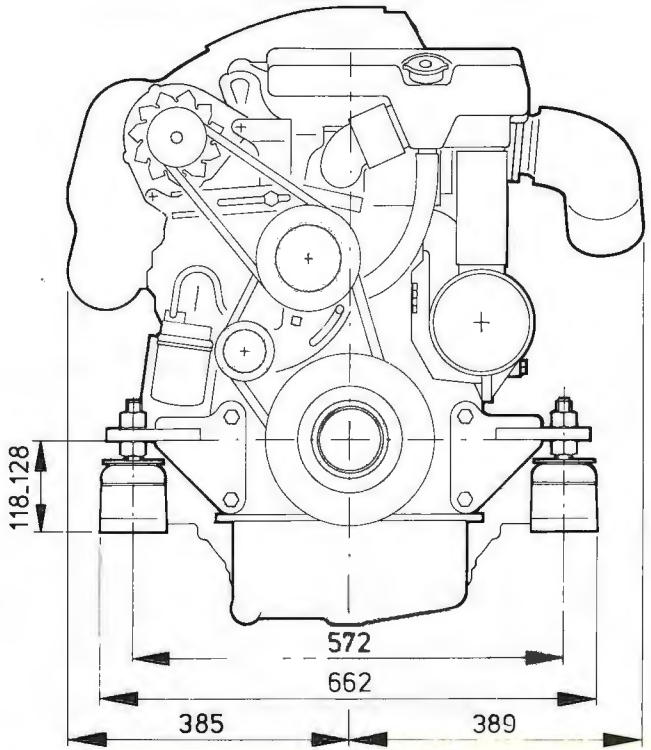

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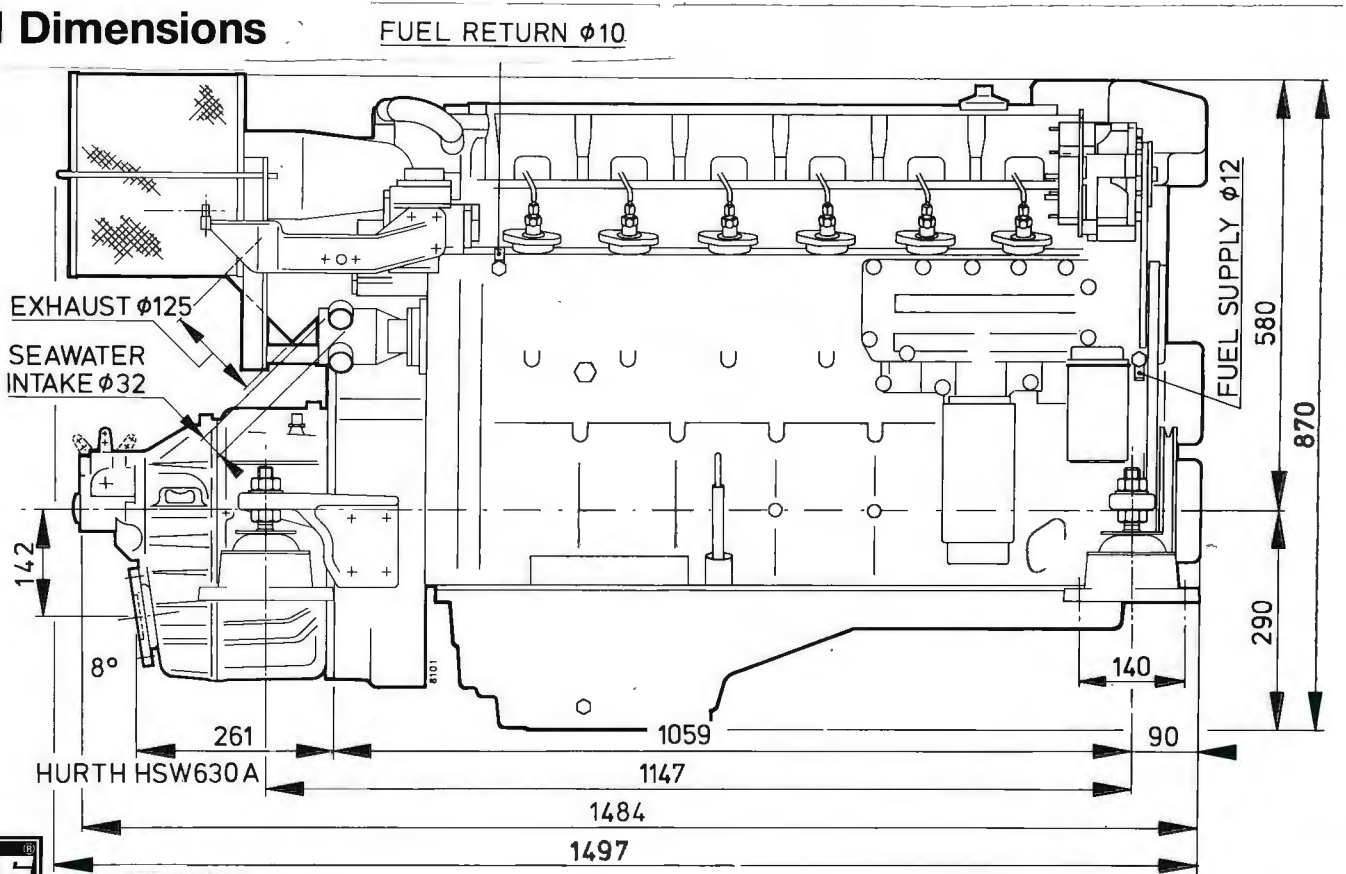

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vetus DIESEL

DT67

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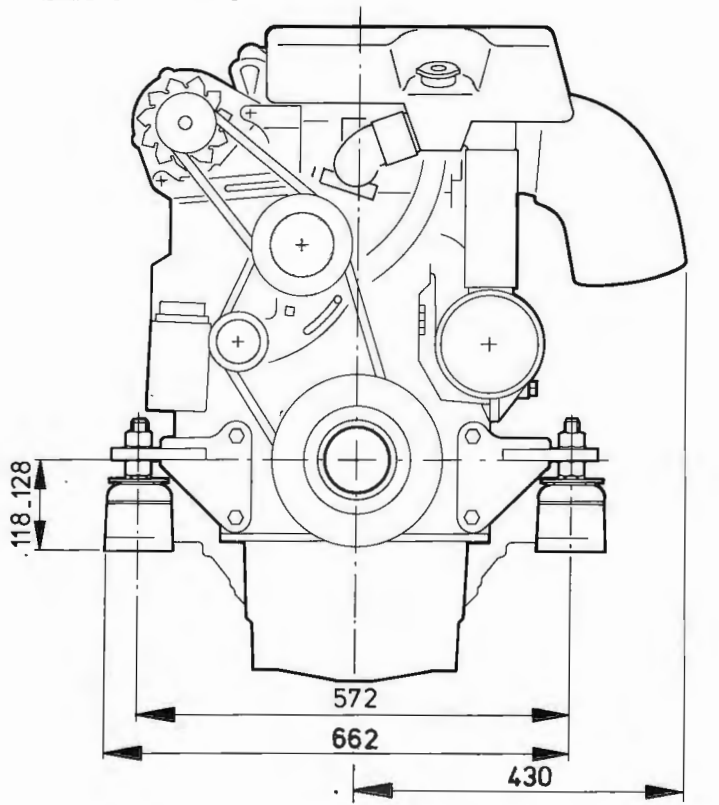

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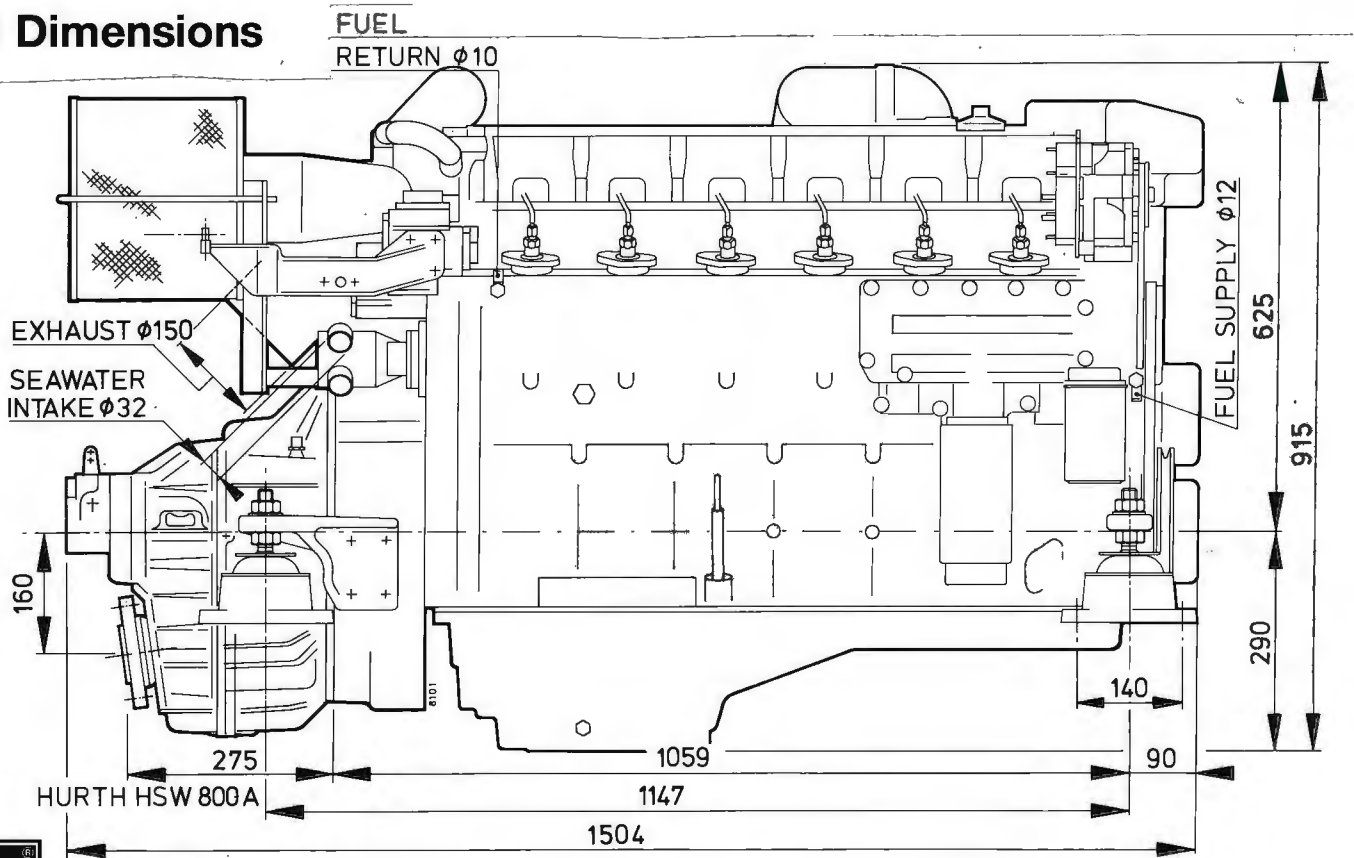

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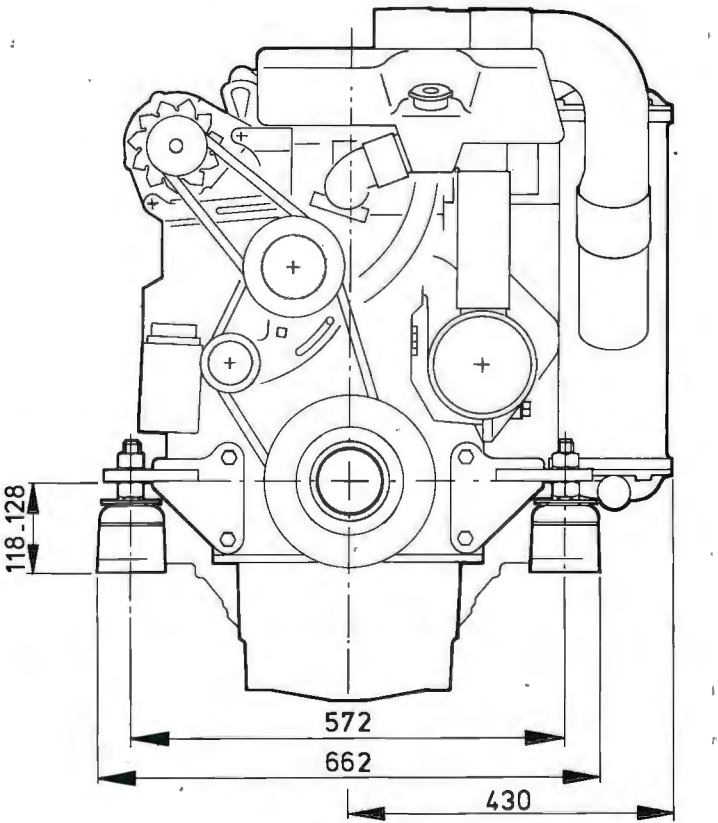

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1 : 10

vetus diesel b.v.

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