



**Design and Operation** 





These installation instructions show the design and For current test, adjustment and repair instructions, operation of new developments! The contents will not be updated.

I

please see the Service literature intended for this purpose.

This installation description explains the procedure for the installation of all 5-cyl. Volkswagen Marine Boat Engines

# **General Information**

- The Volkswagen Marine Accessories Catalogue contains the extensive range of Volkswagen Marine accessories.
- Products that are not listed in these installation instructions or the Volkswagen Marine Accessories Catalogue, but are required, should be purchased exclusively from specialised dealers.

Correct professional installation of the engine and its attached parts is very important for ensuring that all the components will operate together properly.

This work must therefore be carried out with extreme care.



Example: 5-Cyl. SDI 55-5

EB5-0001

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- In order to remove the Volkswagen Marine boat engine from the transport container, the transport eyes included in the tool set must be screwed into the threaded mounts provided (see arrows in the illustration). A motorised crane and the appropriate lifting gear should be used.
- The two hanging eyes provided on the engine (see illustration) must be used when installing and removing the Volkswagen Marine boat engine
- The installation location and space for the engine must be selected so that maintenance work on the engine can be carried out without problems.

Sufficient space must be created for installing and removing the engine.



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The qualified experts on the Volkswagen Marine Team are available to answer special questions and provide technical information on all aspects of the installation of the Volkswagen Marine boat engine.

# Adjusting throttle Bowden cable on throttle-lever position sender

Adjust the throttle Bowden cable so that a dimension of 65 mm results between the idling position and the full-throttle position (see illustration).

# Note

The sensor dimension must be complied with to achieve the full engine output.



# Retrofitting reversing gear on the Volkswagen Marine boat engine

• When retrofitting the reversing gear, you must observe various things and replace components. Please contact the Volkswagen Marine Team for this purpose.

# Engine with reversing gear in operation

• Observe the information on this topic in your operating instructions.

# Engine with Z-drive

- Please see the manufacturer's guidelines for installing and tuning Z-drives.
- With a Z-drive the seawater side in the Z-drive must be removed from operation (see manufacturer's installation instructions).

# **Propeller model**

• When selecting a propeller, ensure that the motor can achieve nominal speed in all operating modes.

# Operation with battery cut-off diodes

- Operation with battery cut-off diodes is not permissible.
- Exclusively use a battery split-charge relay for this purpose. In case of queries, please contact your nearest Volkswagen Marine dealer.

## Individual instrumentation (optional)

 If you require individual instrumentation, please contact your nearest Volkswagen Marine dealer.

### Connecting a hot water boiler

• If you require a hot water boiler, please contact your nearest Volkswagen Marine dealer.



If you do not observe the installation guidelines, you could damage your Volkswagen Marine boat engine.

# Introduction

Volkswagen Marine boat engines are operated with wet exhaust systems. The wet exhaust system has its name from the introduction of water.

After the exhaust plenum chamber or turbocharger the flow of exhaust gas is deflected through the exhaust-pipe connection piece. In these exhaust-pipe connection pieces the raw water/seawater is injected into the exhaust gas of the engine.

### Note

The water collector (item 4 in the illustration) should be of a size to hold all the seawater flowing back when the engine is not running.

The raw water/seawater mixes with the exhaust gases and greatly cools them down so that rubber connection hoses and PVC parts can be used for the remainder of the exhaust system that must have a temperature stability of at least 200 °C.



EB5-0084

### Legend

- Goose neck (the lower edge of exhaust pipe with stern bushing must be at least 5 cm above the waterline)
- 2. Waterline
- 3. Silencer
- 4. Water collector
- 5. Exhaust pipe

6. Ventilation unit

(mount at least 15 cm above the waterline)

- 7. Engine
- 8. Seawater filter
- 9. Seawater valve
- 10. Intake fitting
- 11. Stern bushing

# Notes

 The entire exhaust system should be installed with as few pipe bends as possible. The line cross-section should not be less than 100 mm. The hoseconnections must always be secured

with double hose clips. The hose connections and rubber muff couplings must be temperature-resistant.

• With the Z-drive the rubber muff coupling to the exhaust-pipe connection piece on both sides must be shortened and adjusted evenly (see shaded area -A- in the illustration).



EB5-0005

When designing the exhaust system ensure that it is not so long as to exceed the correct maximum value for the exhaust gas counter-pressure.

The values for the maximum exhaust gas counter-pressure of the respective engine at nominal output:

- SDI 55-5 at 40 kW = 60 mbar
- SDI 75-5 at 55 kW = 150 mbar
- TDI 100-5 at 74 kW = 120 mbar
- TDI 120-5 at 88 kW = 200 mbar
- TDI 150-5D at 108 kW = 250 mbar
- TDI 150-5 at 111 kW = 250 mbar



# Legend

- 1. Sealing plug for exhaust gas extraction
- 2. Exhaust gas inlet
- 3. Connection for raw-water temperature sensor (optional)



These values may not be exceeded.

Measurement is conducted at the exhaust-gas connection piece.

For this purpose you must unscrew the measuring screw (see illustration - item 1) on the exhaust gas connection piece and insert the exhaust gas extraction probe.

### Note

In place of the sealing plug you can also install an exhaust-gas temperature sensor.



### Legend

EB5-0087

- 1. Sealing plug for exhaust gas extraction
- 2. Exhaust gas inlet
- 3. Connection for raw-water temperature sensor (optional)

## Notes on installation of unit mounting

- The unit mounting may not be twisted during installation. Otherwise heavy vibrations and damage can occur.
- Make sure that there is no twisting on the output train and the unit mountings after installing and aligning the engine.
- Use only the original Volkswagen Marine unit mountings.
- The mounting bolts for the unitmounting on the boat hull must be provided with washers (see illustration on page 12).

# Procedure

The unit mounting should be uniformly loaded at all mounting points after installing the engine.

Centre and tilt the engine to the corresponding height with the height adjustment (see item 3 in the illustration) on the unit mounting.

Centring in the centre of the height adjustment is ideal.

After aligning the engine, secure the screw fittings (see illustration item 1) on the unit mountings evenly and with a torque of  $105 \pm 5$  Nm.



### Legend

- 1. Mounting nut:  $105 \pm 5$  Nm
- 2. Washer
- 3. Height adjustment
- 4. Unit mounting with base plate



To prevent lateral turning (twisting) during tightening, you must brace the height adjustment -arrow- of the unit/engine mounting with a suitable tool (e.g. open end spanner).

To mount the base plate on the boat hull, use mounting bolts with a suitable washer.



EB5-0077

Dimensions of unit mounting





# **Connections on engine**

- The electrical wiring connections with multi-pin connectors to the engine fuse box/relay plate, and the main wiring loom with high-voltage connectors are easy and safe to install.
- The multi-pin connectors **-A-**, **-B-** and **-C-** of the engine fuse box/relay plate and the connection unit/relay box must be screwed in the direction indicated by the arrow until they can be felt to lock into place and the plug is securely connected.

### Note

The wiring loom spanners T 01905 and T 01906 must be used to remove and fit the multi-pin connectors.



The multi-pin connectors -A- and -Bare already pre-mounted at the factory. The connector -C- must be fitted after installing the engine.



EB5-0010



EB5-0009

### **Battery connection**

The battery connection cable included with the engine is equipped with a special high-voltage plug on the engine end. The other end of the cable must be shortened to the appropriate length and suitable crimp connectors mounted on it.





Connect the high-voltage plug **-2**- on the battery connection cable in the direction indicated by the arrow to the engine connection plug **-1**- on the engine.

Use only high-quality battery terminals for the connections to the battery.

- The black cable (earth) must be connected to the negative terminal of the battery.
- The red cable (positive) must be connected to the positive terminal of the battery.



EB5-0089

### Note

It is advisable to install a blade-type fuse with 400 A immediately in front of the battery connection. In addition, you should install a main battery switch in the supply line that immediately opens the main power circuit in case of danger and when working on the engine.



EB5-0012



When mounting the ring cable lugs on the cable ends (35 mm<sup>2</sup>) of the battery connection cable, ensure that the crimp connection has been installed properly.



# Connecting a clutch switch (only Mercruiser™ "Alpha one"™ Z-drive)

When using an "Alpha one"™ Z-drive from Mercruiser™, a clutch switch -arrow- must be connected.

# Note

Refer to the instructions in the Mercruiser™ manual to adjust the gear change cables.



EB5-0098

For this purpose the plug **-2**- installed at the factory (on the rear of the engine) must be connected to the gearbox variant plug **-1**- from the switch of the switching unit provided by Mercruiser<sup>™</sup>.

This gearbox variant plug **-1-** must be ordered separately with the engine.



EB5-0099



This switch must be a "break contact element". This means that the switch is closed in the "off" position.

# Main wiring loom (instrumentation)

The connection cables available from Volkswagen Marine in various lengths (see illustration) must be connected with the central multi-pin connector of the engine fuse box/relay plate (see illustration on page 22 - Connection to engine). The other end of the connection cable is connected to the connection unit/relay box.

Various cable lengths are available.





# Description of connection unit/relay box

# Relays

417	Alarm relay
418	Relay for instrument lighting
53	Ignition on relay

S 10A Connection unit/relay box fuse.

### **Multi-pin connections**

- X1 Signals from engine
- X2 Signals to additional connection units/relay boxes
- X4 + X5 D + isolation relay control

### Positive/earth

Power supply for the connection unit/ relay box (only if supply cable > 10 m)

- N1 + N2 Connection of neutral switch of throttle lever
- X3 Main panel Connection for main instrumentation
- X12 Connection for extended instrumentation



EB5-0042

# Dip switch -A- (factory setting)

1 - on neutral:	switched to "off"with
	additional connectionunit/
	relay box

- 2 on engine speed signal: do not change
- 3 off D + charge: do not change
- 4 off speed: with conventional rev. counter set to "on"
- 5 on CAN-L: with Volkswagen Marine rev. counter set to "on"
- 6 off n.C.: not in use



EB5-0022

# Connecting a gearbox neutral switch (engine with reversing gear)

If you have ordered your Volkswagen Marine boat engine complete with reversing gear, then this connection comes pre-mounted at the factory.

### Note

If the reversing gear is retrofitted, the connection cable with plug **-A-** (on the rear of the engine) must be connected to the connection cable **-B-**, from the neutral switch of the reversing gear.



EB5-0055

# Main instrumentation (first control stand)

Volkswagen Marine offers you two instrumentation options for your boat. You can either use the full set of modern instrumentation from Volkswagen Marine or you can put together a customised set of your own design.

Volkswagen Marine boat engines are designed for use with instruments of the VDO "Ocean Line"™ White.

The extensive functions of the multi-function display are only available when the Volkswagen Marine rev. counter is used. This rev. counter is included in both the main and the flybridge instrumentation from Volkswagen Marine.



EB5-0036

# Note

If you require individual instrumentation, please contact your nearest Volkswagen Marine dealer.

# Installation overview of standard main instrumentation

The main instrumentation consists of two components, i.e. the instrument panel and the connection unit/relay box.

The installation template for cutting out the instrument panels is provided from page 50.



# Installing the connection unit/relay box

The installation location for the connection unit/ relay box should be below the instrument panel and not more than one metre away (connection cable is only available in a length of 2 m).



EB5-0040

The connection cable for connection to the connection unit/relay box and the instrument panel is included.



EB5-0018

## **Connection to engine**

Connect the multi-pin connections of the main wiring loom to the fuse box/relay plate (connection **-C-**).



EB5-0009

### Connection to connection unit/relay box

Connect the other end of the main wiring loom with the multi-pin connection to connection **-C-** on the connection unit/relay box **-A-**.

### Note

If the main wiring loom is longer than 10 m, an additional power supply is required, (see page 23) - Connecting an additional power supply.



EB5-0019

# Connecting an additional power supply:

- Connect the tab contact **-A** in the connection unit/relay box marked with "**+**" to the positive terminal of the starter battery via the battery main switch.
- Connect the tab contact **-B** marked with "-" to the negative terminal of the starter battery.



EB5-0056

### Connection to the main instrument panel

Connect the tab receptacle marked with "Main Panel" in the connection unit/relay box using the connection cable for the main instrument panel. The plug for the main instrument panel **-A-** must be connected to the tab receptacle **-B-** "**X2**" on the rear (see illustration).



EB5-0039

# Connecting throttle-lever neutral position switch

The two connection contacts **-C- "N1" + "N2"** in the connection unit/relay box must be connected to the neutral position switch located in the throttle lever.



If your throttle lever is not equipped with a neutral position switch, then the two contacts -C- "N1" + "N2" must be bridged. In this case the neutral position switch on the reversing gear must be connected, see page 18 - Connecting gearbox neutral switch - as otherwise the safety function "Block starting with gear engaged" is inoperative.



EB5-0016



Should you connect neither a neutral position switch on the gearbox nor a neutral position switch on the throttle lever, then the safety function "Block starting with gear engaged" is inoperative.

Operation under this condition is prohibited!

# Notes

Dip switch **-A-** on the connection unit/relay box is set for one control stand at the factory.

Normally a change in the switch position on the connection unit/relay box is only necessary if you want to connect a second control stand (see page 28).



EB5-0022

### Installing the main instrument panel

Connect the connection unit/relay box with the connection cable as described on page 20 (Installation overview of standard main instrumentation).

### Note

An installation template for cutting a space for the main and flybridge instruments is provided from page 50.

# **Connecting navigation instruments**

In order to fully utilise the extensive functions of the multi-function display you must connect the main or flybridge instrument panel to a navigation instrument with an NMEA interface (e.g. GPS receiver, LOG etc.).

For this purpose, connect the connection terminal -**A-** marked with **"X3"** to the NMEA interface of your navigation instrument:

- Plug connector "X3" Terminal "1" for connection NMEA-B
- Plug connector "X3" Terminal "2" for connection NMEA-A



EB5-0062

### Note

To configure your multi-function display, please read the additional operating instructions for the multi-function display in your operating instructions.

# Installation overview of main instrument panels with dual engines

The installation template for cutting out the instrument panels is provided from page 50.



EB5-0048

# Installation overview of instrument panels with second control stand

For installation instructions see page 29.

The installation template for cutting out the instrument panels is provided from page 50.



EB5-0049

### For the installation you require

- 1. One connection cable (connection to the appropriate connection unit/relay box)
- 2. Two connection units/relay boxes
- 3. A connection cable with a length of 1 m
- 4. A flybridge instrumentation (panel)



EB5-0037

### Installing second connection unit/relay box

Find a suitable location for the installation of the connection unit/relay box below the installation location of the flybridge instrument panel. The connection cable between the connection unit/ relay box and the flybridge instrument panel is supplied with the instrument panel.

# Connecting the connection units/relay boxes

Connect the connection cable with the multi-pin connector as shown on page 28 .



EB5-0040

# Connecting an additional power supply:

- Connect the tab contact **-A** in the connection unit/relay box marked "**+**" to the positive terminal of the starter battery via the battery main switch.
- Connect the tab connector **-B** marked with "-" to the negative terminal of the starter battery.



EB5-0056

### Connection to the flybridge instrument panel

Connect the tab receptacle **-A-** marked with "Flybridge" in the second connection unit/relay box to the corresponding connector on the rear of the flybridge instrument panel with the connection cable.



EB5-0020

# Connecting throttle-lever neutral position switch

The two connection contacts **-C- "N1" + "N2"** in the two connection unit/relay boxes must be connected to the neutral position switch located in the throttle lever.



If your throttle lever is not equipped with a neutral position switch, then the tab contacts "N1" + "N2" in the connection unit/relay box must be bridged.



EB5-0016



If there is no neutral switch installed on the gearbox, then the safety device "Block starting with gear engaged" is inoperative.

Operation under this condition is prohibited!

# Setting the microswitch in the first connection unit/relay box

Switch the microswitch **-A-** (neutral) to "off" in the direction indicated by the arrow.



- Please note that you must switch over the microswitches in the connection unit/relay box of the main instrumentation (first control stand) for the connection of the second control stand.
- The microswitches in the second connection unit/relay box remain unchanged.



EB5-0050

# **Connecting navigation instruments**

In order to fully utilise the extensive functions of the multi-function display you must connect the instrument panel to a navigation instrument with an NMEA interface (e.g. GPS receiver, LOG etc.).

Connecting the navigation instruments see page 26.

### Note

To configure your multi-function display, please read the additional operating instructions for the multi-function display in your manual. The following gearbox bells are used for the TDI Volkswagen Marine boat engines with Z-drive:

- 1. Gearbox bell for VOLVO SX/DP-S
- 2. Gearbox bell for VOLVO SP-E/DP-E
- 3. Gearbox bell for Mercruiser Alpha/Bravo

# Gearbox bell for VOLVO SX/DP-S

- 1 Mounting bolt 60 Nm
- 2 Gearbox bell



EB5-0053

# Gearbox bell for VOLVO SP-E/DP-E

- 1 Mounting bolt 60 Nm
- 2 Gearbox bell
- 3 Bearing
- 4 Circlip
- 5 Circlip
- 6 Sealing ring
- 7 Sleeve
- 8 Input shaft



EB5-0054

# Gearbox bell for Mercruiser Alpha/Bravo

- 1 Mounting bolt
- 60 Nm
- 2 Gearbox bell
- 3 Special washer
- 4 Bearing

# Note

TDI engines 150-5 and 150-5D can be ordered from the factory with the Mercruiser drive Bravo I and III.



EB5-0052

# Installation dimensions for SDI Volkswagen Marine boat engine

Side view



SDI engine

SDI engine with additional alternator

EB5-0029

# Front view

# Installation dimensions for TDI Volkswagen Marine boat engine

Side view



TDI engine



TDI engine with additional alternator

EB5-0031

Front view

# For the Volkswagen Marine boat engines with a reversing gear the following gearbox bell is used:

60 Nm

# Gearbox bell for SAE-7 reversing gear

- 1 Mounting bolt
- 2 Gearbox bell



EB5-0051

# The following reversing gear variants are used for the Volkswagen Marine boat engines: SDI 55-5/SDI 75-5/TDI 100-5: ZF 25A hydraulic 8°



# SDI 55-5/SDI 75-5/TDI 100-5:

ZF 25 hydraulic inline



EB5-0079

# TDI 120-5/TDI 150-5/TDI 150-5D

ZF 45A hydraulic 8°



EB5-0080

# Introduction

To keep the engine free of aggressive media, such as salt water, the Volkswagen marine engines are equipped with a dual-circuit cooling system.

The seawater circuit (secondary circuit) is an open circuit in which the seawater is sucked in and is routed to the outside again via the exhaust system after it has flowed through the heat exchanger.

### **Cooling circuit**

## **Example: SDI engine**



### Legend

- 1. Exhaust manifold
- 2. Main heat exchanger
- 3. Exhaust plenum chamber
- 4. Coolant expansion tank
- 5. Oil cooler
- 6. Coolant pump relay

- 7. Engine
- 8. Housing of radiator package
- 9. Seawater pump
- 10. Combination radiator
- 11. Seawater filter

# Seawater circuit

The seawater enters, sucked in by an intake fitting in the boat hull, with a seawater valve located downstream.

The seawater filter filters the impurities out of the entering seawater.

# Bleeding seawater circuit using ventilation unit

A ventilation unit must be used to prevent seawater from entering the exhaust system via the intake side of the seawater circuit (see illustration on page 8, illustration item 6; Installation overview of exhaust system).

# Note

If the cooling system is below the waterline, it can happen that the exhaust system fills with water when the boat has been standing still for some time. This is because the sea water pump is not 100% water tight and a lifting effect in the coolant circuit results in suction. In this case, close the seawater valve.

### Installation overview of seawater cooling



# Legend

- 1. Waterline
- 2. Engine
- 3. Seawater filter

- 4. Seawater valve
- 5. Intake fitting
- 6. Combination radiator

## Notes on intake fitting

- The intake fitting is equipped with an intake screen so that coarse dirt cannot be sucked in and the intake line is not clogged.
- On motorboats the angled side of the intake screen must face the front. The intake fitting should be installed in the shaded area (see illustration) of the boat if possible. The speed backs up the water toward the inside in this case.



EB5-0017

### **General information**

• The seawater flows through the combination radiator after the seawater filter. This combination radiator (for fuel and hydraulic oil) is divided into two sections. The first half is used to cool the gear oil (reversing gear) or the hydraulic oil of the power steering with the Z-drive.

The second half cools the fuel flowing back to the fuel tank.

- The suction hose from the seawater filter to the combination radiator must have a diameter of at least 38 mm. The hose should be as short as possible. The use of two hose clips per connection is recommended.
- In the main heat exchanger the seawater absorbs the heat of the coolant circuit, cooling the engine. On the TDI 150-5 seawater also flows through the intercooler and must be drained accordingly when storing for the winter.



The measures required for storing the Volkswagen Marine boat engine for the winter are described in the operating instructions of the Volkswagen Marine boat engine.

### Introduction

The fuel system consists of several components. These components (fuel tank, circulation pre-filter with water separator etc.) must be very clean and installed extremely carefully.

Impurities can cause engine malfunctions. The fuel system must be checked for leaks following installation to achieve the greatest possible protection against fire.



# Operating description of fuel system

### Legend

- 1. Fuel lift pump
- 2. Fine fuel filter with water warning device
- 3. Injection pump
- 4. Injector

- 5. Circulation pre-filter with water separator
- 6. Fuel tank
- 7. Combination radiator



Please refer to the additional information on the following page!



- The space for the fuel system must be sufficiently ventilated. The fuel tanks and the filler necks must be provided with an earth connection to the battery (on steel boats to the boat hull).
- When arranging the components, ensure sufficient space for any maintenance or repair work required.
- The fuel supply line must be routed from the fuel tank to the electrical fuel pump via the circulation pre-filter and water separator. The line cross-section must be at least 8 mm.
- A fuel return line must be routed from the combination radiator to the fuel tank. The line cross-section must be at least 8 mm.
- The return line from the injection pump to the combination radiator is already mounted at the factory.
- Fuel lines, seals and their connections must be suitable for RME fuel (rape-oil fatty acid methyl ester/bio diesel) (see Technical data on page 48).

# Introduction



• The engine must be supplied with air (oxygen) to ensure optimum fuel combustion.

 The engine compartment must be ventilated sufficiently so that the temperature can be kept as low as possible at an optimum level. (ΔT<sub>max.</sub> over ambient temperature: 10 °C to 5 °C).



- The air inlet must be mounted where the air sucked in is as pure as possible and the engines own exhaust gases cannot be sucked in to produce optimum engine compartment ventilation.
- Water may not flow into the air inlet and outlet.
- The hydraulic cross-section of the air inlet is to be 80 cm<sup>2</sup>.
- If other devices (e.g. an auxiliary heater) are located in the engine compartment which require oxygen for their operation, this must be taken into account during your planning of the air inlet.



# Legend

- 1. Coolant cap (use coolant G12, colour red)
- 2. Step plate
- Designer cover (tighten mounting screw to 4.5 Nm)
- 4. Fuse box/relay plate
- 5. Stop switch
- 6. 3-phase AC alternator
- 7. Fine fuel filter (see operating instructions for change intervals)

- 8. Ribbed V-belt
- 9. Combination radiator
- 10. Unit mounting
- 11. Power steering pump
- 12. Tensioner
- 13. Ribbed V-belt
- 14. Tensioner
- 15. Belt pulley for sea water pump



# Legend

- 1. Turbocharger pressure unit
- 2. Hanging eye
- 3. Housing of radiator package
- 4. Oil dip stick
- 5. Oil filter
- 6. Seawater pump
- 7. Oil cooler
- 8. Oil extraction pump
- 9. Oil sump

10. Engine connection plug with earth cut-off relay

- 11. Gearbox bell
- 12. Coolant drain plug
- 13. Reactive anode
- 14. Water level sender
- 15. Exhaust-pipe connection piece
- 16. Turbocharger

# **Engine description**

Displacement	cm <sup>3</sup>	2461
Stroke/bore	mm	81/95.5
Compression ratio		19:1
Firing order		1-2-4-5-3

### Output

# (as per ISO 3046 with marine control unit)

SDI 55-5	at 2250 rpm	kW	40
SDI 75-5	at 3600 rpm	kW	55
TDI 100-5	at 2600 rpm	kW	74
TDI 120-5	at 3250 rpm	kW	88
TDI 150-5D	at 4000 rpm	kW	108
TDI 150-5	at 4000 rpm	kW	111

### **Boost pressure**

# (at nominal output and under standardised conditions)

TDI 100-5	at 2600 rpm	bar	1.15
TDI 120-5	at 3250 rpm	bar	1.15
TDI 150-5	at 4000 rpm	bar	1.15

# Weight

SDI 55-5	kg	approx. 260
SDI 75-5	kg	approx. 260
TDI 100-5	kg	approx. 275
TDI 120-5	kg	approx. 275
TDI 150-5	kg	approx. 280

# Permissible engine operating data

### Perm. engine temperature

max. permissible temperature °C (°F) 130 (266) in oil sump

### Permissible coolant temperature

max. permissible temperature °C (°F) 105 (221) on engine outlet during continuous operation

### **Electrical engine equipment**

3-phase AC alternator 12 V	А	120
Starter 12 V	kW	2.0
Battery 12 V	A (Ah) Minimu	380 (63) Jm capacity
Sheathed element glow plugs	V	12

# **Control unit**

Manufacturer Bosch EDC 15+

Fault memory present:

Checking with fault reader V.A.G 1552/1551 or the vehicle diagnosis, measuring and information system VAS 5052/5051.

# Maximum operating inclination

 $\not$  15° in all directions

30°short-term

Cooling system			Oil supply				
Dual-circuit cooling system (gauge pressure system with separate expansion tank and overpressure valve) and seawater circuit with impeller pump.			<b>Motor oil quality</b> Brand-name oils in accordance with oil specifications of operating instructions				
Pressure reli	ef valve				Oil pressure		
opens at	bar (gauge pressure) 1.3 - 1.5 at 2,000 rpm and 80 °C (176 °F) r temperature bar (gauge pressure)		F) motor oil ure) at least 2.0				
Thermostat							
Start of open	ing °C	C (°F)	80 (189)		Oil consumption		
					(max. permissible)	l/10 h	0.05-0.1
Coolant							
As antifreeze and anticorrosion, use 60% water and 40% G12 coolant additive in accordance with TLV/W 774D							
					Filling capacities		
					Cooling circuit	ltr.	approx. 12
Fuel					Oil circuit		
Fuel	diesel	a	s per DIN EN 590		with filter change	ltr.	6.0
Required minimum Cetane number CN > 49			Quantity difference between Min. and				
	Bio diesel	a	s per EN 51 606		oil dip stick	ltr.	approx. 1.0







EB5-0081

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