Workshop Manual

A
2(0)

Group 30
EVC-C MC

D3-110, D3-130, D3-160, D3-190

Group 30 Electrical system

Marine Diesel engines

D3-110i-C
D3-130i-C • D3-130A-C
D3-160i-C • D3-160A-C
D3-190i-C • D3-190A-C

Contents

Safety information. 3
Introduction 3
Important 3

General information. 6
About this Workshop Manual 6
Spare parts 6
Certified engines 6

Repair instructions 7
Our common responsibility 7
Torque 7

Special tools 8

Design and function. 9
System description EDC15 9
EVC-MC system 10
Component location 12
Component description 17
HIU 17
Throttle potentiometer 17
Engine control unit, EDC15 17
Injector 18
Sensor, common rail pressure (fuel) 18
Magnetically controlled proportional valve (MPROP) 18
Sensor, boost air pressure/ boost air temperature. 19
Switch, oil pressure, engine 19
Sensor, coolant temperature 19
Sensor, engine speed (flywheel) 20
Sensor, camshaft position 20
Starter motor 20
Alternator 20
Extra stop button 21
Fuses 21
VNT valve 21

Repair instructions. 22
General advice on working with EVC engines 22
Fault tracing of cables and connectors 22
Electric welding 23
Checking the starter motor voltage 23
Checking the charging system 24
Rail pressure measurement 25
Changing the engine control unit (EDC15) 26
Programming the control unit 27

Malfunctions 28
Fault code information 28
FMI table 28
Volvo specific for injectors 29
General advice 29
System introduction, EVC-MC 30
Starting sequence 30
Network 31
Manual fault tracing of bus cables 31
Fault tracing the EVC-MC system 32
Checking the instruments 32
Alarm display 33

Active and inactive fault codes 34

Fault codes 35

MID 128, PID 21 ECU temperature 35
MID 128, PID 43 Start switch status 36
MID 128, PID 91 Throttle control position 37
MID 128, PID 97 Water in fuel 41
MID 128, PID 100 Oil pressure, (engine) 44
MID 128, PID 102 Boost air pressure 46
MID 128, PID 105 Boost air temperature 50
MID 128, PID 108 Atmospheric pressure 54
MID 128, PID 110 Coolant temperature 55
MID 128, PID 158 Battery voltage 59
MID 128, PID 164 Fuel pressure 60
MID 128, PID 190 Engine speed 64

MID 128, SID 1-5 Injector 1-5 66
MID 128, SID 21 Speed sensor, camshaft 67
MID 128, SID 22 Speed sensor, flywheel 70
MID 128, SID 27 VNT valve 74
MID 128, SID 211 Power supply, sensor 2 79
MID 128, SID 212 Power supply, sensor 1 80
MID 128, SID 218 ECM main relay 81
MID 128, SID 231 Communication fault J 1939 . 82
MID 128, SID 232 5 V DC Supply current 83
MID 128, SID 253 Data Set, EEPROM memory 84
MID 128, SID 254 Engine control unit 85

MID 128, PSID 50 Fuel pressure monitoring MPROP 86
MID 128, PSID 54 Booster voltage (”High bank 1”) 89
MID 128, PSID 55 Booster voltage (”High bank 2”) 90
MID 128, PSID 56 System startup test for shutoff path 91
MID 128, PSID 70 Fuel pressure monitoring 1 ... 92
MID 128, PSID 71 Fuel pressure monitoring 2 ... 95

MID 140, PID 96 Fuel level 96

MID 140, PPID 289 Powertrim switch 99
MID 140, PPID 290 Powertrim signal or supply 101
MID 140, PPID 397 Main panel 104
MID 140, PPID 398 Display 105
MID 140, PPID 410 Depth alarm 106

MID 140, SID 231 J1939 Communications warning / fault 107
MID 140, SID 253 Calibration memory fault 109
MID 140, SID 254 Internal CPU fault 110

MID 140, PSID 11 Crank switch (key start) 111
MID 140, PSID 30 Powertrim motor direction up 113
MID 140, PSID 31 Powertrim motor direction down 116
MID 140, PSID 200 J1939 engine bus 119

Malfunctions without fault code 120

Wiring diagram 122
Engine D3 122
Pin configuration, HIU 124

Technical data 122

References to Service Bulletins 126

Index 129

Safety information

Introduction

This workshop manual contains technical data, descriptions and repair instructions for the Volvo Penta products or product versions noted in the table of contents. Check that you have the correct Workshop Manual for your engine.

Read this safety information and the General Information and Repair Instructions in the workshop manual carefully before starting work.

If work is done adjacent to a running engine, a careless movement or a dropped tool can lead to personal injury in the worst case.

Take care to avoid contact with hot surfaces (exhaust pipes, Turbocharger, air intake pipe, starter heater etc.) andfluids in pipes and hoses in an engine which is running or has just been stopped. Reinstall all protective parts removed during servicework before starting the engine.

Important

In this book and on the product you will find the following special warning symbols.

⚠ **WARNING!** Warns for the risk of personal injury, major damage to product or property, or serious malfunctions if the instruction is ignored.

⚠ **IMPORTANT!** Is used to call attention to things which could cause damage or malfunctions to product or property.

NOTE! Is used to call attention to important information, to facilitate work processes or operation.

To give you a overview of the risks which always need to be observed and precautions which always have to be taken, we have noted them below.

⚠ Make it impossible to start the engine by cutting system current with the main switch(es)and lock it (them) in the off position before starting service work. Set up a warning notice by the helm station.

⚠ As a general rule all service operations must be carried out with the engine stopped. Some tasks, such as adjustments, need the engine to be running, however. Approaching an engine which is operating is a safety hazard. Remember that loose clothing or long hair can fasten in rotating parts and cause serious personal injury.

⚠ Never start the engine with the cover removed. Apart from the risk of spilling oil, there is a risk of personal injury. The voltage supplied to the injectors can be as high as 80 V.

⚠ Check that the warning or information labels on the product are always clearly visible. Replace labels which have been damaged or painted over.

⚠ Never start the engine without installing the air cleaner filter. The rotating compressor turbine in the turbocharger can cause severe injury. Foreign objects entering the intake ducts can also cause mechanical damage.

⚠ Never use start spray or similar products as a starting aid. They may cause an explosion in the inlet manifold. Danger of personal injury.

⚠ Avoid opening the coolant filling cap when the engine is hot. Steam or hot coolant can spray out and the system pressure will be lost. Open the filler cap slowly, and release the pressure in the cooling system if the filling cap or tap has to be opened, or if a plug or coolant hose has to be removed when the engine is hot. It is difficult to anticipate in which direction steam or hot coolant can spray out.

⚠ Hot oil can cause burns. Avoid skin contact with hot oil. Ensure that the lubrication system is not under pressure before carrying out any work. Never start or operate the engine with the oil filler cap removed, otherwise oil could be ejected.

⚠ Stop the engine and close the sea cocks before doing any work on the cooling system.

⚠ Only start the engine in a well- ventilated area. When operated in a confined space, exhaust fumes and crankcase gases must be ventilated from the engine bay or workshop area.

⚠ Always use protective glasses or goggles when carrying out work where there is a risk of splinters, grinding sparks, acid splashes or where other chemicals are used. Your eyes are extremely sensitive, injury could cause blindness!

⚠ Avoid getting oil on your skin! Repeated exposure to oil or exposure over a long period can result in the skin becoming dry. Irritation, dryness and eczema and other skin problems can then occur.

Used oil is more dangerous than fresh oil from a health aspect. Use protective gloves and avoid oilsoaked clothes and rags. Wash regularly, especially before eating. There are special skin creams which counteract drying out of the skin and make it easier to clean off dirt after work is completed.

⚠ Most chemicals intended for the product (e.g. engine and transmission oils, glycol, petrol (gasoline) and diesel oil) or chemicals for workshop use (e.g. degreasers, paints and solvents) are hazardous. Read the instructions on the product packaging with care! Always follow the safety precautions for the product (for example use of protective mask, glasses, gloves etc.). Make sure that other personnel are not inadvertently exposed to hazardous chemicals, for example in the air. Ensure good ventilation in the work place. Follow the instructions provided when disposing of used or leftover chemicals.

⚠ Exercise extreme care when leak detecting on the fuel system and testing the fuel injector nozzles. Use eye protection. The jet which comes from a fuel injector has very high pressure and considerable penetrationability. Fuel can force its way deep into body tissue and cause severe injury. Danger of blood poisoning (septicemia).

⚠ All fuels, and many chemicals, are flammable. Do not allow naked flame or sparks in the vicinity. Petrol (gasoline), some thinners and hydrogen gas from batteries are extremely flammable and explosive when mixed with air in the correct ratio. No Smoking! Ensure that the work area is well ventilated and take the necessary safety precautions before starting welding or grinding work. Always ensure that there are fire extinguishers at hand when work is being carried out.

⚠ Make sure that oil and fuel soaked rags, and used fuel and oil filters are stored in a safe place. Rags soaked in oil can spontaneously ignite under certain circumstances.

⚠ Used fuel and oil filters are polluting waste and must be handed to an approved waste management facility for destruction, together with used lubrication oil, contaminated fuel, paint residue, solvents, degreasers and wash residue.

⚠ Batteries must never be exposed to open flames or electric sparks. Never smoke close to the batteries. The batteries generate hydrogen gas when charged, which forms an explosive gas when mixed with air. This gas is easily ignited and highly volatile. A spark, which can be caused by incorrect battery connection, can cause a single spark which is sufficient to cause an explosion with resulting damage. Do not move the connections when you attempt to start the engine (risk of arcing), and do not stand and lean over one of the batteries.

⚠ Always ensure that the Plus (positive) and Minus (negative) battery cables are correctly installed on the corresponding terminal posts on the batteries. Incorrect installation can result in serious damage to the electrical equipment. Refer to the wiring diagram.

⚠ Always use protective goggles when charging and handling the batteries. Battery electrolyte contains sulfuric acid which is highly corrosive. Should the battery electrolyte come into contact with unprotected skin wash off immediately using plenty of water and soap. If you get battery acid in your eyes, flush at once with a generous amount of water, and get medical assistance at once.

⚠ Turn the engine off and turn off the power at the main switch(es) before carrying out work on the electrical system.

⚠ Clutch adjustments must be carried out with the engine stopped.

⚠ The existing lugs on the engine/reversing gear should be used for lifting the assembly.
Always check that the lifting devises are in good condition and that they have the correct capacity for the lift (the weight of the engine plus the reversing gear and extra equipment).

⚠ The engine should be lifted with a customized or adjustable lifting boom for safe handling and to avoid damaging components on top of the engine. All chains or cables should be parallel to each other and should be as square as possible to the top of the engine. If other equipment connected to the engine has altered its center of gravity, special lifting devises may be needed to obtain the correct balance and safe handling.

⚠ Never do any work on an engine which just hangs from a liftingdevise.

⚠ Never work alone when removing heavy engine components, even when using lifting devices such as locking tackle lifts. When using a lifting device two people are usually required to do the work, one to take care of the lifting device and another to ensure that components are lifted clear and not damaged during the lifting operations.
When you work aboard a boat, always make sure that there is enough space for disassembly where you are working, with no risk of personal injury or material damage.

⚠ Components in the electrical and fuel systems on Volvo Penta products have been designed to minimize the risks of explosion and fire. The engine must not be run in areas where there are explosive materials.

⚠ **WARNING**! Fuel delivery pipes must not be bent or straightened under any circumstances. Damaged pipes must be replaced.

⚠ Remember the following when washing with a high pressure washer: Never aim the water jet at seals, rubber hoses or electrical components. Never use a high pressure washer for engine cleaning.

⚠ Only use the fuels recommended by Volvo Penta. Refer to the Instruction Book. Use of fuels that are of a lower quality can damage the engine. Poor fuel can also lead to higher-maintenance costs.

General information

About this Workshop Manual

This workshop manual contains technical data, descriptions and repair instructions for the following marine diesel engines: D3-130i-C, D3-160i-C, D3-190i-C, D3-130A-C, D3-160A-C, D3-190A-C

The workshop manual can illustrate tasks done on any of the engines noted above. This means that the illustrations and photographs which clarify certain details might not correspond with other engines in some cases. Repair methods are similar in all important respects, however. If this is not the case, this is noted. Important differences are noted separately.

The engine designation and number are noted on the number plate and engine decal. The engine designation and number must always be given in all correspondence about any product.

The Workshop Manual is produced primarily for the use of Volvo Penta workshops and service technicians. This assumes that people who use the Manual have basic knowledge of marine drive systems and can do the tasks of a mechanical or electrical nature associated with the trade.

Volvo Penta constantly improves its products, so we reserve the right to make modifications without prior notification. All information in this manual is based on product data which was available up to the date on which the manual was printed. Any material changes introduced into the product or service methods after this date are notified by means of Service Bulletins.

Spare parts

Spare parts for electrical- and fuel systems are subject to various national safety requirements, such as U.S. Coast Guard Safety Regulations. Volvo Penta Original Spare Parts meet these specifications. Any damage, occasioned by use of non--original Volvo Penta spares for the product, will be not be compensated by the warranty offered by Volvo Penta.

Certified engines

When doing service and repair on emission certified engines, it is important to be aware of the following:

Certification means that an engine type has been checked and approved by the relevant authority. The engine manufacturer guarantees that all engines made of the same type are equivalent to the certified engine.

This makes special demands on service and repair work, as follows:

Maintenance and service intervals recommended by Volvo Penta mustbe complied with.

Only Volvo Penta original spares may be used.

Service to injection pumps, pump settings and injectors must always be done by an authorized Volvo Penta workshop.

The engine must not be converted or modified, except for the accessories and service kits which Volvo Penta has approved for the engine.

No installation changes to the exhaust pipe and engine air inlet ducts may be done.

No seals may be broken by unauthorized personnel.

The general advice in the instruction book about operation, care and maintenance applies.

⚠ **IMPORTANT**! Delayed or inferior care/maintenance, and the use of non-original spares,parts means that AB Volvo Penta can no longer be responsible for guaranteeing that the engine complies with the certified version.

Damage and/or costs which arise from this will not be compensated by Volvo Penta.

Repair instructions

The working methods described in the Workshop Manual apply to work carried out in a workshop. For this reason, the engine is lifted out of the boat and mounted on an equipment support. Renovationwork which does not need the engine to be lifted out can be done in situ, with the same work methods, unless otherwise specified.

The warning signs which occur in the workshop manual (please refer to “Safety information” for their meanings).

WARNING!

IMPORTANT!

NOTE!

are not comprehensive in any way, since we can not of course foresee everything, because service work is done in highly varying circumstances. For this reason, all we can do is to point out the risks which we believe could occur due to incorrect work in a well-equipped workshop, using work methods and tools tested by us.

All operations described in the Workshop Manual for which there are Volvo Penta Special Tools available assume that these tools are used when carrying out the repair. Volvo Penta Special Tools have been developed to ensure the most safe and rational working methods possible. It is therefore the responsibility of anyone using other tools or other working methods than we recommend to determine that there is no risk of personal injury or mechanical damage or malfunction as a result.

In some cases special safety precautions and user instructions may be required in order to use the tools and chemicals mentioned in the Workshop Manual. These rules must always be observed, so there are no special instructions about this in the workshop manual.

By following these basic recommendations and using-using common sense it is possible to avoid most of the risks involved in the work. A clean work place and a clean engine will eliminate many risks of personal injury and engine malfunction.

Above all, when work on fuel systems, lubrication systems, induction systems, turbocharger, bearing caps and seals is done, it is extremely important that no dirt or other kinds of foreign particles are able to get in, since this would otherwise cause malfunctions or shortened repair life.

Our common responsibility

Each engine consists of a large number of collaborating systems and components. Any deviation of a component from its technical specification can dramatically increase the environmental impact of an otherwise good engine. For this reason, it is important that the specified wear tolerances are observed, that systems which are adjustable are correctly adjusted and that Volvo Penta Original Spares are used for the engine. The stated service intervals in the Maintenance Schedule must be observed.

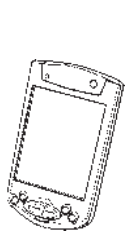
Some systems, such as the components in the fuel system, require special expertise and special testing equipment for service and maintenance. For environmental reasons etc., some components are sealed at the factory. It is only permissible to work on sealed components if you are authorized to do such work.

Remember that most chemical products, incorrectly used, damage the environment. Volvo Penta recommends the use of biodegradable degreasers whenever engine components are de-greased, unless otherwise specified in the workshop manual. When working aboard a boat, be careful to ensure that oils, wash residue etc. are processed for destruction, and are not inadvertently discharged with bilge water into the environment.

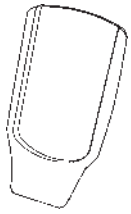
Torque

The tightening torque for vital fasteners, which should be tightened with a torque wrench, are listed in “Technical Data: Special tightening torques” and noted in the job descriptions in the book. All torque specifications apply to clean screws, screw heads and mating faces. Torque data stated apply to lightly oiled or dry threads. Iflubricants, locking fluids or sealants are needed on a fastener, the type of preparation to be used will be noted in the job description. For fasteners where specific torque values are not given, please refer to “Technical data: General tightening torques”. General torque specifications are target values and the fastener does not need to be tightened with a torque wrench.

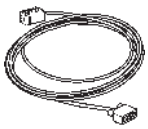
Special tools



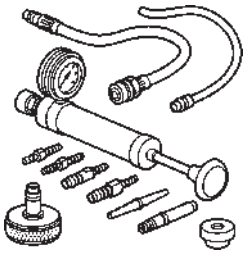
3838620



3838621

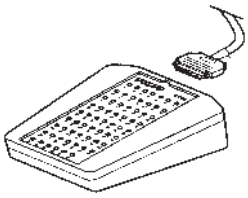


3838622

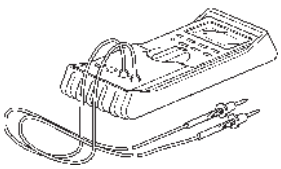


3849613

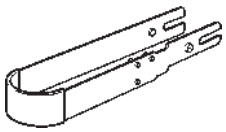
88890016



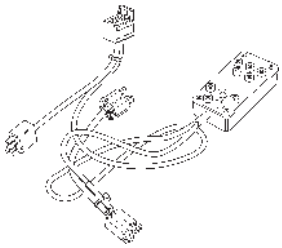
9998699



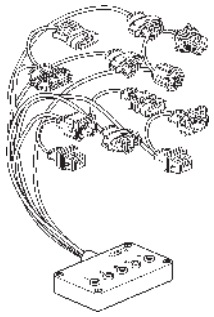
9812519



9995722



9990136



885675

3838620 VODIA – hand-held computer (PDA) with SD card

3838621 VODIA – docking station. Used with VODIA PDA (3838620).

3838622 VODIA – cable with connector. Used with docking station (3838621) on the engine's communication connector.

3849613 Pressure testing equipment

88890016 Adapter cable

9998699 Measurebox

9812519 Multimeter

9995722 Puller, engine control unit

9990136 Adapter cable for relay test

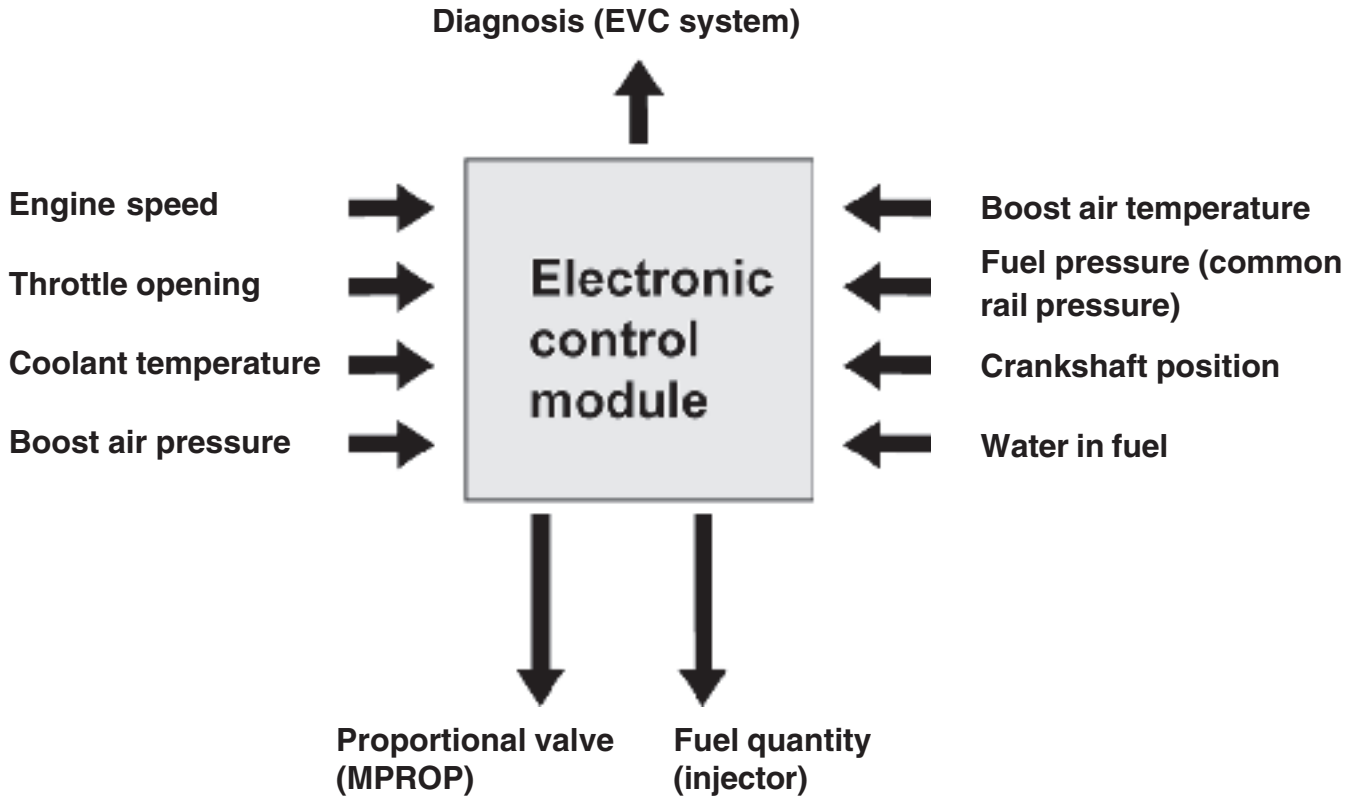
885675 Adapter cable for sensor test

Design and function

System description EDC15

EDC* is a system for electronic diesel engine control. The system has been developed by Volvo Penta and includes fuel control and diagnostic function

* EDC = ”Electronic Diesel Control”.



Engine control unit

EDC system processor is located in the controlunit, protected from water and vibration.

The processor receives continuous information about:

- Engine speed
- Throttle opening
- Boost air pressure/temperature
- Fuel pressure (common rail pressure)
- Crankshaft position
- Coolant temperature

The information provides information about current operation conditions and allows the processor to calculate the correct fuel volume, monitor engine status etc.

Fuel control

The amount of fuel injected into the engine and the injection advance are fully electronically controlled, via fuel valves and the injectors, once the control unit has analyzed the engine’s fuel requirements.

This means that the engine always receives the correct volume of fuel in all operating conditions, which offers lower fuel consumption, minimal exhaust emissions etc.

The control unit monitors and reads the injectors to ensure that the correct volume of fuel is injected into each cylinder, and it calculates and set the injection advance. Control is mainly done with the help of the speed sensors,fuel pressure sensor and the combined sensor for boost air pressure/boost air temperature.

The control unit controls the injectors via a signal to the electromagnetically operated fuel valve in each injector, which can be opened and closed.

When the fuel valve is open, fuel is forced through the injector nozzle and into the cylinder. Injection ceases when the fuel valve is closed.

The control unit receives signals from various sensors on the engine, which allow it to decide when the fuel valve should be opened and closed.

Calculation of fuel quantity

The quantity of fuel to be injected into the cylinder is calculated by the control unit. The calculation gives the time when the fuel valve is open (fuel is injected into the cylinder when the fuel valve is open).

The parameters which govern the amount of fuel injected are:

- Demanded engine speed
- Engine protection functions
- Temperature
- Boost air pressure
- Fuel pressure

Diagnostic function

The EDC system has a built-in diagnostic function which can discover any faults in the engine and sensors.

The function of the diagnostic function is to discover and localize any function faults in the EDC system, to protect the engine and guarantee continued operation if a serious function fault should occur.

If a malfunction is discovered, a fault message is shown on the tachometer display.

Idling (low idle)

Idling speed is 700 rpm (±10 rpm).

The EVC^{MC}-C system

The EVC^{MC}-C system is a so-called distributed system.

The EVC^{MC}-C system has a helm station node, a helm station control unit or HIU (Helm interface unit) which communicates with the engine control unit. In twin engine installations, two HIUs are used.

The helm station control unit is located close to the helm station and is connected to a number of nearby components, such as sensors, controls and instruments.

A self adhesive label containing the engine chassis number is located on the left side of the engine cover. This chassis number is unique for each engine.

On delivery, each HIU is given a default chassis number that does not coincide with the engine's chassis number, so there will be a conflict between these chassis numbers in VODIA.

To avoid a warning in VODIA, you can re-program the HIU so that the chassis numbers coincide. Functionality is not affected if you choose not to re-program the HIU.

A data link (CAN bus) links the nodes to each other. They combine to form a data network and the nodes exchange information and benefit from each others services. The principle of using a network of nodes to which all components are connected means that the amount of cable installation is radically reduced.

A distributed system allows the system architecture to be extended by adding extra equipment. Functionality becomes more effective since the nodes are allowed to collaborate and combine their resources, which creates a more useful and safer product.

Functionality

Instrumentation

The instruments use a serial communication bus. The serial communication bus in combination with EVC radically reduces wiring and simplifies installation.

Gauges are available with white or black dial face and chromed or black bezel.

EVC system tachometer

This tachometer will be recommended as a standard for all installations. All alarms are available in the tachometer. The tachometer has a built in buzzer alarm and an output to the instrument serial bus (easy-link).

Power Trim

Trimming up and down can be calibrated to suit the specific installation. To protect the drive it cannot be tilted when engine is running above a certain rpm.

Power Trim Assistant (PTA)

The EVC system controls automatically the drive trim position proportional to the engine speed. Trim positioning is set in five steps/levels. Settings can be done by the LCD tachometer or the EVC display and the EVC control panel. This feature is software related. Hardware changes are not needed. Old hardware versions **cannot** be upgraded to PTA level.

EVC system display

The EVC system display is a complement or replacement for the EVC system tachometer and optional instruments. The display shows operation information, information messages and alarms. The user selects what operation information to display with the buttons on the display. The EVC system display can display more than one operation information at one and the same time. The display also has access to the same display mode and calibration functions as for the EVC system tachometer display.

The EVC system display must be connected to the HIU.

Fuel level

EVC^{MC}-C makes it easy to install the fuel level indication. All you need is a fuel level sensor in the fuel tank and a fuel level gauge or a display at the helm. If a fuel level gauge is used it must be connected to the instrument serial communication bus. The HIU-Sender cable harness has an input for the fuel level sender.

The system has a "Multipoint setting" facility with a possibility of setting fuel level in six steps depending on the fuel tank shape.

Trip computer

EVC supports trip computer functions if following are installed.

- multisensor or NMEA 0183/2000 compatible component (plotter, GPS, paddle wheel etc)
- fuel level sender
- software for trip computer. Order and download from VODIA website.

Trip computer information can be displayed on the EVC system tachometer or/and on the optional EVC system display.

Trip data: Fuel rate, fuel consumption, fuel consumption/time, trip fuel consumtion, trip fuel consumption/time, remaining fuel, trip hours, trip distance, remaining distance to empty tank, remaining time until tank is empty.

NOTE! If no trip computer software is installed, only fuel volume will be presented.

Fresh water level

EVC makes it easy to install the water level indication. All you need is a level sensor in the water tank and a level gauge at the helm. If a water level gauge is used it must be connected to the instrument serial communication bus. The HIU–Senders cable harness has an input for the fresh water level sender.

Rudder indicator

To install a rudder indicator you need a sensor at the rudder and a gauge or a display at the helm. The gauge shall be connected to the instrument serial communication bus. The HIU-Senders cable harness has an input for the rudder sender.

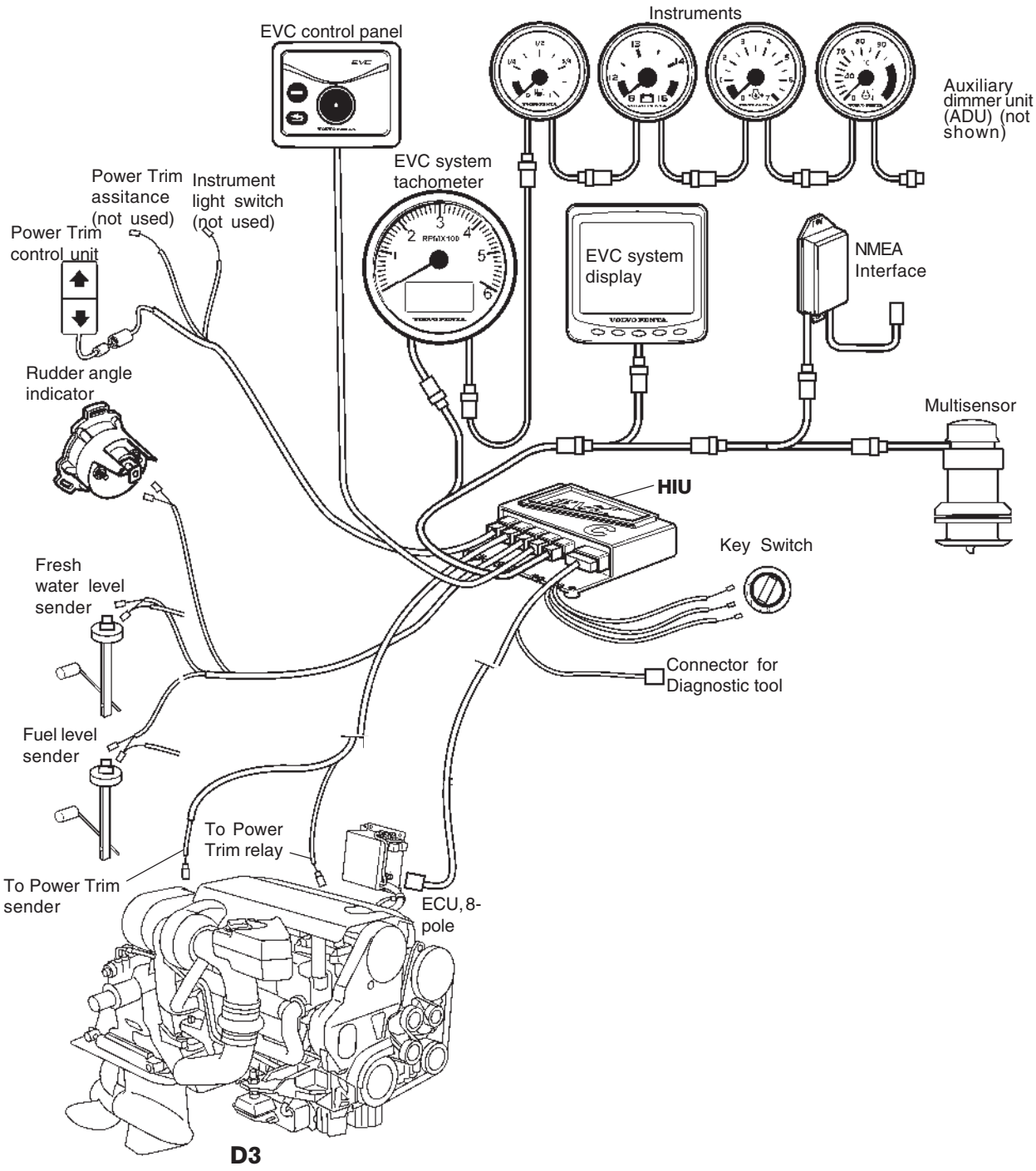
NMEA support

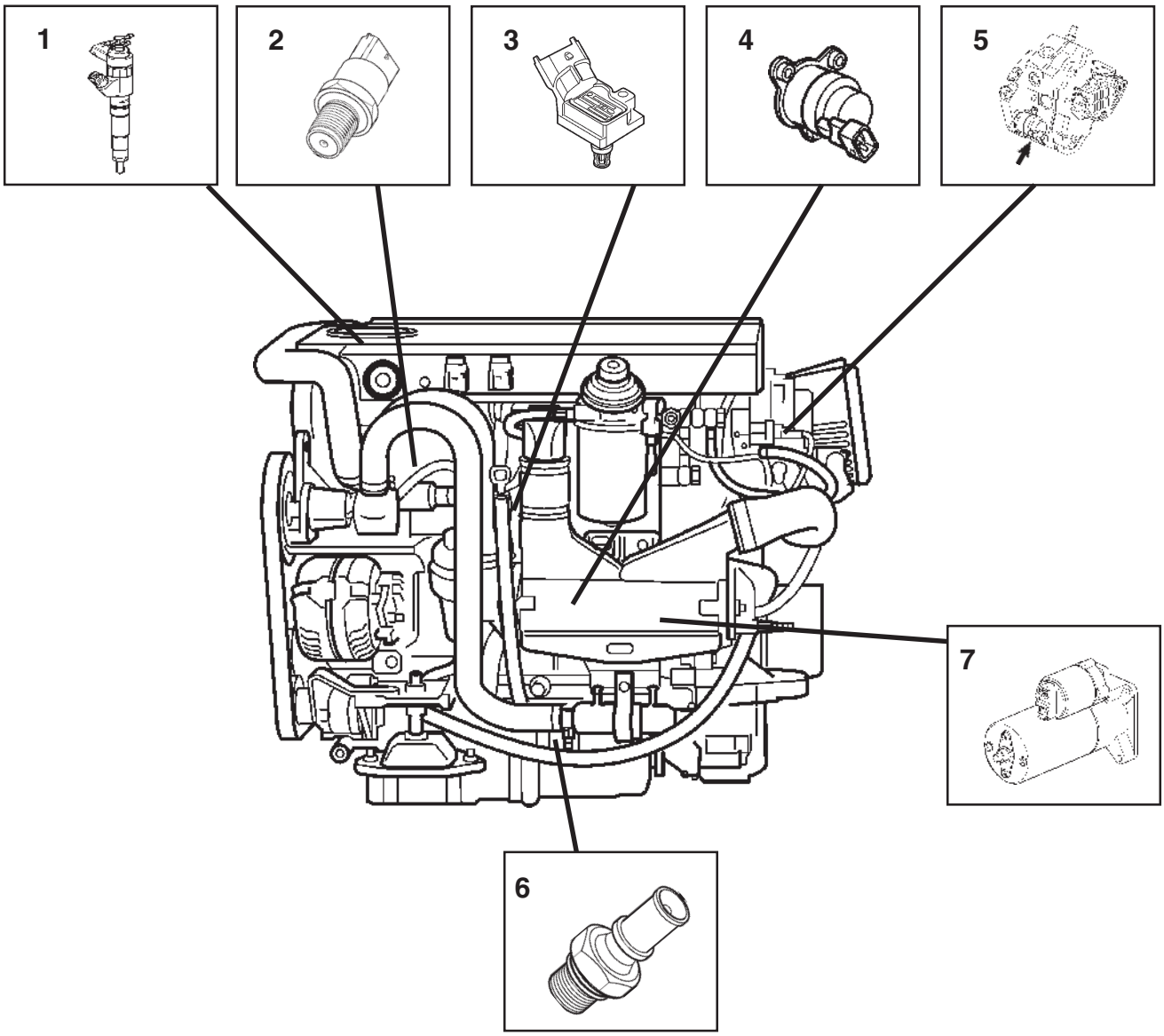
The EVC system supports NMEA 0183 and NMEA 2000 by means of a hardware interface.

Boat speed, echo sounder and water temp (Multisensor)

The multisensor is connected to the multilink cable. Data from the multisensor are shown in the EVC system tachometer/display and the speedometer instrument.

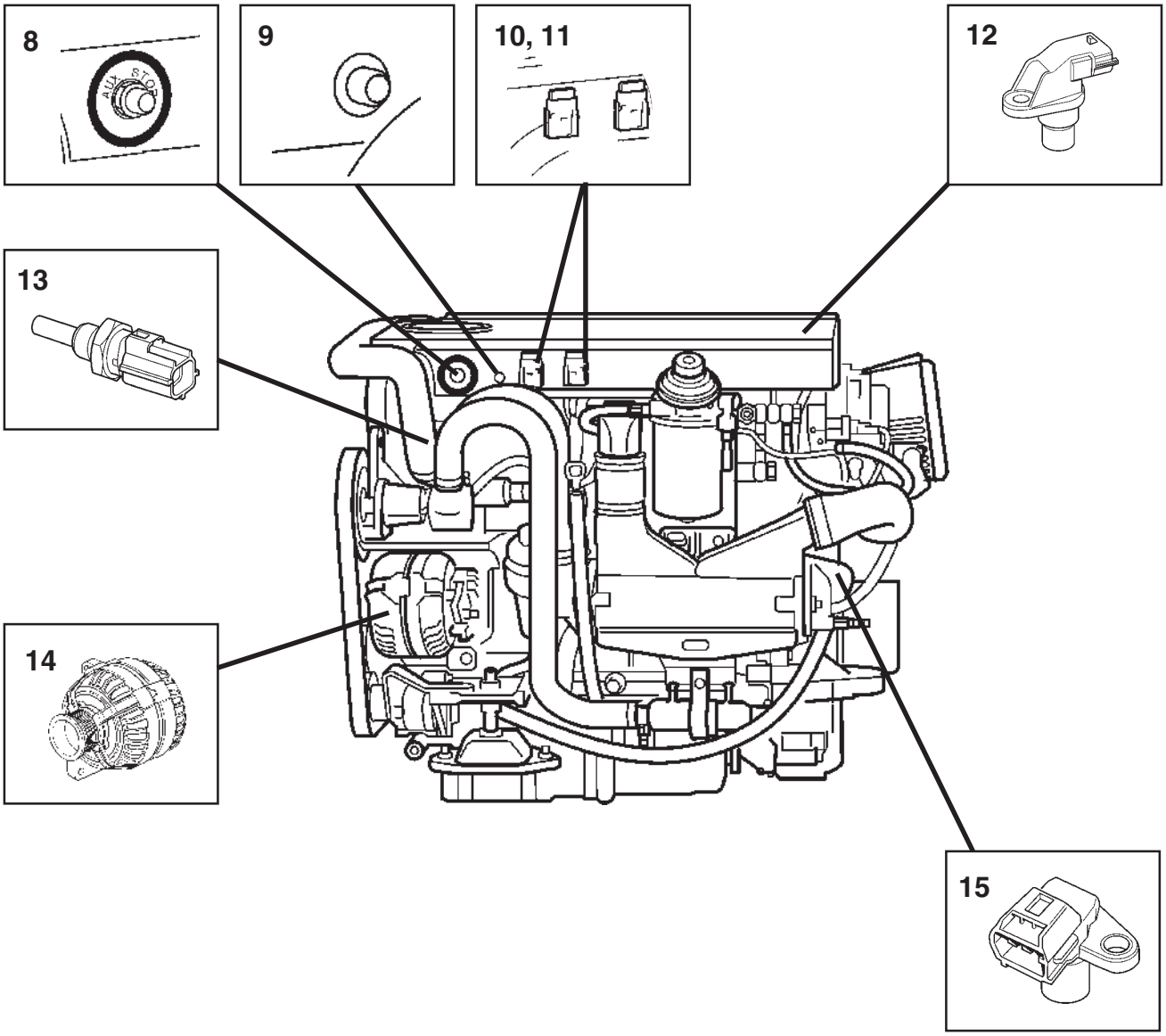
Component location





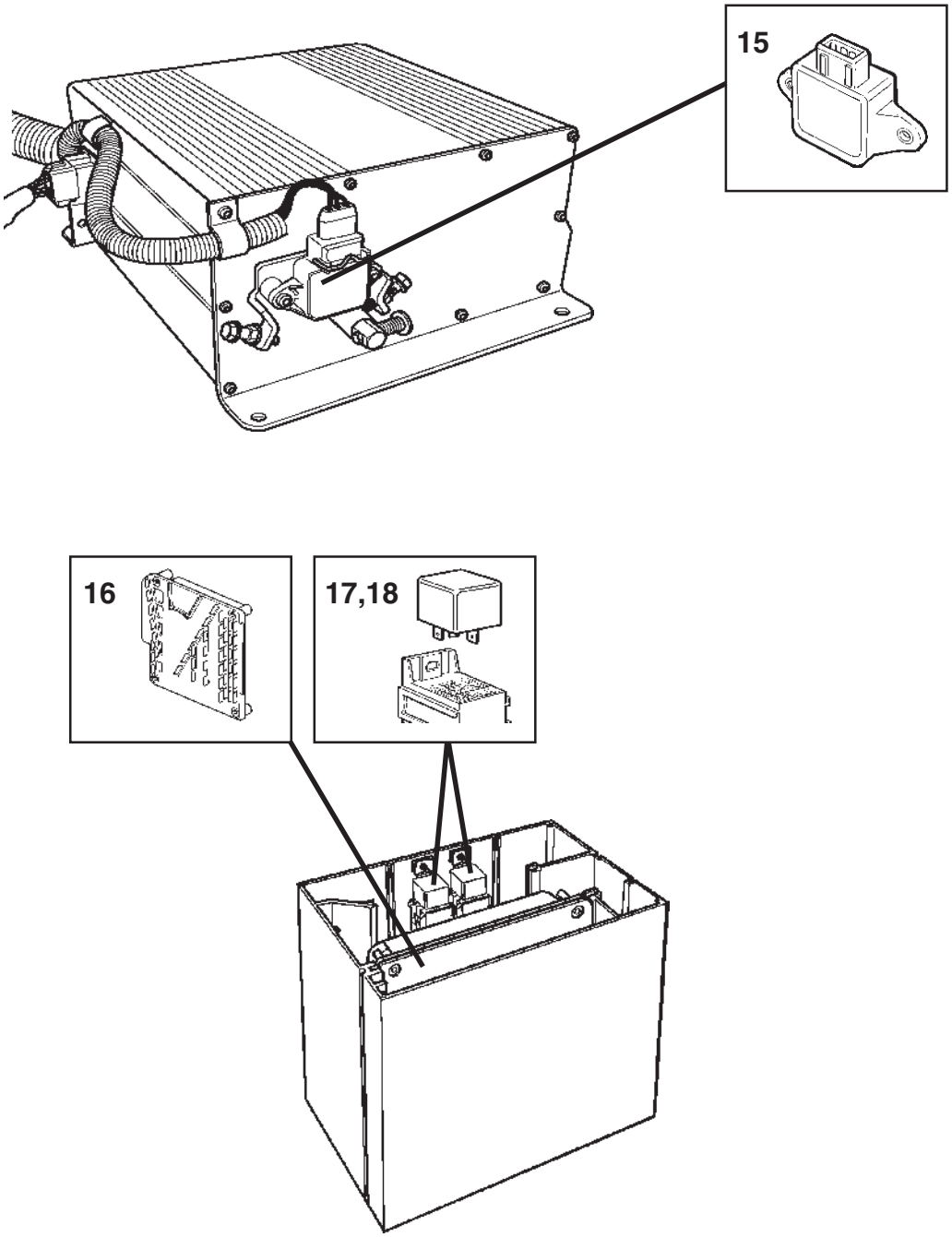
D3

1. Injector
2. Sensor, common rail pressure (fuel)
3. Sensor, boost air pressure / boost air temperature
4. VNT valve
5. Solenoid controlled proportional valve, high pressure pump – fuel (MPROP)
6. Oil pressure switch
7. Starter motor (with starter motorsolenoid)



D3

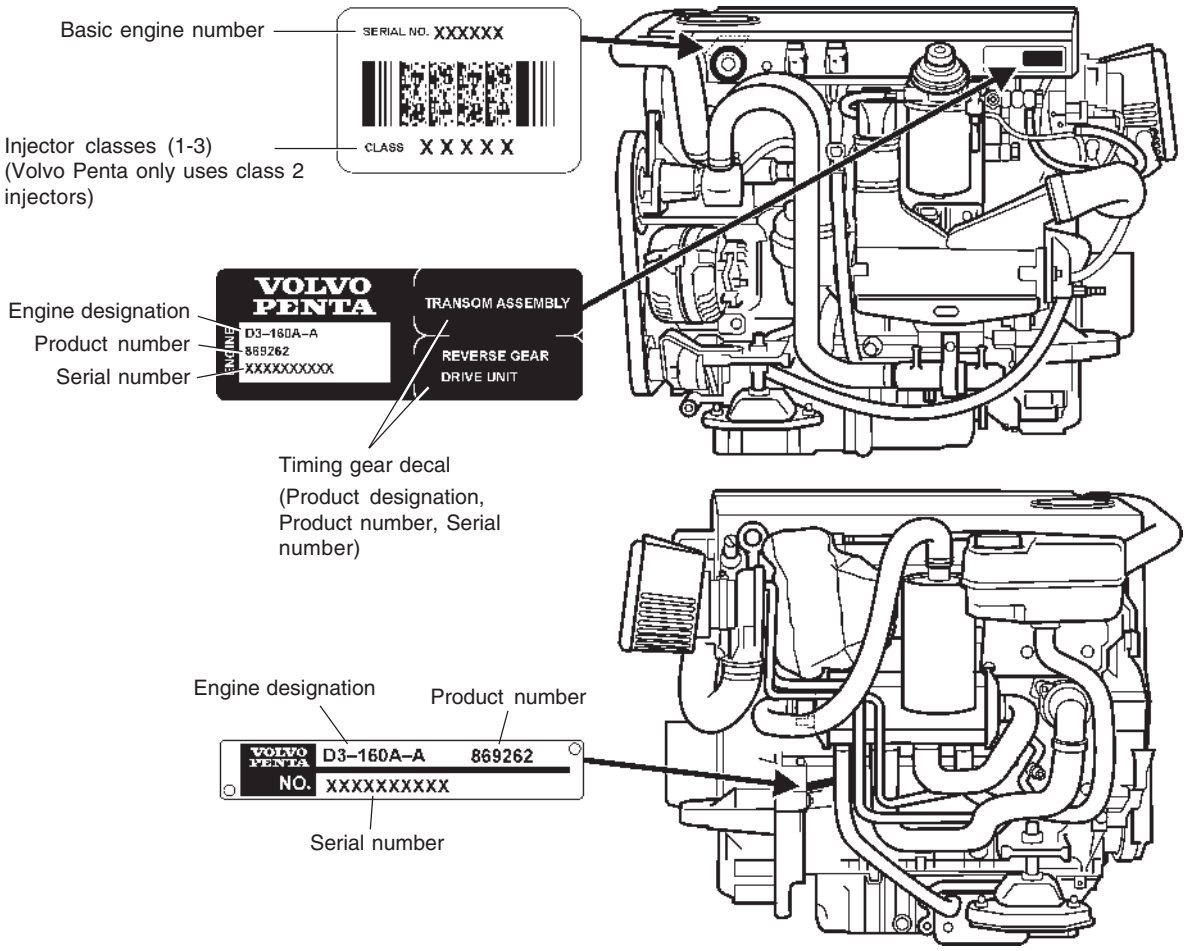
8. Extra stop button
9. Circuit breaker, trim pump (50 A)
10. Fuse, engine control unit (20A)
11. Fuse , EVC-MC (20A)
12. Sensor, camshaft position
13. Sensor, coolant temperature
14. Alternator
15. Speed sensor – flywheel



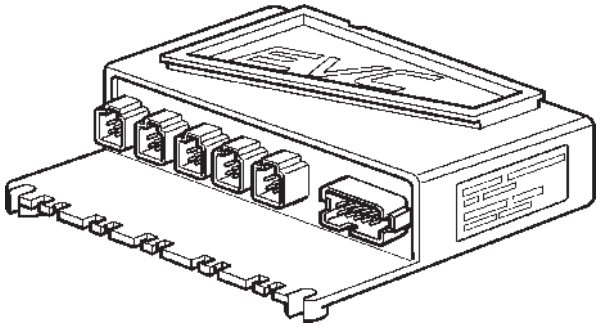
D3

15. Throttle potentiometer
16. Engine control unit EDC 15
17,18. Relays

Location of engine type signs



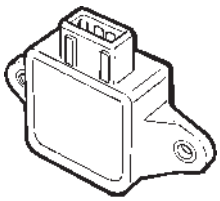
Component description



HIU* (A)

The node is located close to the helm station and its components. Communicates with the engine control unit via the standard bus.

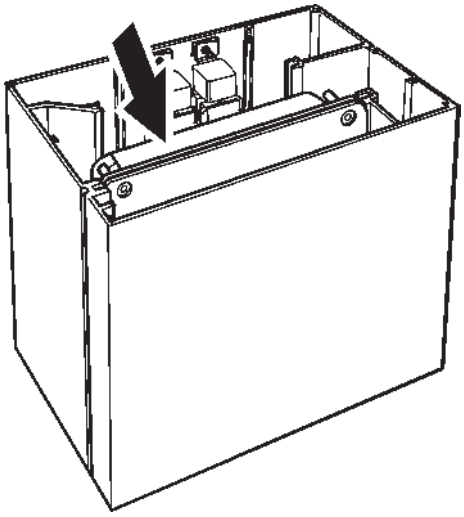
* HIU = ”Helm Interface Unit” – Helm station control unit. There is a decal containing the serial number and CHASSIS-ID number on the HIU. The CHASSIS ID number must coincide with the CHASSIS ID number on the decals on the engine.



Throttle potentiometer (15)

The potentiometer registers the movements of the control lever and gives the control module information about the demanded engine speed. The potentiometer is installed on the engine control unit box.

Function check**:**
Please refer to measurements under fault codes MID 128, PID 91.



Engine control unit, EDC15 (A/16)

The engine control unit is installed inside a protective box. It controls and monitors the injectors to ensure that the correct amount of fuel is injected into each cylinder at the correct point in time. It also controls the high pressure pump via the proportional valve (MPROP) to ensure that the system always has the correct fuel pressure (rail pressure).

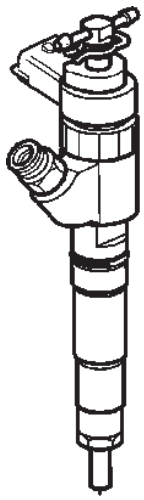
The control unit also calculates and adjusts the injection advance. Regulation is mainly done with the aid of the engine speed sensors and the combined sensor for charge air pressure/charge air temperature.

The EDC system processor is located in the control unit, unit, protected from water and vibration.

The processor receives continuous information about:

- Engine speed
- Throttle opening
- Charge air pressuree/temperature
- Fuel pressure (common rail pressure)
- Fuel alarm, “water in fuel”
- Crankshaft position
- Coolant temperature

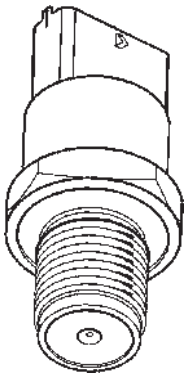
The information provides information about current operation conditions and allows the processor to calculate the correct fuel volume, monitor engine status etc.



Injector (1)

The injectors are installed on the cylinder head, underneath the protective cover.

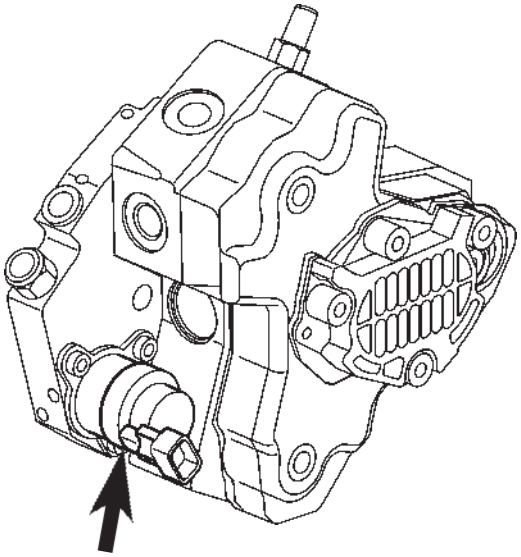
The amount of fuel injected and injection duration is controlled by the control unit, via electromagnetically controlled fuel valves in the injectors. This means that the engine always receives the correct volume of fuel in all operating conditions, which offers lower fuel consumption, minimal exhaust emissions etc.



Sensor, common rail pressure (fuel) (2)

The sensor is mounted on the left of the engine, at the front of the distribution manifold (“rail”) which distributes fuel to the injectors.

The rail pressure sensor senses the fuel pressure and converts this to a voltage which is registered by the engine control unit (EDC 15).



Magnetically controlled proportional valve (MPROP) (5)

A magnetically controlled proportional valve (MPROP) controls the high pressure pump to ensure that the correct fuel pressure (rail pressure) is retained despite varying engine speed and loading.

The valve is located in the high pressure pump at the rear of the engine on the left.

The input signal to the valve is a PWM signal whose pulse width is controlled by the engine control module (EDC 15).

When the current through the valve is changed, this affects the fuel flow, which results in changed fuel pressure (rail pressure).