

Operating Manual



4-Cyl. SDI

**Volkswagen Marine
Boat Engines**



**You have decided on a
Volkswagen Marine Boat Engine
- Thank you for putting your trust in us.**

Volkswagen Marine boat engines have been developed for the special requirements in boats.

Volkswagen Marine offers a broad range of variants to meet any specific requirements.

Volkswagen Marine boat engines are characterised by many advantages:

- *Compact design and low weight create the conditions for universal installation.*
- *A long life and low fuel consumption ensure economy and environmental friendliness.*

You have decided on a Volkswagen Marine boat engine that is advanced in every regard. Your boat engine has been developed to put the least possible strain on the environment.

VW-Marine Service Partner are available for support:

The VW-Marine Service Partner

The VW-Marine Service Partner works at low cost and professionally according to factory specifications. It also guarantees that everything on your Volkswagen Marine boat engine is in proper working order. In addition, VW-Marine Service Partner offer an extensive package of warranties and services.

VW Marine Service Partners will be happy to provide details on the services and any processing in individual countries.

Volkswagen Marine

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What you should know before you read this manual

This manual

contains important information on using your Volkswagen Marine Boat Engine. You should read this manual carefully prior to initial operation to quickly become familiar with the engine and to know how to operate and handle the engine.

Along with regular service and maintenance, proper operation and use of the Volkswagen Marine Boat Engine make an important contribution to maintaining its value.

Additional warranty information are contained in the service schedule.

For safety reasons, please also be sure to follow the safety precautions on page 17 and the information on changes and part replacement on page 20.

Equipment

This manual contains information covering the full range of options available as we went to press. Some of the equipment may not be available until a later time.



Equipment marked with an asterisk are not part of the standard equipment of the Volkswagen Marine Boat Engine.

Notes on environmental protection



Texts which follow this symbol and are printed in italics are important notes on environmental protection.

Table of Contents

The first page contains a list of contents in which all the subjects dealt with in this manual are given in the order that they appear.

Index

At the back of the Owner's Manual is a comprehensive alphabetically ordered index.

The required information can be located quickly using key words.

Warnings

Attention

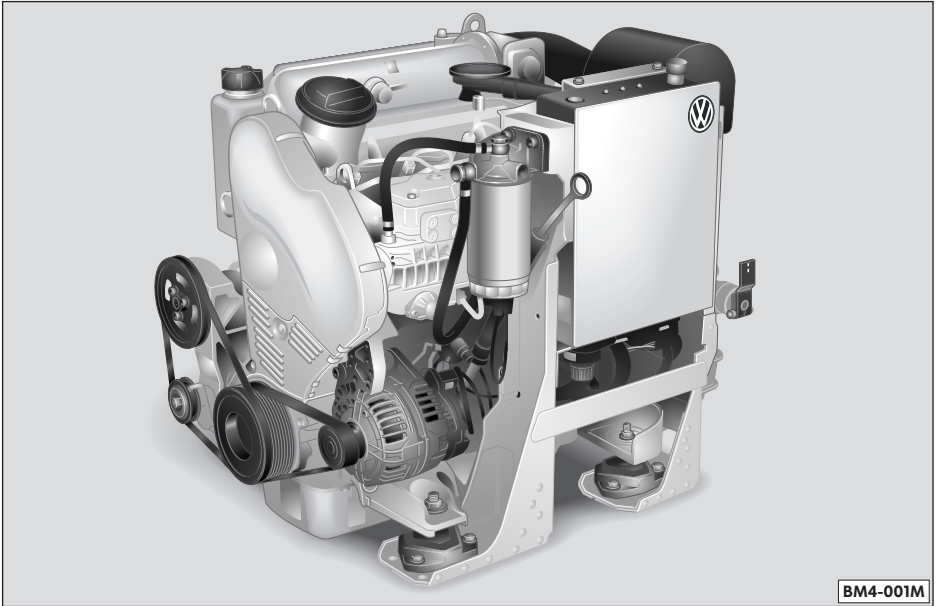
Blocks of text written in bold print and with this background refer to potential accident or injury risks.

The passages in this bold print provide useful information on using and caring for your Volkswagen Marine engine and call your attention to potential sources of damage to it.

One final request:

When you sell your boat or your Volkswagen marine boat engine, please pass on this manual to the new owner, as the literature is part of the Volkswagen marine boat engine!

General view of engines



Description of engines SDI-40-4, SDI 50-4 and SDI-60-4

- Four-stroke diesel engine
- 4-cylinder in-line
- 1.9 litre displacement
- Crankshaft mounted on five bearings
- Valve control by toothed belt and over-head cam
- Hydraulically adjusted bucket tappets
- Engine lubrication as pressure circulation lubrication with geared oil pump and replaceable oil filter in main flow
- Dry air filter

The engine has two separate cooling circuits.

- 1 - The open seawater circuit runs via the gearbox radiator, the main heat exchanger and the exhaust manifold.
- 2 - The coolant circuit runs as a closed pressurised system through the engine block, oil cooler, exhaust collector and, after reaching the operating temperature, via the main heat exchanger.

Attention

Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.

Starting engine

Important

● **Never allow the engine to run with the vehicle standing in an enclosed area - asphyxiation hazard!**

The engine exhaust gases contain carbon monoxide, which is colourless and odourless. Inhaling these gases can be damaging to your health.

● **Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.**

● **Never start the engine when the driving lever(s) has/have been removed.**

Accident danger!

● When the driving level is correctly installed, the engine cannot be started when the lever is not in the neutral position. A corresponding message appears in the display of your rev. counter.

● Before starting the engine, check the engine oil, coolant and gear oil levels, the fuel supply and the seawater filter, and make sure that the seawater valve for the seawater cooling circuit is open.

● As soon as the engine starts, release the ignition key immediately, as the starter may not continue to run with the engine.

● When restarting the engine, restarting is not possible until the key has been turned back completely. The non-repeat mechanism is designed to prevent the starter from engaging while the engine is running, thus incurring damage.

● Avoid high engine speeds and full throttle until the engine has reached its operating temperature.

● You may hear a small amount of noise in the first few seconds after starting. This noise will disappear once oil pressure builds up in the hydraulic tappets. This phenomenon is normal with this type of tappet and does not indicate a defect or malfunction.

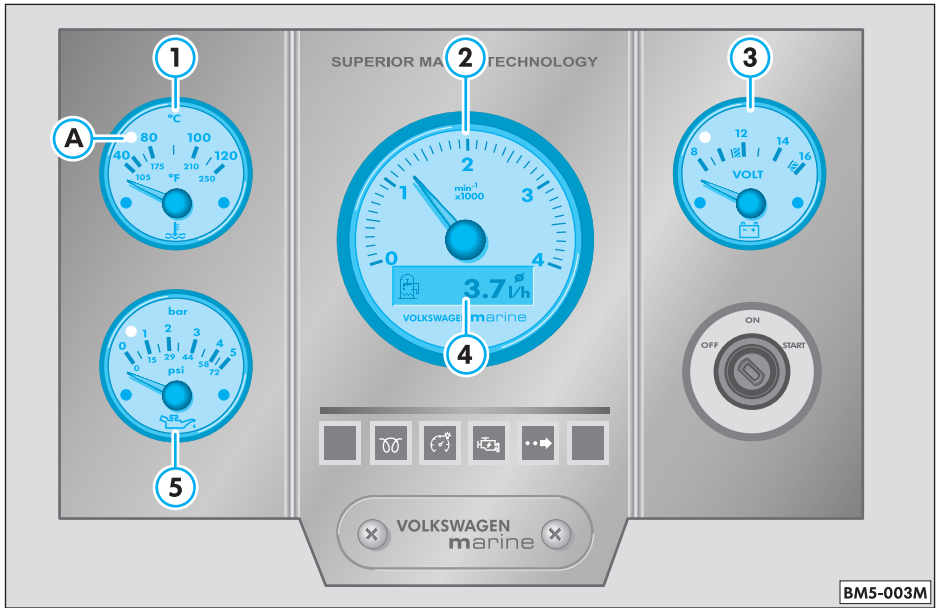
Stopping the engine

Do not immediately switch off the engine after a lengthy period of heavy load, but rather allow it to run at idle speed for about 2 minutes to prevent a build-up of engine heat.

Attention

Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.

Instruments



The illustration shows the instruments of the navigating stand panel*.

Item	Page
1 - Coolant temperature gauge	8
2 - Rev. counter	8
3 - Voltmeter	8
4 - Multifunction indicator (MFI)	8
5 - Engine-oil pressure gauge	9
A - Warning lamp	



The illustration shows the navigating stand panel

1 - Coolant temperature gauge*



The display appears when you switch on the ignition.

When the ignition is switched on, the warning lamp **A** lights up for a few seconds as an operating check.

Note

Avoid high engine speeds and do not subject the engine to heavy loads while the coolant temperature is still below 40°C.

Under normal operating conditions the needle should remain in the middle of the scale range.

At heavy engine loads and high outside temperatures, the needle may also move far into the upper range.

This is not a cause for concern as long as the warning lamp A does not light up and the acoustic signal does not sound.

A - Warning lamp

If the lamp lights up during driving, first check the coolant temperature gauge.

If the gauge is in the normal range, coolant must be added as soon as possible.

If the needle is above 105°C, the coolant temperature is too high. **Stop the engine** and determine the cause of the fault - see page 11.

Attention

Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.

2 - Rev. counter

Never run the cold engine at high speeds - either at idle or during driving.

If the needle of the rev. counter goes above 4,000 rpm, you should cut back on the throttle to prevent engine damage.

3 - Voltmeter*



The voltmeter indicates the voltage in the on-board electrical system. Normal value: between 12 and 16 volts. If the gauge drops below 12 volts with the engine running, have the power supply (battery and alternator) checked by a VW-Marine Service Partner.

During starting the voltage gauge may drop below 8 volts.

4 - Multi-function indicator (MFI)

The multi-function indicator (MFI) provides a great deal of information. For information on the operation and functions, please see the additional operating manual for the multi-function indicator.

5 - Engine-oil pressure gauge*



The engine-oil pressure gauge only functions with the engine running and indicates the existing engine oil pressure.

During driving the engine oil pressure is between approx. 2 and 5 bar.

At an engine oil pressure below 2 bar the engine oil-pressure warning lamp can light up and an acoustic signal can sound.

If the engine oil-pressure warning lamp lights up (see page 13) and the acoustic signal sounds.

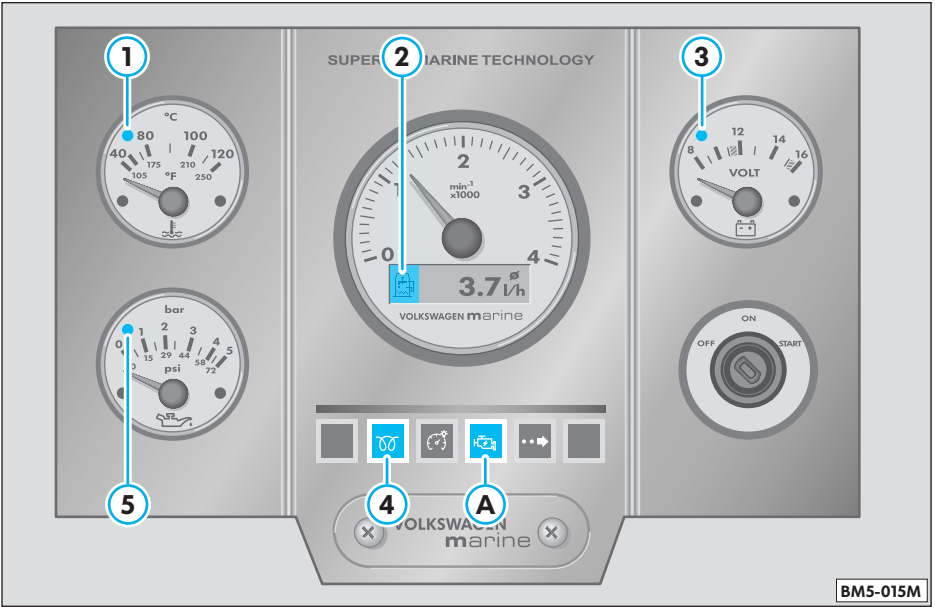
Switch off engine! Check the oil level - see page 33.

The engine oil-pressure warning lamp is not an engine oil level indicator! Therefore, check the engine oil level at regular intervals, preferably before each trip.

Attention

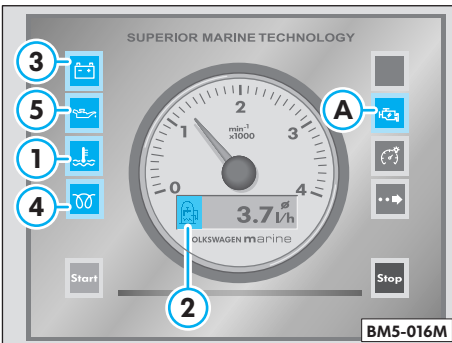
Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.

Warning lamps



BMS-015M

The illustration shows the warning lamps of the optional navigating stand panel*.



BMS-016M

The illustration shows the navigating stand panel

Item	Page
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3 - Alternator	12
4 - Glow plug system and engine fault	13
5 - Engine oil pressure	13
A - Switch	

1 - Coolant temperature

The warning lamp lights up when the coolant temperature is too high.

As an additional warning, an acoustic signal sounds at the same time, which can be switched off with the switch **A**.

Should the fault not be eliminated, the acoustic signal sounds again after a short time.

In this case, switch off the engine immediately and check whether ...

- the seawater filter is clogged.
- the sea valve is open.
- sufficient coolant is present. Check the cooling system for leaks.
- the ribbed V-belt of the seawater pump is OK.
- the impeller of the seawater pump is OK
- see page 48.

Important

● **Exercise caution when opening the coolant cap! When the engine is hot, the cooling system is pressurised - danger of scalding! Therefore, allow the engine to cool down before unscrewing the cap.**

● **Exercise particular caution when working in the engine compartment!**

● **Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.**

If the fault cannot be eliminated, please contact the nearest VW Marine Service Partner.

2 - Multi-function indicator (MFI)

The following faults may be indicated in the left-hand area of the MFI:

Coolant level



If a fault occurs in the closed cooling system while driving, this is indicated by a flashing symbol in the left-hand area of the multi-function indicator.

In this case, switch off the engine immediately and check whether ...

- sufficient coolant is present.
- the coolant system is leaky.

Important

● **Exercise caution when opening the coolant cap! When the engine is hot, the cooling system is pressurised - danger of scalding! Therefore, allow the engine to cool down before unscrewing the cap.**

● **Exercise particular caution when working in the engine compartment!**

● **Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.**

If the fault cannot be eliminated, consult the nearest VW Marine Service Partner.

Water separator



This symbol appears when water has collected in the fuel filter on the engine.

In this case, switch off the engine and drain the water from the fuel filter - see page 40.

Attention

Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.

3 - Alternator



This warning lamp lights up when you switch on the ignition. It should go out again once the engine is running.

If the alternator warning lamp lights up during operation:

- Switch off the engine immediately and check the ribbed V-belt.

If the ribbed V-belt is OK, the fault is probably in the alternator or the regulating switch. If the damage cannot be repaired, please contact the nearest VW Marine Service Partner.

Note

The engine may not:

- **be operated with the battery disconnected, as otherwise the alternator will be damaged.**
- **operated without the alternator ribbed V-belt, as otherwise the front vibration damper will be damaged.**

4 - Glow plug system and engine fault



Glow plug system

When the engine is **cold**, the warning lamp lights up when the driving position is activated (ignition on).

Should the warning lamp fail to light up, a fault is present in the glow plug system - please obtain professional help.

Start the engine immediately after the lamp goes out – see page 5.

The engine can also be started immediately **without** preheating, however then a slightly poorer starting behaviour must be expected.

When the engine is at **operating temperature**, the preheating warning lamp **does not** light up - the engine can be started immediately.

engine fault

If a fault occurs in the engine control system during driving, this is indicated by the warning lamp flashing - the engine should be checked immediately by a VW-Marine Service Partner.

5 - Engine oil pressure



This warning lamp lights up when the ignition is switched on and must go out after the engine starts.

If the engine oil-pressure warning lamp lights up or flickers during operation:

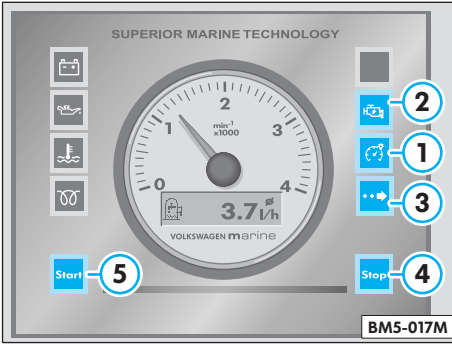
- 1 - Switch off the engine immediately, as the engine lubrication may be interrupted.
- 2 - Then check the engine oil level (see page 33).
If the oil level is OK, please contact the nearest VW Marine Service Partner.

As an additional warning, an acoustic signal sounds at the same time, which can be switched off with the switch **A**. Should the fault not be eliminated, the acoustic signal sounds again after a short time.

On the other hand, occasional flickering of the warning lamp at idle with the engine is warm is meaningless if the lamp goes out again when the engine speed is increased.

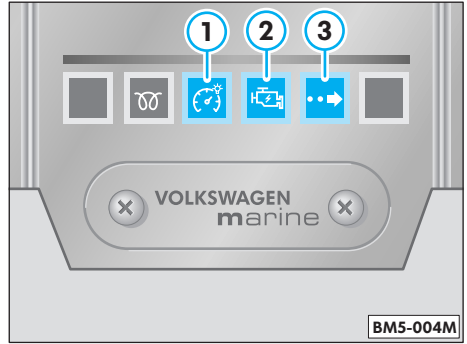
The oil-pressure warning lamp is not an oil level indicator! Therefore, the oil level should be checked at regular intervals, preferably before each trip.

Switch



The illustration shows the switches of the navigating stand panel.

Item	Page
1 - Instrument lighting/dimmer LEERER MERKER	
2 - Acknowledgement button for acoustic signal	15
3 - Buttons for multi-function indicator (MFI)	15
4 - Stop engine	15
5 - Start engine	15



The illustration shows the switches of the navigating stand panel*.

Item	Page
1 - Instrument lighting/dimmer LEERER MERKER	
2 - Acknowledgement button for acoustic signal	15
3 - Buttons for Multi-function indicator (MFI)	15

1 - Instrument lighting



The brightness of the instrument lighting can be adjusted by pressing the button.

2 - Acknowledgement button for acoustic signal

The acoustic signal of a fault message can be acknowledged with this button.

3 - Button for MFI

The MFI is operated with this button. Each time the button is pressed, the display in the MFI is advanced.

4 - Stop engine

To stop the engine from the flying bridge, press the Stop button.

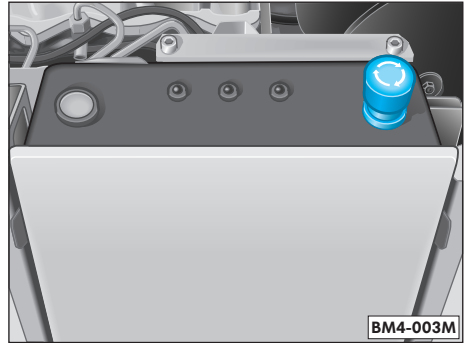
5 - Start engine

When the ignition key is inserted and the ignition is switched on in the navigation stand panel, you can start the engine by pressing the Start button.

Important

Always remove the ignition key if you leave the boat - even for a short time. This is particularly important when children remain on the boat. Otherwise they could start the engine or operate the electrical equipment. Accident danger!

Stop switch



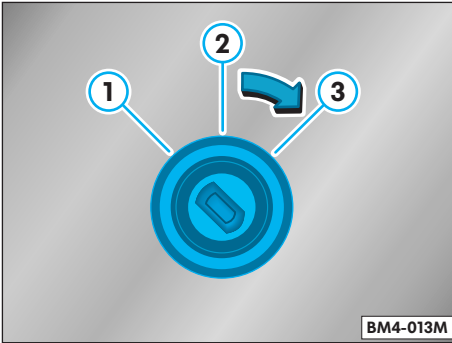
Stop switch

You can stop the engine in case of danger with the Stop switch on the fuse box/relay plate.

After the Stop switch is actuated it must be released again, as otherwise the engine cannot be started.

To release the Stop switch, turn it in the direction of the arrow shown on the switch.

Ignition switch



1 - Fuel supply interrupted, engine off

2 - Preheating and driving position

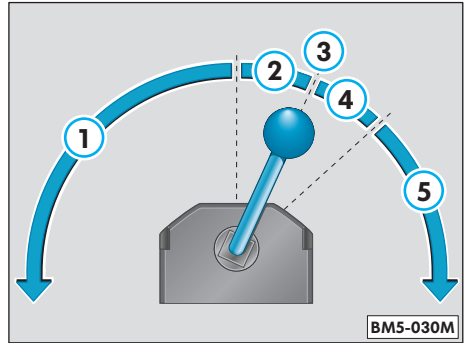
As long as the engine is being preheated, no major consumers should be switched on - otherwise this will place an unnecessary load on the starting battery.

3 - Starting engine

Important

Always remove the ignition key if you leave the boat - even for a short time. This is particularly important when children remain on the boat. Otherwise they could start the engine or operate the electrical equipment. Accident danger!

Driving lever



The illustration shows the pattern of the driving lever.

1 - Forward driving

2 - Shifting during forward driving

3 - Neutral

4 - Shifting during reverse driving

5 - Reverse driving

Always make sure that the driving lever is in the Neutral position **3** before starting the engine.

Safety precautions for working in the engine compartment

When performing any work on the engine or in the engine compartment, e.g. checking and topping up the operating fluids, there may be a danger of scalding, injuries, accidents and fire.

Important

Exercise particular caution when working on the engine or in the engine compartment!

Protect yourself with suitable work clothing, e.g. gloves, eye protection etc.

- Never open the engine compartment cover or perform work on the engine when you notice that steam or coolant is escaping – danger of scalding!

Wait until steam or coolant no longer escapes and the engine has cooled down.

- Stop the engine, remove the ignition key and press the Stop button.

- Move the driving lever into the Neutral position.

- Allow the engine to cool.

- Keep children away from the engine compartment.

- Do not open the cap of the coolant reservoir while the engine is at operating temperature, as the cooling system is pressurised.

- Be sure not to spill liquids over the hot engine. These liquids could ignite.

- Avoid short circuits in the electrical system, and in particular at the battery.

- If maintenance, testing, repairs or adjustments must be carried out with the engine running, there is an additional danger from rotating parts – e.g. ribbed V-belt and alternator – danger to life and limb!

Please also observe the warnings on the following page.

● If work on the fuel system or the electrical system is required:

- Always disconnect the battery from the engine.
- Do not smoke.
- Never work near an open flame.
- Always keep a fire extinguisher close at hand.

Avoid contact with operating materials. Should operating materials get into the eyes, flush the eyes immediately with clean water and see a doctor at once. Take along the original container to the doctor in these cases. You should be particularly aware of the following when you if to carry out work on open water:

- Swells may put you off balance.
- The danger of spilling operating materials is increased by swells.
- If you require a doctor in an emergency, there will be a delay.

The warnings in this manual and the generally applicable safety rules must be observed.

When topping up fluids, make sure that they are not confused, as otherwise serious malfunctions and engine damage will result.



To ensure that leaks are detected in due time, the bilge under the engine should be kept clean and should be checked regularly. If soiling by oil or other operating fluids can be seen there, the engine should be checked by a VW Marine Service Partner.

Important note

Of course, coolant additives and motor oil are constantly being further developed. Therefore, the information contained in this manual can only reflect the status at the time of printing. The VW Marine Service Partner will always be kept up to date on any changes by the factory. Therefore, it is best to have operating materials changed by a VW Marine Service Partner.

Diesel

The diesel fuel must comply with the standard DIN EN¹⁾ 590.

CN²⁾ no lower than 49.

RME fuel (biodiesel)

in accordance with DIN 51 606.

Volkswagen Marine boat engines can also be operated with **RME fuel** (rape-oil fatty acids **methyl**ester).

Important

It must be ensured that the fuel tank and the fuel hoses to the engine are also suitable for RME fuel.

Special features of RME

- RME is a plant-based oil (primarily rapeseed), manufactured using a chemical process in which a catalytic element is employed to transform a mixture with methanol into RME fuel.
- RME is virtually sulphur-free. This means that practically no sulphur dioxide emissions (SO₂) are generated when it combusts.
- The exhaust gas contains
 - less carbon monoxide,
 - fewer hydrocarbons and
 - fewer particles (e.g. soot)

compared to the emissions produced by conventional diesel fuels.

All emission levels are lower than those laid down by law.

1) **Euro Standard**

2) **Cetan Number.** Measure of the ignitability of diesel fuel.

- The RME fuel is biodegradable.
- Its use may be accompanied by slight reductions in performance.
- Fuel consumption may be slightly higher.
- RME is suitable for winter use at temperatures down to about -10 °C.
- At outside temperatures below approx. -10 °C diesel fuel must be added to prevent the RME fuel from flocculating. The mixing ratio of diesel fuel to RME fuel should be approx. 50 : 50.

If RME percentage is higher than 50%, more smoke may be produced.

- RME can be mixed with diesel fuel in any desired ratio during the warm season.

Winter operation

When using summer diesel, malfunctions may occur at outside temperatures below 0 °C, as the fuel also becomes too thick due to paraffin precipitation.

Therefore, "winter" diesel fuel is available in Germany at roadside petrol stations during the cold season which - depending on the fuel brand - is also safe for operation at approximately -15 °C to -22 °C.

In countries with other climatic conditions, diesel fuels with a different temperature behaviour are offered.

Changes and parts replacement

The state of the Volkswagen Marine boat engines when shipped from the factory may not be changed without careful consideration. Therefore, if technical changes are made to the engine, or if parts must be renewed later, the following instructions must be observed:

● **Before** purchasing parts and before making technical changes, a consultation by a VW Marine Service Partner should always take place, as the VW Marine Service Partner is particularly competent in this area due to its close co-operation with us.

Important

● **In your own interest we recommend using only genuine Volkswagen Marine parts for your Volkswagen Marine boat engine. The reliability, safety and suitability of these parts is ensured specifically for boat engines.**

● **Other products can have a negative influence on the service life of your Volkswagen Marine boat engine.**

● **Despite ongoing observation of the market, we cannot evaluate or provide any form of guarantee for other products, even if in isolated cases an approval by an officially recognised technical testing and monitoring association or a government approval has been granted.**

● Genuine Volkswagen Marine parts are available from a VW-Marine Service Partner. Of course, proper fitting is also carried out there.

● To prevent damage to the vehicle and avoid compromising its safety and reliability, always observe our technical guidelines when carrying out any technical modifications. This ensures that no damage to the engine occurs, the operating safety is maintained and the changes are permissible. A VW Marine Service Partner will also carry out this work properly or refer you to a specialised workshop in special cases.

Do-it-Yourself

The far-reaching network of VW Marine service partners with specially trained experts, modern equipment and all necessary special tools is available to support your Volkswagen Marine boat engine.

Here you will receive professional advice and find fast, effective help.

If, for example, the engine should fail to start or idling faults occur, faults and their remedies are described in detail in the following chapter. Should the individual remedies not solve the problem, your VW Marine Service Partner will be happy to provide additional assistance.

If repairs must be made, the engine should be brought to a VW Marine Service Partner. It is in good hands there.

Important

Refer to the safety instructions provided on Page 17 onwards before carrying out any work on the engine or in the engine compartment.

Fault	
Engine does not start	
Starter does not turn	
Cause	Remedy
Driving lever is not in neutral position Neutral position	Move driving lever into Neutral position
Neutral switch in gearbox does not output signal (only with ZF reversing gear)	Check operation of neutral switch
STOP button pressed	Release Stop button
Ignition switched off	Switch on ignition
Battery discharged or defective	Check battery and charge; renew if necessary
Connections on starter loose or corroded	Check connections and clean or renew if necessary
Connections on earthing relay loose or corroded	Check connections and clean or renew if necessary
Connections on ignition/starter switch loose or corroded	Check connections and clean or renew if necessary
“Fuel pump” LED lights up	
Fuse defective	Renew fuse
“Glow plug system” LED lights up	
Fuse defective	Renew fuse
“MDC” LED lights up	
Fuse defective	Renew fuse

Should the individual remedies not solve the problem, your VW Marine Service Partner will be happy to provide additional assistance.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Fault	
No or insufficient fuel supply	
Cause	Remedy
Fuel cock closed	Open fuel cock
No fuel in tank	Refuel
Tank dirty	Clean
Fuel lines clogged	Check lines and clean if necessary
Water level in circulation filter too high	Drain water from circulation filter
Circulation filter clogged	Clean circulation filter and renew if necessary
Water level in fuel supply filter too high	Draining water from fuel supply filter
Fuel supply filter clogged	Renew fuel supply filter
Electric fuel pump does not run	Check connections and clean or renew if necessary or Check electric fuel pump and renew if necessary
"Fuel pump" LED lights up	Check fuse and renew if necessary
Engine shakes	
See section on fuel supply	
Engine dies	
See section on fuel supply	

Should the individual remedies not solve the problem, your VW Marine Service Partner will be happy to provide additional assistance.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

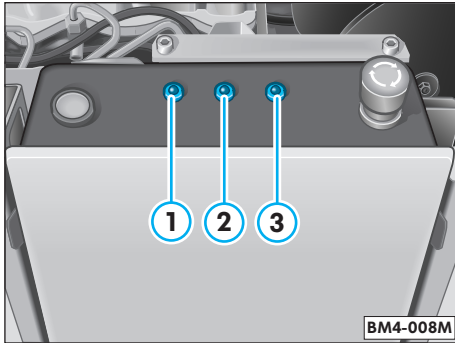
Fault	
Engine becomes too hot	
Cause	Remedy
Seawater valve closed	Check impeller and renew if necessary. Then open seawater valve.
Seawater filter is clogged	Close seawater valve, check impeller and renew if necessary. Then clean seawater filter and open seawater valve.
Seawater pump aspirates air	Close seawater valve, check impeller and renew if necessary. Then check cover of seawater filter for proper seating and leaks and check suction hose. Open seawater valve
Gearbox oil cooler clogged	Check gearbox oil cooler and clean if necessary
Ribbed V-belt for seawater pump loose or defective	Check ribbed V-belt and tensioning element; renew if necessary
Impeller of seawater pump defective	Renew impeller
Insufficient coolant in cooling system - engine circuit	Add coolant (pure water in an emergency). Check cooling system for leaks and seal off if necessary.
Coolant pump for engine circuit defective	This fault should always be checked and eliminated by a VW Marine Service Partner, as special tools are required.

Should the individual remedies not solve the problem, your VW Marine Service Partner will be happy to provide additional assistance.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Fuses



The individual electrical circuits are protected by fuses.

It is advisable to always carry a selection of replacement fuses available VW Marine Service Partners.

Important

On no account attempt to repair a defective fuse or use a fuse with a higher rating as this could result in damage at other points of the electrical system. It could even cause a fire.

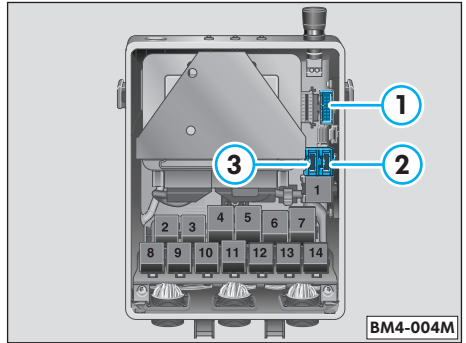
Note

If a recently fitted fuse blows again after a short time, the electrical system must be checked as soon as possible by a VW Marine Service Partner.

Replacing fuses

The failure of a fuse is indicated by the respective LED on the fuse box/relay plate lighting up:

- 1 - Permanent positive (Terminal 30)
- 2 - Fuel pump
- 3 - Glow plug system



The fuses are located in the fuse box/relay plate behind the cover.

- Switch off the ignition and corresponding electrical equipment.
- Press down the Stop switch on the fuse box/relay plate.
- Open the locks and fold down the cover of the fuse box/relay plate.
- Determine which fuse belongs to the failed consumer using the fuse table.

Fuse assignment

No.	Consumer	A ¹⁾
1	Glow plug system	50
2	Fuel pump	15
3	Permanent positive (Terminal 30)	15

Colour marking of fuses:

blue: 15 amperes

- Pull out corresponding fuse.
- Renew blown fuse (recognisable from melted metal strip) with a new fuse **of the same** amperage.
- Secure the cover of the fuse box/relay plate again with the locks.
- Release the Stop switch.

¹⁾ Amperes

Service and care

The far-reaching network of VW Marine service partners with specially trained experts, modern equipment and all necessary special tools is available to support your Volkswagen Marine boat engine.

If an inspection service is required, all checking and adjustment to be carried out in this context are described in detail in the following chapter.

Some of the work must be carried out before each start.

Other work is not required until the end of a year, at the end of the season or after 200 operating hours.

The work described here is used to maintain your Volkswagen Marine boat engine.

The specified service intervals are matched to normal operating conditions.

Under **more extreme conditions** it is necessary to have some work carried out before the next service is due or between the specified service intervals. This primarily applies to cleaning the air filter element in case of operation under very dusty conditions.

Daily checks

Visual inspection before going out

Before going out you should subject the engine to a check and visual inspection.

Work required	Page
Visual inspection for leaks and damage	
Check engine oil level	33
Check circulation filter* (Bowlle) and drain off water if necessary	37
Checking coolant level and top up if necessary	45
Check seawater filter* and clean if necessary	42

Note

Maintenance must be performed on the reversing gear according to the specifications of the respective manufacturer.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

End of season

Work at end of season

At the end of the season you should subject the engine to a check and visual inspection. You should have the service work on your Volkswagen Marine boat engine conducted by your VW Marine Service Partner, as the work required specialised knowledge and special tools.

Important

- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**
- **Please be sure to observe the working sequences and information on engine preservation from page 59.**

Work required	Page
Visual inspection for leaks and damage	
Interrogate fault memory of engine electronics	
Change engine oil and oil filter	59
Renew fuel supply filter	41
Check air filter and clean if necessary	43
Check seawater filter* and clean if necessary	42
Check coolant level and top up if necessary	45
Seawater pump: Check impeller and renew if necessary	48
Check reactive anode and renew if necessary	50
Cleaning and preserve engine	59
Seawater circuit: flush and drain	60
Fill fuel tank until full	

Note

Maintenance must be performed on the reversing gear according to the specifications of the respective manufacturer.

Start of season

Work at start of season

At the start of the season you should subject the engine to a check and visual inspection. You should have the service work on your Volkswagen Marine boat engine conducted by your VW Marine Service Partner, as the work required specialised knowledge and special tools.

Work required	Page
Check condition of ribbed V-belt for seawater pump	52
Check condition of ribbed V-belt for alternator etc.	52
Check condition of toothed belt for camshaft drive	
Check proper operation of seawater valve*	
Check battery voltage and charge battery* if necessary	53

Note

Maintenance must be performed on the reversing gear according to the specifications of the respective manufacturer.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Service scope once a year or every 200 operating hours

Your Volkswagen Marine boat engine must be serviced once a year at the end of the season or every 200 operating hours.

You should have the service work on your Volkswagen Marine boat engine conducted by your VW Marine Service Partner, as the work required specialised knowledge and special tools.

The following table shows the work required.

Work required	Page
Visual inspection for leaks from above and below	
Interrogate fault memory	
Changing engine oil	34
Renew oil filter insert	36
Renew circulation filter element*	38
Renew fuel supply filter	41
Check coolant level	46
Check air filter and clean if necessary	43
Check condition of ribbed V-belt for seawater pump	52
Check condition of ribbed V-belt for alternator etc.	52
Check condition of toothed belt for camshaft drive	
Clean seawater filter*	42
Renew seawater pump impeller	48
Check reactive anode and renew if necessary	50

Note

Maintenance must be performed on the reversing gear according to the specifications of the respective manufacturer.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Additional work every 5 years or every 1,000 operating hours

This additional work on your Volkswagen Marine boat engine must be carried out every 5 years or every 1,000 operating hours.

You should have the additional work on your Volkswagen Marine boat engine conducted by your VW Marine Service Partner, as the work required specialised knowledge and special tools.

The following table shows the additional work required.

Work required	Page
Clean air filter element	43
Renewing toothed belt for camshaft drive	
Check pipe bundles of heat exchangers; remove and clean if necessary	

Note

Maintenance must be performed on the reversing gear according to the specifications of the respective manufacturer.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Engine oil

Specifications

A special VW Marine Longlife oil that can be ran as an all-year oil is used in the engine at the factory.

It has special corrosion protection properties to protect the engine in an aggressive environment such as salty sea air. It also protects the engine from inner corrosion during long downtimes, e.g. winter storage.

The container must be labelled with the specifications on this page.

Important note

Of course, engine oils are also constantly being improved. Therefore, the information in this manual can only reflect the status at the time of printing.

VW Marine Service Partners will always be kept up to date on any changes by the factory. Therefore, it is best to have the oil change carried out by a VW Marine Service Partner.

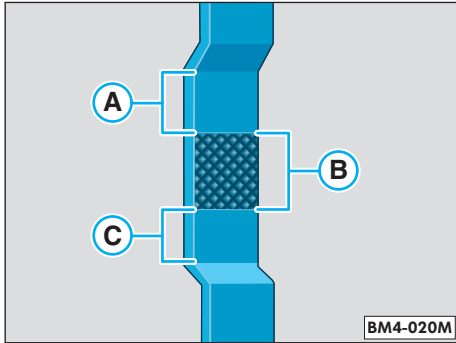
Multi-grade light-running oil:

VW Marine Longlife specification
VW 506 00 (0W30)

Important notes

- **The engine oil named above is a condition for the specified maintenance intervals. Only this oil should be used for topping up.**
- **Avoid mixing with other oils, as otherwise the condition for the maintenance intervals specified in the service schedule will no longer be met.**
- **If the special VW Marine Longlife oil is not available, at least a commercially available oil in accordance with VW 506 00 (0W30) should be used.**

Check engine oil level



Check engine oil level

It is normal for the engine to consume oil. Therefore, the engine oil level must be checked at regular intervals.

The boat must be at rest when measuring the oil level. Wait a few minutes after switching off the engine so that the oil can flow back into the oil sump.

Then pull out the dipstick wipe off with a clean cloth and push dipstick back in as far as possible.

Then pull out the dipstick again and read off the oil level:

- A** - If the oil level is within the range **A**, **no oil may** be added.
- B** - If the oil level is within the range **B**, **oil may** be added.
When doing so, the oil level may then be within the range **A**.
- C** - If the oil level is within the range **C** or below, oil **must** be added. It is sufficient when the oil level is then somewhere within the range **B**.

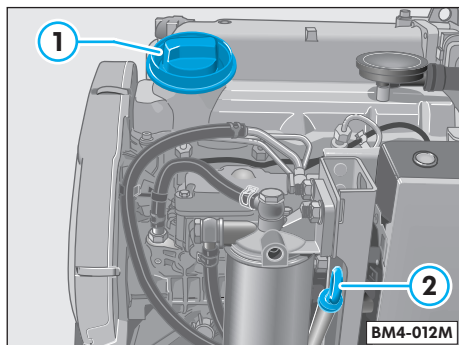
However, the oil level may never be above the range A.

In the case of heavy engine loading, such as during longer engine operation (10 - 12 hours), the oil level should at least lie in the middle of the two markings (min/max).

The quantity difference between the min. and max. mark is 1.0 litre.

Changing engine oil

Changing engine oil



Topping up engine oil

Unscrew the cap **1** of the oil filler opening in the cylinder head cover and add oil in small quantities, checking the oil level with the oil dipstick **2** in the process.

The oil level may never be above the range A. Otherwise oil may be aspirated via the crankcase ventilation.

Important

When adding oil, no oil may get onto hot engine parts - fire danger.

Carefully close the cap **1** of the filler opening and push the oil dipstick **2** in as far as possible. Otherwise, oil could escape with the engine running.

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

The properties of VW Marine Longlife oil not only worsen due to loading during operation, but also due to ageing. The oil change date is therefore dependent on both the running time but also the stationary time.

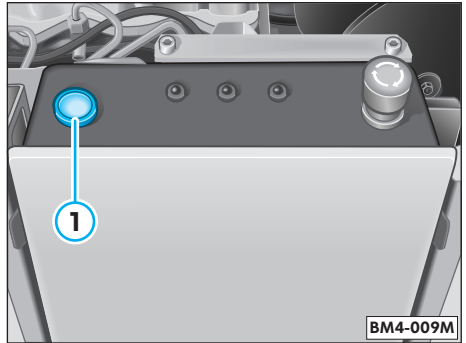
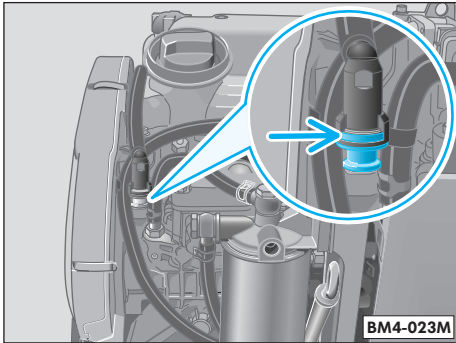
If the engine is constantly operated under extreme operating conditions, the engine oil should be changed at shorter intervals.

The engine oil must be changed at the intervals specified on page 28 and 30. Have the oil changed by a VW Marine Service Partner.

Important

If you wish to change the engine oil yourself, then please be sure to observe the following points:

- **To prevent the danger of burns form hot engine oil, allow the engine to cool down first.**
- **Use a suitable container of a sufficient size to hold the oil filling capacity of your engine when draining the oil.**
- **Wear eye protection.**
- **If your hands come into contact with engine oil, they must be washed thoroughly afterwards.**
- **Used oil must be stored in a safe place out of reach of children until it is properly disposed of.**



- Remove the cover of the oil filter so that the return valve opens and the used oil can flow back into the oil sump.
- Remove the protective cap by pressing the lock -arrow- at the front and rear out of the hose.
- Route the end of the hose into the container provided for the oil change.
- Press and hold the button **2** fuse box/ relay plate with the engine stopped and the ignition switched on until all engine oil is completely pumped out.
- After completing draining, remove the hose from the oil change pump again and refit the protective cap.
- Tighten the oil filter cover with a tightening torque of 25 Nm.

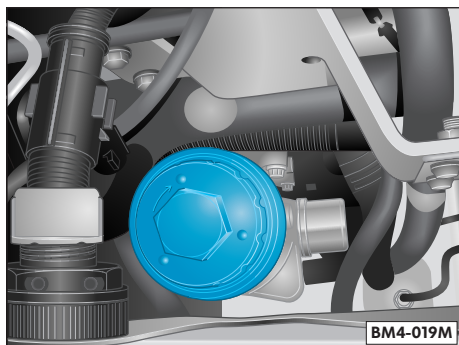
Oil must never get into waterways, the sewer system or the ground.

Due to the disposal problem, it is best to have the engine oil and filter change carried out by a VW Marine Service Partner.

Engine oil additives

No lubricant additives are to be added to the engine oil.

Damage resulting from such agents is excluded from the warranty.



Renewing oil filter element

- Unscrew the cover **1**.
- Separate the filter element from the cap.
- Clean the cover with a clean cleaning cloth.
- Renew the sealing ring on the cover.
- Moisten the new sealing ring with oil.
- Fit the new filter element in the cover.
- Tighten the cover with a tightening torque of 25 Nm.

Pouring in engine oil

For filling quantities, see the chapter "Technical data".

Check the oil level with the oil dipstick - also see page 33.

The oil level must be between the two markings and may never be above the max. mark.

Important

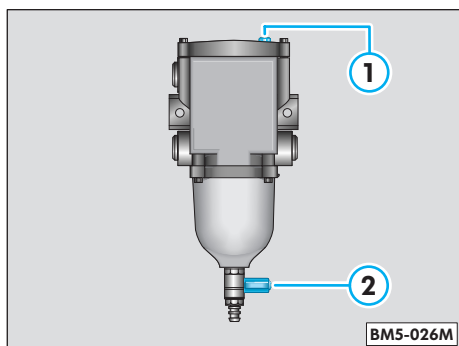
Used oil must be stored in a safe place out of reach of children until it is properly disposed of.



Oil must never get into waterways, the sewer system or the ground.

Due to the disposal problem, it is best to have the engine oil and filter change carried out by a VW Marine Service Partner.

Circulation filter*



Draining water from circulation filter*

The circulation filter* can be cleaned simply by backflushing; this increases the life of the filter element.

Important

If you want to drain the water from the circulation filter yourself, then please be sure to observe the following points:

● **Close the cut-off valve is present. If the engine is equipped with a single filter, switch off the engine. With a double filter, it is sufficient to switch over to the other filter.**

● **Please make sure that no diesel fuel gets onto the hoses. Clean the hoses with water immediately if necessary.**

● **Wear eye protection.**

● **If your hands come into contact with diesel fuel, they must be washed thoroughly afterwards.**

● **Used fuel must be stored in a safe place away from children until its proper disposal.**

● **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

Backflushing

● Switch off the engine (single filter) or switch over to the second filter (double filter).

● Unscrew the bleeder screw **1**.

● Open the drain valve **2** below the bowl and catch fuel in a suitable container until the entire dirt is flushed out of the bowl.

● Close the drain valve **2**.


● Pour clean fuel into the filter via the bleeding hole.

● Screw in the bleeder screw **1** again.

- Start the engine and conduct a visual inspection of the fuel system for leaks.

Notes

- After draining the fuel it is not necessary to bleed the fuel system.
- Should a power drop or excessively high intake resistance not be eliminated by back-flushing, the filter element must be renewed.

 ***Diesel fuel must never get into waterways, the sewer system or the ground.***

Due to the disposal problem, it is best to have the filter change carried out by a VW Marine Service Partner.

Renewing circulation filter*

Important

If you want to change the circulation filter element* yourself, then please be sure to observe the following points:

- **Close the cut-off valve is present. If the engine is equipped with a single filter, switch off the engine. With a double filter, it is sufficient to switch over to the other filter.**
- **Please make sure that no diesel fuel gets onto the hoses. Clean hoses immediately if necessary.**
- **Wear eye protection.**
- **If your hands come into contact with diesel fuel, they must be washed thoroughly afterwards.**
- **The used fuel filter element must be stored in a safe place away from children until its proper disposal.**
- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

Renewing filter element

- Switch off the engine (single filter) or switch over to the second filter (double filter).
- Unscrew the 4 cover screws and take off the cover.
- Remove the filter cartridge.
- Take out the filter insert by the hoop.
- Lay in the new filter element.
- Lay the filter cartridge on the filter element.
- Check the cover gasket for damage and correct seating in the cover.

Note

Should the gasket be damaged, it must be replaced.

- Fit the cover with the gasket and tighten the screws diagonally.

Note

After renewing the filter element, it is not necessary to bleed the fuel system.

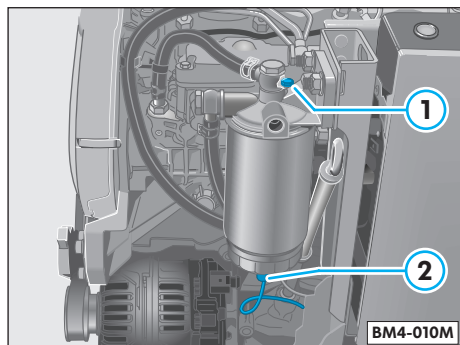
- Turn the ignition key to position 2 (ON) - see page 16 - and leave it in this position for approx. 1 minute. This causes the electrical fuel pump to operate and the fuel system is filled with diesel.
- Start the engine and conduct a visual inspection of the fuel system for leaks.



Diesel fuel must never get into waterways, the sewer system or the ground.

Due to the disposal problem, it is best to have the filter change carried out by a VW Marine Service Partner.

Fuel supply filter



Draining water from fuel supply filter

Important

If you want to drain the water from the fuel supply filter yourself, then please be sure to observe the following points:

- Please make sure that no diesel fuel gets onto the coolant hoses. Clean hoses immediately if necessary.

- Wear eye protection.

- If your hands come into contact with diesel fuel, they must be washed thoroughly afterwards.

- Used fuel must be stored in a safe place away from children until its proper disposal.

- Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

- Unscrew the bleeder screw **1**.
- Open the drain screw **2** by a few turns and can approx. 100 cm³ of fuel with a suitable container.
- Screw in the drain screw **2** again.
- Screw in the bleeder screw **1** again.

Note

After renewing the filter element, it is not necessary to bleed the fuel system.

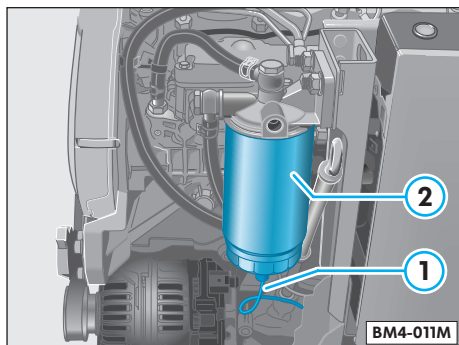
- Turn the ignition key to position 2 (ON) - see page 16 - and leave it in this position for approx. 1 minute. This causes the electrical fuel pump to operate and the fuel system is filled with diesel.

- Start the engine and conduct a visual inspection of the fuel system for leaks.



Diesel fuel must never get into waterways, the sewer system or the ground.

Due to the disposal problem, it is best to have the filter change carried out by a VW Marine Service Partner.



Renewing fuel supply filter

Important

If you want to renew the fuel supply filter yourself, then please be sure to observe the following points:

- **Please make sure that no diesel fuel gets onto the coolant hoses. Clean hoses immediately if necessary.**

- **Wear eye protection.**

- **If your hands come into contact with diesel fuel, they must be washed thoroughly afterwards.**

- **The used fuel supply filter must be stored in a safe place out of reach of children until it is properly disposed of.**

- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

- Disconnect the connector **1** on the cable below the fuel supply filter.

- Screw out the old fuel supply filter **2** and clean the sealing surface of the bracket.

- Moisten the rubber ring of the new filter with diesel fuel.

- Fill the fuel supply filter with clean diesel fuel. This enables the engine to be started more quickly.

- Screw in the filter and tighten it hand-tight.

- Connect the connector **1** on the cable below the fuel filter.

Note

After renewing the filter element, it is not necessary to bleed the fuel system.

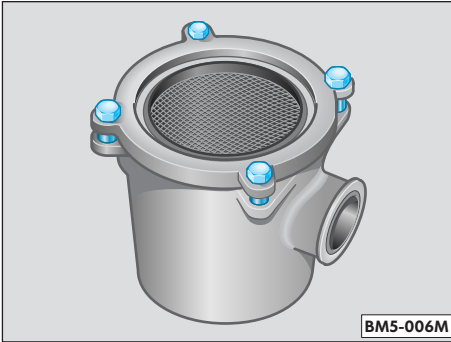
- Turn the ignition key to position 2 (ON) - see page 16 - and leave it in this position for approx. 1 minute. This causes the electrical fuel pump to operate and the fuel system is filled with diesel.

- Start the engine and conduct a visual inspection of the fuel system for leaks.

⚠ Diesel fuel must never get into waterways, the sewer system or the ground.

Due to the disposal problem, it is best to have the filter change carried out by a VW Marine Service Partner.

Seawater filter*



If you determine soiling, proceed as follows:

- Close the seawater valve.
- Unscrew the screws - see left illustration - and remove the cover.
- Remove the filter element, flush it thoroughly with clean water and refit it.
- Before screwing on the filter cover, the sealing ring should be lubricated, e.g. with silicone oil or Teflon spray.
- Check the cover and the seal for proper seating.

Cleaning seawater filter*

Important

- **Never open the filter housing with the seawater valve open to prevent water from entering.**
- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

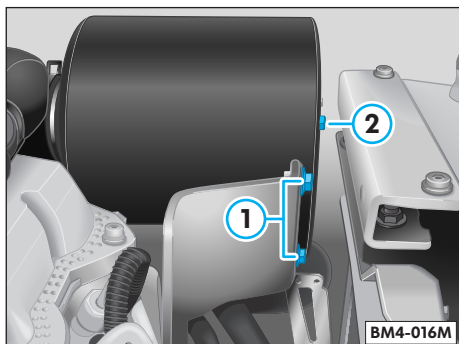
As the degree of soiling of the seawater filter is dependent on the water the engine is operated in, you should check the filter for soiling each time before starting the engine. As the cover of the filter housing is transparent, you do not need to open the cover.

Important

If a cover is not seated correctly, air can also be aspirated, causing the engine to overheat.

- Open the seawater valve again.
- Start the engine and conduct a visual inspection of the seawater filter* for leaks.

Cleaning air filter element



Cleaning air filter element

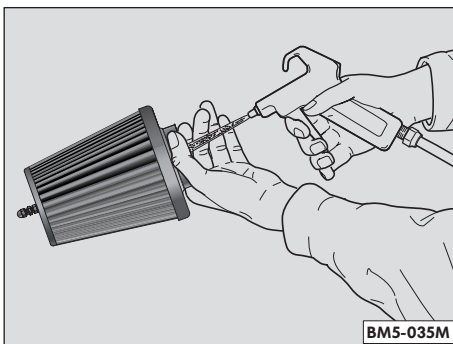
Wash out and oil the filter element as specified in the service schedule.

A dirty air filter element can be recognised from the fact that it has lost its red colour or the dust deposit has reached 3 mm.

If the engine is operated in very dusty areas, clean the filter insert more frequently.

Removing air filter insert

- Unscrew the two screws **1** - see illustration.
- Loosen the clip **3** - see illustration on page 44.
- Detach the air filter from the intake manifold.
- Unscrew the screw **2** - see illustration - and remove the air filter housing from the air filter element.



Cleaning air filter element

- Blow out the filter insert with a **maximum of 2.0 bar compressed air** from the inside outward.

Important

● **Wear protective goggles when blowing out the filter element. Flying dirt particles can get into the eyes - danger of injury.**

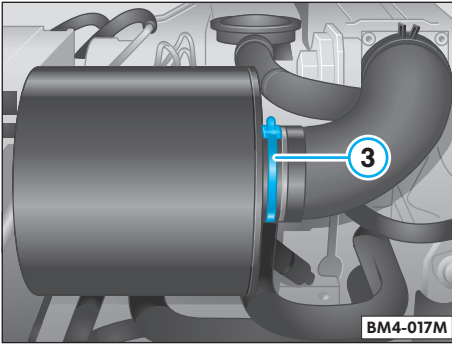
● **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

- Clean the filter element as described in the instructions on the special cleaning and service kit available from a VW Marine Service Partner.

Note

Never use petrol, thinner or other agents for cleaning! There is a danger of the filter element being destroyed.

- Wipe out the air filter housing thoroughly.



Installing air filter element

- Guide the air filter housing over the air filter element and tighten the screw **2** - see left-hand illustration on page 43 - again.
- Push the air filter element with the air filter housing over the intake manifold again.
- Secure the air filter housing with the two screws **1** - see left-hand illustration on page 43.
- Tighten the clip **3**.

Cooling system

The cooling system must be filled with a mixture of water and a 33 % share of our coolant additive G 12 A8C (glycol-based antifreeze with corrosion inhibitors).

This mixture not only offers the necessary frost protection down to -25 °C, it also primarily protects the alloy parts in the cooling system against corrosion. In addition, it prevents lime deposits and considerably increases the coolant boiling point.

For these reasons, you should never dilute the coolant by topping it up with pure water, even during the summer months or in warm climates. **The percentage of coolant additive must be at least 33 %.**

If for climatic reasons greater frost protection is required, the percentage of G 12 A8D can be increased, however only up to 60 % (frost protection down to approximately -40 °C), as otherwise the frost protection is decreased again and the cooling effect worsens.

Coolant loss

The primary cause of coolant loss is system leakage. In this case the cooling system should be checked immediately by a VW Marine Service Partner. Simply continuing to top up the system will not solve the underlying problem.

A leak-free system may also discharge a certain amount of coolant through the discharge tube in response to high engine temperatures.

Coolant additive

Only G 12 A8D coolant additive (antifreeze on glycol basis with corrosion protection additives) or an additive with the specification TL-VW 774 D (see container label) may be used. The coolant additive is available from VW Marine Service Partners.


Other coolant additives can lead to serious reductions in the coolant's ability to inhibit corrosion.

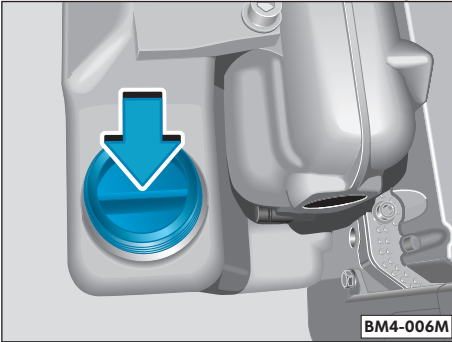
The ultimate result could assume the form of coolant loss and substantial engine damage.

Important

The antifreeze additive and the coolant are potential health hazards!

Always store coolant and antifreeze additive in original containers only, being sure to keep them well beyond the reach of children. Should it be necessary to discharge coolant from the system for any reason, drain it into a container and store it in a safe place.

 **Drained coolant should normally not be reused; it must be disposed of under observance of the applicable environmental protection regulations.**



To obtain correct readings you should check the coolant level with the engine switched off.

Correct coolant level is important for ensuring your coolant system functions at an optimum. You should therefore check the coolant level regularly!

With the engine cold, the coolant must be above the min mark and below the max mark -arrow-.

Note

A low coolant level is measured with a sensor and an insufficient coolant level is shown in the display of the multi-function-indicator, and an acoustic warning sounds.

Checking coolant level

Important

● **Never open the engine compartment cover when you can see steam or coolant escaping from the engine compartment - danger of scalding! Wait until steam or coolant no longer escapes.**

● **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

Visual inspection

Check the coolant hoses for leaks and porosity.

When operating the engine in the tropics, the notes on page 64 must also be observed!

Topping up the coolant

Important

- **Never open the engine compartment cover when you can see steam or coolant escaping from the engine compartment - danger of scalding! Wait until steam or coolant no longer escapes.**
- **Do not open the cooling system cap while the engine is hot - danger of scalding: Remember that the cooling system is under pressure!**
- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

Only use fresh coolant for topping up purposes!

First switch off the engine and allow it to cool down. Then cover the cap with a cloth and carefully unscrew the cap to the left.

If no G 12 A8D or an additive with the specification TL-VW 774 D (see container label) is available, no other coolant additive should ever be used. In such cases, top up with water only and add the approved coolant additive at the earliest opportunity to restore the coolant to the prescribed mixture ratio (see Page 45).

To avoid engine damage you should refrain from adding large amounts of coolant with the engine hot - wait until it has cooled (thermal shock).

Never fill the coolant to beyond the MAX mark:

Excess coolant would be discharged through the system cap pressure release mechanism as soon as the engine warmed to its normal temperature!

Always make sure that the cap is screwed on tightly.

Important note

Please observe the following when adding:

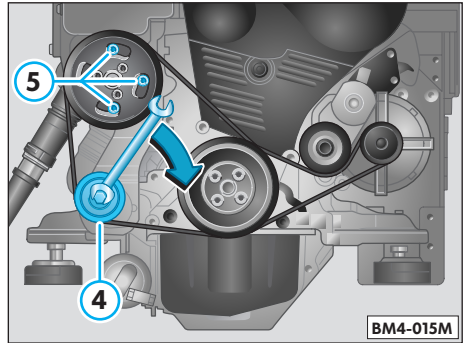
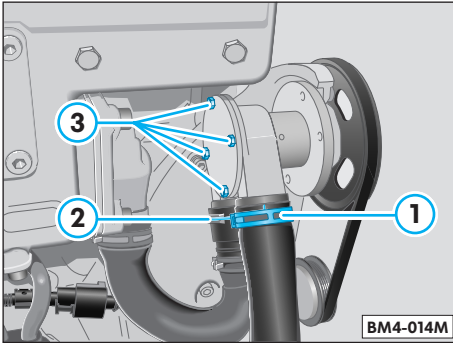
Never mix G12 with other coolant additives (not even with G11).

You can recognise the G12 from its red colour. If the liquid in the expansion tank is brown, G12 has been mixed with another coolant!

In this case, the entire coolant must be changed immediately!

Otherwise serious malfunctions of engine damage may occur!

Seawater pump



Checking seawater pump impeller and renewing if necessary

In accordance with the specifications in the service schedule, the impeller must be checked and renewed if necessary.

Note

The impeller can only be checked with the seawater pump removed.

- Close the seawater valve.
- Disconnect the two coolant hoses by releasing the clip **1** and by pulling back the retaining clip **2** from the seawater pump.
- Mark the running direction of the ribbed V-belt.
- Tension the tensioner **4** in the direction of the arrow - right-hand illustration - with a suitable spanner and remove the ribbed V-belt from the rollers.

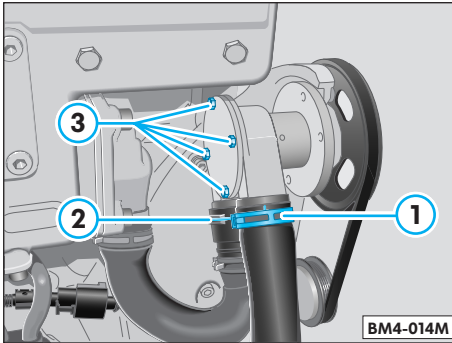
Important

- **Slowly guide the tensioner back into the relaxed position with the spanner - danger of injury!**
- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

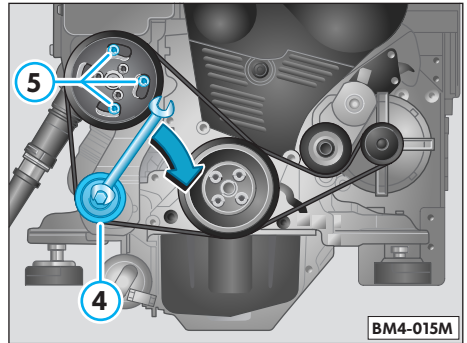
- Unscrew the screws **5**.
- Pull the seawater pump out of the bracket on the side.
- Remove the screws **3** - left-hand illustration - on the back of the seawater pump from the housing and take off the cover.
- Mark the running direction of the impeller and remove the rubber gasket in the middle of the impeller.
- Pull the impeller off the shaft with a suitable puller.
- Check the impeller for damage.

Notes

- The impeller must always be renewed, even in the case of minor damage.
- Make sure you always have a reserve impeller on board.



- Before reinstalling the impeller, grease it with silicone spray or glycerine.
- Push the impeller onto the shaft and press the rubber protection cap into the impeller.
- Screw on the cover again with the screws **3**. Always use a new sealing ring when mounting the cover.



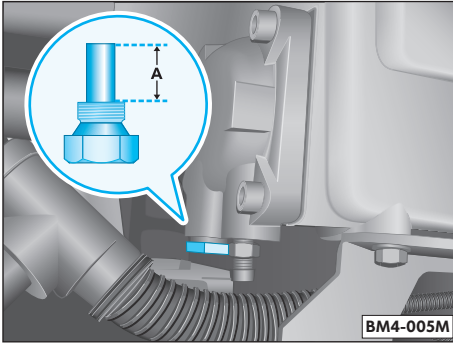
- Insert the seawater pump in the bracket and secure it with the screws **5** on the bracket.
- Press in the retaining clip **2** - left-hand illustration - again and push the two coolant hoses onto the seawater pump. The rear hose must engage. Tighten the clip **1** of the front hose again.
- Tension the tensioner **4** with a suitable spanner and lay the ribbed V-belt on the rollers in the running direction.

Important

Slowly guide back the tensioner with the spanner - danger of injury!

- Open the seawater valve.
- Start the engine and check the cooling system for leaks.

Reactive anode



Checking reactive anode of coolant system and renewing if necessary

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

The reactive anode in the cooling system must be checked in accordance with the specifications in the service schedule and renewed if necessary.

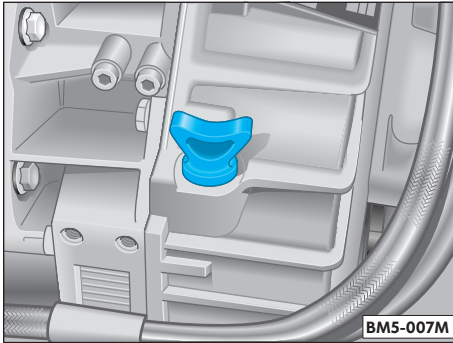
Check the reactive anode, as it protects the engine from galvanic corrosion.

A new reactive anode has a length of dimension A = 20 millimetres - see illustration.

The anode must be replaced with a new one when more than 50 % (10 millimetres) of it has been used.

Use only genuine Volkswagen Marine parts, as an incorrect composition of the anode can result in serious corrosion damage in the engine.

Reversing-gearbox oil level



Check reversing-gearbox oil level

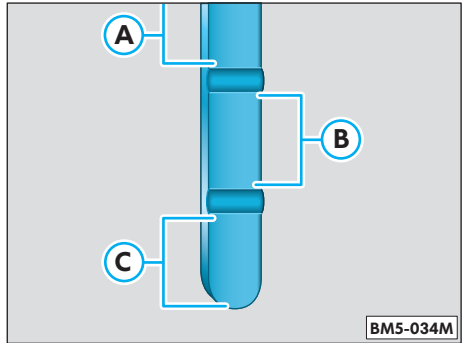
Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

The reversing-gearbox oil level must be checked at regular intervals.

The boat must be at rest when measuring the oil level. Wait a few minutes after switching off the engine so that the oil can flow back.

Then screw out the oil dipstick, wipe it with a clean cloth and guide the oil dipstick into the opening again.



Then pull out the oil dipstick again and read off the oil level:

A - If the oil level is within the range **A**, **no** oil may be added.

B - If the oil level is within the range **B**, oil may be added.

When doing so, the oil level may then be within the range **A**.

C - If the oil level is within the range **C** or below, oil **must** be added. It is sufficient when the oil level is then somewhere within the range **B**.

However, the oil level may never be above the range A.

In the case of especially heavy gearbox loading, such as during longer engine operation (10 - 12 hours), the oil level should at least lie in the middle of the two markings (min/max).

Changing reversing-gear oil

The reversing gear oil must be changed in accordance with the specifications of the respective manufacturer.

Ribbed V-belt

Checking ribbed V-belt

Important

- **The ribbed V-belt may only be checked or renewed with the engine stopped - danger of injury!**
- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

Check the ribbed V-belt for wear, separations and cracks.

Ribbed V-belts in poor condition must be replaced.

Should you not be sure whether the ribbed V-belt is damaged, please contact a VW Marine Service Partner.

Note

It is always advisable to keep replacement ribbed V-belts on board.

Battery*

Important

The following warnings and safety precautions must be observed when working on the battery.



Wear eye protection. Avoid allowing acid or lead particles to come into contact with your eyes, skin or clothing.



Battery acid is highly corrosive. Wear eye protection and protective gloves. Never tilt the battery, as acid could emerge from the ventilation openings.

Flush the eyes with clean water for several minutes if acid splashes into them. Consult a doctor immediately. If you get electrolyte spray on your skin or clothing, you should apply a mild soap to neutralise the acid and rinse with plenty of water. If battery acid is accidentally ingested, you should consult a physician immediately.



A highly-explosive gas is generated whenever you charge the battery.



Always avoid sparks and open flame near the battery; never smoke in its vicinity. Take care to avoid generating sparks when working with cables, wiring and electrical equipment. Avoid short circuits. Never short-circuit the battery terminals as dangerous high-voltage sparks could cause injury.



Keep children well away from batteries and battery acid.

- Always switch off the engine, the ignition and all electrical consumers and press the Stop button before working on the electrical system. The negative cable must be disconnected at the battery.

- When disconnecting the battery from the vehicle electrical system, start by detaching the earth cable, then proceed to the positive side. The battery may not be disconnected with the engine running or with the ignition switched on, as otherwise the electrical system (electronic components) will be damaged.

- When reconnecting the battery cables, start by attaching the positive side first. Attach the negative cable last. Never connect either cable to the incorrect battery terminal, as a cable fire could result!

The battery may not be disconnected with the ignition switched on or with the engine running, as otherwise the electrical system (electronic components) can be damaged.

To protect the housing from UV rays, do not expose the battery to direct sunlight.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Acid level

Check the acid level and add distilled water if necessary up to the acid level marking or 5 mm above the separators.

Charging state

Determine the battery charging state by checking the acid density or the battery voltage.

Acid density (specific weight)

charged = 1.285

discharged = 1.12

Total voltage

Determine the total voltage only when the battery is loaded with a voltage tester:

- test duration: 5 to 10 seconds
- nominal voltage 12 volts
- discharged 9.6 volts

Battery terminals

Clean and grease terminals and note external condition of battery, e.g. raised plates, cracked housing.

Observe the instructions on page 53.

Checking acid level

Please observe the warnings on the previous page.

The battery is virtually maintenance-free under normal operating conditions. However, at high outside temperatures or during long, daily operating hours it is advisable to check the acid level from time to time. The acid level must also be checked after each charging process.

Battery without magic eye

The acid level is always to be at the **max.** mark on the long side. Never top up above the **max.** mark and do not allow the acid level to drop below the **min.** mark.

The concerned battery cells must be filled up to the **max** mark with distilled water at the latest when the acid level reaches the **min** mark.

Do not overfill the battery cells as the battery acid could then escape through the gas escape holes. This can lead to parts and corrosion damage.

After topping up, the battery cell must be tightly sealed with the battery plugs.

We recommend having the acid level checked and corrected by a VW Marine Service Partner.

Note

The use of gel batteries on board is recommended.

Removing battery

Start by making certain that the ignition and all vehicular electrical equipment and systems are switched off.


To remove the battery, first disconnect the negative cable (usually black or brown), then the positive cable (usually red). Then unscrew the battery mounting.

Renewing battery

If the battery is renewed, the new battery must have the same voltage (12 V), design and safety characteristics, such as central venting and an O-ring seal for the battery plugs.

The amperage and capacity should match. VW Marine Service Partners offer a range of suitable batteries.

When installing the battery, make sure that the ignition and all current consumers are switched off.

 ***Due to the disposal problem regarding used batteries, it is best to have a battery renewed by a VW Marine Service partner. Batteries contain sulphuric acid and lead and may never be disposed of in household refuse.***

Connecting battery

Before connecting the battery, switch off the ignition and all current consumers.

Place the battery in the location provided and secure the battery with the battery bracket.

To connect the battery, first disconnect the positive cable (usually red), then the negative cable (usually black or brown).

Charging battery

Important

Observe the warnings on the pages 53 and the information of the charger manufacturer.

Note

To charge the battery of the on-board electrical system, the use of special boat chargers that prevent gassing is recommended.

Before recharging, make certain that the ignition and all electrical consumers are switched off.

When charging at low amperages (e.g. with a trickle charger), the connection cables normally do not need to be removed. However, the specifications of the charger manufacturer must always be observed.

Before **rapid charging**, i.e. charging at high amperages, both connection cables must be removed.

Always observe the following precautions:

Important

- **Keep children away from the battery, battery acid and the charger.**
- **Only charge the battery in well-ventilated rooms. Do not smoke and keep naked flames and electrical sparks at a distance, as a highly explosive electrolytic gas mixture is emitted when the battery is being charged.**
- **Protect your eyes and face. Do not bend over the battery.**

- **Flush acid splashes in the eyes or on the skin with clean water for several minutes. Then consult a doctor immediately.**

- **Rapid charging a battery is dangerous and should only be carried out by a VW Marine Service Partner, as special chargers and knowledge are required.**

- **Never charge a frozen battery - danger of explosion! A discharged battery can already freeze at temperatures of under 0 °C. A frozen battery must always be thawed before charging.**

We do not advise the continued use of thawed batteries, as the battery casing may be cracked by the formation of ice and battery acid may flow out as a result.

- The battery plugs should not be open during charging.

- Always ensure that the charger's terminal clamps are correctly and securely attached to the battery terminals before inserting its electrical plug in the mains socket:

red = positive
black or brown = negative.

- After charging, first switch off the charger before reconnecting the battery properly.

Engine test run

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Warning lamps

Check the warning lamps for the coolant, the alternator and the engine oil pressure. The warning lamps light up when the engine is shifted into the operating position and must go out again after the engine is started.

Starting engine

Check the starting behaviour of the engine during starting.

Leaks

Check the cylinder head cover, oil filter, fuel system and cooling system for leaks.

Exhaust system

Check the exhaust system for leaks and damage.

Preserving engine

Preparing engine for winter

Depending on the operating conditions, Volkswagen Marine boat engines must be protected against possible corrosion damage.

It is not necessary to use special corrosion protection oils (see engine oil specifications on page 32).

Changing engine oil and oil filter element

For units you shut for longer periods

- e.g. after the end of the season - please carry out preservation in the specified order:

- 1 - Thoroughly clean all parts to be preserved.
- 2 - Allow the engine to warm up.
- 3 - After switching off the engine, renew the oil filter element and pump off the engine oil - see page 36 and 34.
- 4 - Add 6.0 litres of engine oil and run the engine for approximately 30 seconds at increased idling speed.
- 5 - Switch the engine off.

6 - Plug all openings (e.g. exhaust pipe, air filter) to prevent the penetration of dirt or moist air.

7 - Spray the engine with an anti-corrosion agent from the outside.

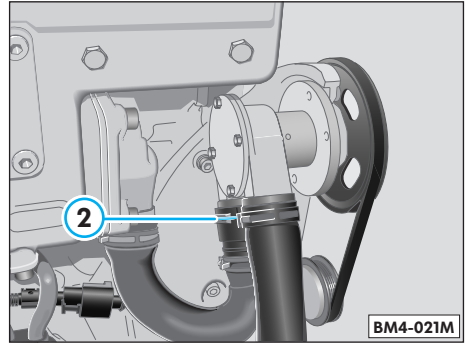
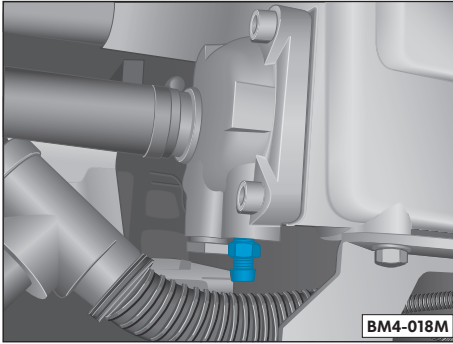
A corresponding anti-corrosion agent is available from VW Marine Service Partners.

Note

On engines that run at least 20 minutes under load every two weeks, no corrosion protection is required. However, the engine oil must be changed at the intervals specified in the service schedule.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.



Flushing and draining seawater cooling system

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Flushing and subsequent draining of the seawater cooling system with fresh water is very important for preventing corrosion and frost damage.

The flushing process should be carried out together with the engine oil change.

Conduct flushing in the specified order:

- 1 - Close the seawater valve.
- 2 - Open and clean the seawater filter - see page 42.
- 3 - Fill the seawater filter with fresh water and run the engine at idle.

Make sure that the seawater filter is always filled with fresh water to prevent the seawater pump from running dry. This would cause the pump to become defective.

It is important that the engine runs for a while so that all sludge and salt residues are flushed away that could otherwise promote corrosion.

- 4 - Switch off the engine again.
- 5 - Screw on the cover of the seawater filter.
- 6 - Fit a suitable hose on the connection - see Fig. BM4-018M - of the drain screw **1**.
- 7 - Open the drain screw **1** - see Fig. BM4-018M - and catch the water with a suitable container.
- 8 - Loosen the retaining clip **2** - see Fig. BM4-021M - and pull off the hose. Catch the water with a suitable container.
- 9 - After draining is complete, pull the hose off the drain screw **1** again, close the drain screw **1** and reattach the hose **2**.

Note

Also remember to remove the water from the exhaust plenum chamber. For an exact description of the process, please see the manual of the respective manufacturer.

Fuel system

The fuel system also requires an inspection and care at the end of the season.

Please observe the following:

- To prevent condensation water in the tank, completely fill the tank before the end of the season.
- Check the fuel system for leaks.
- Drain the water from the circulation filter - see page 37.
- Renew the fuel filter - see page 41.

Important

There is fire danger with a leaky fuel system.

If you want to drain the water from the circulation filter and renew the fuel supply filter yourself, then please be sure to observe the following points:

- **Please make sure that no diesel fuel gets onto the coolant hoses. Clean hoses immediately if necessary.**
- **Wear eye protection.**
- **If your hands come into contact with diesel fuel, they must be washed thoroughly afterwards.**
- **The used fuel and fuel supply filter must be stored in a safe place out of reach of children until it is properly disposed of.**
- **Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.**

Winter operation

An inspection service should always be conducted on the Volkswagen Marine boat engine before the start of the cold season. In addition, please observe the following instructions when operating the Volkswagen Marine boat engine at extremely low temperatures:

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Battery

The battery capacity decreases as the temperature drops. This is due to its chemical and physical properties. This is why an extremely cold battery, which is also not well charged, only has a fraction of the starting power it has at normal temperatures.

We recommend recharging the battery every 6 to 8 weeks in the winter. The acid level and density must be checked. The voltage of the cells must be measured with the battery loaded.

It is best to have this work conducted by a VW Marine Service Partner.

If the engine is not used for several weeks at extremely low sub-zero temperatures, the battery should be removed and stored in a frost-proof room to prevent it from freezing and being destroyed.

Cable connections

Check and clean all cable connections, as oxidised connections lead to voltage drops and starting difficulties.

Cooling system

The coolant consists of 67 % water and a 33 % share of our coolant additive **G 12 A8C** (glycol-based antifreeze with corrosion protection additives).

It is advisable to use and antifreeze effective down to -25 °C.

At temperatures down to -30 °C a mixture in a ratio of 55 % to 45 %, and down to -35°C one of 50 % to 50 % should be used.

If for climatic reasons greater frost protection is required, the percentage of G 12 A8D can be increased, however only up to 60 % (frost protection down to approximately -40 °C), as otherwise the frost protection is decreased again and the cooling effect worsens.

Only our **G 12 A8D** or an additive with the **specification TL-VW 774 D** (see container label) may be used as a coolant additive. These additive are available from VW Marine Service Partners.

Other coolant additives can lead to considerable reduction in corrosion protection.

The resulting corrosion damage can lead to coolant loss and subsequently to major engine damage.

Important note

Please observe the following when topping off:

Never mix G12 with other coolant additives (including not with G11).

You can recognise the G12 from its red colour. If the liquid is brown, G 12 has been mixed with another coolant!

In this case, the coolant must be changed immediately!

Otherwise serious malfunctions or engine damage may occur!

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Tropical operation

To protect the engine against heat, dust and corrosion, the following measures are required:

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Engine

If the unit is not operated for a longer period, the engine should be protected against possible corrosion damage. See the chapter "Preserving engine".

Battery

Check the battery acid level above the upper edge of the plates weekly. It is approx. 5 mm or can be read off at the existing acid level marks. In case of losses due to evaporation, only distilled water may be added. Observe the instructions on pages 53.

Air filter element

If the engine is to be operated in very dusty areas, check the filter element more frequently. Observe the instructions on page 43 for this purpose.

Cooling system

The coolant level must be checked daily. If a coolant loss is determined, the cooling system must be checked for leaks, as normally coolant losses hardly occur in the closed cooling system. Observe the instructions on the pages 11, 45 and 53.

Fuel supply filter

Drain the water from the filter weekly. The fuel filter should be changed earlier than specified in the service schedule if necessary. Observe the instructions on the pages 37 and 40.

SDI 40-4 Diesel Engine

Engine data		
Output	<i>at rpm</i>	29 kW (40 bhp)/2,600
Maximum torque	<i>in Nm at rpm</i>	125 / 2000
Number of cylinders, displacement		4 cylinders, 1,900 cm ³
Compression ratio		19.5
Bore/stroke in mm		79.5/95.5
Weight in kg ¹⁾		198
Diesel fuel		at least CN 49 as per DIN EN 590 or bio-diesel as per DIN 51606 EU3 standard
Complies with the following emission legislation		3)
Fuel consumption		
Min. specific	<i>in g/kWh</i>	220
Filling capacities		
Coolant	<i>in litres</i>	approx. 8.0 G12
Hydraulic oil		
Depending on reversing gear type	<i>in litres</i>	approx. 2.5 - 3.5
Engine oil ²⁾ with filter change The oil level must be checked when topping up. Do not overfill!		4,5
VW Marine Longlife oil	<i>Specification</i>	VW 506 00 (0W30)

1) The weight corresponds to a dry engine, with ancillary units, cooling system and clutch flange.

2) For additional information see "Engine oil" on page 32.

3) Specification was not available at the editorial deadline.

SDI 50-4 Diesel Engine

Engine data		
Output	<i>at rpm</i>	37 kW (50 bhp)/3000
Maximum torque	<i>in Nm at rpm</i>	125/2,000
Number of cylinders, displacement		4 cylinders, 1,900 cm ³
Compression ratio		19.5
Bore/stroke in mm		79.5/95.5
Weight in kg ¹⁾		198
Diesel fuel		at least CN 49 as per DIN EN 590 or bio-diesel as per DIN 51606 EU3 standard
Complies with the following emission legislation		3)
Fuel consumption		
Min. specific	<i>in g/kWh</i>	220
Filling capacities		
Coolant	<i>in litres</i>	approx. 8.0 G12
Hydraulic oil		
Depending on reversing gear type	<i>in litres</i>	approx. 2.5 - 3.5
Engine oil ²⁾ with filter change	<i>in litres</i>	4,5
The oil level must be checked when topping up.		
Do not overfill!		
VW Marine Longlife oil	<i>Specification</i>	VW 506 00 (0W30)

1) The weight corresponds to a dry engine, with ancillary units, cooling system and clutch flange.

2) For additional information see "Engine oil" on page 32.

3) Specification was not available at the editorial deadline.

SDI 60-4 Diesel Engine

Engine data		
Output	<i>at rpm</i>	44 kW (60 bhp)/3,600
Maximum torque	<i>in Nm at rpm</i>	125/2,000
Number of cylinders, displacement		4 cylinders, 1,900 cm ³
Compression ratio		19.5
Bore/stroke in mm		79.5/95.5
Weight in kg ¹⁾		198
Diesel fuel		at least CN 49 as per DIN EN 590 or bio-diesel as per DIN 51606 EU3 standard
Complies with the following emission legislation		3)
Fuel consumption		
Min. specific	<i>in g/kWh</i>	220
Filling capacities		
Coolant	<i>in litres</i>	approx. 8.0 G12
Hydraulic oil		
Depending on reversing gear type	<i>in litres</i>	approx. 2.5 - 3.5
Engine oil ²⁾ with filter change The oil level must be checked when topping up. Do not overfill!		4,5
VW Marine Longlife oil	<i>Specification</i>	VW 506 00 (0W30)

1) The weight corresponds to a dry engine, with ancillary units, cooling system and clutch flange.

2) For additional information see "Engine oil" on page 32.

3) Specification was not available at the editorial deadline.

Engine characteristic data

Important note

Please always specify the model with the engine number or the engine code when making all queries, any complaints and when ordering spare parts.

This will prevent misunderstandings when processing your query.

Before you read off the characteristic data, stop the engine and allow it to cool down.

Important

Observe the safety precautions beginning on page 17 before performing out any work on the engine or in the engine compartment.

Identification plate

The identification plate is located in the front on the toothed belt guard.

Engine code/Engine number

The engine code and the engine number are stamped on the left-hand side of the cylinder block next to the fuel pump. In addition, they can also be found on the identification plate.

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