

Installation EVC^{EC}-C Electronic Vessel Control	B E
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D4, D6, D9, D12, D16

Installation

Electronic Vessel Control

EVC^{EC}-C

D4, D6, D9, D12, D16

Contents

Safety precautions	5
General information	7
Engine monitoring and the EVC system	10
Engine monitoring system	10
The EVC-C system.....	11
Installation tools and literature	13
Other special equipment.....	14
Major components.....	15
General view.....	15
Installation procedure, general	28
Cable routing	29
Marking and color coding of cables.....	32
Building an EVC network.....	33
Identification of the PCU and the HCU.....	34
Installation procedure, engine room.....	35
Location and mounting of the PCU and HCU..	35
Engine-PCU cable, stern drive	36
Engine-PCU cable, Inboard engine	36
Transmission cables	37
Checking rotation of propeller, D4/D6	38
Checking rotation of propeller, D9/D12/D16....	39
Volvo Penta Lowspeed and Trolling	42
PCU, installation	43
Fuel and fresh water level senders	43
Rudder indicator	46
Standard bus cable PCU-HCU	45
HCU, installation.....	47
Powertrim system, D4/D6 stern drive.....	48
Gear shift actuator, D4/D6 stern drive.....	48

Contents cont.

Installation procedure, helm	49
Y-connector.....	49
Key switch and relay.....	49
Start/stop panel.....	50
EVC control panel.....	52
Powertrim panel.....	54
Relay for external accessories.....	55
Instruments.....	57
Instrument, panels and auxiliary cable.....	59
Buzzer.....	60
Auxilliary dimmer unit (ADU).....	61
Synchronizing cable, twin installtions.....	62
EVC system display.....	63
NMEA 0183 interface.....	68
NMEA 2000 interface.....	69
Multisensor.....	71
Controls, electronic.....	72
Adapter for mechanical controls.....	75
Controls, mechanical.....	76
Interface 4–20 mA.....	79
EVC control panels	82
Calibration and settings	83
General.....	83
Calibration mode.....	84
Auto configuration.....	84
EVC control lever combinations	
Calibration summary.....	86
Lever calibration.....	88
Select language and units.....	91
Powertrim calibration.....	92
Powertrim Assistance, PTA.....	93
Trolling calibration.....	94
Slip calibration.....	95
Idling speed calibration.....	96
OEM-mode.....	97
Fuel tank settings.....	97
Fuel tank calibration.....	98
Multisensor calibration.....	100
EVC system display.....	102
Diagnostic function	107
Fault register	109
Parameter settings	117
Starting the engine	119
Wiring color and pin-out schematics	123
Templates for controls and panels	125
References to Service bulletins	136

Safety precautions

Introduction

This Installation Manual contains the information you will need to install and test the Electronic Vessel Control (EVC) system.

Read this Installation Manual carefully before installation. Incorrect installation may result in personal injury or damage to property or the engine itself.

If you do not understand or are uncertain about any operation or information in this Installation Manual, please contact the Volvo Penta organization.

Installation

This Installation Manual is intended for professional use only.

The Manual must be used in conjunction with the relevant Engine Operator's Manual.

Volvo Penta will not assume any liability for damage to materials or personal injury, which may result if the installation instructions are not followed or if the work is carried out by non-professional personnel.

The installer is responsible for ensuring that the system operates in accordance with this Installation Manual.

Work procedures

These instructions are for use by suitably qualified personnel, referred to as the installer in these instructions.

Refer to the specific Engine Operator's manual for relevant information where necessary, especially regarding safety and engine operation.

The work must be done at Volvo Penta's service workshops, boat builders or other authorised and suitably equipped workshops with personnel who have the appropriate qualifications and experience.

Important!

The following special warning symbols are found in this manual and on the engine.

⚠ WARNING! Possible danger of personal injury, damage to property or mechanical malfunction if the instructions are not followed.

⚠ IMPORTANT! Used to draw your attention to something that can cause damage to or malfunction of a product or damage to property.

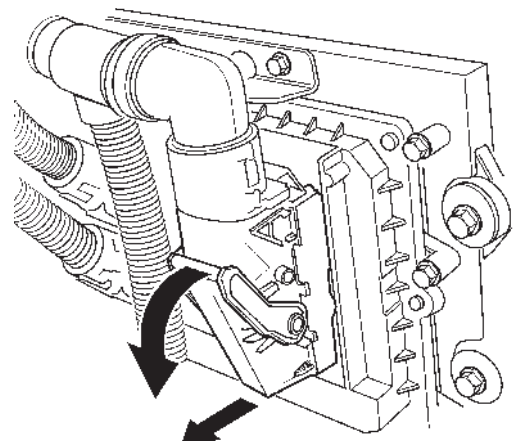
NOTE! Used to draw your attention to important information that will facilitate the work or operation in progress.

A summary is given below of the risks and safety precautions you must observe or carry out when installing and calibrating the EVC system.

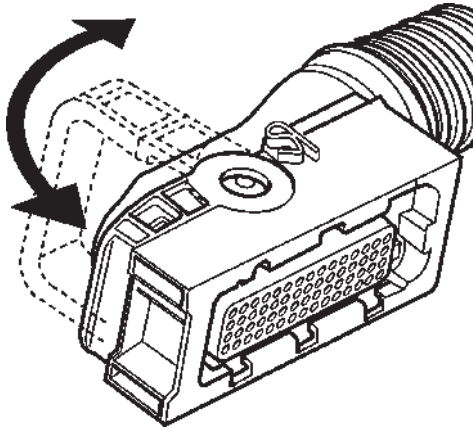
⚠ Before carrying out electric arc welding, remove:

- connector from the engine control unit
- 8-pin connector from the PCU.

D4 and D6 engines



Press the lock tab down and pull the connector out. Refit the connector to the engine control unit after disconnecting the welding equipment.

D9, D12 and D16 engines

Press the lock tab up and pull the connector/connectors out. Refit the connector to the engine control unit after disconnecting the welding equipment.

-  Take care to avoid all moving parts of the engine during testing and operation. Approaching an engine which is operating is a hazard to personal safety. Loose clothing or long hair can become entangled in moving parts, and may cause serious personal injury.
-  Never carry out work on an engine that is suspended from a hoist.
-  The engine must not be run in areas where there are explosive materials or gases.
-  Only start the engine in a well-ventilated area. If operating the engine in a closed area ensure that there is exhaust ventilation leading out of the work area to remove exhaust gases and crank-case ventilation emissions.
-  Never allow an open flame or electric sparks near the batteries. Never smoke close to the batteries. The batteries give off hydrogen gas during charging, which can form an explosive mixture when mixed with air. This gas is easily ignited and highly flammable. Incorrect connection of the battery can cause a single spark, which is sufficient to cause a gas explosion. Do not alter the battery connections when attempting to start the engine (spark risk) and do not lean over any of the batteries. Refer to the instructions in the Engine Instruction Manual.

 Always ensure that the + (positive) and – (negative) battery leads are correctly installed on their corresponding terminal posts on the batteries. Incorrect installation can result in serious damage to the electrical equipment. Refer to the wiring diagrams in the Engine Instruction Manual.

 Always use protective goggles when charging or handling the engine batteries. The battery electrolyte fluid contains sulfuric acid which is highly corrosive. If the battery electrolyte comes into contact with unprotected skin, wash it off immediately using copious amounts of clean water and soap, then seek medical assistance. If the electrolyte fluid comes into contact with the eyes, flush your eyes immediately (preferable using an eye bath) with copious amounts of clean water, and obtain medical assistance without delay.

 **IMPORTANT!** AB Volvo Penta has developed and tested the complete EVC system and its components. However, non Volvo Penta components or components installed in a way that differ from the instructions may cause the system to malfunction. In this case Volvo Penta do not accept any responsibility.

General information

About the Installation Manual

This publication is intended as a guide for the installation of Volvo Penta EVC system for D4, D6, D9, D12 and D16 engines, Aquamatic and inboard use. The publication is not comprehensive and does not cover every possible installation, but is to be regarded as recommendations and guidelines applying to Volvo Penta standards. Detailed Installation Instructions are included in most of the accessory kits.

These recommendations are the result of many years of practical experience of installations from all over the world. Departures from recommended procedures etc. can be necessary or desirable, however, in which case the Volvo Penta organization will be glad to offer assistance in finding a solution for your particular installation.

It is the sole responsibility of the installer to ensure that the installation work is carried out in a satisfactory manner, it is operationally in good order, the approved materials and accessories are used and the installation meets all applicable rules and regulations.

This Installation Manual has been published for professionals and qualified personnel. It is therefore assumed that persons using this book have basic knowledge of marine propulsion systems and are able to carry out related mechanical and electrical work.

Installation of electrical systems shall only be carried out by a professional boat electrician.

Only components, cables, connections etc, delivered or approved by the manufacturer may be used. The manufacturer will accept no responsibility what so ever if this requirement is ignored.

Volvo Penta continuously upgrades its products and reserves the right to make changes. All the information contained in this manual is based on product data available at the time of print. Notification of any important modifications to the product causing changes to installation methods after this date will be made in Service Bulletins.

NOTE! Commercial and classified systems including:

- MCC system
- CU 305 system
- SDU (Shut Down Unit)

Please refer to ***Installation Marine Propulsion, Diesel Engines D5–D16***.

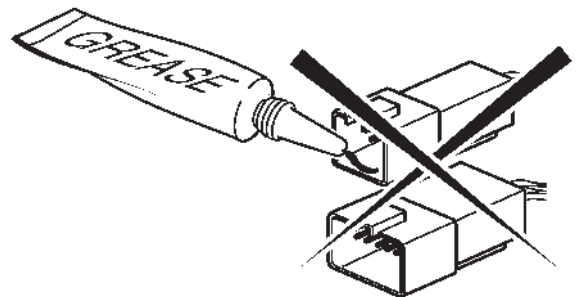
Plan installations with care

Great care must be taken in the installation of engines and their components if they are to operate perfectly. Always make sure that the correct specifications, drawings and any other data are available before starting work. This will allow for correct planning and installation right from the start.

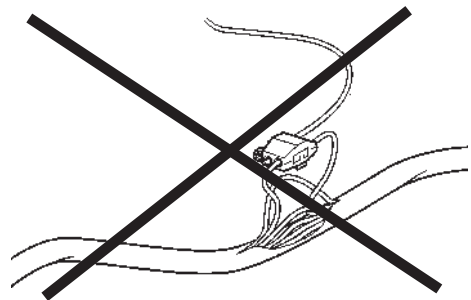
Plan the engine room so that it is easy to carry out routine service operations involving the replacement of components. Compare the engine Service Manual with the original drawings showing the dimensions.

It is very important when installing engines that no dirt or other foreign matter gets into the fuel, cooling, intake or turbocharger systems, as this can lead to faults or engine seizure. For this reason the systems must be sealed. Clean supply lines and hoses before connecting them to the engine. Only remove protective engine plugs when making a connection to an external system.

Important



Never use any kind of grease in the EVC connectors.



Never cut or modify the Volvo Penta EVC cable harnesses. For extra power supply use the Volvo Penta relay for accessories. Refer to the ***Relay for external accessories*** section.

Certified engines

The manufacturer of engines certified for national and local environmental legislation (Lake Constance for example) pledges that this legislation is met by both new and currently operational engines. The product must compare with the example approved for certification purposes. So that Volvo Penta, as a manufacturer, can pledge that currently operational engines meet environmental regulations, the following must be observed during installation:

- Servicing of ignition, timing and fuel injection systems (gasoline) or injector pumps, pump settings and injectors (diesel) must always be carried out by an authorised Volvo Penta workshop.
- The engine must not be modified in any way except with accessories and service kits developed for it by Volvo Penta.
- Installation of exhaust pipes and air intake ducts for the engine compartment (ventilation ducts) must be carefully planned as its design may affect exhaust emissions.
- Seals may only be broken by authorised personnel.

 **IMPORTANT!** Use only Volvo Penta Genuine Parts.

Using non-genuine parts will mean that AB Volvo Penta will no longer take responsibility for the engine meeting the certified design.

All damage and costs caused by the use of non-genuine replacement parts will not be covered by Volvo Penta.

Seaworthiness

It is the boat builder's duty to check that the security requirements apply to the market in which the boat is sold. In the USA for example, these are the US Federal Regulations for pleasure boats described in Title 46. The requirements described below apply to the EU principles. For information and detailed descriptions of the safety requirements that apply to other markets, contact the authority for the country concerned.

As of June 16 1998, pleasure boats and certain associated equipment marketed and used within the EU must bear CE labels to confirm that they meet the safety requirements stipulated by the European Parliament and Council of Europe's directive for pleasure boats. The normative requirements can be found in the standards drawn up to support the directive's objective of uniform safety requirements for pleasure boats in EU countries.

Certificates that grant the right for CE label use and confirm that boats and equipment meet safety requirements are issued by approved notified bodies. In many Member States the classification societies have become the notified bodies for pleasure boats, e.g. Lloyd's Register, Bureau Veritas, Registro Italiano Navale, Germanischer Lloyd, etc.

In many cases completely new institutions have been approved as notified bodies. The directive also allows boat builders and component manufacturers to issue assurances of compliance with the requirements of the directive. This requires the manufacturer to store the prescribed product documentation in a place that is accessible to the monitoring authority for at least ten years after the last product is produced.

Life boats and boats for commercial activities are approved by classification societies or by the navigation authority for the boat's registered country.

Joint liability

Each engine consists of many components working together. One component deviating from its technical specification can cause a dramatic increase in the environmental impact of an engine. It is therefore vital that systems that can be adjusted are adjusted properly and that Volvo Penta Genuine Parts are used.

Certain systems e.g. components in the fuel system may require special expertise and special test equipment. Some components are sealed at the factory for environmental reasons. No work should be carried out on sealed components except by authorised personnel.

Remember that most chemical products damage the environment if used incorrectly. Volvo Penta recommends the use of biodegradable degreasing agents for cleaning engine components, unless otherwise indicated in a Workshop Manual. Take special care when working on board boats to ensure that oil and waste are taken for destruction and not accidentally pumped into the environment with bilgewater.

Conversion factors

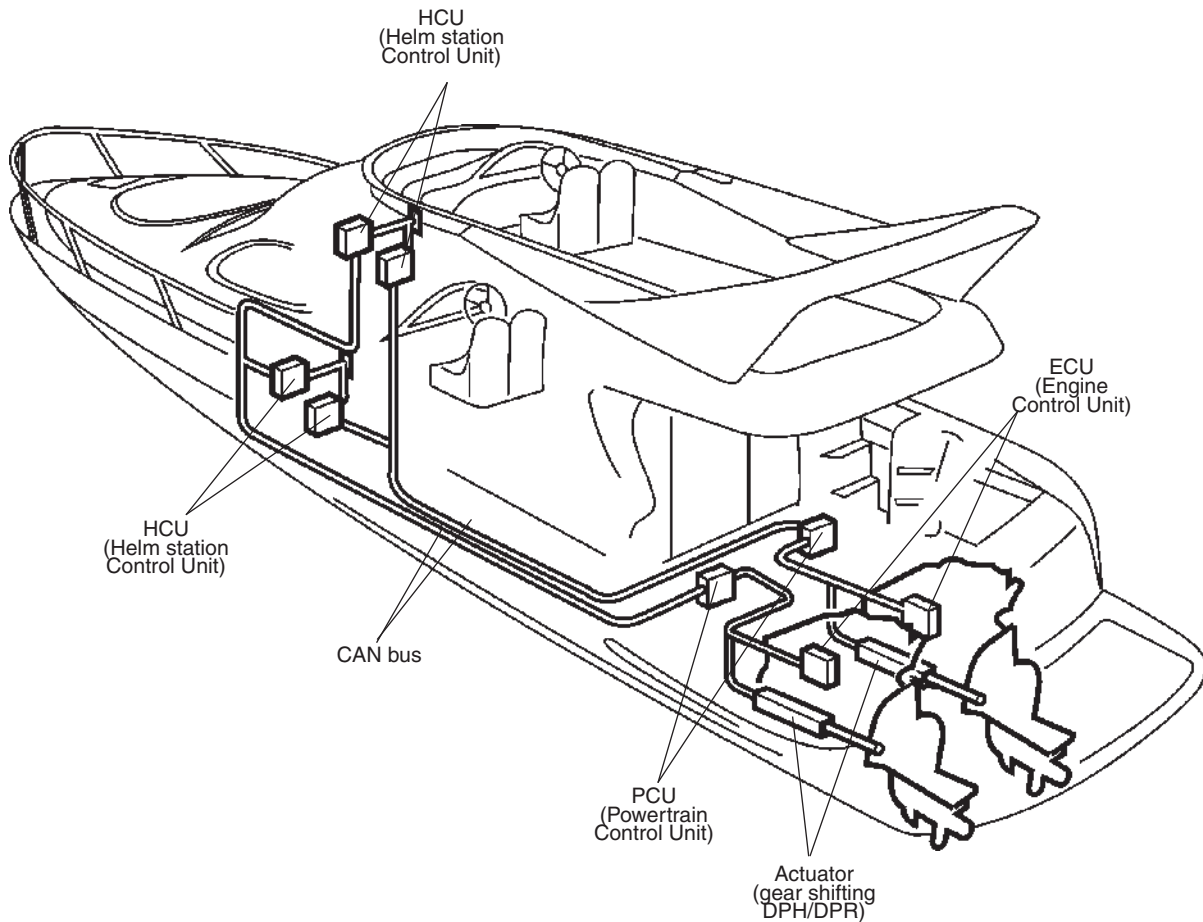
Metric to U.S. or IMP. conversion factors:

U.S. or IMP. to metric conversion factors:

	To convert from	To	Multiply by	To convert from	To	Multiply by
Length	mm	inch	0.03937	inch	mm	25.40
	cm	inch	0.3937	inch	cm	2.540
	m	foot	3.2808	foot	m	0.3048
Area	mm ²	sq.in.	0.00155	sq. in.	mm ²	645.2
	m ²	sq. ft.	10.76	sq. ft.	m ²	0.093
Volume	cm ³	cu. in.	0.06102	cu. in.	cm ³	16.388
	litre, dm ³	cu. ft.	0.03531	cu. ft.	litre, dm ³	28.320
	litre, dm ³	cu. in.	61.023	cu. in.	litre, dm ³	0.01639
	litre, dm ³	imp. gallon	0.220	imp. gallon	litre, dm ³	4.545
	litre, dm ³	U.S. gallon	0.2642	U.S. gallon	litre, dm ³	3.785
	m ³	cu. ft.	35.315	cu.ft.	m ³	0.0283
Force	N	lbf	0.2248	lbf	N	4.448
Weight	kg	lb.	2.205	lb.	kg	0.454
Power	kW	hp (metric) ¹⁾	1.36	hp (metric) ¹⁾	kW	0.735
	kW	bhp	1.341	bhp	kW	0.7457
	kW	BTU/min	56.87	BTU/min	kW	0.0176
Torque	Nm	lbf ft	0.738	lbf ft	Nm	1.356
Pressure	Bar	psi	14.5038	psi	Bar	0.06895
	MPa	psi	145.038	psi	MPa	0.006895
	Pa	mm Wc	0.102	mm Wc	Pa	9.807
	Pa	in Wc	0.004	in Wc	Pa	249.098
	kPa	in Wc	4.0	in Wc	kPa	0.24908
	mWg	in Wc	39.37	in Wc	mWg	0.0254
Energy	kJ/kWh	BTU/hph	0.697	BTU/hph	kJ/kWh	1.435
Work	kJ/kg	BTU/lb	0.430	BTU/lb	kJ/kg	2.326
	MJ/kg	BTU/lb	430	BTU/lb	MJ/kg	0.00233
	kJ/kg	kcal/kg	0.239	kcal/kg	kJ/kg	4.184
Fuel consump.	g/kWh	g/hph	0.736	g/hph	g/kWh	1.36
	g/kWh	lb/hph	0.00162	lb/hph	g/kWh	616.78
Inertia	kgm ²	lbft ²	23.734	lbft ²	kgm ²	0.042
Flow, gas	m ³ /h	cu.ft./min.	0.5886	cu.ft./min.	m ³ /h	1.699
Flow, liquid	m ³ /h	US gal/min	4.403	US gal/min	m ³ /h	0.2271
Speed	m/s	ft./s	3.281	ft./s	m/s	0.3048
	mph	knots	0.869	knots	mph	1.1508
Temp.	°F=9/5 x °C+32			°C=5/9 x (°F-32)		

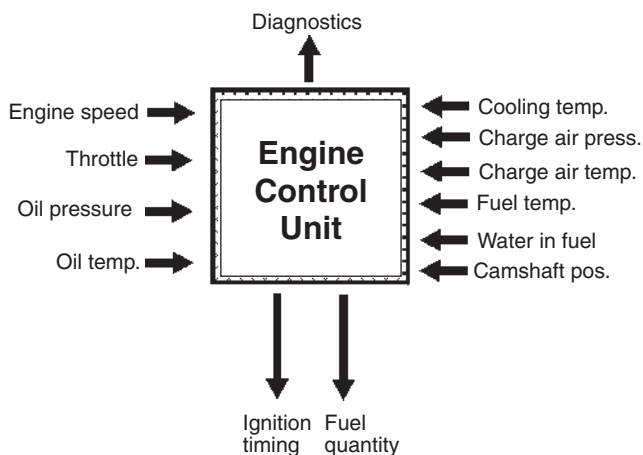
1) All hp figures stated in the catalogue are metric.

Engine monitoring and the EVC system



Engine monitoring system

The engines are equipped with common rail system and electronically controlled injectors (D4, D6) or unit injectors (D9, D12, D16) with an electronic control



unit.

The injectors contain an electro-magnetic valve which sets the amount of fuel injected and the correct timing. The monitoring system measures the charge air pressure and temperature, and calculates the available air mass. This determines the maximum amount of fuel that can be injected (smoke limiter function).

The system also limits the maximum torque available at the engine speed registered to protect the engine and transmission from overload.

To protect the engine at too high coolant or charge air temperatures and boost pressure as well as oil pressure, the monitoring system reduces the amount of fuel (reduced engine output) until the current values are normalized.

The engine monitoring system also has a diagnostic system, which helps users and service technicians to determine the cause of any malfunctions in the system quickly by using the diagnostic tool.

Any fault is shown on the EVC system tachometer display / EVC system display and the VODIA diagnostic scan tool. The diagnostic tool has menus in several languages.

The EVC^{EC} -C system

The Electronic Vessel Control (EVC) system is a so called distributed system. The principle of a distributed system is to have "small" electronic units, called nodes, located at suitable places in the boat.

The EVC nodes are the Powertrain Control Unit (PCU) and the Helm station Control Unit (HCU). Nodes are located close to the components they are connected to. A helm node is located close to the helm. A powertrain node is mounted in the engine room.

Each node is connected to a number of adjacent components, such as sensors, controls, instruments and actuators.

Each PCU and HCU is programmed for a specific engine. There is a sticker with serial no. and chassis no. on each PCU and HCU. The serial no. must correspond with the sticker on the engine.

A data bus, a CAN bus, connects the nodes to each other. Together they form a network and exchange information and take advantage of each others' services. The principle of forming a network of nodes to which all components are connected reduces wiring radically. A CAN bus can be very long, but in the EVC system the bus length shall not exceed 40 meters.

CAN stands for Controller Area Network, an industry standard for communication between nodes in distributed systems.

A distributed system supports a growing multiplicity of system configurations and optional features. New nodes can be connected to the network with minimal wiring redesign. New effective functionality can be created by letting the nodes interact and combine their capabilities, creating a more useful and safe product.

Functionality

Engine speed and gear shift

Speed and gear shift control is handled electronically. The reverse gear or stern drive has high speed shifting protection. Dual function electronic controls can be used in the EVC system as well as can mechanical controls with control adapters.

Multiple helm stations

Up to four helm stations can easily be installed (plug in). The EVC system provides different options for station transfers in neutral position or under way. Another safety feature is a helm station "lock function" to avoid unexpected station transfers.

Engine synchronization

Engine synchronization results in better comfort, good fuel economy and minimized wear due to less vibration and reduced noise level. The master (port) and slave (starboard) systems must be able to communicate to allow synchronization. For this reason a synchronization cable must be installed at each helm.

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).

Powertrim

The function is considerably improved compared with non EVC governed Powertrim systems. EVC introduces a new trim panel with the same design as other EVC control panels. If you have a twin engine installation the stern drives can be both individually and simultaneously controlled.

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

Powertrim 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 and only supported by the EVC-C system. Hardware changes are not needed. Old versions of the EVC system **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.

Fuel level

EVC-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 PCU–engine 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/NMEA 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 consumption, 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 in the EVC system tachometer.

EVC system display: Fuel rate will be shown in the "Engine data window".

Fresh water level

EVC makes it easy to install the water level indication. All you need is a level sensor, 3–180 ohm, 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 PCU–engine cable harness has an input for the fresh water level sender.

Rudder indicator

To install a rudder indicator you need a sensor, 3–180 ohm, at the rudder and a gauge or a display at the helm. The gauge shall be connected to the instrument serial communication bus. The PCU–engine cable harness has an input for the rudder sender.

Volvo Penta Lowspeed function D4, D6, D9, D12

Boats with powerful engines can be difficult to maneuver in narrow waters since the boat speed is high even at idling speed. This problem is minimised using Volvo Penta Lowspeed functionality. EVC system controls the reverse gear to slip hydraulically so that lower boat speed can be achieved.

The gear slip can be implemented by means of a separate trolling valve or by controlling primary or secondary solenoids, depending on type of reverse gear. The reverse gear also has to be equipped with an rpm sensor and a tooth wheel on the output shaft as well as an oil pressure/oil temperature sensor.

Volvo Penta trolling function, D9, D12

The EVC system controls the reverse gear to slip hydraulically so that lower boat speed can be achieved with maintained engine rpm. The gear slip is implemented by means of a separate trolling valve. The reverse gear also has to be equipped with an rpm sensor and a tooth wheel on the output shaft as well as an oil pressure/oil temperature sensor. Default trolling slip is 70%. Max slip is 80% but suitable slip is dependent on each installation. Slip can be set from 10% up to 80% by using the VODIA tool.

NMEA support

The EVC system supports NMEA 0183 or NMEA 2000 by means of hardware interfaces.

Boat speed, echo sounder and water temp (Multisensor)

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

4–20 mA interfaces

The EVC system supports different control systems from the aftermarket that support 4–20 mA by means of input or output interfaces. No calibration is needed.

Installation tools and literature

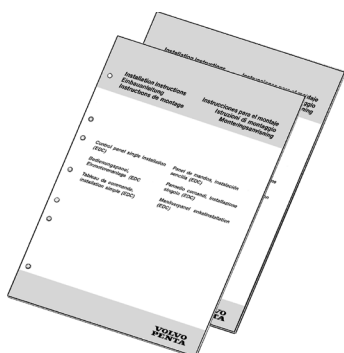


Installation manuals

For D4, D6 with IPS: **Installation EVC^{EC}-C Electronic Vessel Control Volvo Penta IPS.**

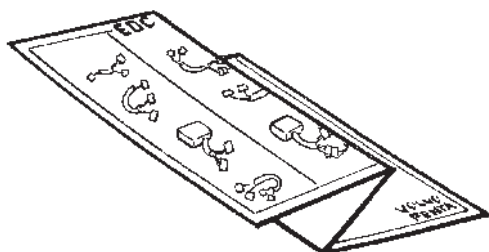
For D4, D6: **Installation Aquamatic DPH, DPR, Volvo Penta IPS, Inboard - D4, D6.**

For D9, D12 and D16: **Installation Marine Propulsion Diesel Engines Inboard - D5–D16 series.**



Installation instructions

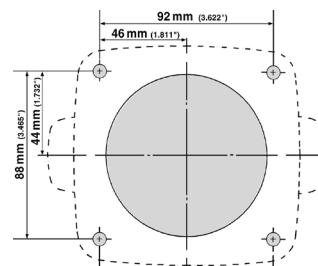
Installation instructions are included in most kits



Posters

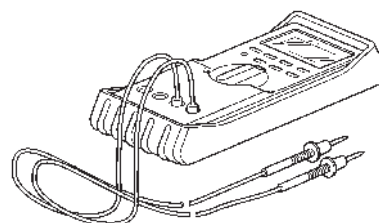
Installation procedure Electronic Vessel Control EVC-C D4, D6

Installation procedure Electronic Vessel Control EVC-C D9, D12, D16



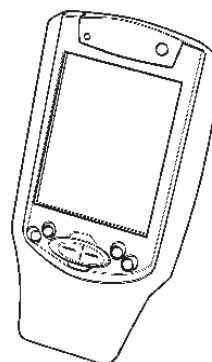
Templates for panels and controls

All installation instructions and templates are included in each kit. Please refer to the **Templates for controls and panels** chapter



Multimeter

Special tool **9812519**



VODIA Diagnostic scan tool

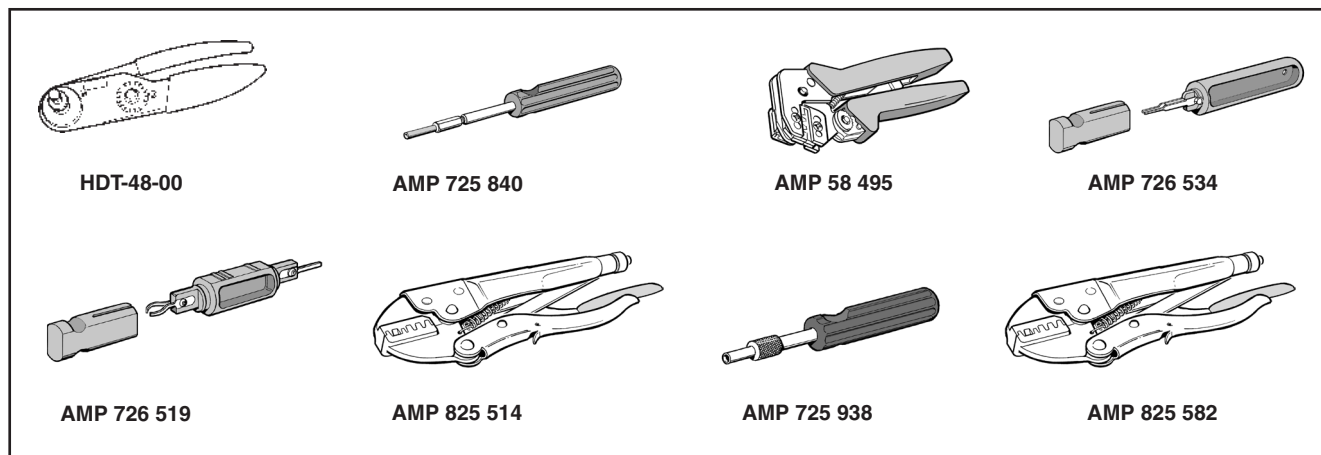
The VODIA tool is used in diagnostic work to read fault codes in clear text. It can also be used to log EVC parameters.

It is very useful in fault tracing since it makes it possible to see the values the EVC nodes read and send.

Please contact the Volvo Penta organization for ordering.

Other special equipment

The tools below are intended for use in work on the cable harnesses of the engine. The tools are not included in Volvo Penta's range, they must be ordered from a local **AMP** or **Deutsch** dealer. If you experience problems in contacting a dealer, please contact Volvo Penta Quality Action Center for advice.



Deutsch connectors

HDT-48-00 Crimping tool
0411-310-1605 Disassembly tool

16-pin CPC connector, d=1.6 mm (0.063")

725 840-1 Disassembly tool
58 495-1 Crimping tool

JPT connector (42-pin EDC, 2 and 3-pin Bosch etc.)

726 534-1 Disassembly tool 1.6 mm (0.063") pin width
726 519-1 Disassembly tool 2.8 mm (0.11") pin width
825 514-1 Crimping tool

Blades and sockets 3.5 mm (0.14")

725 9380 Disassembly tool
825 582-2 Crimping tool

4.8 mm (0.19") and 6.3 mm (0.25") cable clamps. Tongues and socket terminals

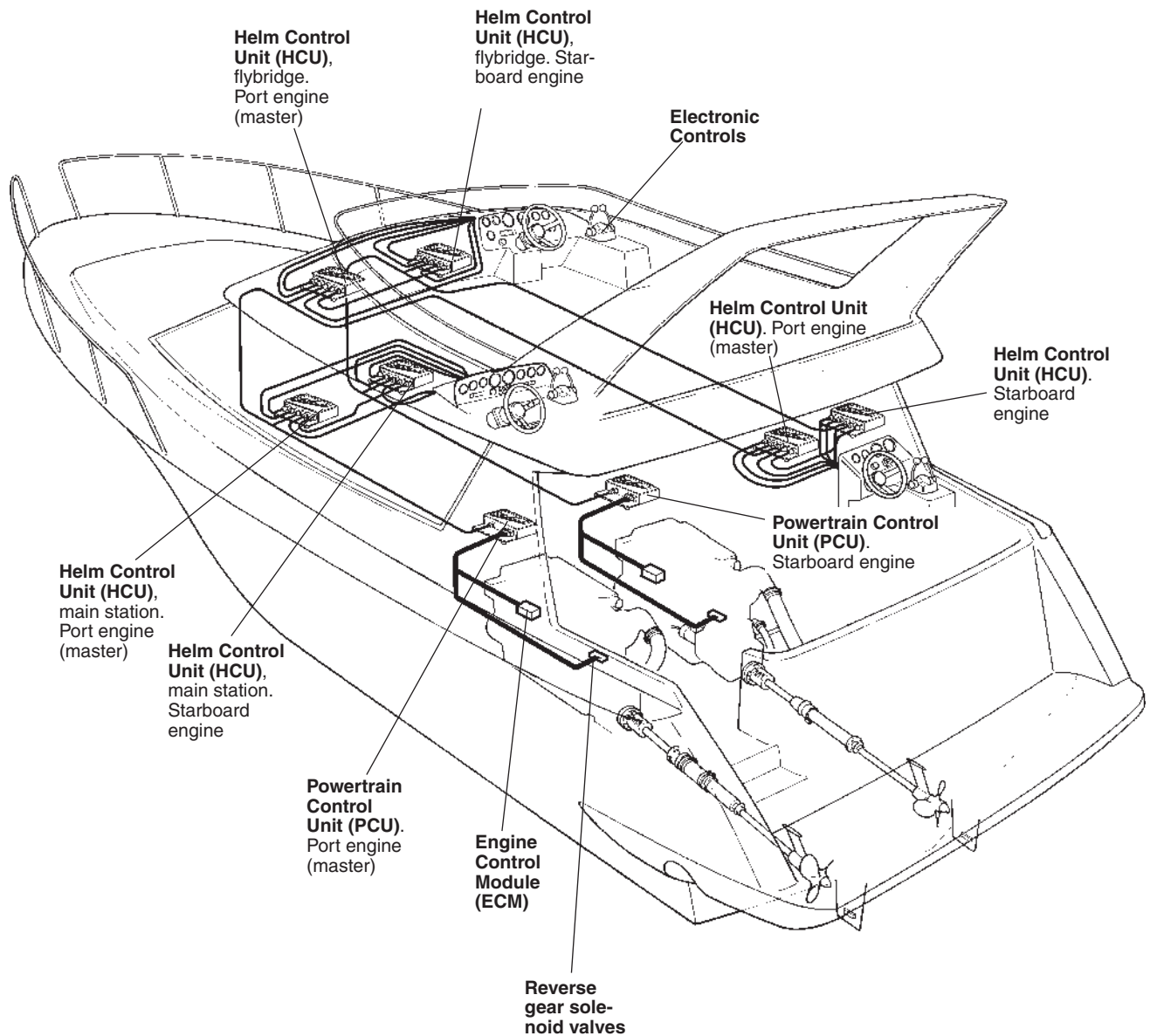
825 514-1 Crimping tool

Deutsch service kit incl. connectors and crimping tool

11 666 200 **NOTE!** Volvo Part no. only

Major components

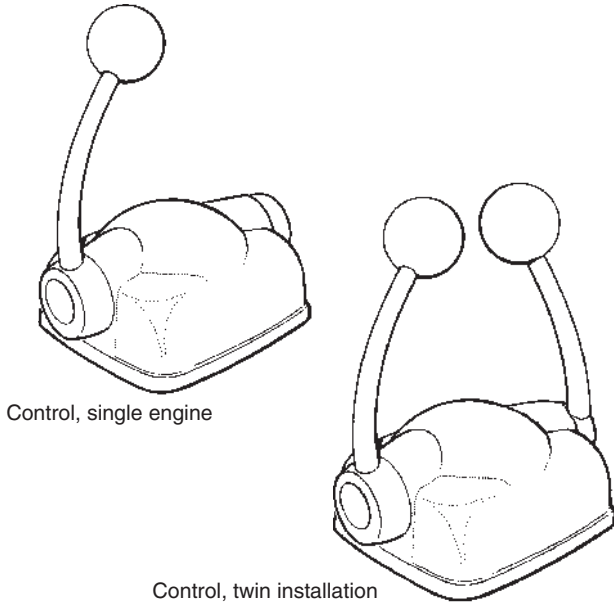
General view



EVC system with two inboard engines (twin installation) and three individual helm stations.

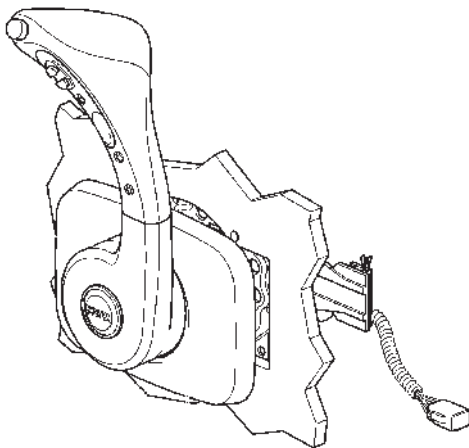
Electronic controls

Top mounted controls



Lever controls for electronic control of engine speed and gear shifting. Available in black or stainless steel housing and for both single and twin installation. The controls are equipped with neutral switches.

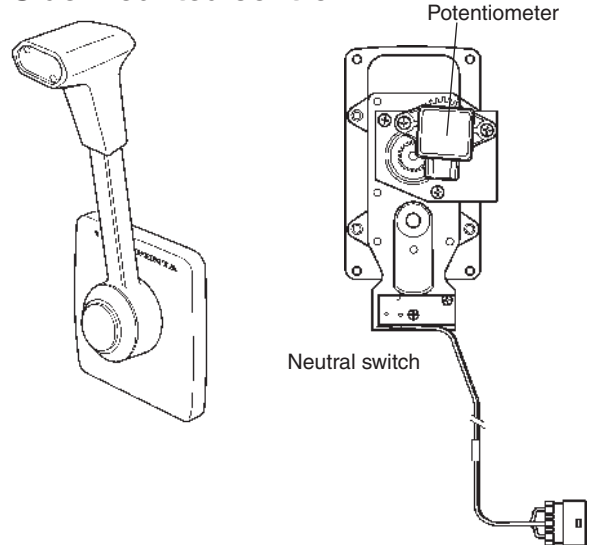
Side mounted control. DPH and DPR applications



Side mounted lever control for electronic control of engine speed, gear shifting. The control is available with buttons for Powertrim adjustments and control.

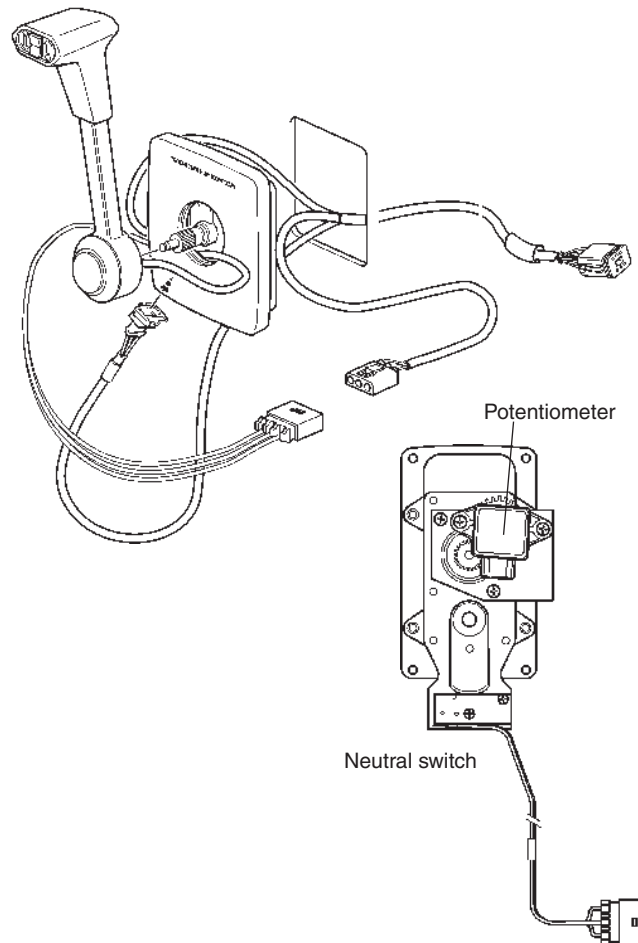
Available for single installation. Including cable 2.0 m (6 ft).

Side mounted control



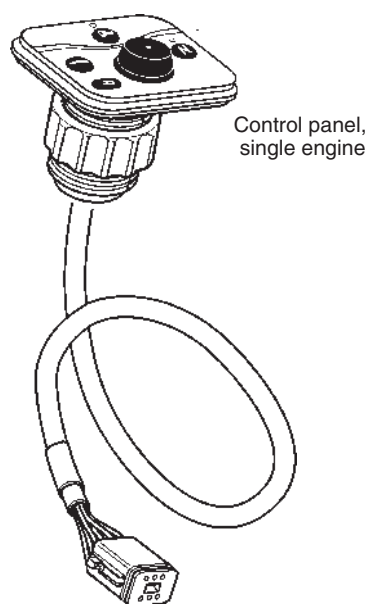
Side mounted lever control for electronic control of engine speed and gear shifting. Available for single installation.

Side mounted control with Powertrim switch

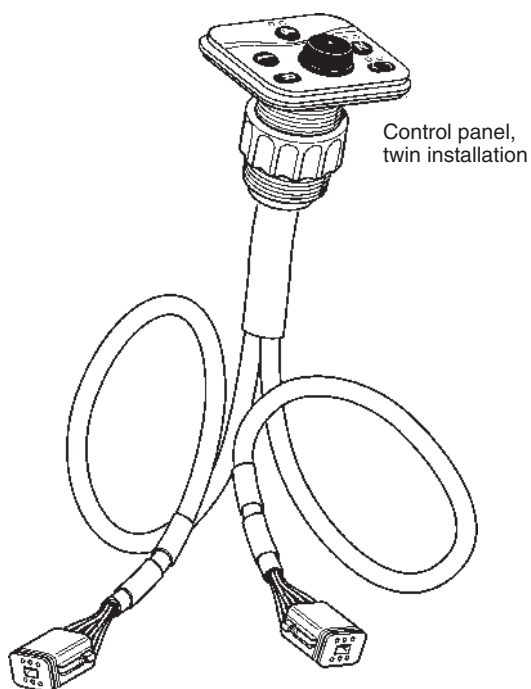


Side mounted lever control for electronic control of engine speed, gear shifting and Powertrim. Available for single installation. Including cable 2.0 m (6 ft).

EVC control panels

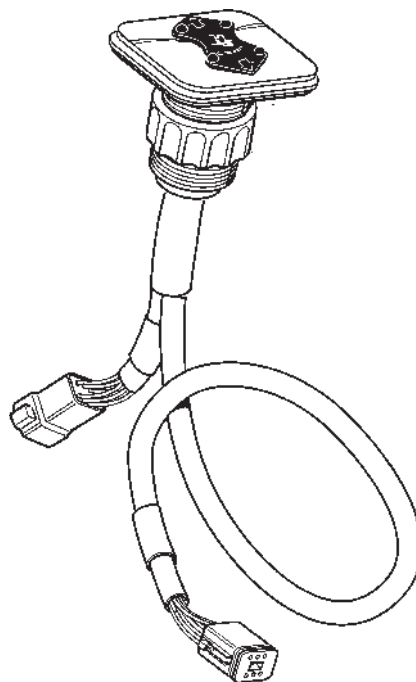


Control panel,
single engine



Control panel,
twin installation

Powertrim control panel, stern drive DPH/DPR

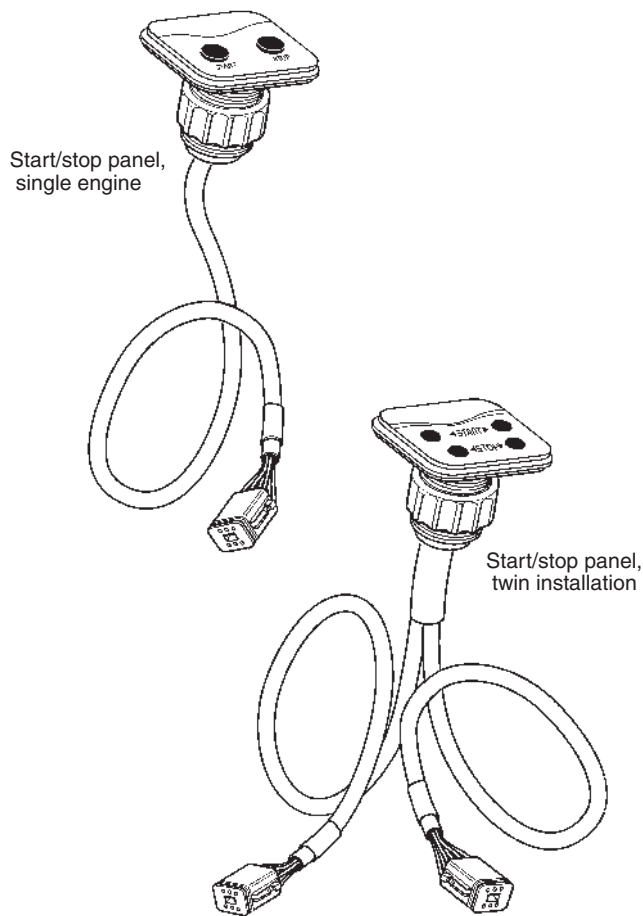


The panel can be installed with a frame or flush on dashboard. The panel is supplied with the necessary connections.

A control panel is required to start and operate EVC engines.

The panels can be installed with frames or flush on dashboard. The panels are supplied with the necessary connections.

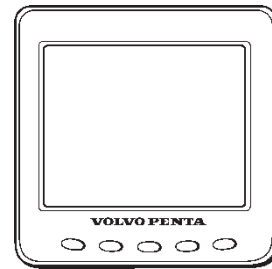
Start/stop control panel, secondary helm station



To start and stop the engine from a secondary helm station.

The panel can be mounted with a frame or flush on dashboard. The panels are supplied with all necessary connections.

EVC system display, including cable



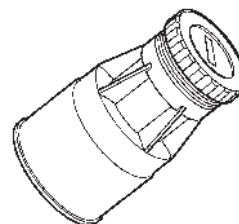
The Volvo Penta EVC system display is an on-board instrument for indication of engine operating values, boat speed and other data. The display consists of a self-contained, computerised unit for fixed installation on a dash board. A Liquid Crystal Display (LCD) screen is used for data presentation.

The EVC system display can show information from one or two engines.

If only a display is used (no tachometer) this requires an additional buzzer and an instrument, panels and auxiliary cable.

⚠ IMPORTANT! An EVC system display can be connected together with a tachometer. The display can also substitute a tachometer. The EVC system must have either a tachometer or a display.

Key switch, main station



On the main helm station a key switch to power up the system and start/stop the engine must be installed.

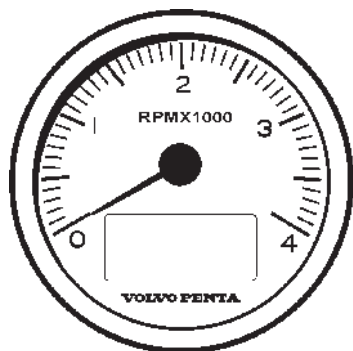
The key switch is available in kits for single and twin installations. A kit for twin installations has two switches which can be operated with the same key.

Instruments

There is a variety of instruments available for the EVC system. The instruments can be ordered with black or white dial face.

The instruments can be mounted with an attaching ring or clamp or flush on dashboard. The instruments are delivered with the necessary wiring for connection to the system.

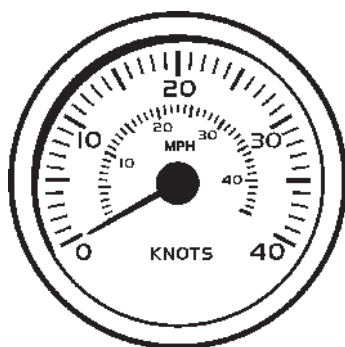
Some of the most common instrument types are shown below.



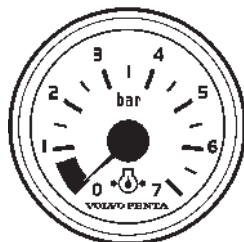
EVC system tachometer. Engine speed incl. buzzer and communication display
 Ø 85 mm (3.35")
 Ø 110 mm (4.33") (rpm).

The EVC system tachometer has an integrated buzzer and a communication LCD showing alarms, diagnosis data and information about the system.

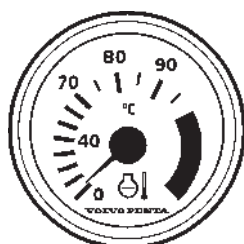
NOTE! The EVC system allows maximum one tachometer per helm station (HCU).



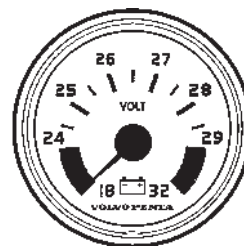
Speedometer
 Ø 85 mm (3.35")
 Ø 110 mm (4.33") (knots, mph)



Engine oil pressure
 Ø 52 mm (2.05") (bar alt. psi)



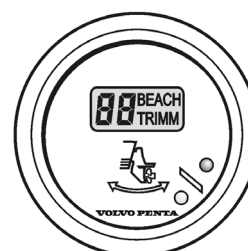
Coolant temperature
 Ø 52 mm (2.05") (°C alt. °F)



Voltage
 Ø 52 mm (2.05") (12V/24V)



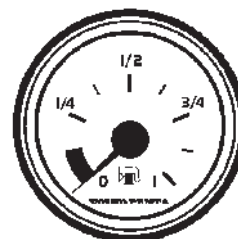
Trim instrument, analog
 Ø 52 mm (2.05")



Trim instrument, digital
 Ø 52 mm (2.05")



Rudder indicator
 Ø 52 mm (2.05")



Fuel level
 Ø 52 mm (2.05")

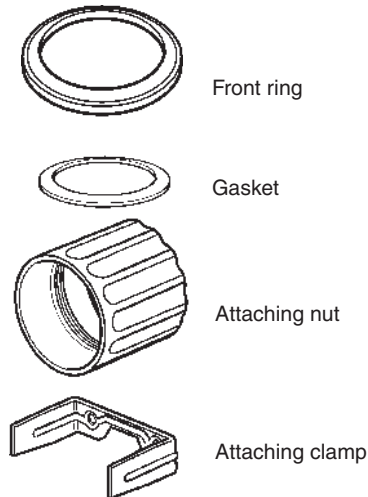


Alarm panel (option)
 Ø 52 mm (2.05")

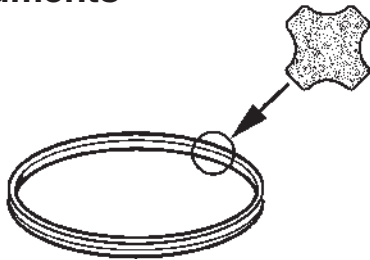
Instrument ring kit, chrome/black

The kit contains a front ring, a gasket and an attaching nut or an attaching clamp.

Diameters 52 mm (2.05"), 85 mm (3.35") or 110 mm (4.33") depending on type of instrument.

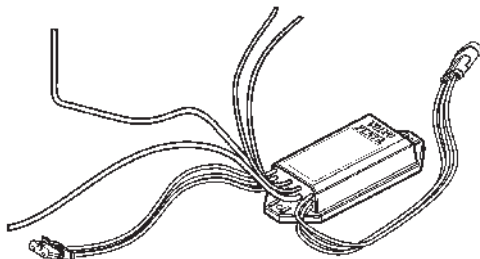


Gasket for flush mounted instruments



If the instruments should be flush mounted into the instrument panel, a gasket must be fitted to prevent water from entering behind the panel.

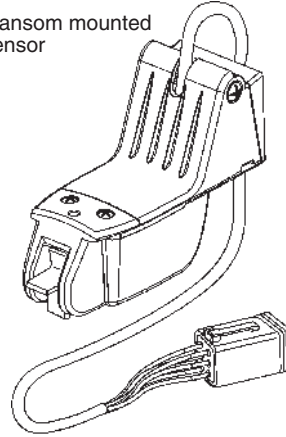
Auxiliary dimmer unit (ADU)



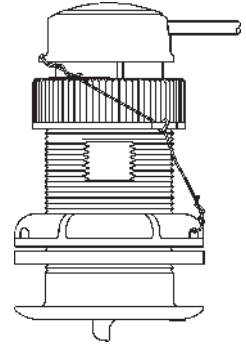
Dimmer for instrument lights in auxiliary instruments and equipment. Instruments not supported by the EVC system (third party instruments). The function is controlled by the multifunction button (⊖) on the EVC control panel.

Multisensor

Transom mounted sensor



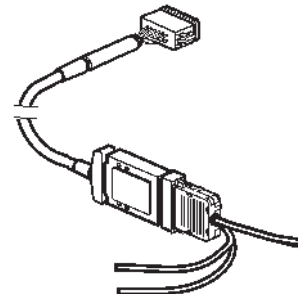
Hull mounted sensor



The multisensor is available in two designs, for transom mounting and for hull mounting. The multisensor submits data about boat speed, water depth and water temperature. Data can be shown in the EVC display. The speed data is also available in an instrument (speedometer).

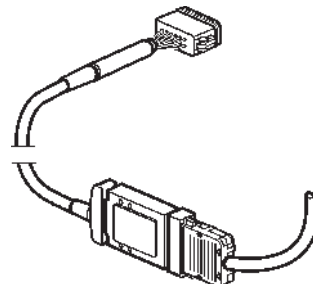
4–20 mA input interface for auxiliary control levers

Input interface to aftermarket control systems that support 4–20 mA. No calibration is needed.

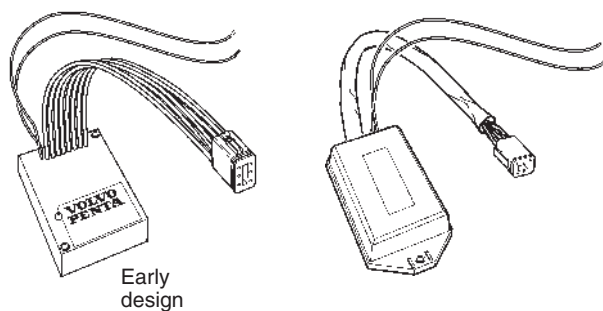


4–20 mA output interface for auxiliary control levers

Output interface to aftermarket control systems that support 4–20 mA. No calibration is needed.



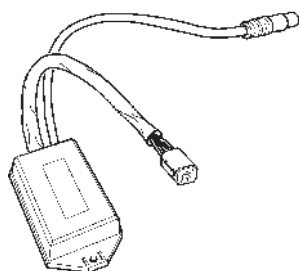
NMEA 0183 interface



Transmits:

Information about boat speed from a GPS or similar, to be presented on an instrument and in the tachometer or the EVC system display. An NMEA interface/multisensor must be installed to supply this information to the EVC system.

NMEA 2000 interface

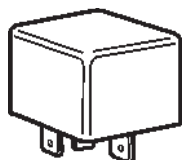


Transmits:

Engine data information to third party NMEA 2000 compatible equipment.

Information about boat speed from a GPS or similar, to be presented on an instrument and in the tachometer or the EVC system display. An NMEA interface/multisensor must be installed to supply speed information to the EVC system.

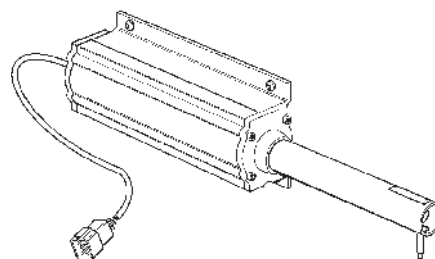
Relay for external accessories



The EVC architecture is prepared to operate a relay to power up additional equipment when the engine key switch is turned on.

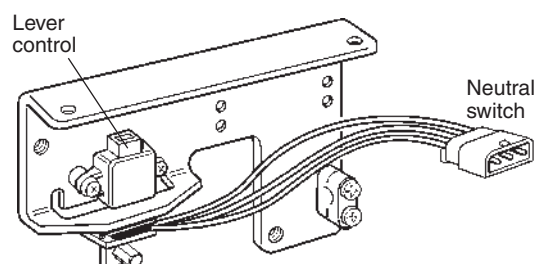
Relay 12 V, 20A	D4, D6, D9
Relay 24 V, 20A	D6, D9, D12, D16

Actuator D4/D6, stern drive DPH/DPR



Actuator which operate the shift control cable to the stern drive.

Adapter for mechanical controls



Use of an adapter for mechanical controls will enable you to use any mechanical control in combination with the EVC system. The adapter will convert the mechanical push-pull movement into an electric signal.

A neutral switch with a connector (pig tail) is connected to the adapter lever.

Install the adapter as close as possible to the control to reduce the amount of force needed to move control lever and make sure the location is dry and easy accessible.

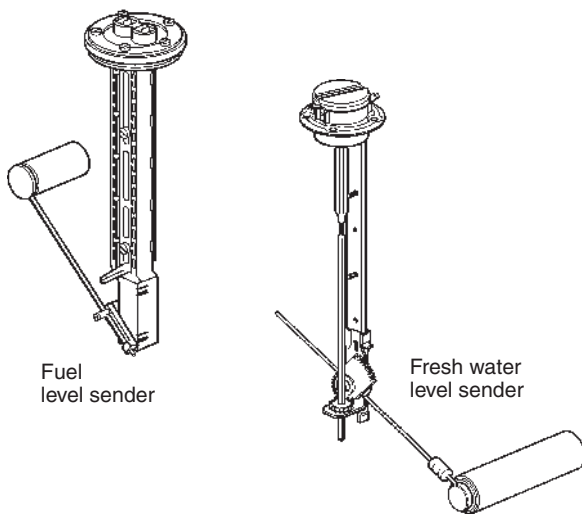
The adapter should also be used for trolling function when a mechanical control is used.

Buzzer (option)



The buzzer is to be mounted in a concealed place, preferably under the dashboard. When installing a buzzer there is a need for an "instruments, panels and auxiliary cable".

Fuel level sender and fresh water level sender



The fuel and water tank levels can be displayed on the EVC display or in separate instruments.

Level sender suitable for tanks with a height of max. 600 mm (23").

Fuel level sender resistance (two types):

3 –180 ohms, 3 ohms = empty tank

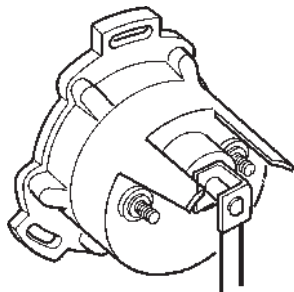
240 –30 ohms, 240 ohms = empty tank

Fresh water level sender resistance:

3 –180 ohms, 3 ohms = empty tank

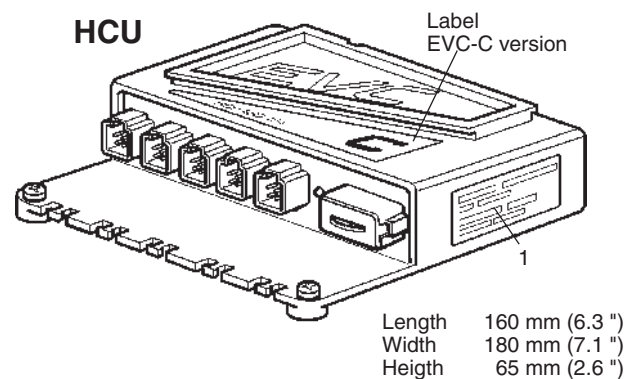
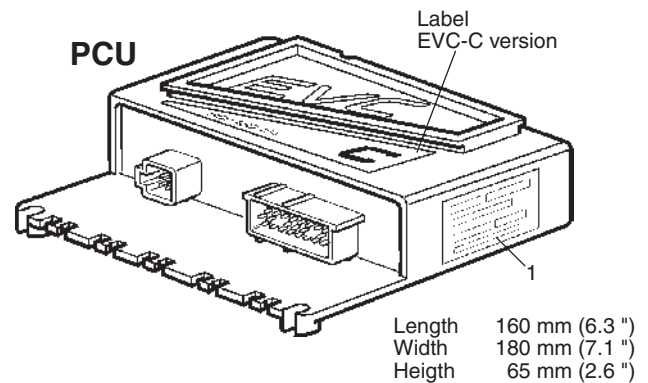
⚠ IMPORTANT! The fresh water sender potentiometer is protected against corrosion. Make sure to use the right type of sender.

Rudder angle sensor



The rudder angle sensor, 3–180 ohms, is connected to the EVC system through the engine/transmission cable harness. A special instrument or display on the dashboard shows the rudder angle.

Powertrain control unit, PCU Helm station control unit, HCU



The PCU node is to be located in the engine room. The PCU communicates with the engine and with the drive or the reverse gear. It also communicates with the helm station control unit HCU, via the standard bus cable.

The HCU node is to be located close to the helm and the components that it controls. It communicates with the PCU via the standard bus cable.

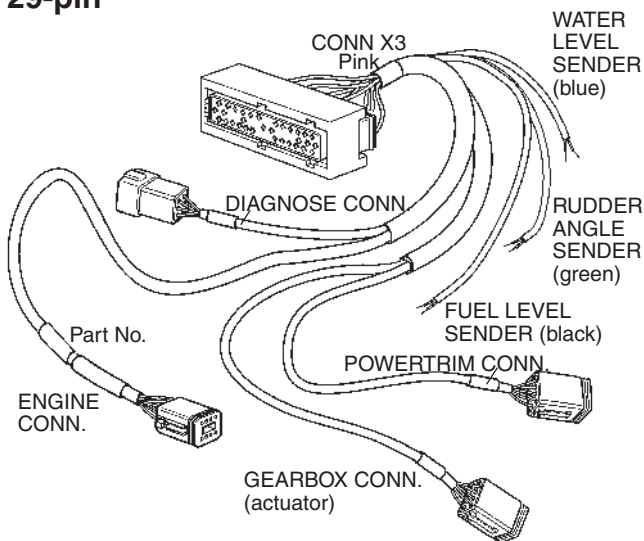
The HCU is equipped with a LED (STATUS). When installed the LED is flashing quickly when power is on and is off when power is off. Connector X8 is plugged.

⚠ IMPORTANT! On the PCU and HCU there is a label (1), with serial no. and chassis identification. There are also corresponding labels on the engine. The reason for having individually programmed PCU:s and HCU:s is that the software must correspond to each engine specification or helm specification (equipment and functionality).

Please refer to chapter **Identification of the PCU and the HCU.**

Cables and cable harnesses, D4 and D6 engines

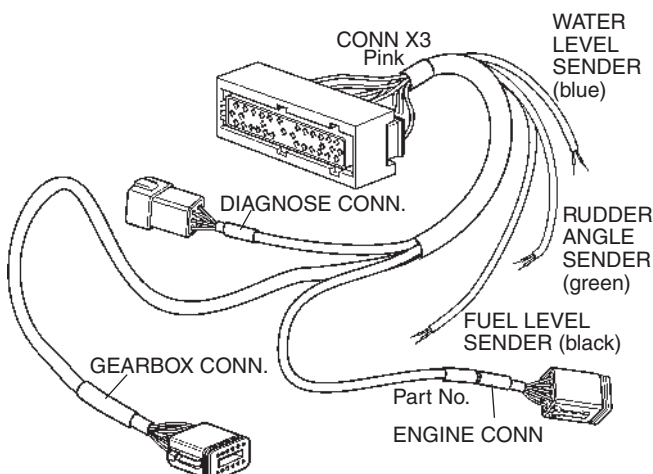
Stern drive DPH, DPR Engine/actuator/Powertrim cable, 29-pin



The cable connects the PCU to the engine, the actuator, Powertrim pump, fuel level sender (black PVC-coating), fresh water sender (blue PVC-coating) and rudder indicator (green PVC-coating). The harness also has a diagnostic connector to the VODIA diagnostic tool.

Length, m (ft): 3 (10), 5 (16)

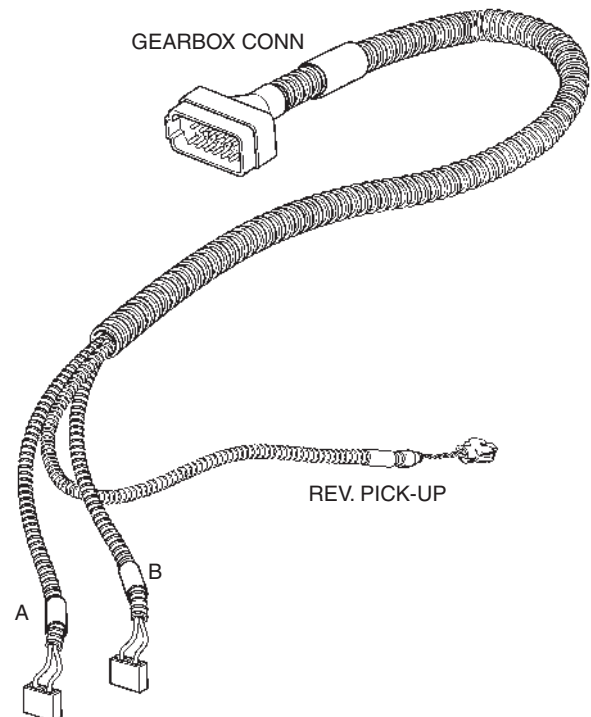
Inboard Engine/transmission cable, 29-pin



The cable connects the PCU to the engine, transmission (reverse gear), fuel level sender (black PVC-coating), fresh water sender (blue PVC-coating) and rudder indicator (green PVC-coating). The harness also has a diagnostic connector to the VODIA diagnostic tool.

Length, m (ft): 3 (10), 5 (16)

Inboard Transmission cable HS45/HS63 HS80/HS85, 12-pin



The cable harness connects the gear shift solenoids on the reverse gear to the engine/transmission cable from the PCU.

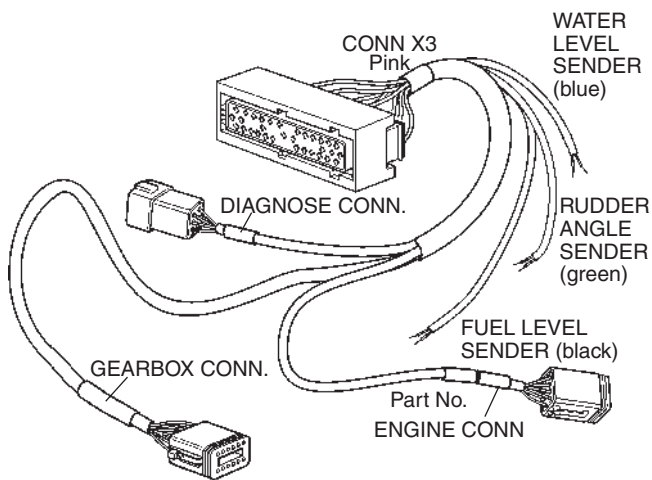
There is also a connection to the revolution pick-up sensor used on reverse gear HS80/HS85 in Volvo Penta Lowspeed applications.

The cable harness is connected and clamped together with the reverse gear at the factory.

Length, m (ft): 1.3 (4)

Cables and cable harnesses, D9, D12 and D16 engines

Engine/transmission cable, 29-pin

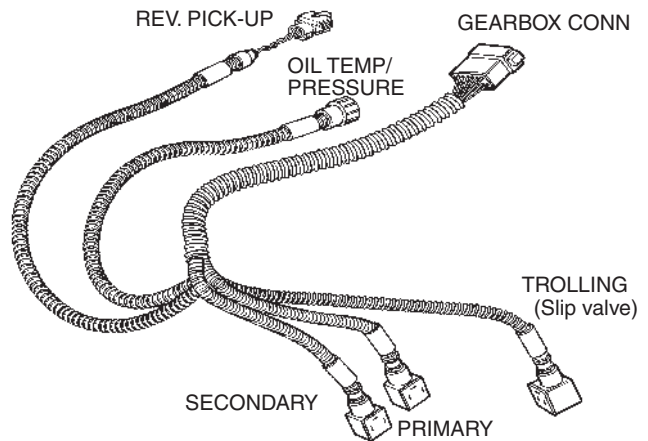


The cable connects the PCU to the engine, transmission (reverse gear), fuel level sender (black PVC-coating), fresh water sender (blue PVC-coating) and rudder indicator (green PVC-coating). The harness also has a diagnostic connector to the VODIA diagnostic tool.

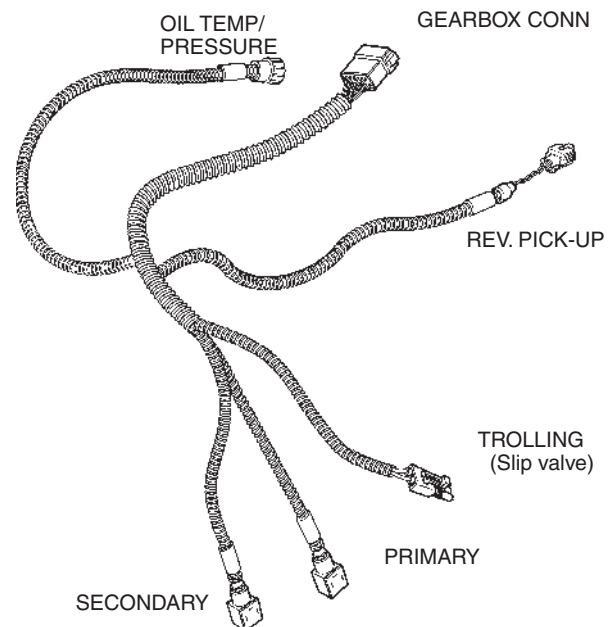
Length, m (ft): 3 (10), 5 (16)

Transmission cable, 12-pin Reverse gear type ZF

Transmission cable, 12-pin



Reverse gear type Twin Disc

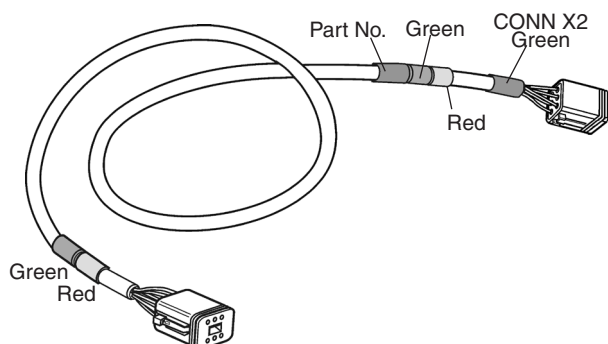


The cable harness connects the gear shift solenoids on the reverse gear to the engine/transmission cable and the PCU. There is also a reverse gear rpm pick-up cable and an oil temp and pressure cable. The cable harness is connected and clamped together with the reverse gear at the factory.

Length, m (ft): 1.3 (4)

Cables and cable harnesses, all engines

Standard bus cable, 6-pin



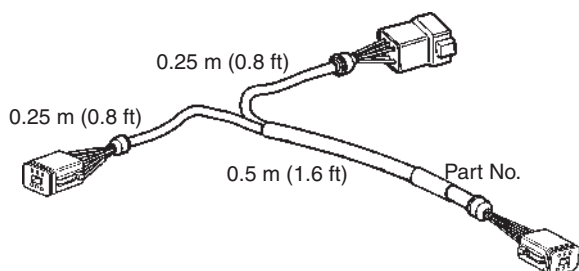
The cable must be used to connect the PCU to the HCU.

NOTE! The cable has female connections in both ends and cannot be used as an extension.

Two female connectors.

Length m: 5, 7, 9, 11, 13
Length ft: 16, 23, 30, 36, 42

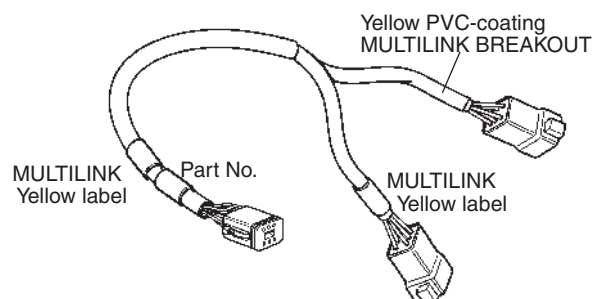
Y-connector, EVC bus cable, 6-pin



To connect the standard bus cable to the HCU in systems with secondary helm stations.

Length, m: 0.25 x 0.25 x 0.5
Length, ft: 0.8 x 0.8 x 1.6

Y-split multilink, 6-pin

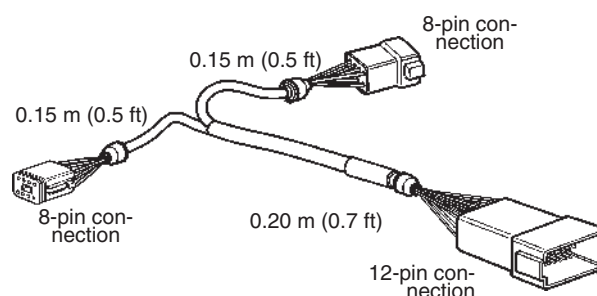


For making branches in the multilink cabling, EVC display-sync. connection-NMEA-connection.

NOTE! Do not install an Y-split cable without having the MULTILINK BREAKOUT connected.

Length, m (ft): 0.5 (1.6)

Y-connector to 4–20 mA output interface, engine transmission cable, 8 and 12-pin



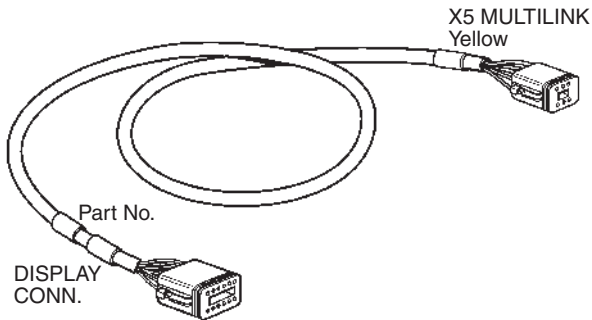
To connect the 4–20 mA interface output to an aftermarket control system supporting 4–20 mA, i.e. a CP-control (pitch) system.

The cable is connected to the EMS unit cable (ENGINE CONN) on the engine/transmission cable harness.

This connector is not used on D4 and D6 engines with sterndrive DPH and DPR.

Length, m: 0.2 x 2.0
Length, ft: 0.7 x 6

Display cable, 6-pin/12-pin

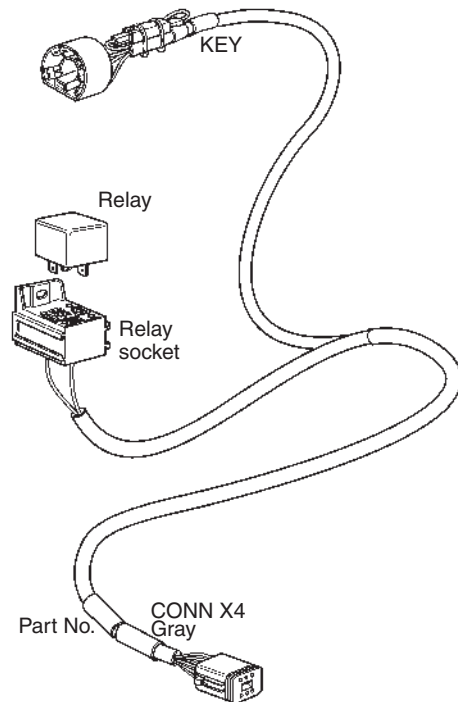


To connect the EVC System Display to the multilink cable or the MULTILINK BREAKOUT on the Y-split cable from connection X5 on the HCU.

Two female connectors

Length, m (ft): 1.5 (5)

Key switch and relay cable, 6-pin

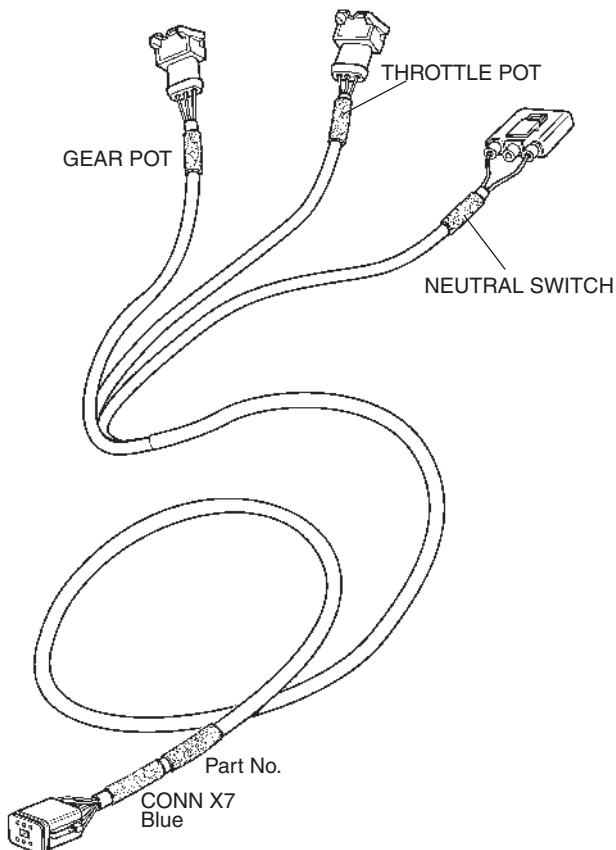


Connects the key switch to the HCU. The relay to external accessories, if used, should be connected to the relay socket included in the cable.

Length, m (ft), connector–key: 1.5 (5)

Length, m (ft), connector–relay: 1.5 (5)

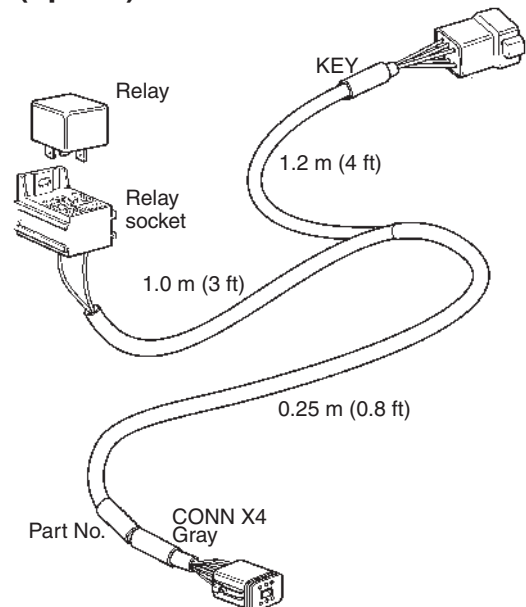
Control lever cable, 6-pin



Connects the control or the adapter for mechanical controls to the HCU.

Length, m (ft): 1.5 (5)

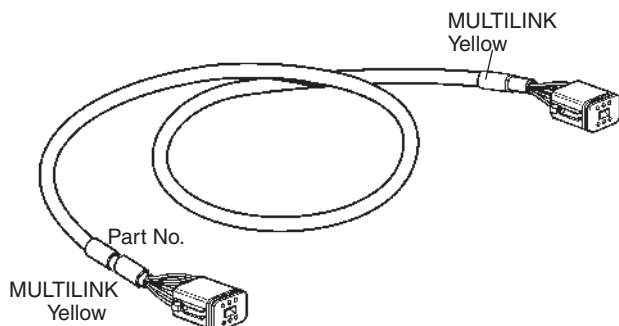
Start/stop panel and relay cable, 6-pin (option)



This cable is used in combination with the Start/stop panel and connects the panel and the relay socket to the HCU. The relay to external accessories shall be mounted on the relay socket.

Length, m (ft): 1.5 (5)

Multilink/tachometer and synchronization cable, 6-pin



This cable has female/female connectors. It is used to connect the tachometer to the multilink chain.

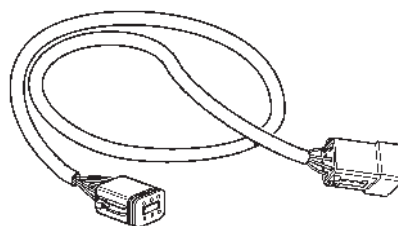
In a twin installation the cable is used to connect both the HCU's, to synchronize the engines.

Two female connectors

Length, m (ft): 1.5 (5)

Extension cables, all engines

6-pin



This cable is used as a synchronisation cable extension.

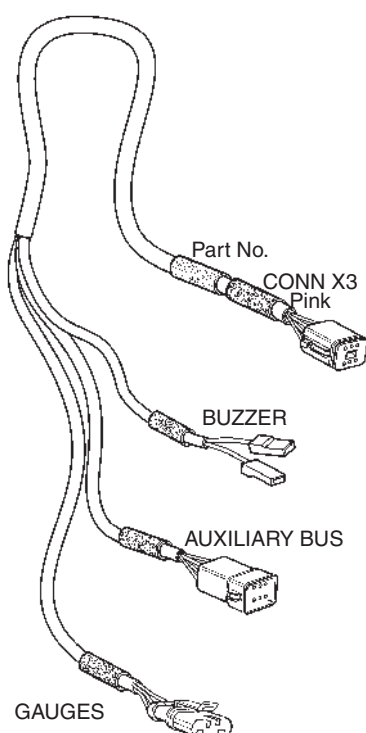
It is also used as an extension in all other 6-pin, male/female combinations.

Male and female connectors.

Length m: 1.5, 3, 5, 7, 9, 11

Length ft: 5, 10, 16, 23, 30, 36

Instrument, panels and auxiliary cable, 6-pin (option)



This cable harness is used when an EVC system display substitutes a tachometer and/or when you need an additional buzzer. The harness connects the HCU to the instrument bus cable (easy link), the auxiliary bus and the buzzer .

Length, m (ft): 1.5 (5)

Instruments, 3-pin

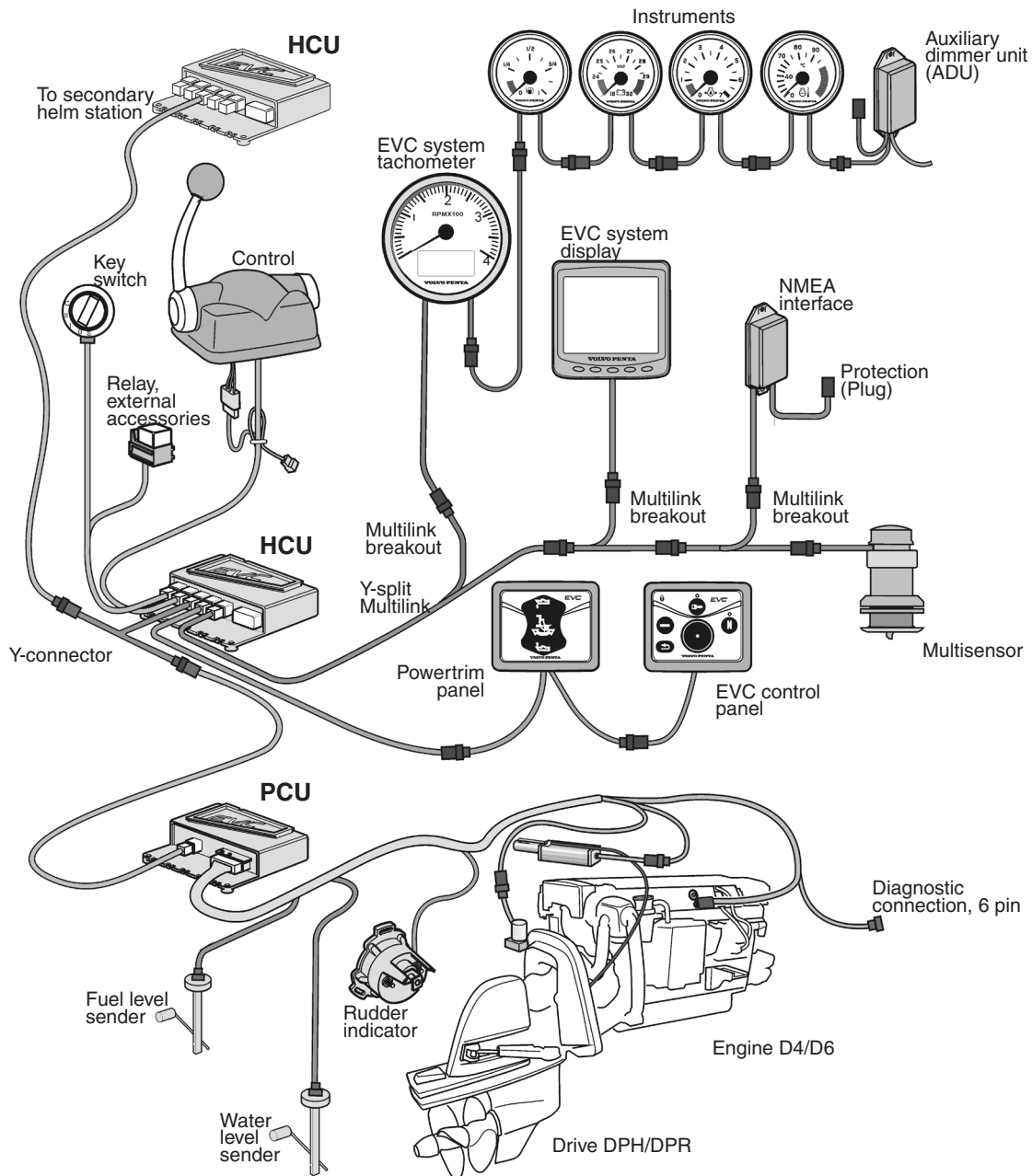


Connection of instrument to instrument when distance exceeds 220 mm (8.6").

Length m (ft): 1, 3 (3, 10)

Installation procedure, general

D4 or D6 engine, single installation with stern drive DPH/DPR



The figures on the following pages show different EVC installations. The principle is the same for all combinations of engines, helm stations and controls.

NOTE! The nodes are always located close to the components they control. A powertrain node, the Powertrain Control Unit (PCU), is located in the engine room. A helm node, the Helm station Control Unit (HCU), is located close to the helm station.

Cables and connectors must never be located where they are exposed to water.

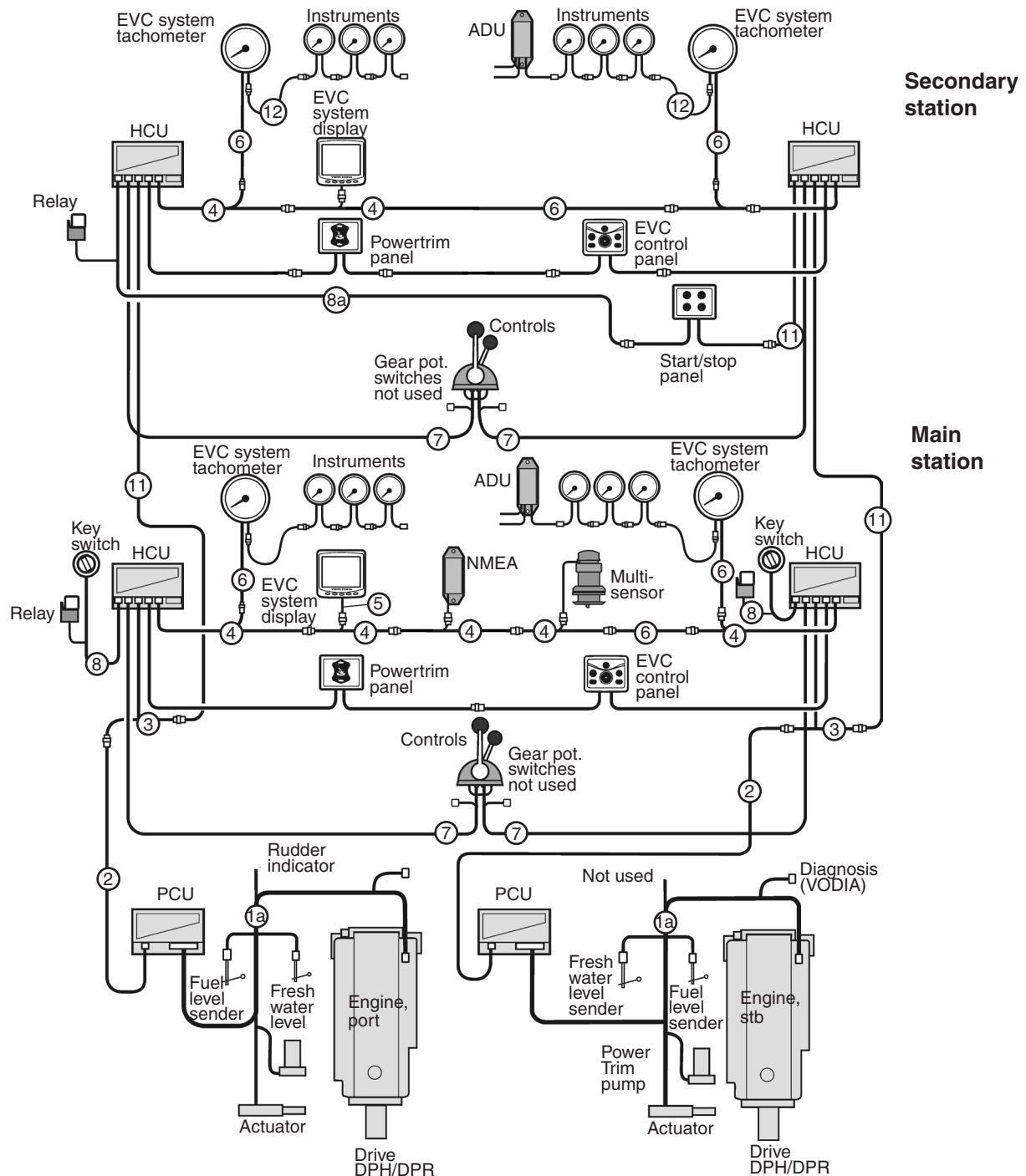
Locate the electrical equipment far from heat sources.

Choose cable lengths to minimize the number of connectors and never locate a connection in a non accessible area.

NOTE! You are not allowed to build network in a way that branches will be formed. Bus cables with branches longer than 0.5 m (1.6 ft) cannot exist in an EVC system. Also please refer to the **Building a network. Requirements** chapter for more information.

Cable routing

D4 and D6 .Twin engine installation, main and secondary helm stations.
Stern drive DPH/DPR installation is shown.



To obtain a clear overview, begin by determining the location of the main components.

All cables have colored marking sleeves and sleeves with an identity printed on them.

Begin at the engine room and build the system towards the main helm station. Then continue with the other helm stations.

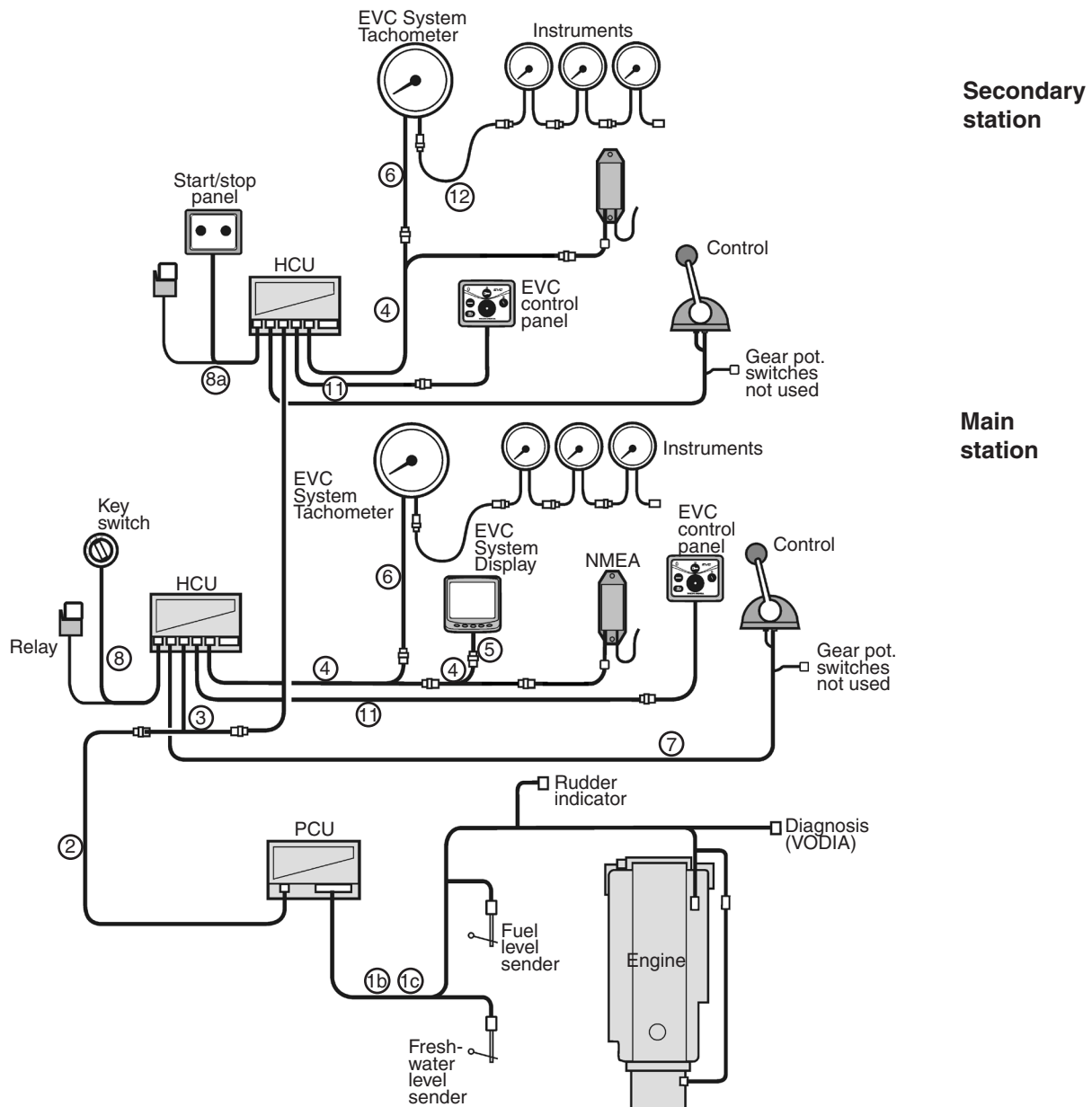
The wiring is first routed to the PCU unit. Each engine is connected to the EVC system via its own PCU unit.

Connections in the engine room should be positioned above the level of the alternator .

Avoid connections hidden behind fixed panels etc.

For item figures, please refer to page 31.

D4, D6, D9, D12 and D16. Single engine installation, main and secondary helm stations. Reverse gear installation is shown



Choose cable lengths to minimize the number of connectors. Extension cables are available in different lengths. See the **Major components** chapter for more information about cable lengths etc.

⚠ IMPORTANT! Remember that the wiring should be routed so that there is no risk that it will be exposed to heat, moisture or abrasion and that joints and components are located in dry locations, easily accessible for service and repair.

Cables and cable harnesses

Pos. in figure on previous pages	m	ft
– Transmission cable (reverse gear) D4/D6, 12-pin	2.0	6
1a. PCU–Engine/Drive actuator/Powertrim pump, D4/D6, DPH/DPR, 29-pin	3.0 5.0	10 16
1b. PCU–Engine/transmission, inboard, 29-pin, D4/D6	3.0 5.0	10 16
1c. PCU–Engine/transmission, inboard, 29-pin, D9/D12/D16	3.0 5.0	10 16
2. Standard EVC bus cable PCU–HCU, 6-pin	5.0 7.0 9.0 11.0 13.0	16 23 30 36 42
3. Y-connector, 6-pin	0.5	1.6
4. Y-split, multilink 6-pin	0.5	1.6
5. Display cable 6-pin/12-pin, to be used as: Connection of EVC system display to HCU or to the Multilink chain (Y-split cable)	1.0	3
6. Multilink/tachometer/synchronization, 6-pin	1.5	5
7. Control lever cable, 6-pin *)	1.5	5
8. Key switch and relay, 6-pin	1.0	3
8a. Start/stop control panel and relay, 6-pin	1.0	3
9. Y-connector, 8-pin/8-pin/12-pin, 4–20 mA output interface, D9/D12/D16		
10. Instrument, panels and auxiliary bus, 6-pin (option)	1.5	5
11. Extension cables, 6-pin *) To be used as:	1.5 3.0 5.0 7.0 9.0 11.0	5 10 16 23 30 36
EVC bus cable		
EVC control panel		
Multilink connections		
Multilink break out connections		
HCU–Key switch cable		
HCU–Start/stop control panel cable		
Synchronization cable		
EVC system display, multisensor		
NMEA interface 0183 and 2000		
12. Extension cables, 3-pin To be used as:	1.0 3.0	3 10
Instrument cable		

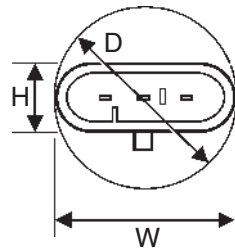
*) **NOTE!** No extension cables are allowed in combination with the control lever cable.

Connector dimensions:

Connector dimensions are given to facilitate making of lead-throughs in bulk heads etc.

3-pin

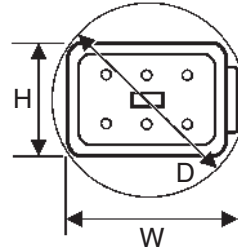
H = 18 mm (0.71 in.)
W = 26 mm (1.02 in.)
D = 26 mm (1.02 in.)



3-pin

6-pin

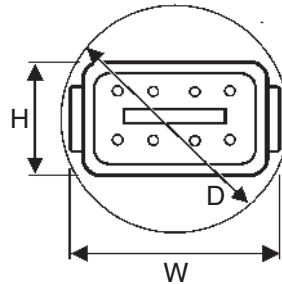
H = 21 mm (0.82 in.)
W = 23 mm (0.88 in.)
D = 32 mm (1.26 in.)



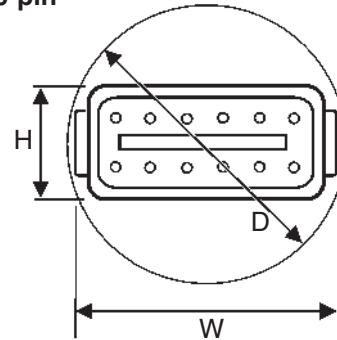
6-pin

8-pin

H = 25 mm (0.99 in.)
W = 37 mm (1.44 in.)
D = 45 mm (1.77 in.)



8-pin



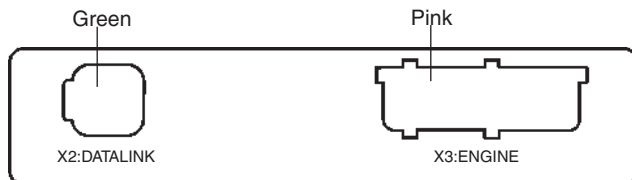
12-pin

12-pin

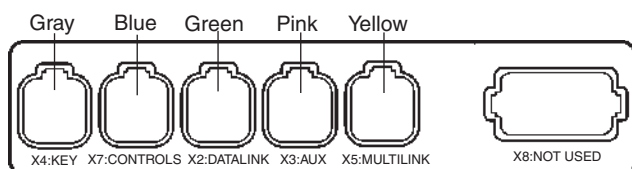
H = 23 mm (0.88 in.)
W = 41 mm (1.62 in.)
D = 48 mm (1.90 in.)

Marking and color coding of cables

PCU label



HCU label



All cable connectors are marked and color coded, to facilitate installation. The markings on cables connected to the PCU and the HCU, correspond with the designation of connectors and color codes on the labels on the control units.

NOTE! HCU with connector X8 open and marked X8: STEERING cannot be used in an Aquamatic or inboard systems (only for IPS systems).

Twin installations, starboard and port engine

The EVC connectors and the Powertrim panel connectors are color coded with red (port) and green (starboard) stripes to ensure connections to the right engine.

The EVC standard bus cable is marked with both red and green stripes and the color (stripe) not used should be removed.

NOTE! In a twin installation it is recommended to mark all cables with red and green stripes during installation.

Building an EVC network Requirements

The EVC system is a distributed system with the electronic units (nodes) located all around the boat. The EVC nodes are the Powertrain Control Unit (PCU) located in the engine room and the Helm Control Unit (HCU) located near the helm station. The standard bus cable connects the nodes to each other and forms a network. The standard bus cable, Y-connectors and extension cables are used for this purpose.

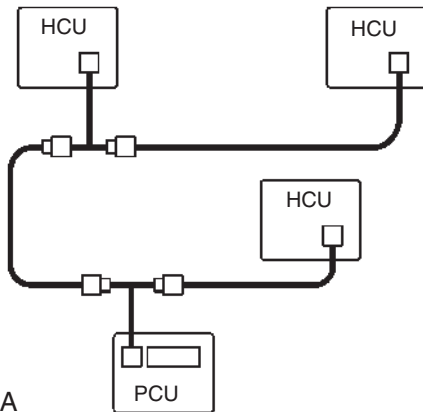


Fig. A

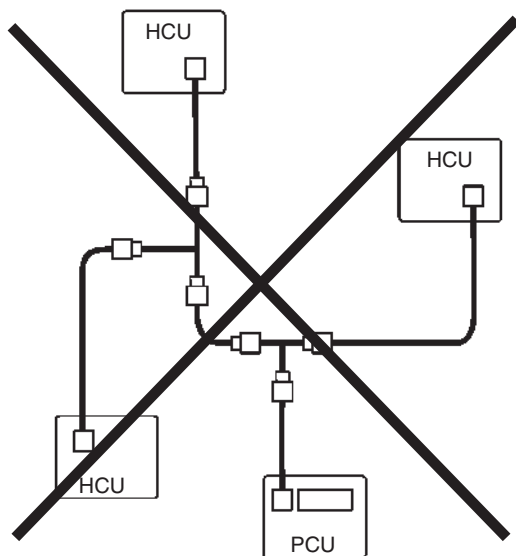
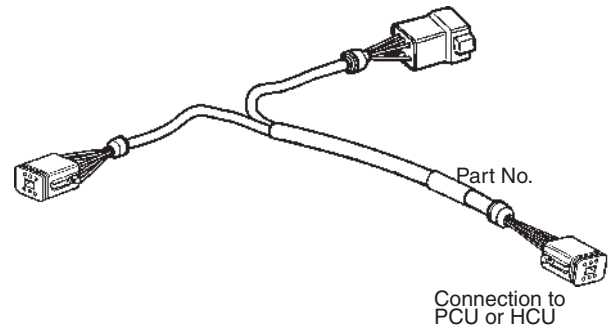


Fig. B

The nodes must be connected and the network must be designed in such a way that no branches will be formed. Longer branches (max. 0.5 m/1.6 ft) may generate communication disturbances in the EVC bus cable.

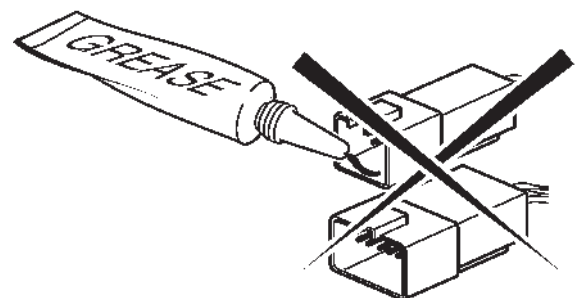
Figure A above illustrates a correctly designed network including three helm stations. Figure B gives an example of an incorrect network with long branches.



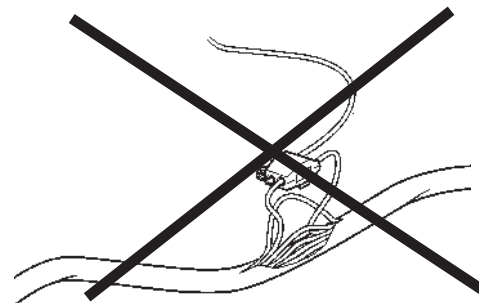
This is avoided by always connecting the longer cable on the Y-connector **directly** to the node (PCU or HCU) without using any extension cable.

⚠ IMPORTANT! Note that the Y-connector always is connected directly to a node without use of any extension cable.

Important

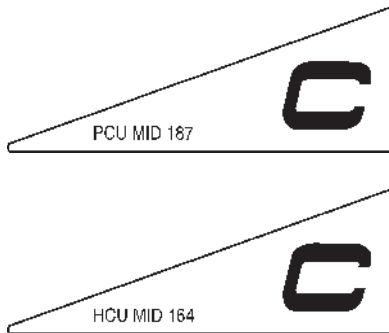


⚠ IMPORTANT! Never use any kind of grease in the EVC connectors.



⚠ IMPORTANT! Never cut or modify the Volvo Penta EVC cable harnesses. For extra power supply use the Volvo Penta relay for accessories. Refer to the **Relay for external accessories** section.

Identification of the PCU and the HCU

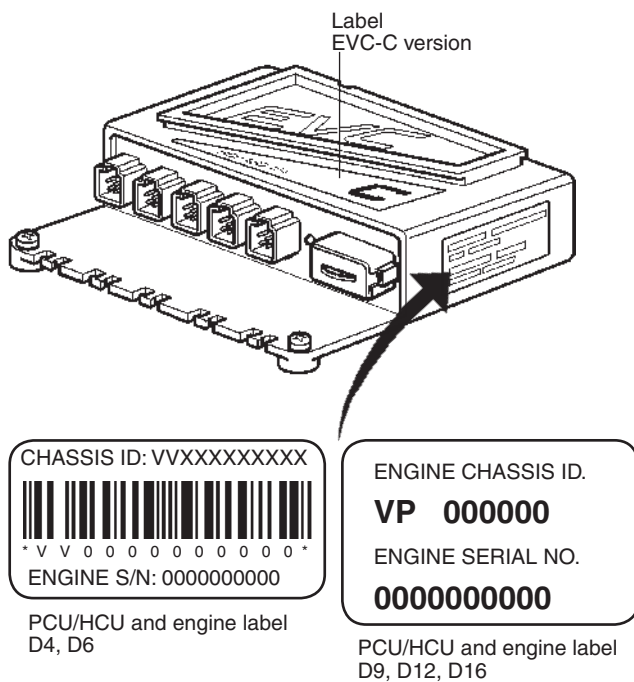


PCUs and HCUs in the EVC-C system have a label fitted on front side with the letter "C" printed on it and with the following marking:

On the PCU unit
On the HCU unit

PCU MID 187
HCU MID 164

NOTE! New and old hardware are not interchangeable.



Each PCU and HCU (node) in the EVC system is programmed to communicate with a specific engine. Software can vary depending on engine type, equipment, parameter setting, etc. It is therefore, prior to installation, important to identify the different nodes.

This is carried out by checking identically designed labels, placed on the node gables, on top of the engine cover and on the engine control unit (ECU).

Identification is done by using the **ENGINE CHASSIS ID.** number.

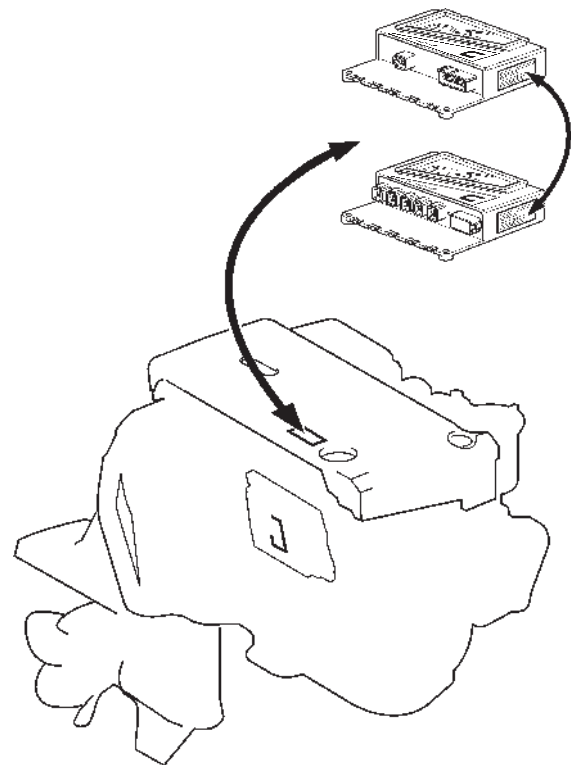
⚠ IMPORTANT! The CHASSIS ID. number on the node labels must correspond with the CHASSIS ID. number on the engine labels.

The CHASSIS ID. number is also intended for the Volvo Penta organisation for identification of the system in the VODIA diagnostic tool.

The CHASSIS ID. number can also be shown in the tachometer display or in the EVC system display.

"Chassis conflict"

NOTE! If there is no correspondence between the CHASSIS ID. numbers, this will be indicated in the tachometer display or EVC system display. Alarm indication will also be shown in the displays and the fault indicator lamp in the alarm gauge will lit up with an orange light. (Alarm gauge is optional).



Installation procedure, engine room

Location and mounting of the PCU and the HCU

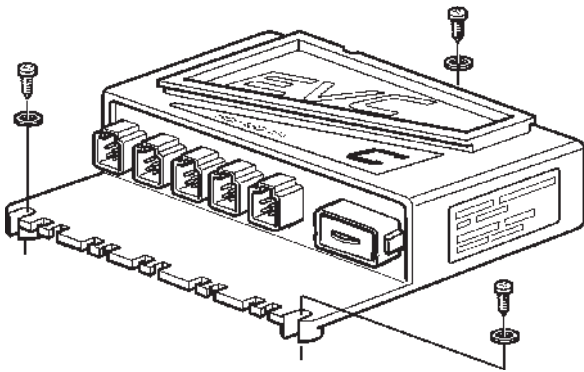
PCU location

Locate the PCU node in the engine room, far from heat sources and in a dry and accessible place.

HCU location

Always locate the HCU node in a dry and accessible place and close to the helm station it is serving.

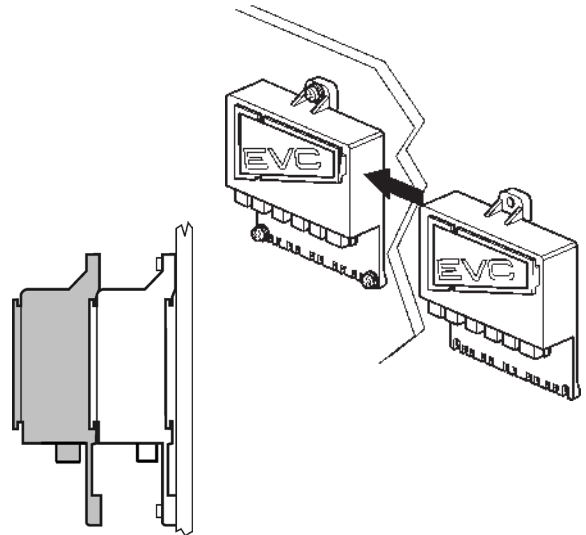
Mounting



The PCU/HCU nodes shall be fitted with **three** screws.

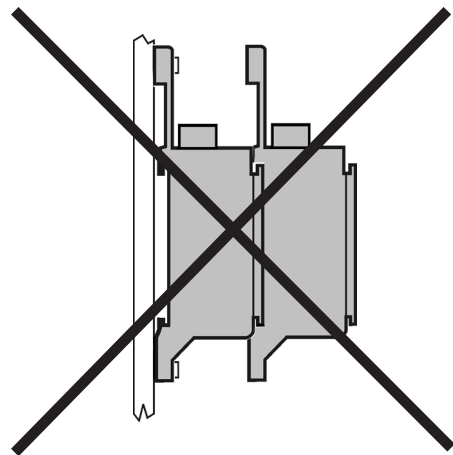
Cables shall be lead into the PCU/HCU in a way such that no water can enter into the units or the cable harnesses.

NOTE! The HCU in a **twin installation** can be installed with a maximum distance between them of approximately 0.8 m (2.6 ft) as the synchronization cable has a length of 1m (3 ft).



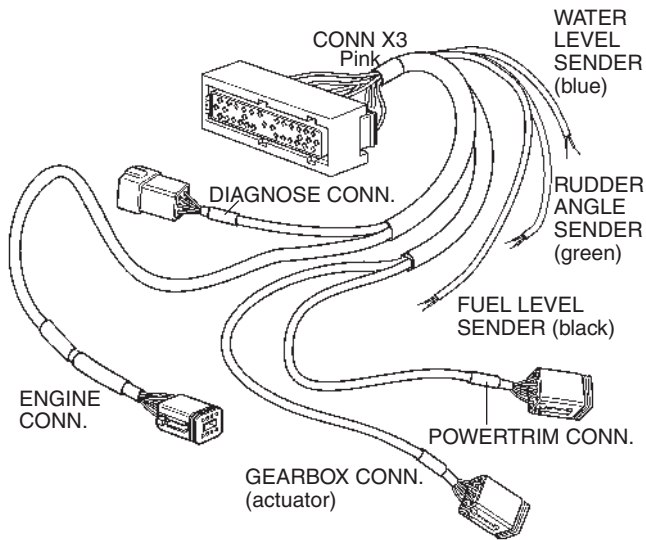
The PCUs and HCU can also be stacked through slides on top the nodes.

NOTE! Maximum two units are to be stacked.



⚠ IMPORTANT! Never mount the PCU and HCU units with the connectors pointing upwards.

Engine-PCU cable D4/D6 Stern drive DPH/DPR



This cable harness has connectors to:

- PCU
- engine monitoring system (ENGINE CONN.)
- DPH/DPR actuator (GEARBOX CONN.)
- powertrim pump (POWERTRIM CONN.)
- diagnosis system (DIAGNOSE CONN.)
- fuel level sender (FUEL LEVEL SENDER)
- fresh water level sender (WATER LEVEL SENDER)
- rudder indicator (RUDDER ANGLE SENDER)

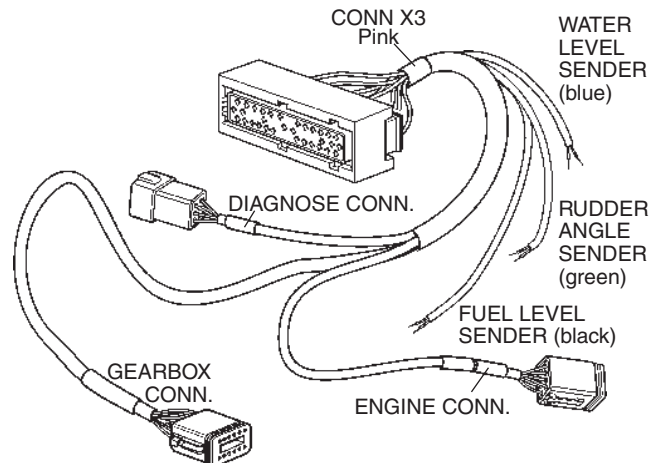
The cable harness is connected to the PCU through the 29-pin connector (CONN X3).

Connect the cable harness to engine connectors according to markings.

Clamp the cable securely to the engine and to the PCU.

⚠ IMPORTANT! Clamp and insulate cables that are not in use.

Engine-PCU cable D4/D6/D9/D12/D16 Inboard engines



This cable harness has connectors to:

- PCU
- engine monitoring system (ENGINE CONN.)
- gear shift solenoids on the reverse gear, on D9 engines also trolling/slipping valve (GEARBOX CONN.)
- diagnosis system (DIAGNOSE CONN.)
- fuel level sender (FUEL LEVEL SENDER)
- fresh water level sender (WATER LEVEL SENDER)
- rudder indicator (RUDDER ANGLE SENDER)

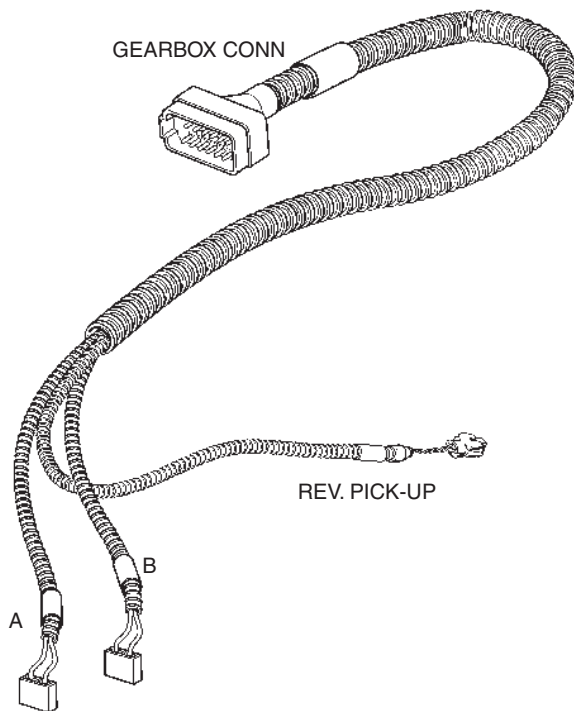
The cable harness is connected to the PCU through the 29-pin connector (CONN X3).

Connect the cable harness to engine connectors according to markings.

Clamp the cable properly to the engine and to the PCU.

⚠ IMPORTANT! Clamp and insulate cables that are not in use.

Transmission cable D4/D6 Inboard engines



This cable harness has connectors to:

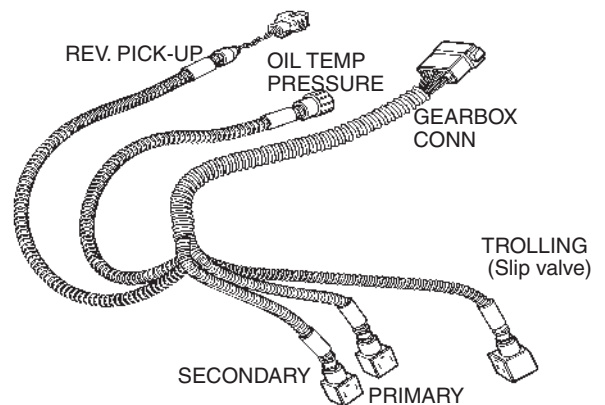
- gear shift solenoids on the reverse gear, A and B
- revolution pick-up for output shaft speed on reverse gear, on HS80/HS85 in Volvo Penta Lowspeed applications, REV.PICK-UP.
- to the engine-PCU cable, GEARBOX CONN.

How to connect to the two solenoids is depending on propeller rotation. See **Checking rotation of propeller. Inboard engine.**

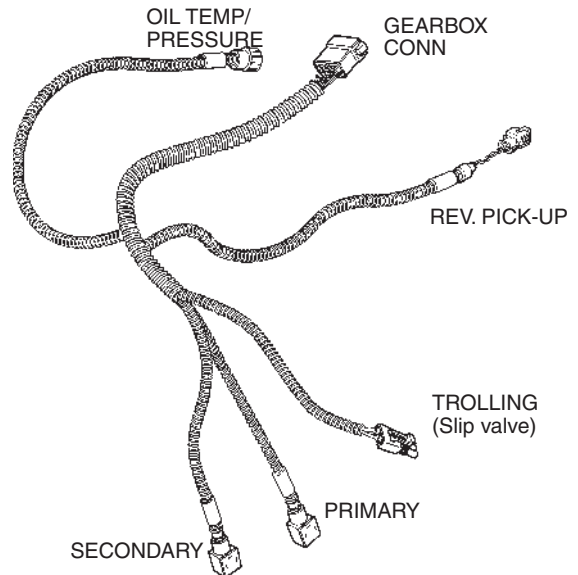
The cable harness is connected and clamped from factory.

Transmission cable D9/D12/D16

Reverse gear type ZF



Reverse gear type Twin Disc



This cable harness has connectors to:

- gear shift solenoids, SECONDARY and PRIMARY
- slip valve, TROLLING
- rpm pick-up on reverse gear for output shaft speed, REV. PICK UP
- engine – PCU cable, GEARBOX CONN.
- reverse gear oil cooler, OIL TEMP/PRESSURE.

How to connect to the two solenoids is depending on propeller rotation. See **Checking rotation of propeller. Inboard engines.**

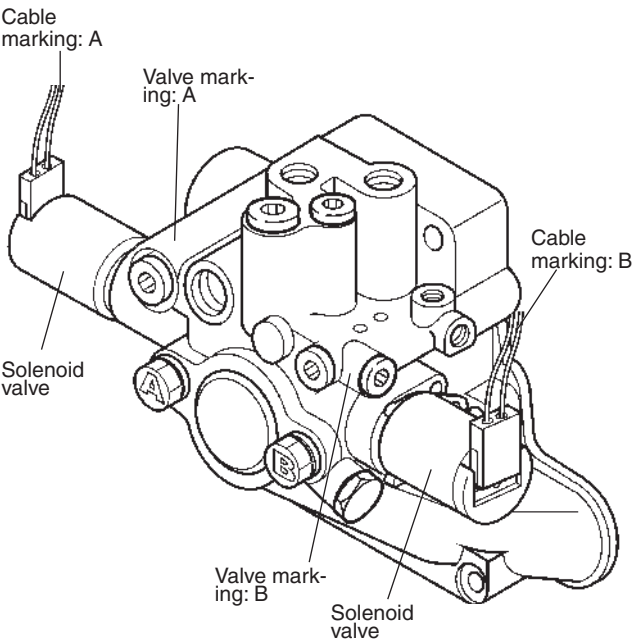
The cable harness is connected and clamped from factory together with the reverse gear.

⚠ IMPORTANT! Clamp and insulate cables that are not in use.

Checking rotation of propeller
D4/D6 Inboard engines
Reverse gear
HS45/HS63/HS80/HS85

The solenoid connectors shall be set up for right-hand rotation in forward gear as standard. The cable kit connectors are marked A and B and the solenoid valves are marked A for primary valve and B for secondary valve.

NOTE! The standard fitting gives A to valve A and B to valve B



Twin installation

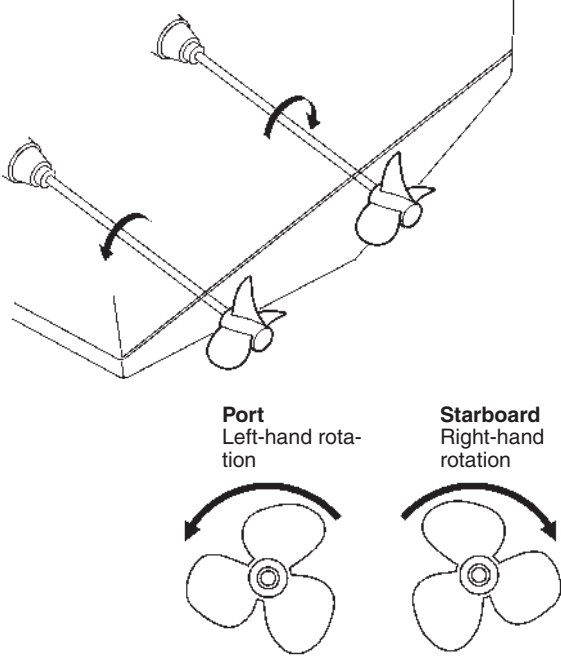


Illustration shows propellers seen from the aft forward. Starboard engine, standard right-hand rotation and port engine left-hand rotation.

	Rev.gear valve marking	Cable marking
Lefthand rotation		
Anticlockwise rotation seen from astern.	A	B
	B	A
Righthand rotation (standard setting)		
Clock wise rotation seen from astern.	A	A
	B	B

Make sure that the connectors are properly fitted for your installation. Check the table.

Check adjacent figures which describe cable connected for right-hand rotation. For left hand rotation, just switch the connectors on the gear shift solenoids.

! IMPORTANT! Apply low temperature grease, Volvo Penta part no. 1161417-9 in the solenoid connectors prior to connection.

Checking rotation of propeller. D9/D12/D16 engine

The solenoid connectors are factory fitted for left-hand rotation in forward gear. The cable kit is marked with PRIMARY and SECONDARY. There is no corresponding mark on the reverse gear, so make sure that the connectors are properly fitted for your installation.

Check the adjacent figures which describe cable connected for left-hand rotation.

For right-hand rotation, switch the cable connectors on the gear shift solenoids.

Twin installation

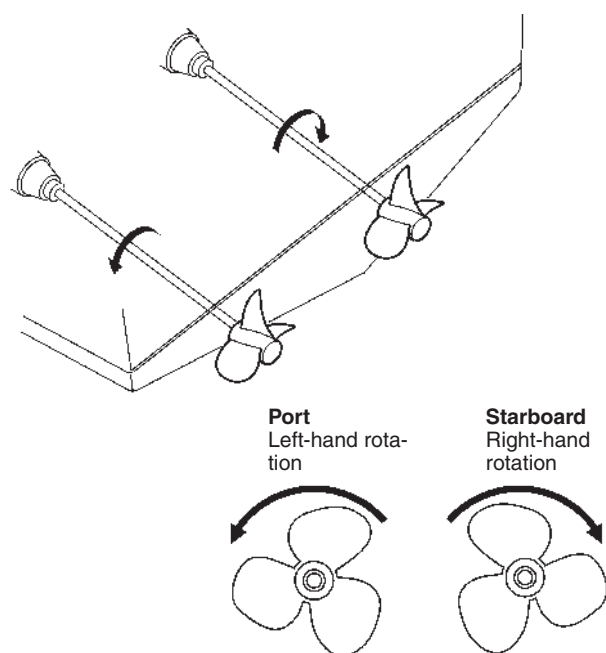
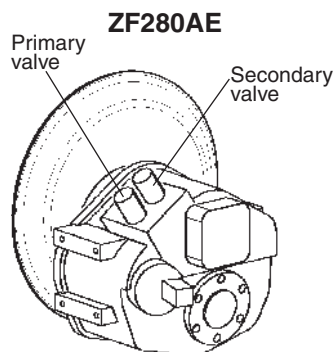
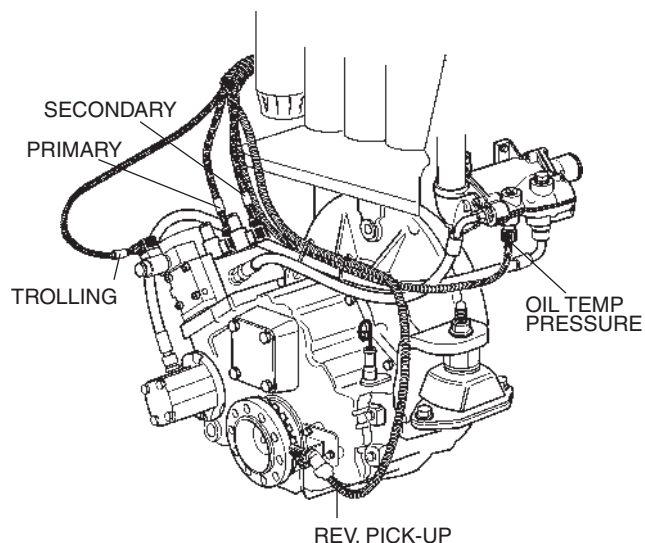
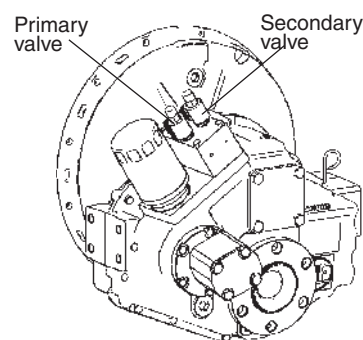


Illustration shows propellers seen from the aft forward. Port engine, factory fitted lefthand rotation and starboard engine righthand rotation.

D9 Reverse gear ZF280AE/VE, ZF286AE/VE, ZF305AE



ZF305AE

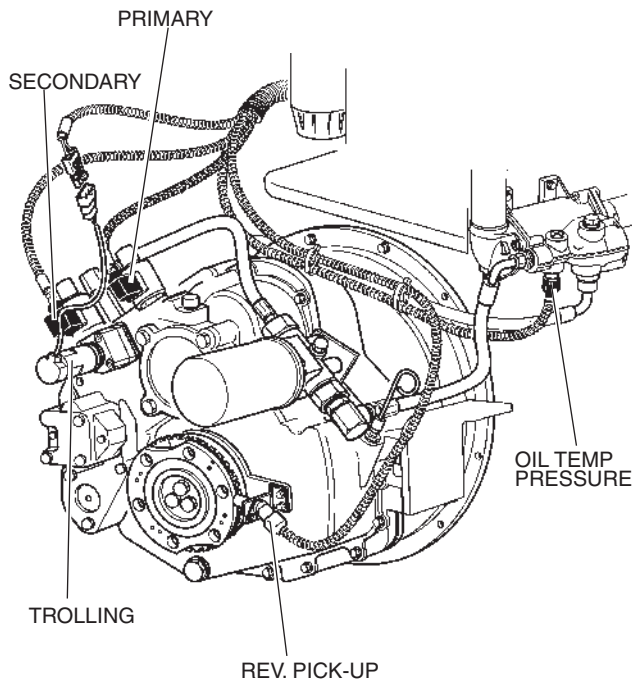


The figures show reverse gear 280A and 305A with cables connected for left-hand rotation in forward gear.

NOTE! For ZF280IV (integrated V-drive) the primary and secondary solenoid valves are inverted.

⚠ IMPORTANT! Apply low temperature grease, Volvo Penta part no. 1161417-9 in the solenoid connectors prior to connection.

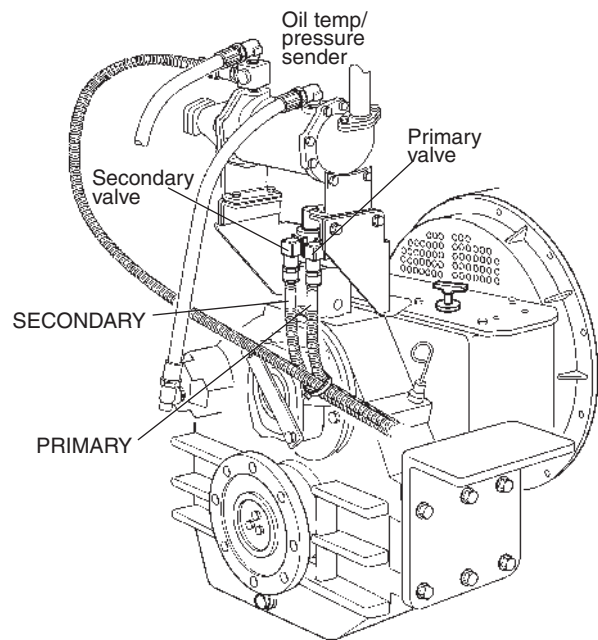
D9, D12DMP
Reverse gear
MG5065AE, MG5075AE, MG5075IVE



The figure shows reverse gear with cables connected for left-hand rotation in forward gear.

⚠ IMPORTANT! Apply low temperature grease, Volvo Penta part no. 1161417-9 in the solenoid connectors prior to connection.

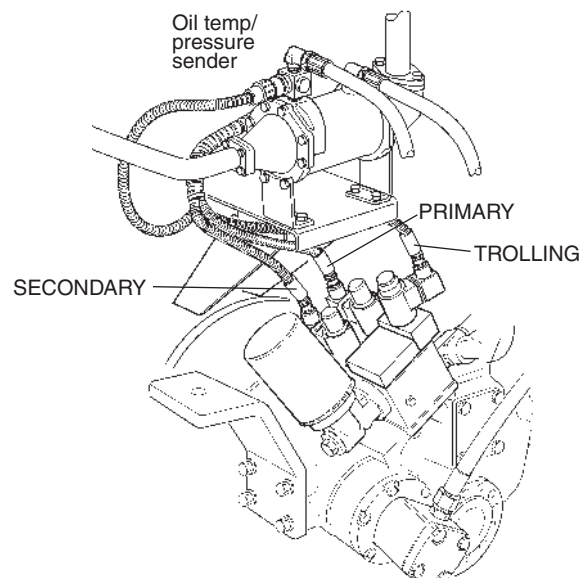
D9, D12DMP
Reverse gear
MG5114SCE/DCE



The figure shows reverse gear with cables connected for left-hand rotation in forward gear.

⚠ IMPORTANT! Apply low temperature grease, Volvo Penta part no. 1161417-9 in the solenoid connectors prior to connection.

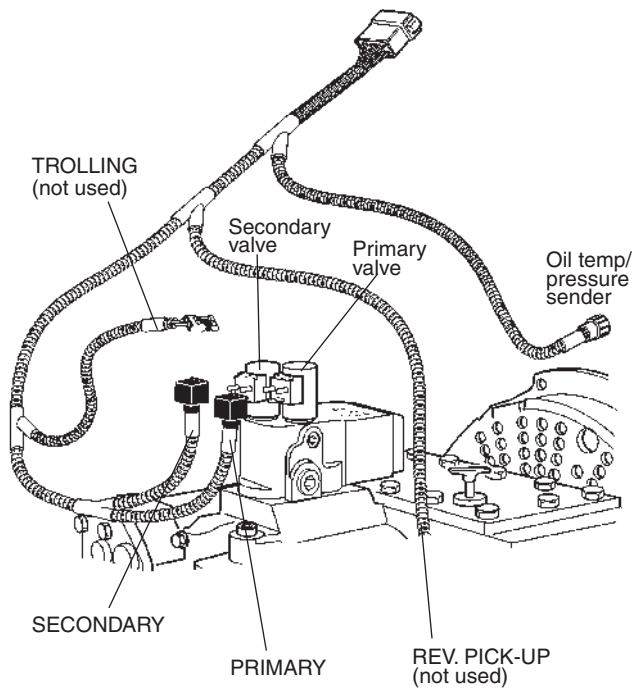
D12DMP
Reverse gear
ZF311, ZF325



The figure shows reverse gear with cables connected for left-hand rotation in forward gear.

⚠ IMPORTANT! Apply low temperature grease, Volvo Penta part no. 1161417-9 in the solenoid connectors prior to connection.

D16
Reverse gear
MG 5145A, MG 5170DCE



The figure shows reverse gear with cables connected for left-hand rotation in forward gear.

⚠ IMPORTANT! Apply low temperature grease, Volvo Penta part no. 1161417-9 in the solenoid connectors prior to connection.

Volvo Penta Lowspeed and Trolling function

Slip valve with Volvo Penta Lowspeed function are implemented on the following engines and reverse gears:

D6 engines

Reverse gear

HS80A/IV

HS85A/IV

D9 engines

Reverse gear

ZF 280 A/IV

MG5065 A

ZF 286 A/IV

MG5075 A/IV

D12DMP engines

Reverse gear

ZF 311 A

MG5114 SC

ZF 325 A/IV

MG5114 DC

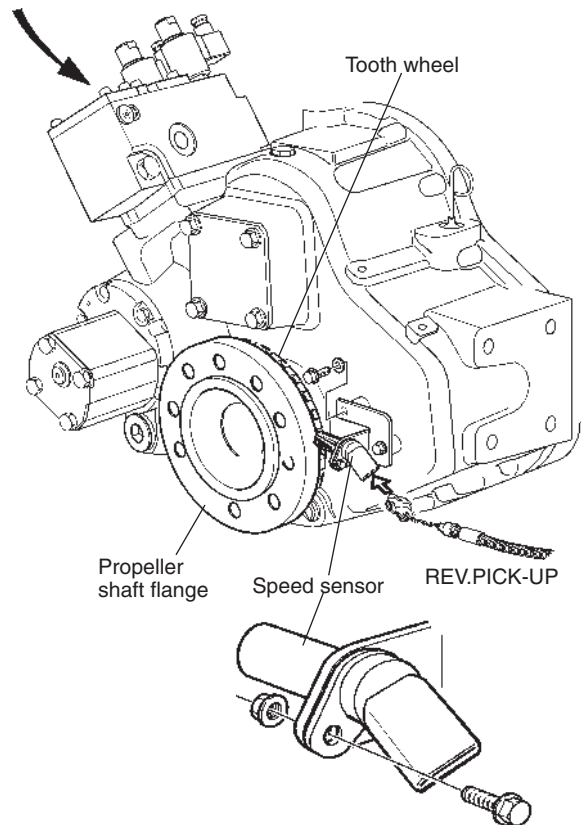
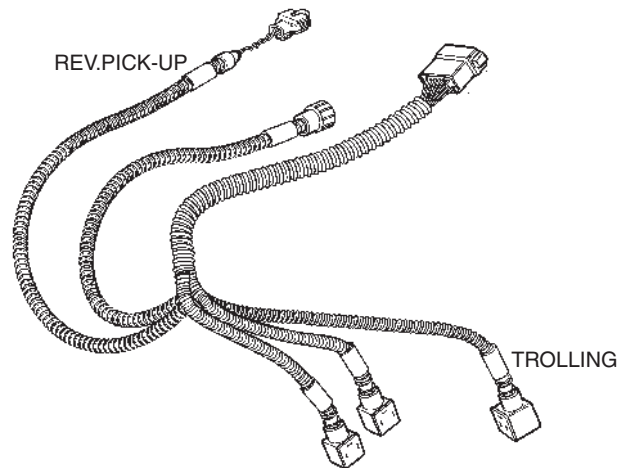
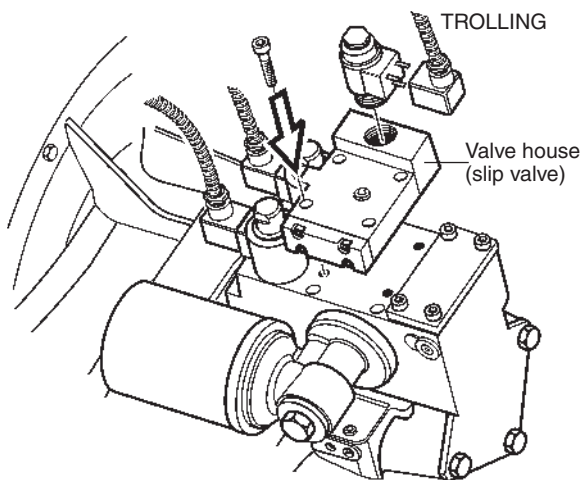


Figure shows a ZF286 application.

The kit consists of a valve house (slip valve) with adapter for mounting on the reverse gear.



Volvo Penta Lowspeed function is normally mounted on the reverse gear from factory but can also be ordered separately as a kit.

Default Volvo Penta lowspeed slip is 50%. Max slip is 80% but suitable slip is dependent on each installation. Slip can be set from 10% up to 80% by using the VODIA tool.

It also consists of a tooth wheel and a propeller shaft speed sensor. These parts are fitted on the reverse gear output flange.

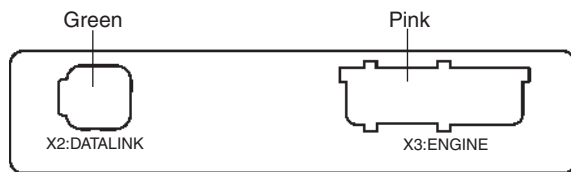
The transmission cable harness has a connector to the speed sensor marked REV.PICK-UP. The sensor transmit propeller shaft rpm to the EVC system. The cable harness also has a connector to the slip valve marked TROLLING.

The Lowspeed function is maneuvered by the control on the helm station.

NOTE! For complete information about mounting and testing see **Installation instructions** attached to the kits.

PCU, installation

PCU label

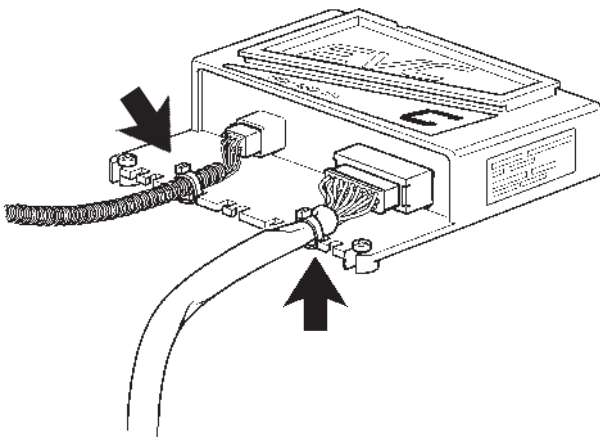


X2 Green Data link – EVC bus cable

X3 Pink Engine and transmission

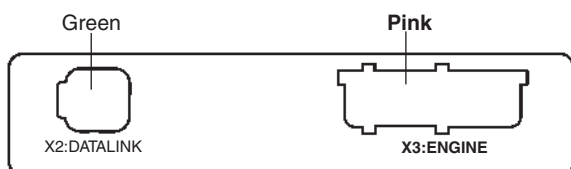
There is a label on the PCU showing the connectors with marking and color coding.

⚠ IMPORTANT! It is very important to reduce stress from the cables to the connectors. It is recommended that all cables are fixed to the PCU with strain reliefs.



Mount strain reliefs as shown in the illustration above.

Connect the engine and transmission to the PCU



Connect the cable from the engine, marked CONN X3, to connector X3:ENGINE (pink).

Fuel and fresh water level senders

Installation of sender in tank

The Volvo Penta fuel and fresh water level senders are suitable for a max. tank depth (H max) of 600 mm (23"). If the tank is deeper, use another sender but note that this sender must have the following resistance scales:

Fuel (two types)

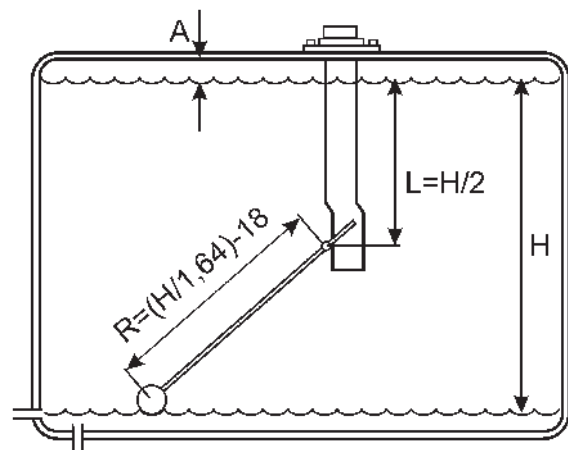
3 –180 ohms, 3 ohms = empty tank

240 –30 ohms, 240 ohms = empty tank

Fresh water

3 –180 ohms, 3 ohms = empty tank.

NOTE! Type of **fuel level sender** is identified by the EVC system when setting "FUEL TANK SET EMPTY".



NOTE! Never use the fuel level sender as a fresh water sender. Corrosion problems can occur.

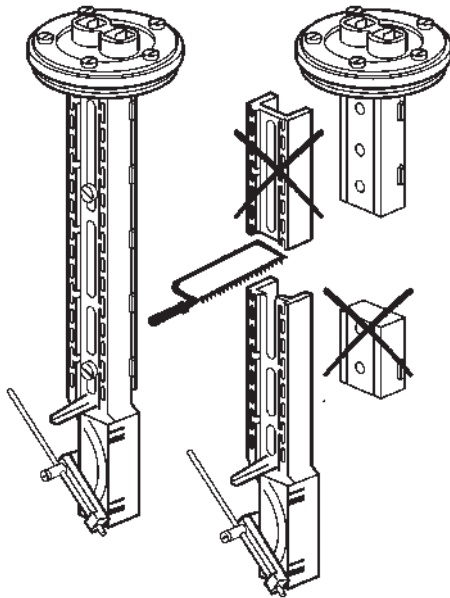
Make a hole for the sender in the fluid tank, diameter 60 mm. Locate the hole so that the float can move freely inside the tank.

NOTE! Clean all burrs out of the tank.

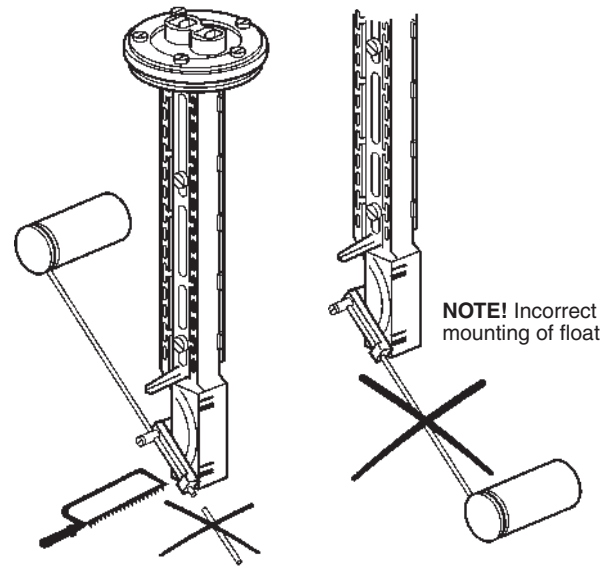
Adjust sensor length ($L=H/2$) on the basis of the min. and max. fluid levels. Then do not forget to extend the sensor length by the gap (A). The gap (A) between the tank and the maximum level must not be less than 40 mm.

Calibration of fuel level

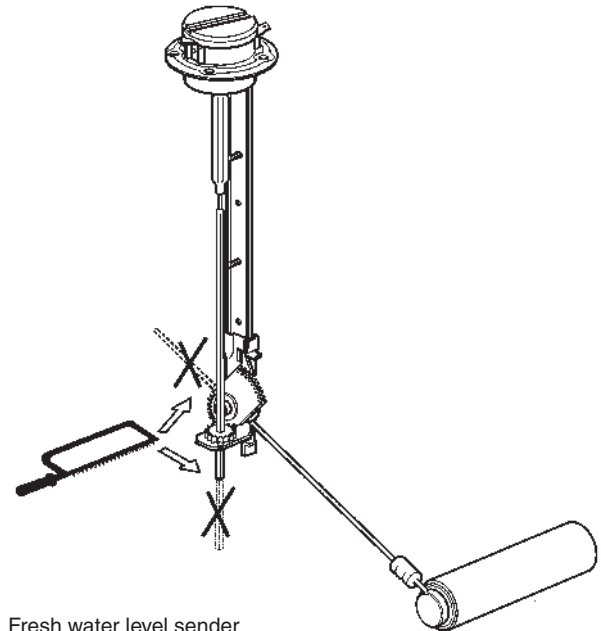
The fuel level sender is calibrated by the EVC system tachometer/display and the EVC control panel. Please refer to the **Calibration and settings** section in this manual.



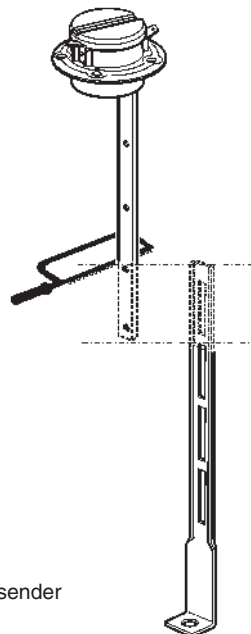
Fuel level sender



Fuel level sender



Fresh water level sender



Fresh water level sender

Tighten the two screws on the sensor securely. The minimum fluid level must not be lower than the fluid exit hole.

If the minimum sensor length is too long, you can cut it to a suitable length.

Install the float as in figure. Calculate and adjust the length of the float arm using the formula:

$R = H / 1.64 - 18$ mm and also on the basis of the minimum and maximum fuel levels.

Example: $H = 580$ mm ($H/2 = 290$ mm)

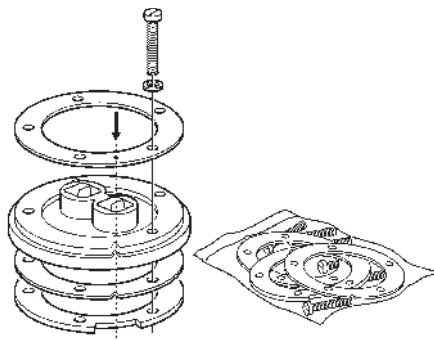
$R = 580 / 1.64 - 18$

$R = 353 - 18$

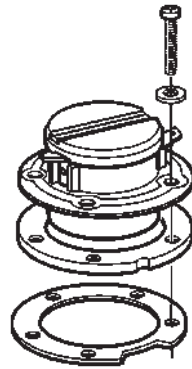
$R = 336$ mm

Tighten the screw and cut off the projecting part of the float arm.

⚠ IMPORTANT! It is very important that the float is installed on the correct side of the sensor.



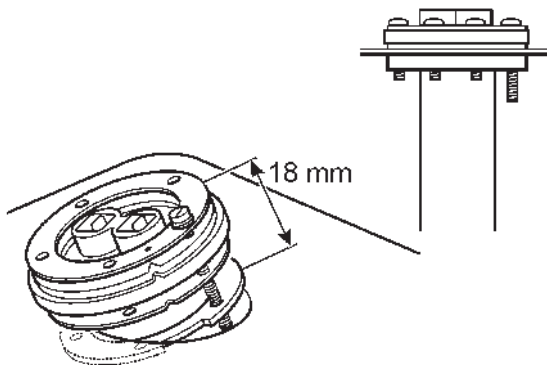
Fuel level sender



Fresh water level sender

Assemble the ring with the tapped holes and rubber seals with the long screw. Note the locations of the cutout on the ring with the tapped holes, and the marks on the upper ring and rubber seals. Make sure that there is the greatest possible distance between the seal and the ring with the tapped holes.

Lower the sensor with float and the ring with tapped holes down into the tank. The rubber seal must be



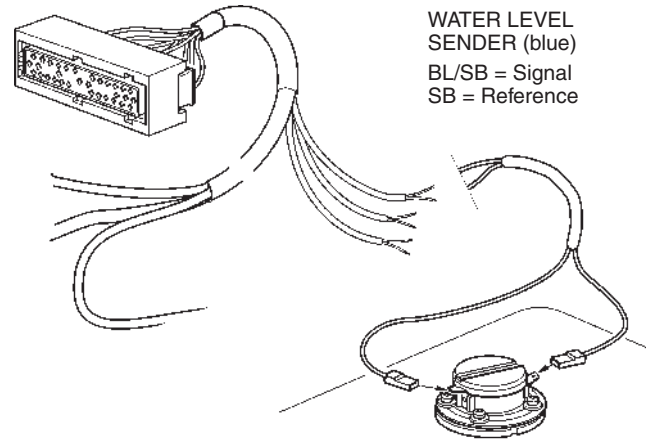
outside the tank. Align the sensor so that the float has free movement inside the tank. Tighten the long screw so that the seals and the ring with the tapped holes come into place.

Install the remaining screws and tighten all of them simultaneously.

The level sender cables are connected to the EVC system via the engine-PCU cable harness.

FUEL LEVEL
SENDER (black)
GN/SB = Signal
SB = Reference

WATER LEVEL
SENDER (blue)
BL/SB = Signal
SB = Reference



Connect the black (fuel level sender) or blue (water level sender) cable to the terminal marked $\perp$ (earth/ground) and the green/black or blue/black cable to the other terminal.

NOTE! On the Fuel/Water level sender cables a battery minus/ground cable must be connected to the reference line (black or blue). This cable is not included in the cable harness.

Setting of low fuel alarm

Setting (on/off) of the fuel alarm is made via the EVC system tachometer/display and the EVC control panel. Please refer to the **Calibration and settings** section in this manual.

NOTE! The default level of the fuel alarm is set to 0% of the tank volume, which means that the alarm is off. For the alarm to function, the desired alarm level must be set.

Rudder indicator

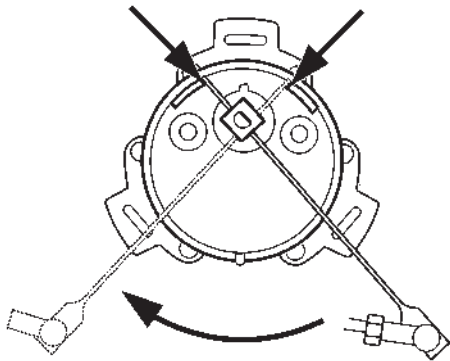
Working area 3–180 ohms.

NOTE! The control rod in this kit is designed for general installations. In another type of installation, an alternative control rod version may have to be used.

Fitting of sensor

NOTE! Always connect the rudder indicator to **port** driveline.

Install the bracket for the control rod.

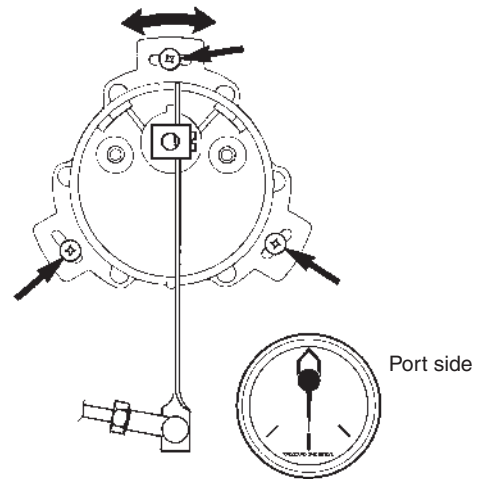


Install the nuts and the ball cups on the control rod. Remove the existing lever on the sensor. Install the new lever with the existing screw.

! IMPORTANT! Adjust the lever length so that the sensor shows **exactly** full mechanical extension to starboard and port when the rudder does the same.

Install the control rod between the ball joints on the bracket and the lever. Lock it with the nuts.

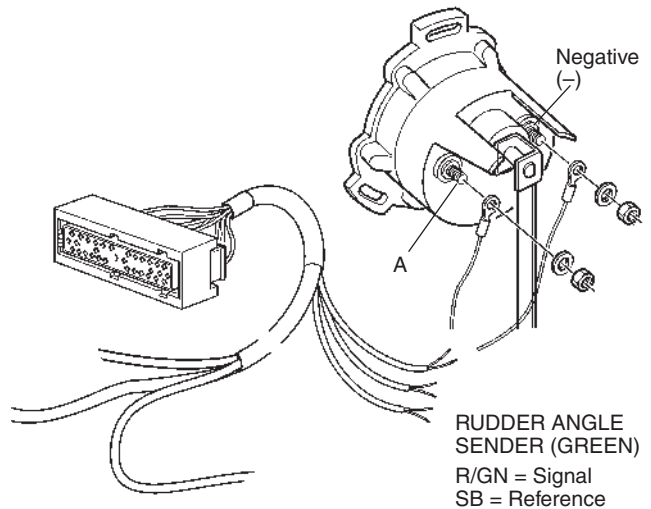
Mark and drill holes for the sensor where it will be placed. Use the full size template located inside the back cover of the manual.



! IMPORTANT Position the sensor so that the sensor shows **exactly** full mechanical extension to both starboard and port when the rudder does the same.

Install the sensor with washers and screws without fully tightening the screws. The sensor position can be adjusted when cables have been connected to the sensor and the system is powered up.

Connecting cables to sensor

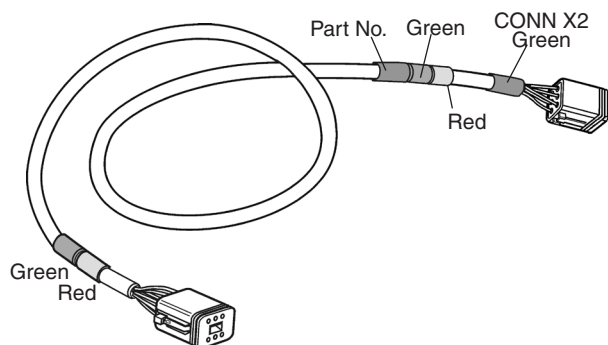


Extend cables from the cable harness and connect as shown. Red/green cable is connected to pin marked A and black cable is connected to pin marked – (negative). Cables are not included in the kit.

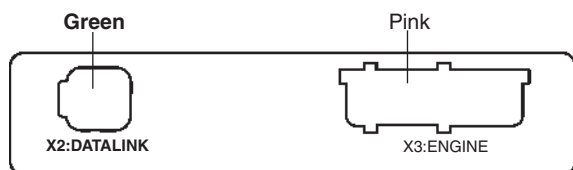
Adjusting sensor

Set the rudder fore-and-aft. Turn on the main circuit breaker. Adjust the sensor position by turning it so that the rudder indicator (the instrument) shows the rudder fore-and-aft. Tighten the screws in the sensor. Perform additional checks by turning the steering wheel to full extension to starboard and port.

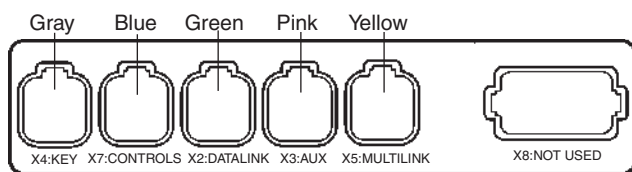
Standard bus cable, PCU–HCU



PCU



HCU



The standard bus cable connects the PCU to the helm station(s), HCU, in the system. It is fitted in the PCU X2:DATALINK connector and the HCU X2: DATALINK connector, that is, cable connector marked CONN X2 (green) shall be fitted in the helm unit.

The standard bus cable is available in the following lengths:
5 m (16 ft), 7 m (23 ft), 9 m (30 ft), 11 m (36 ft), 13 m (42 ft) with socket connectors (female) at both ends.

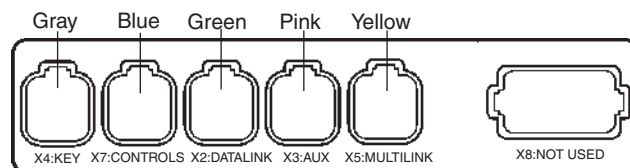
NOTE! The cable has female connections on both ends and cannot be used as an extension.

Extension cables are available in the following lengths: 1.5 m (5 ft), 3 m (10 ft), 5 (16 ft), 7 m (23 ft), 9 m (30 ft), 11 m (36 ft) and with a pin (male) and a socket (female) connectors.

! IMPORTANT! The red and green marking strips indicate port and starboard respectively. In a twin engine installation, only the appropriate color marking strips should remain on the cable. The other markings shall be removed.

HCU, installation

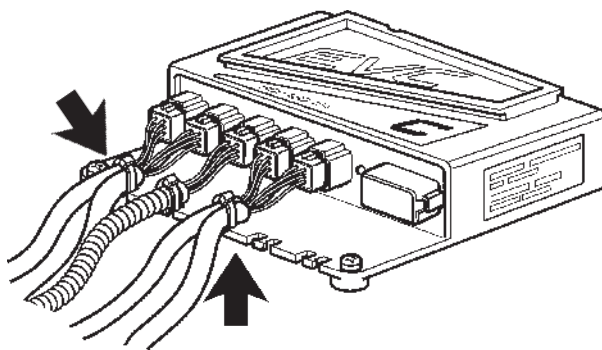
HCU label



There is a label on the HCU showing the connectors with marking and color coding.

X2 Green	Data link – EVC bus cable
X3 Pink	Auxiliary bus – EVC control panel, Powertrim panel
X4 Gray	Key switch or start/stop panel
X5 Yellow	Multilink – Tachometer/instruments, engine synchronization, EVC system display, NMEA interface, multisensor
X7 Blue	Controls
X8 —	Connector plugged and not used (only for IPS installations named X:8 STEERING)

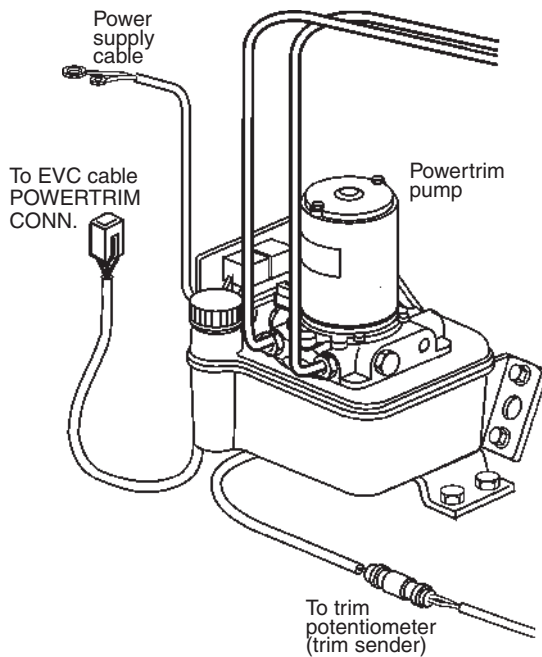
! IMPORTANT! It is very important to reduce stress from the cables on the connectors. We recommend that all cables are fixed to the HCU with strain reliefs.



Mount strain reliefs as shown in the illustration above.

! IMPORTANT! Always make sure that the locking mechanism between the male and female connectors closes with a click. This guarantees a water-tight correct closure.

Powertrim system D4/D6, stern drive DPH/DPR



Connect the 6-pin connector from the Powertrim pump harness to the engine and transmission cable connector marked POWERTRIM CONN.

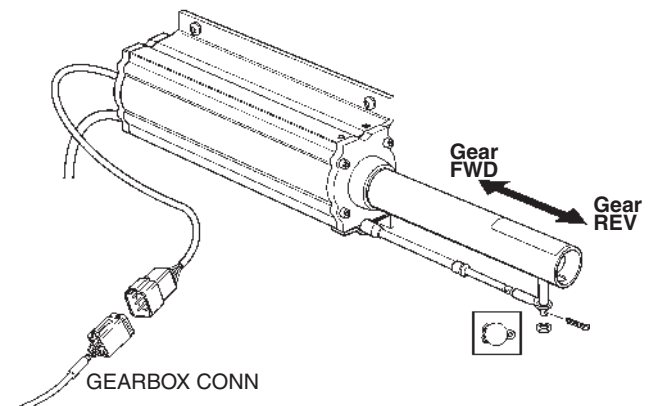
Connect the power supply cable, ring terminals, positive (+) to 55A fuse on port side of engine and negative (–) to starter.

Connect the cable from the trim potentiometer (trim sender) on the shield to the trim pump 3-pin connector.

Clamp the cables securely.

Please refer to handbook, *Installation Marine Diesel Engines Aquamatic, Volvo Penta IPS, Inboard - D4, D6*

Gear shift actuator D4/D6, stern drive DPH/DPR



Connect the actuator connector to the cable harness connector marked GEARBOX CONN. Use a 6-pin standard extension cable if necessary.

Clamp the cables in a proper way.

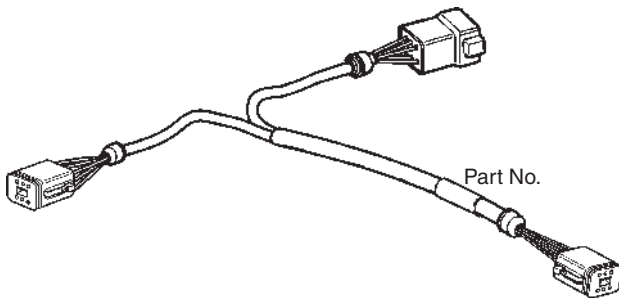
Please refer to *Installation Marine Diesel Engines Aquamatic, Volvo Penta IPS, Inboard - D4, D6* for actuator mounting instructions.

⚠ IMPORTANT! Power up the system before connection of the shift cable to make sure that the gear shift actuator is in NEUTRAL position.

Installation procedure, helm

Y-connector, location

The Y-connector is used to form a branch in the EVC standard bus cable when there are several helm stations (HCUs) in the system. Also please refer to the ***Building a network, requirements*** chapter.



⚠ IMPORTANT! The Y-connector must always be connected directly to the PCU (X2) or the HCU (X2) without using any extension cables.

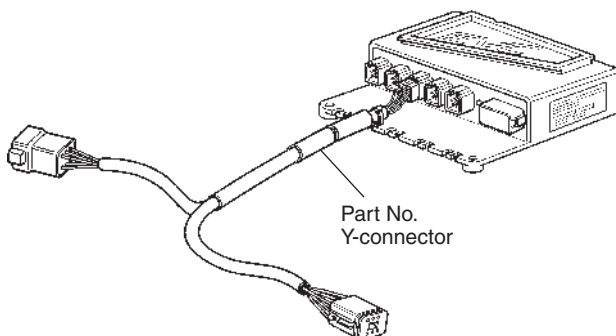
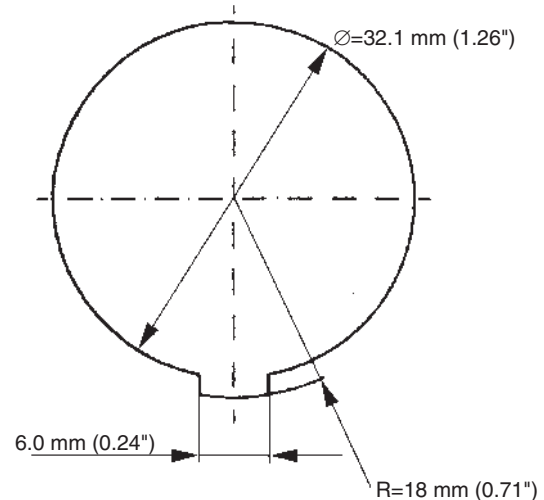


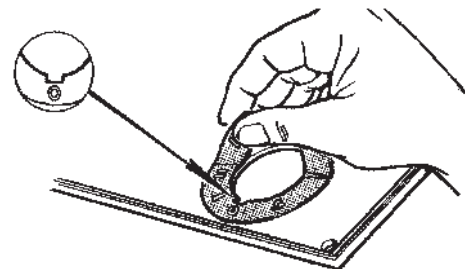
Figure shows the Y-connector fitted to a HCU unit.

Key switch and relay for external accessories

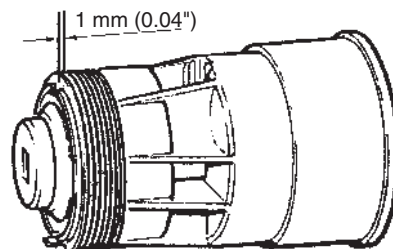
⚠ IMPORTANT! There must always be one key switch to operate each engine. The key switch shall be connected to the main helm station. On additional helm stations start/stop panels should be used.



Locate a dry, suitable place for the switch and make a hole according to the drawing.

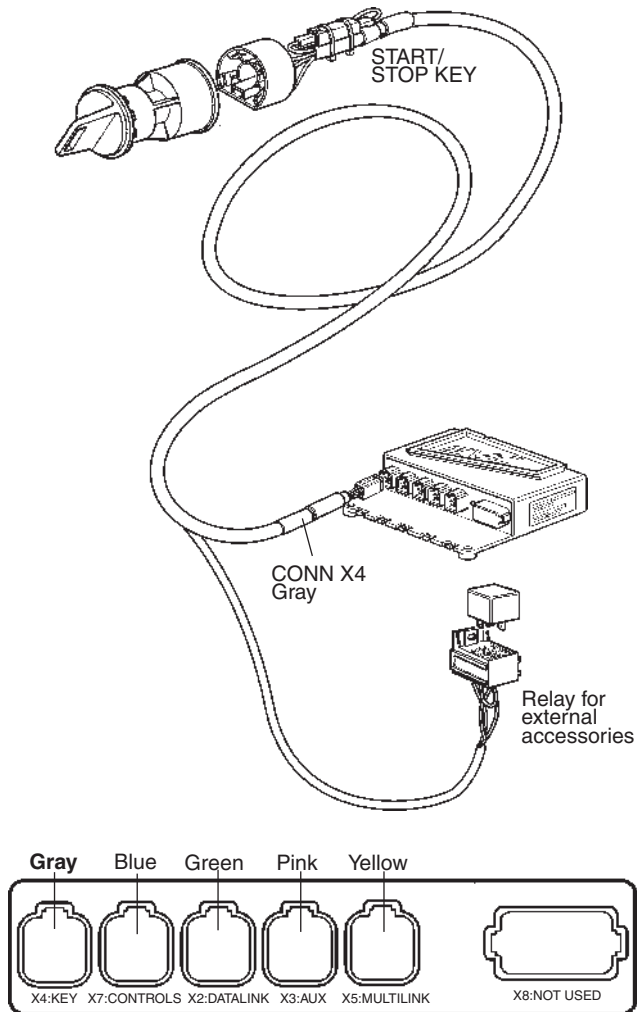


Fix the adhesive label.



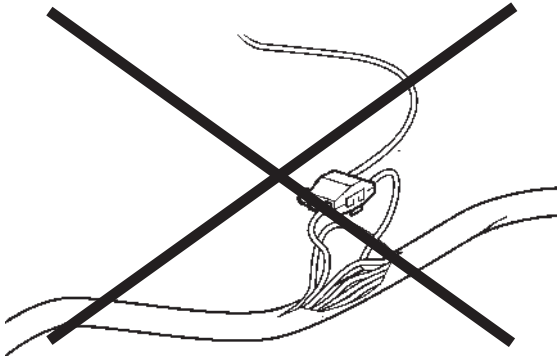
The switch fits to 2 mm (0,08") panel. If the switch is installed in a thicker panel the switch housing can be trimmed by up to 10 mm (0,4"), 1 mm (0,04") between each flute.

Connection to the HCU



The key switch is connected to the HCU, X4:KEY connection (gray) together with the relay socket for external accessories.

⚠ IMPORTANT!



Never cut or modify the Volvo Penta EVC cable harnesses. For extra power supply use the Volvo Penta relay for accessories.

Refer to the **Relay for external accessories** section.

Start/stop panel

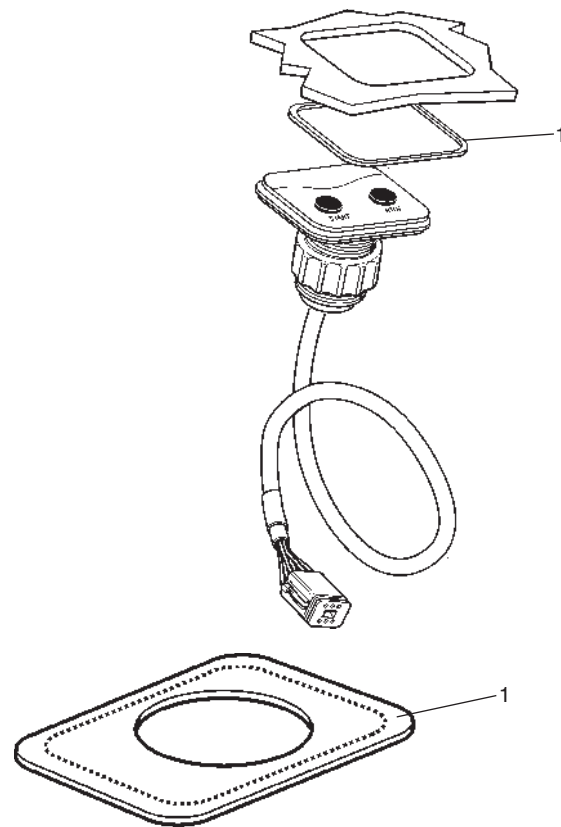
Use templates enclosed in the mounting kits. Please refer to the **Templates for controls and panels** chapter.

NOTE! There are start/stop panels suitable for single and twin installations.

⚠ IMPORTANT! For twin installations, it is essential to distinguish between the **Red** and the **Green** connections. Red is for port engine and Green is for starboard engine. The port engine is the master engine.

Flush-mounted panel

Single engine panel is shown.



Make a hole for the button panel using the template enclosed with the installation kits. Also refer to the **Templates for controls and panels** chapter.

The insert depth is 4 mm (0.16") including gasket.

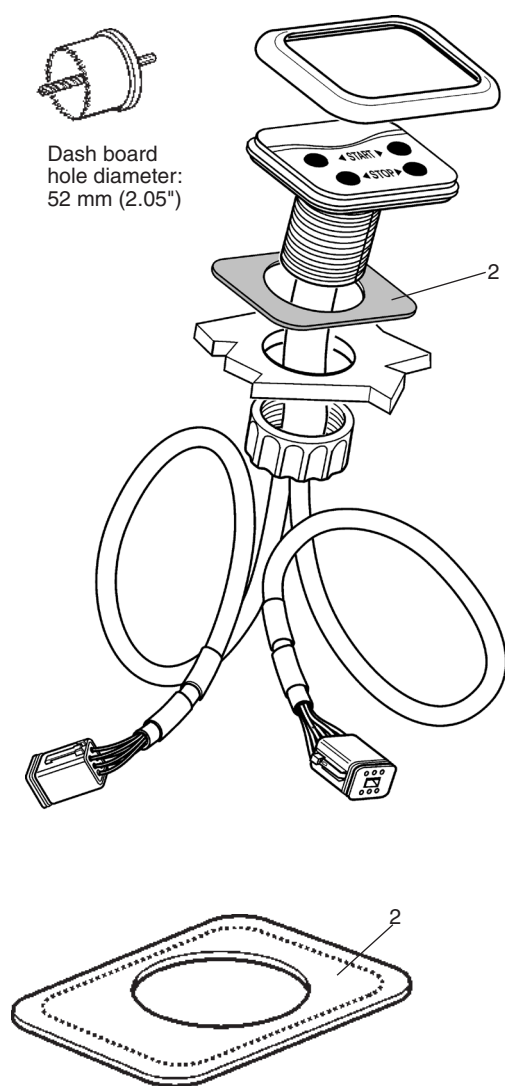
Separate the outer part of the gasket (1) from the inner part. Remove the protective paper and fit the gasket (2) in the panel recess.

Install the panel as illustrated in the figure.

NOTE! It is important that the self adhesive gasket is fitted properly in the panel recess.

Frame-mounted panel

Twin engine panel is shown.



Make a hole for the button panel. The hole must be of diameter 52 mm (2.05").

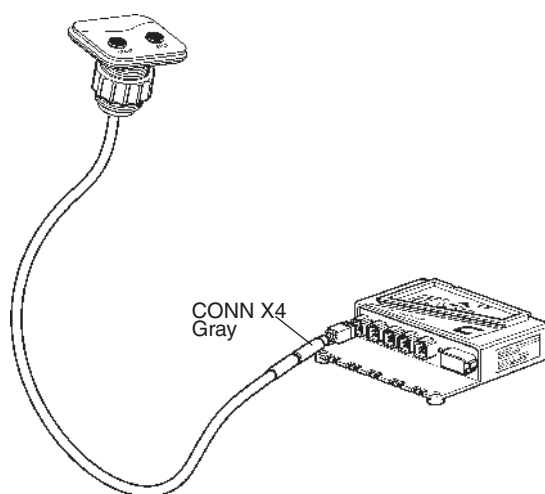
Separate the inner part of the gasket (2) from the outer part. Remove the protective paper and fit the gasket (2) on the underside of the panel.

Install the panel as illustrated in the figure and place the frame over the panel.

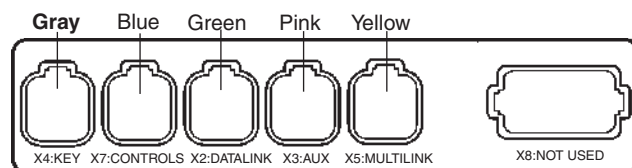
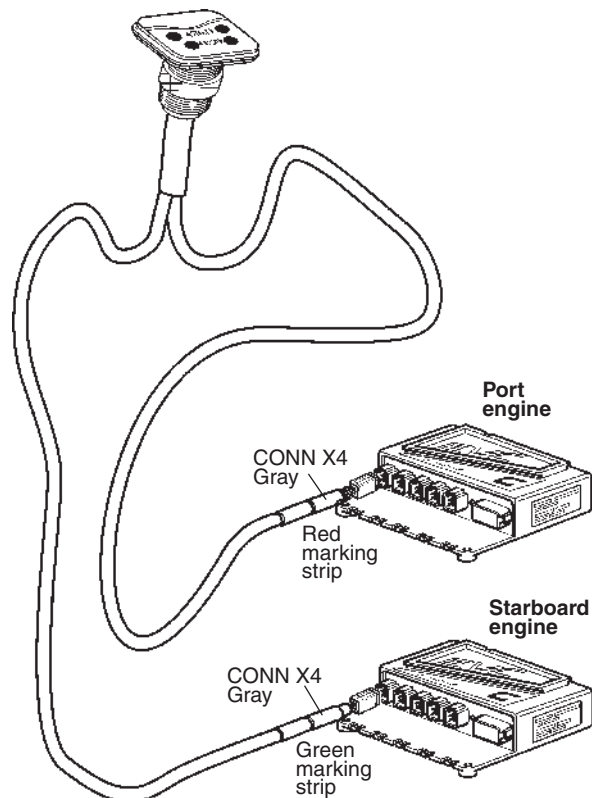
NOTE! It is important that the self adhesive gasket is fitted properly on the under side of the panel.

Connection to the HCU

Single engine panel



Twin engine panel

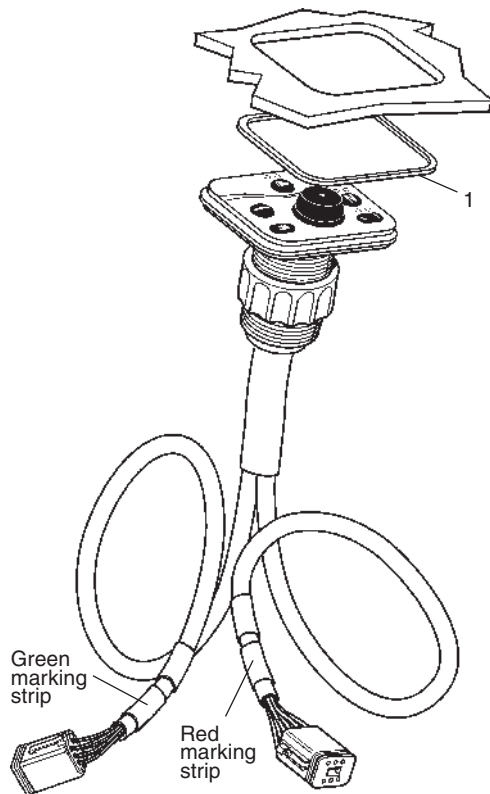


Connect the start/stop control panel cable to the connector marked X4:KEY (gray) on the HCU.

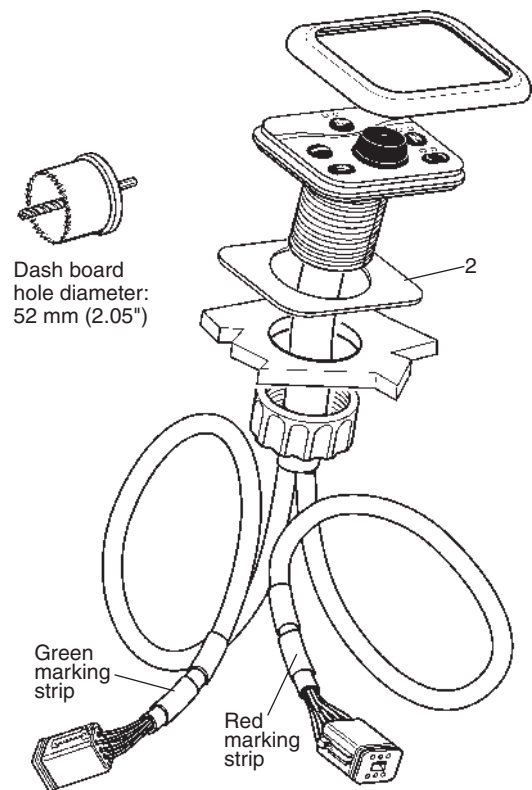
⚠ IMPORTANT! Green cable to starboard HCU and red cable to port HCU.

EVC control panel

Flush-mounted panel



Frame-mounted panel

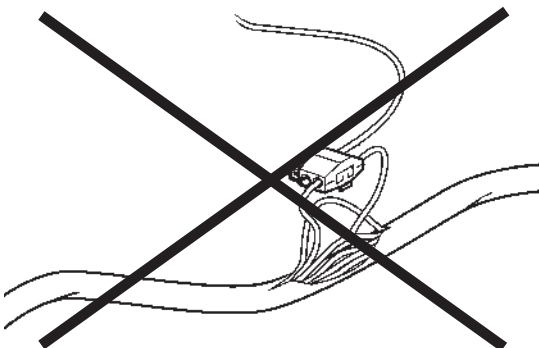


Please refer to the **Start/stop panel** section for assembling instructions.

Use the templates enclosed with the mounting kits. Please refer to the **Templates for controls and panels** chapter.

Figures show an EVC control panel for twin engine installation.

⚠ IMPORTANT!

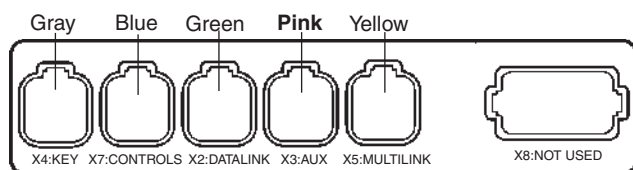
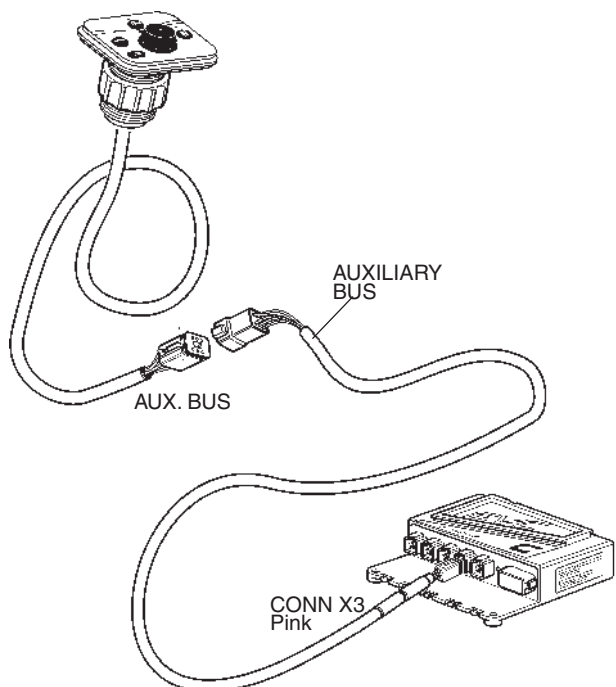


Never cut or modify the Volvo Penta EVC cable harnesses. For extra power supply use the Volvo Penta relay for accessories.

Refer to the **Relay for external accessories** section.

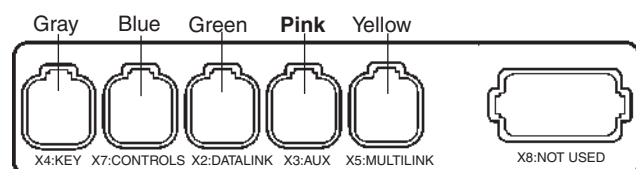
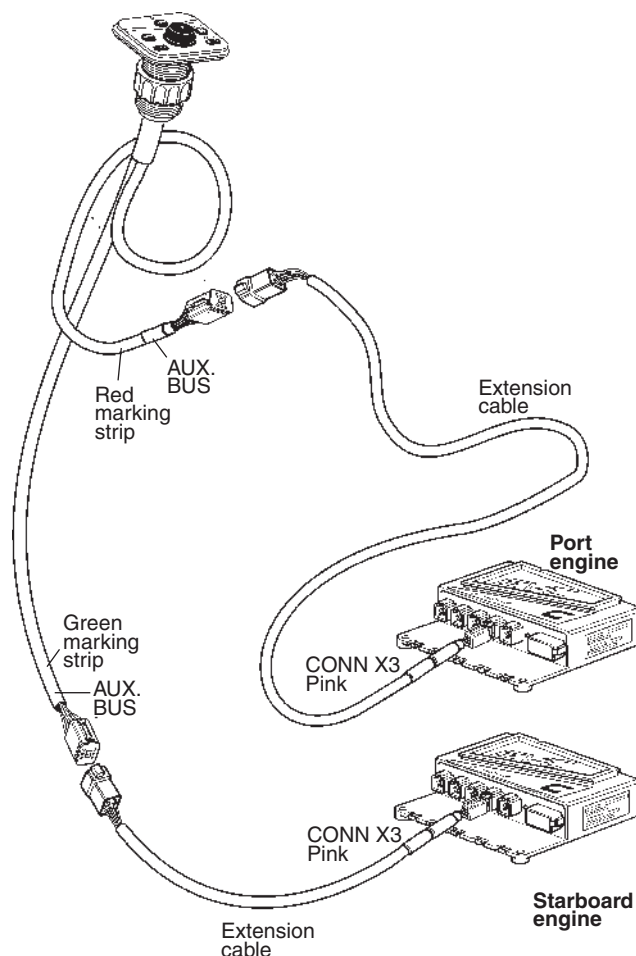
Connection of the EVC control panel

Single engine panel



Connect the EVC control panel cable to the connector marked AUXILIARY BUS on the instrument cable harness. The instrument cable harness in turn, is connected to X3:AUX (pink) in the HCU.

Twin engine panel



Connect the EVC control panel cable to the connector marked AUXILIARY BUS on the instrument cable harnesses on the HCUs, **red colored** cable to port and **green colored** cable to starboard engines.

The instrument cable harnesses in turn, are connected to X3:AUX (pink) in the HCUs.

⚠ IMPORTANT! Green cable to starboard HCU and red cable to port HCU.

Powertrim panel

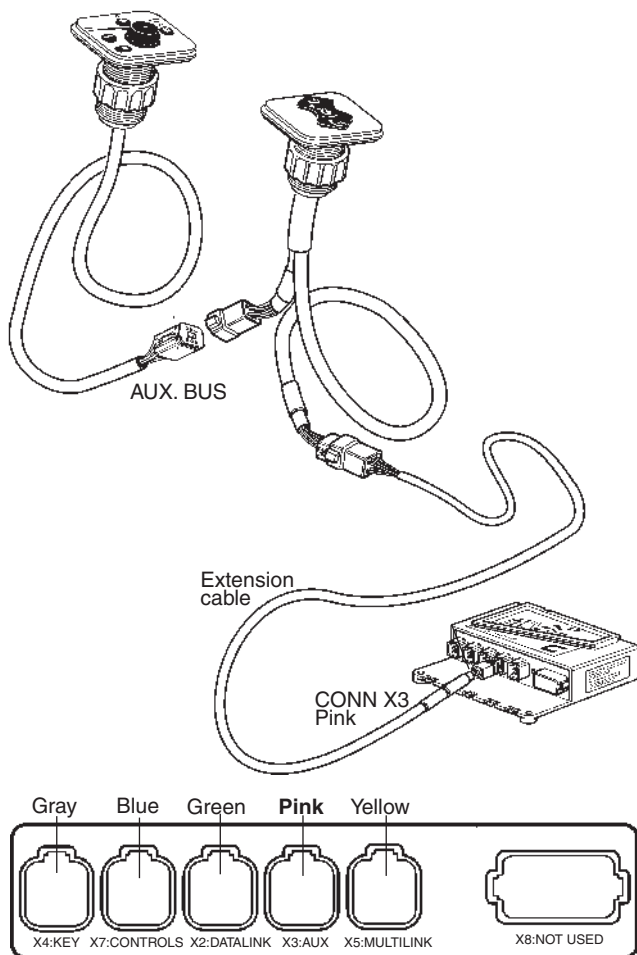
Connection of the EVC control panel and the Powertrim panel

⚠ IMPORTANT! In a twin installation the Powertrim panel must be connected to the HCU for the **port** engine. The port engine is always the master engine in the EVC system.

NOTE! The Powertrim panel controls both port and starboard drive in a twin installation.

NOTE! For Powertrim switch on side mounted controls, please refer to the **Controls, electronic** section.

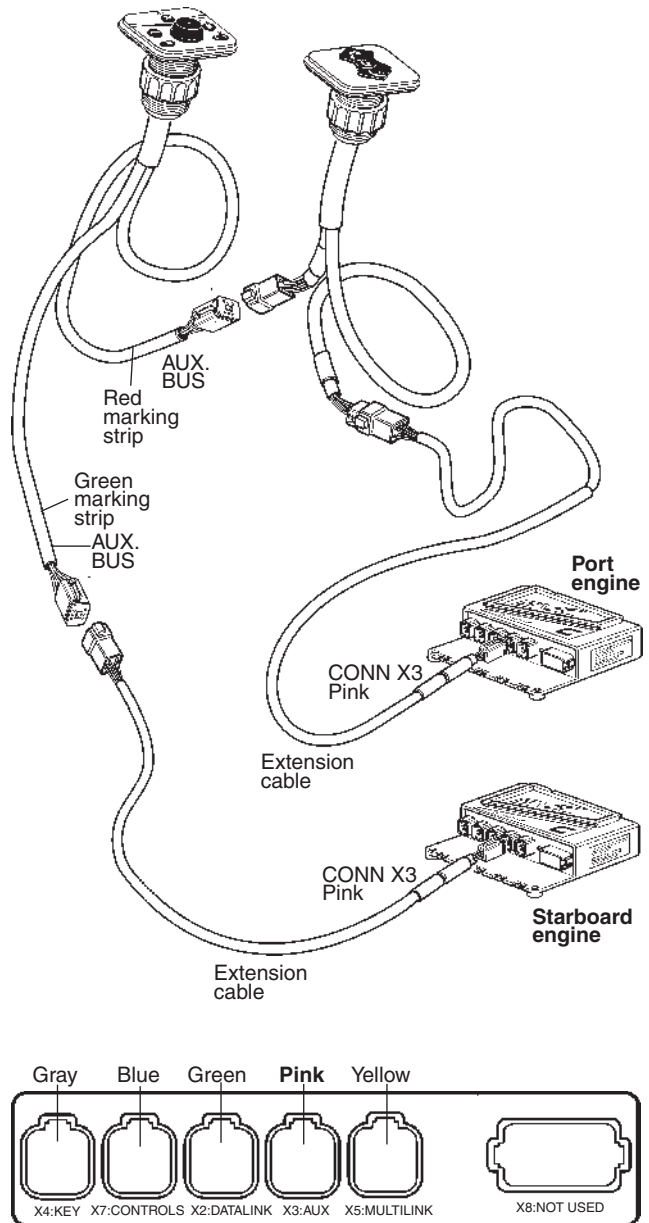
Single engine



Connect the EVC control panel cable marked CONN X3 to the Powertrim panel.

The Powertrim panel and instrument cable harness in turn, is connected to in the HCU, X3:AUX (pink).

Twin engine



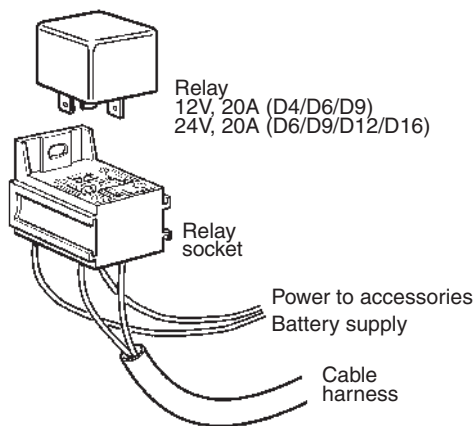
Connect the **red colored** cable to the Powertrim panel, port HCU.

The **green colored** cable is connected to the connector marked AUXILIARY BUS on the instrument cable harnesses on the starboard HCU.

The instrument cable harnesses in turn, are connected to X3:AUX (pink) in the HCUs.

⚠ IMPORTANT! Green cable to starboard HCU and red cable to port HCU. In a twin installation the Powertrim panel must be connected to the cable harness from the **port** engine HCU.

Relay for external accessories

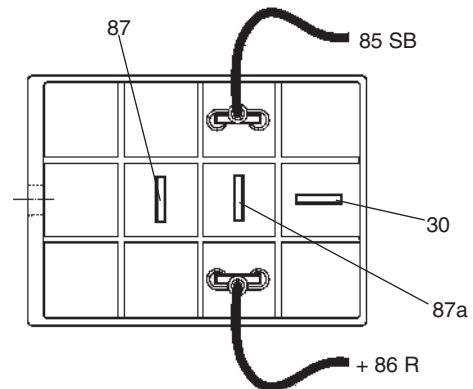


The relay controls the power supply to external accessories. The relay position (open or closed) and the power supply depend on the key switch position. The relay is normally open and there is no power when key switch is in the OFF position.

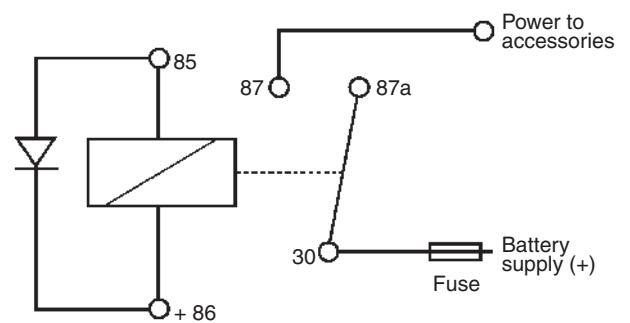
The relay cable and the relay can also be fitted to a secondary helm station with a start/stop control panel. In such an installation the relay is activated by the key switch on the main helm station.

NOTE! All relays in a drive line, and in an active or inactive helm station are operated by the key switch.

Connection points on relay socket



Relay diagram



Connection 85 and +86 are wired from the EVC cable harness.

Figure shows the key switch in OFF position and the relay in open position.

Connect power supply for external accessories from the battery to connector 30 on the relay socket.

⚠ IMPORTANT! Never supply any external accessories from the EVC system. Always use the relay.

Connect external accessories to pin 87 which will supply power when the key switch is ON.

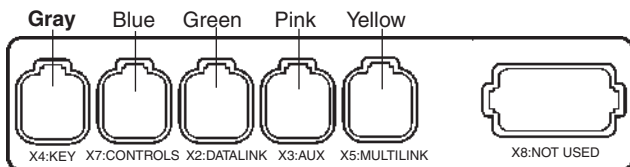
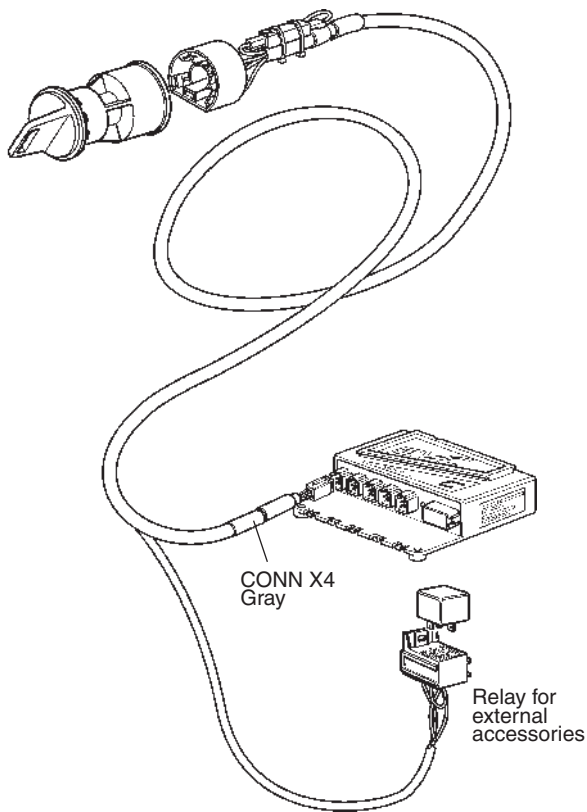
Cables from battery to relay and from relay to accessories must be dimensioned for the expected maximum current. There must also be a fuse in the circuit between battery and relay, preferably close to the battery.

Maximum current through the relay is 20 Amp.

Maximum output is:

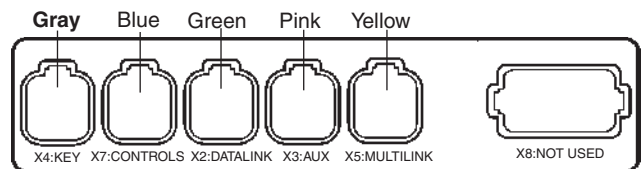
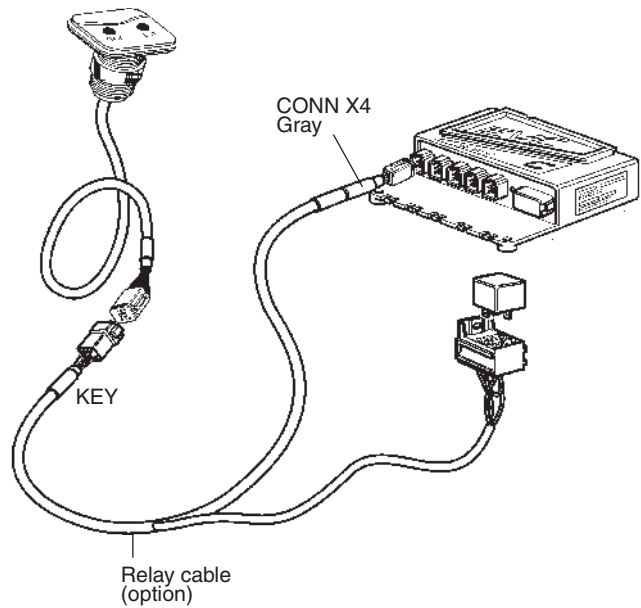
12 V 240 W
24 V 480 W

Connection to the HCU when using a key switch



The relay socket is permanently connected to the cable for the key switch. The key switch cable is connected to the HCU, X4:KEY connection (gray).

Connection to the HCU when using a start/stop panel



The start/stop panel is connected to the HCU, X4:KEY (gray) or to separate relay cable harness (option).

The cable harness is option. The connector on the harness is marked KEY and the harness is connected to the HCU, X4:KEY connection (gray).

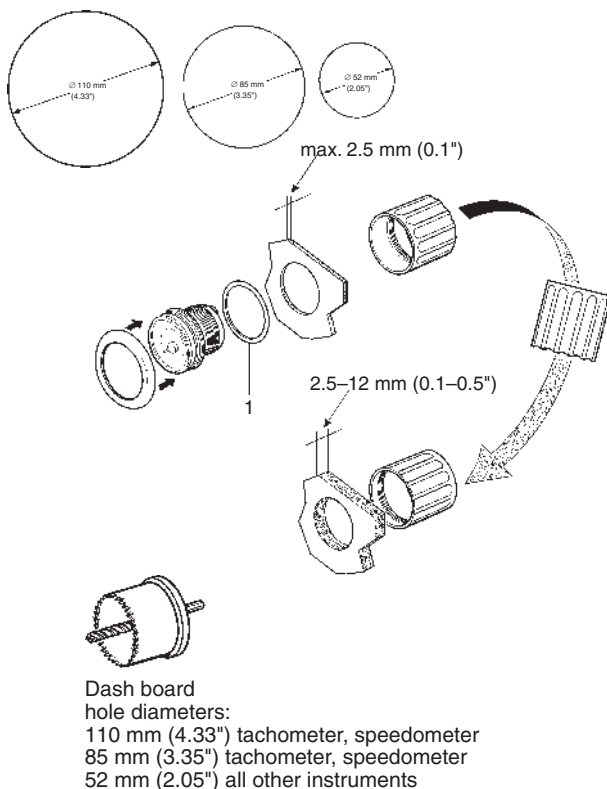
Instruments

Choose dry suitable places for the instruments.

NOTE! Max. distance (CC) between instruments without using an extension cable is 220 mm (8.6").

⚠ IMPORTANT! Always connect instruments which are common for both engines, such as speedometer, rudder indicator etc. to **port HCU**.
The port engine is the master engine in the EVC system.

Instrument with attaching nut



NOTE! An attaching nut is used when dash board thickness is up to 12 mm (0.5"). If dash board thickness is greater than 12 mm (0.5"), please refer to **Instrument with attaching clamp**.

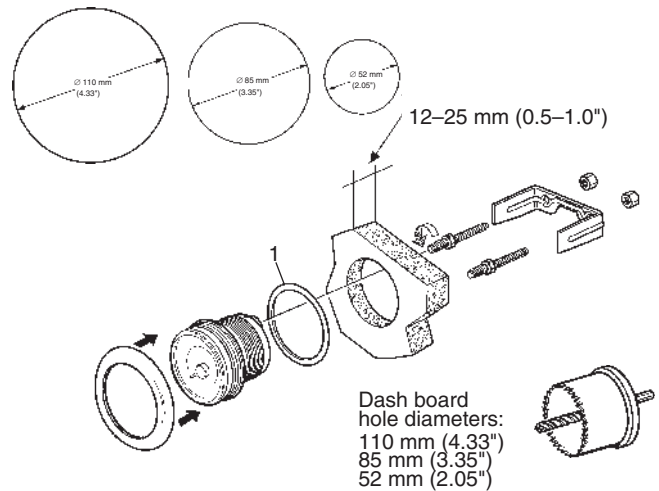
Make a hole, diameter 110 mm (4.33"), 85 mm (3.35") or 52 mm (2.05") depending on the type of instrument.

Fit the instrument according to the figure. Install the gasket (1) between instrument and dashboard.

NOTE! The position of the attaching ring when insert depth exceeds 2.5 mm (0.1").

Instrument with attaching clamp

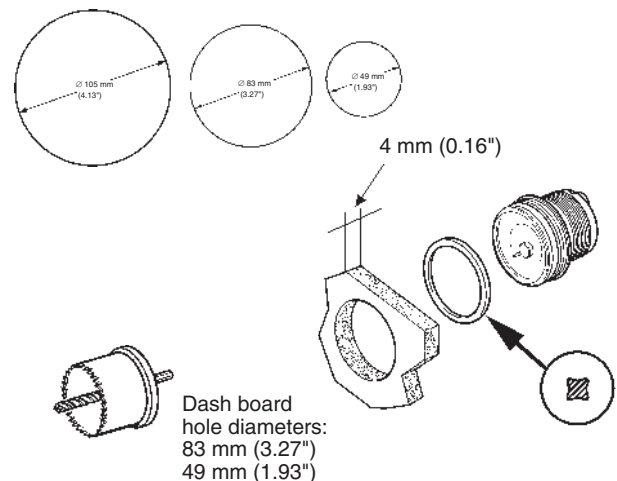
NOTE! Attaching clamp is used when dash thickness is between 12 mm (0.5") and 25 mm (1.0"). For dash board thickness less than 12 mm (0.5"), please refer to **Instrument with attaching nut**.



Make a hole, diameter 85 mm (3.35") or 52 mm (2.05") depending on type of instrument.

Fit the instrument as illustrated in the figure. Install the gasket (1) between the instrument and the dash-board.

Flush-mounted instrument



NOTE! Holes diameters should be 105 mm / 83 mm / 49 mm.

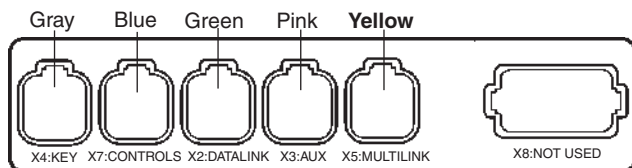
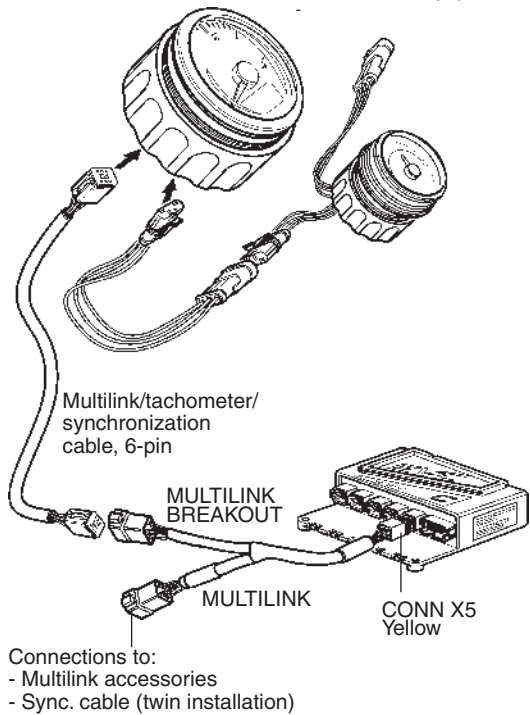
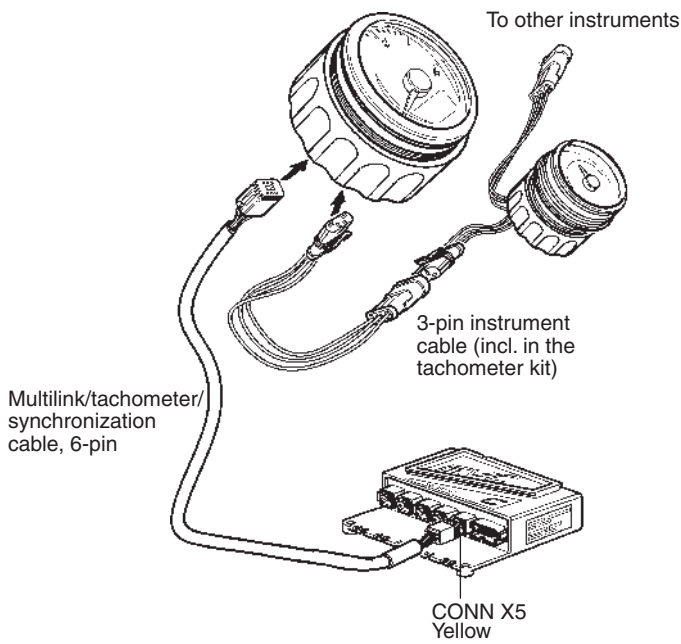
Insert depth should be 4 mm (0.16").

Make a hole, diameter 105 mm (4.13"), 83 mm (3.27") or 49 mm (1.93") depending on type of instrument.

Place the sealing ring (X-ring) between the dash-board and the instrument.

Fit the instrument.

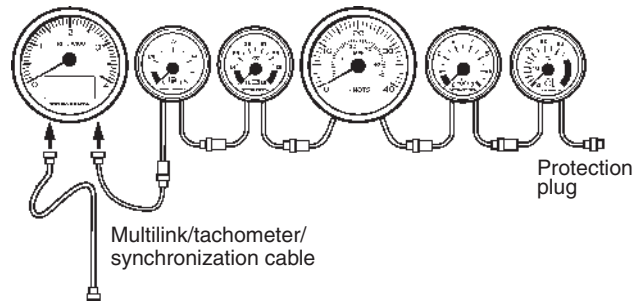
Connection of EVC System Tachometer and other instruments



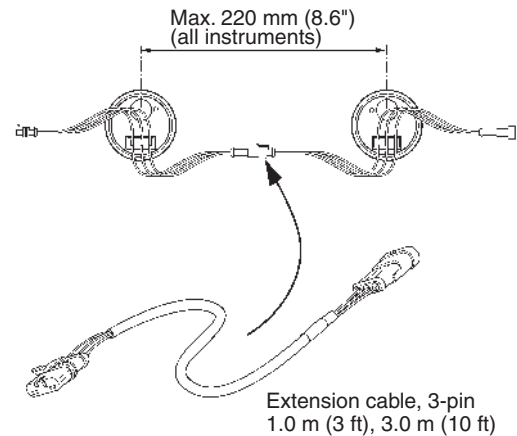
Connect the EVC System Tachometer to the HCU connection X5 (yellow). Connect directly to X5 using a multilink/synchronization cable.

Alternatively use a Y-split multilink cable and the MULTILINK BREAKOUT connection. See figure.

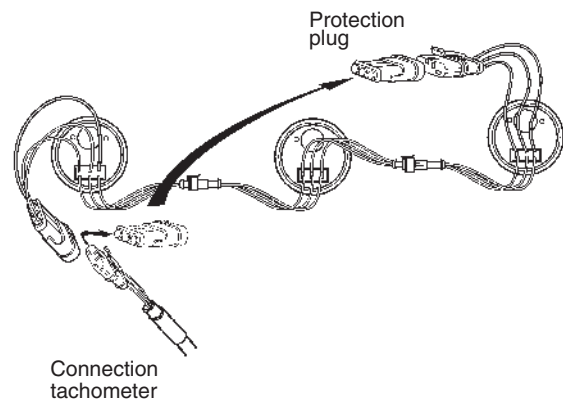
EVC system tachometer



X5 MULTILINK



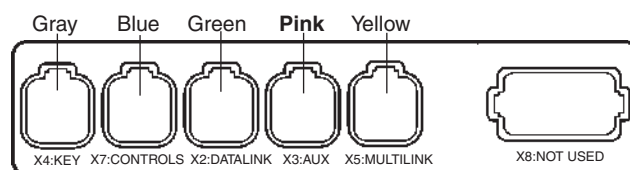
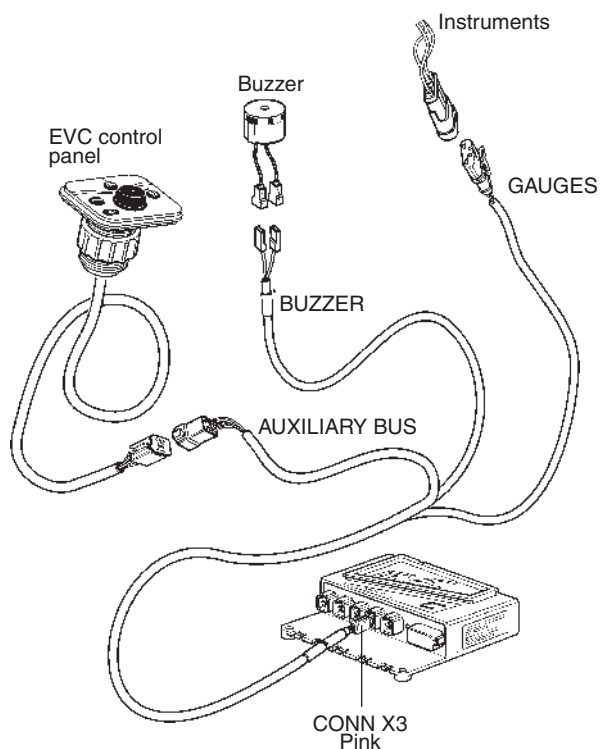
Connect the other instruments to the 3-pin EasyLink connector in the tachometer.



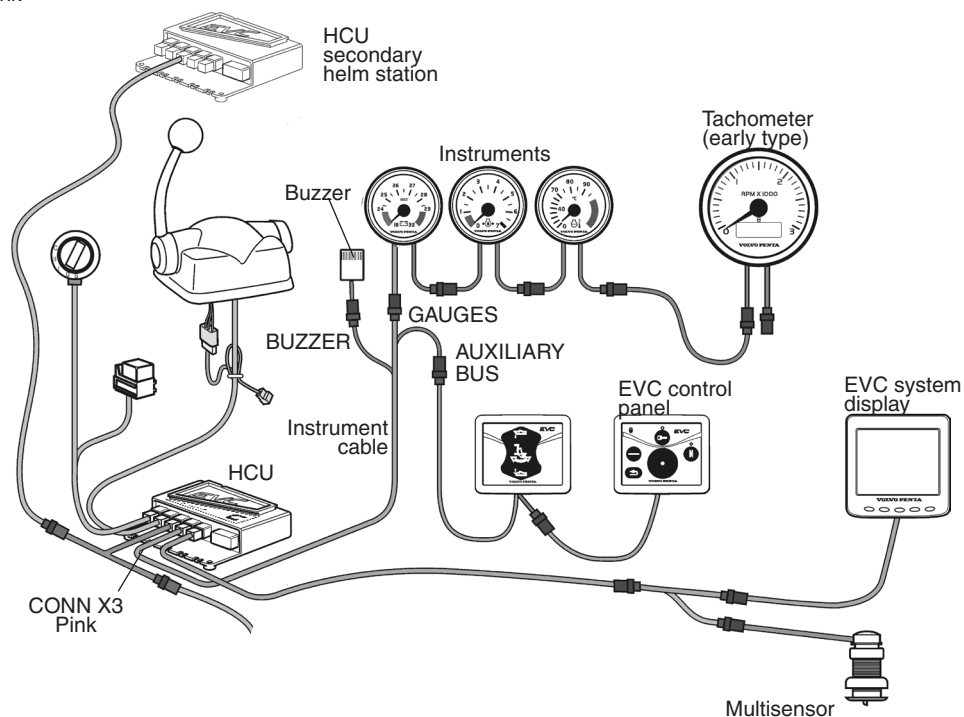
⚠ IMPORTANT! Always plug the open end of the instrument cable to prevent corrosion. Use the plug attached to the cable harness.

⚠ IMPORTANT! Do not install a Y-split cable without having the MULTILINK BREAKOUT connected.

Instrument, panels and auxiliary cable, 6-pin (option)



The instrument cable is connected to the HCU X3: AUX connector (pink).



This cable is optional. It is used when an EVC system display is installed and an additional buzzer is required.

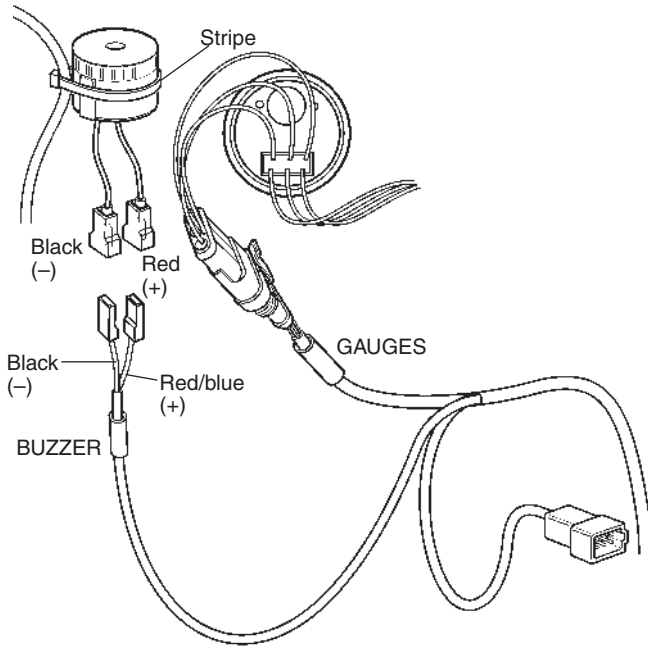
The cable can also be used for an additional buzzer when the EVC system includes an EVC system tachometer.

The instrument serial bus can also be used.

⚠ IMPORTANT! In a twin installation, when using one combined EVC system display, the display must be configured as a **"TWIN"** before auto configuration is performed.

In a twin installation, when using two EVC system displays, the displays must be configured as **"PORT"** resp. **"STARBOARD"** before auto configuration is performed.

Buzzer (option)



Mount the buzzer under the dash board in an appropriate place by using one or two stripes.

Connect the buzzer cables to the connectors marked BUZZER in the instrument cable harness.

⚠ IMPORTANT! Note the pinarity of the buzzer and buzzer cable: Red/blue to red cable, positive (+) and black to black cable, negative (-).

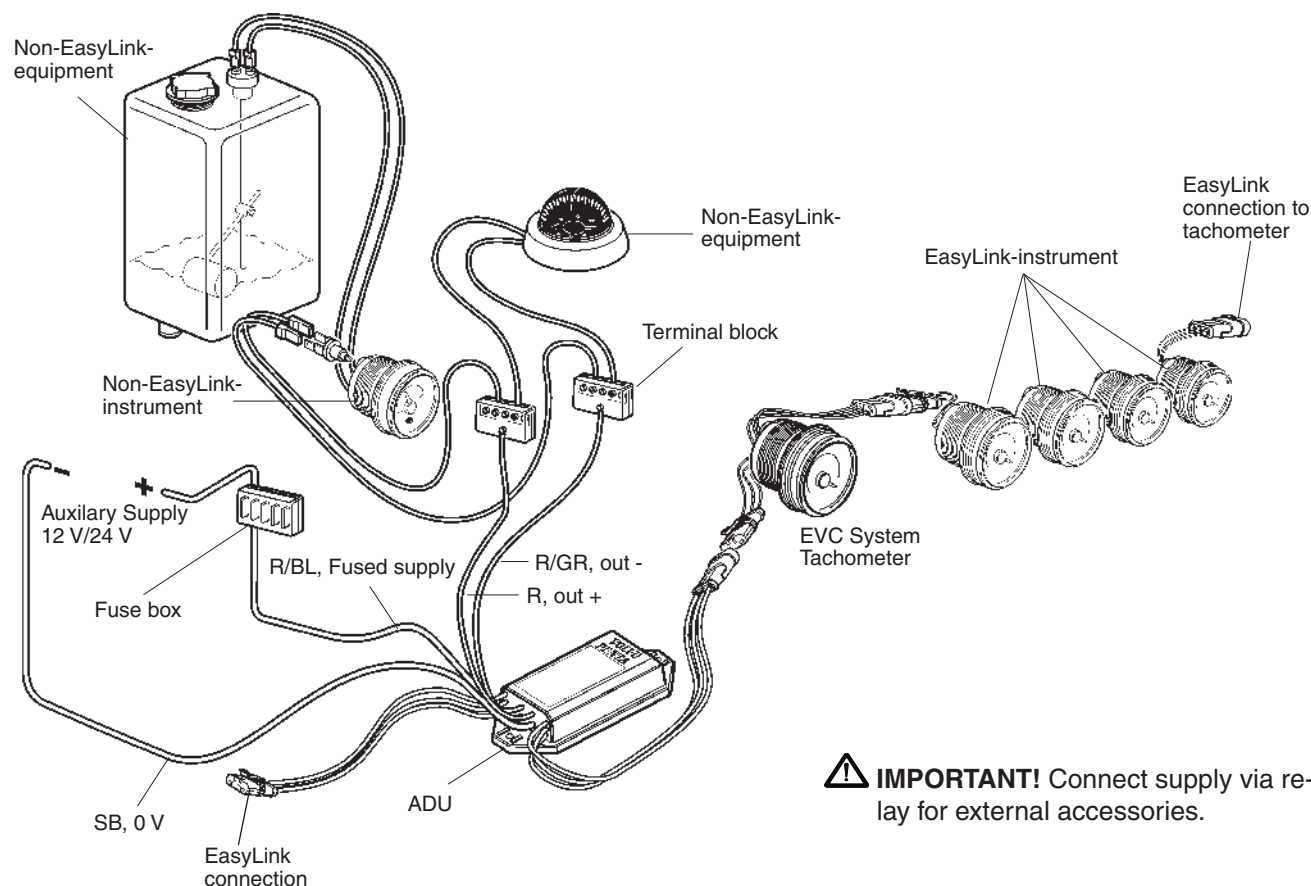
Auxiliary dimmer unit (ADU)

If the existing installation comprises instruments that are not of the EasyLink type, then an ADU can be installed. This means non-EasyLink instrument can also have the lighting intensity adjusted with the dimmer function.

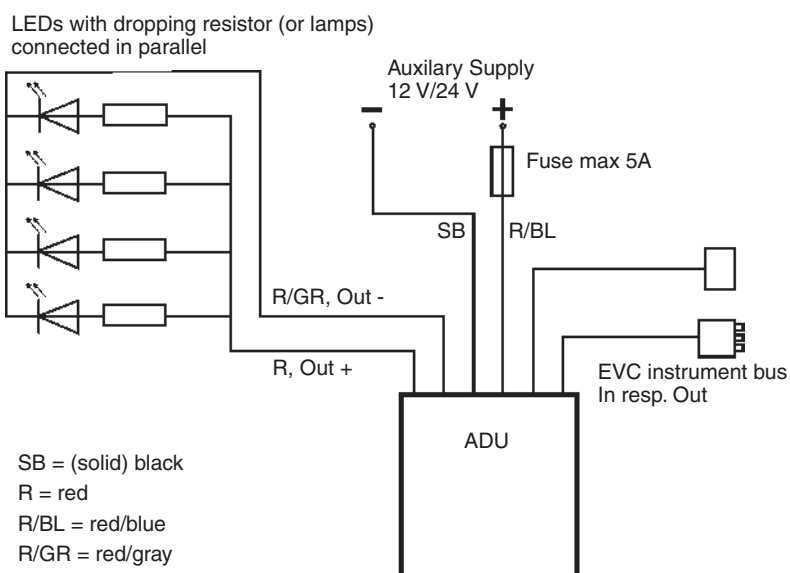
The ADU can be fitted anywhere along the chain of other EasyLink instruments. See the figure below.

The number of ADUs required depends on how many filament lamps/LEDs there are in the circuit. One ADU can supply 5 x 1.2 W (12 V/24 V) filament lamps or 30 x LEDs, 15 mA (12 V/24 V).

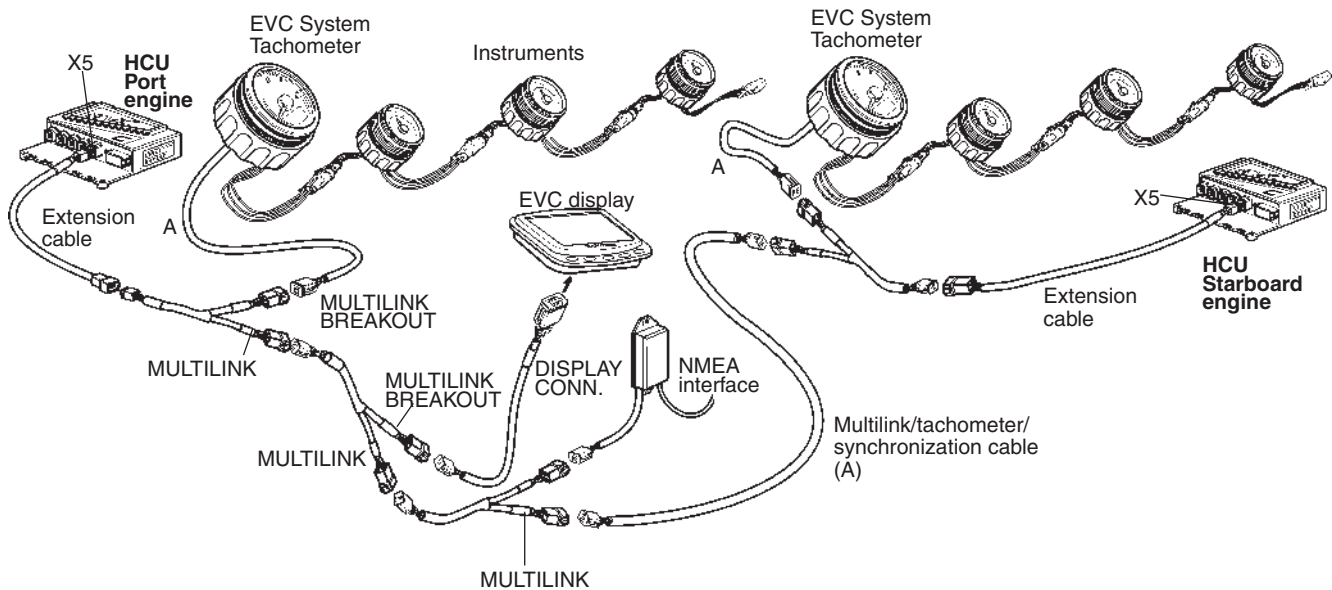
When attaching to the auxiliary + supply, an extra fuse of max 5 A must be used. See positioning in figure below



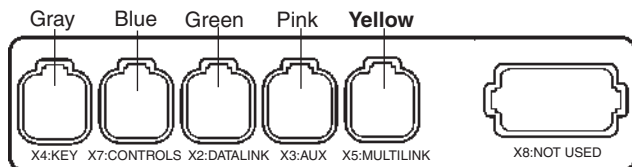
⚠ IMPORTANT! Connect supply via relay for external accessories.



Synchronizing engines in twin installations



To synchronize the engines the multilink/tachometer/synchronization cable (A) must be installed between the HCUs for starboard and port engines in a twin installation.



The marking sleeves on the cable are yellow and named MULTILINK.

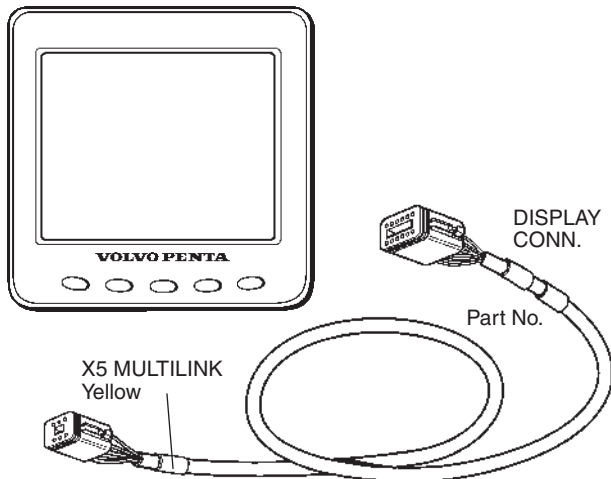
The multilink/tachometer/synchronization cable (A) is a part of the multilink chain connected to X5: MULTILINK (yellow) on each HCU. See figure above.

⚠ IMPORTANT! There must be a synchronizing cable installed between the HCUs on all helm stations.

⚠ IMPORTANT! Do not install an Y-split cable without having the MULTILINK BREAKOUT connected.

NOTE! If the system is equipped with e. g. an EVC display an Y-split cable must be installed between the HCU X5 and the display cable. The synchronizing cable is then connected to the Y-split part, marked MULTILINK.

EVC system display



! IMPORTANT! An EVC system display can be connected together with a tachometer. The display can also substitute a tachometer. The EVC-C system must have either a tachometer or a display.

The following information is available in the EVC-C system display:

- Coolant pressure
- Fuel pressure
- Fuel level
- Engine oil pressure
- Turbo pressure
- Coolant temperature
- Transmission oil pressure
- Voltage
- Exhaust temperature
- Engine oil temperature
- Transmission oil temperature
- Engine rpm
- Engine running hours
- Boat speed
- Engine Powertrim
- Sea water pressure
- Trip data: (fuel rate, fuel consumption, fuel consumption/time, trip fuel consumption, trip fuel consumption/time, remaining fuel, trip hours, trip distance, remaining distance to empty tank, remaining time until tank is empty)
- Sea water depth
- Sea water depth alarm
- Sea water temperature
- Rudder angle
- Engine oil filter differential pressure

Information is depending on engine model, number of sensors and type of accessories.

The EVC display kit consists of the display with connection and a cable, length 1.5 m (5 ft) with 12- and 6- pin connections. An extension cable may be used, lengths: 1.5, 3, 5, 7, 9, 11 m (5, 10, 16, 23, 30, 36 ft). Please refer to the **Connection** section on the next pages.

! IMPORTANT! Always connect instruments and senders which are common for both engines, such as speedometer, rudder indicator etc to **port HCU**. The port engine is the master engine in the EVC system.

NOTE! In a twin installation the default setting of the display will show port engine data. Please refer to the **EVC system display/Calibration and settings** chapter for further information.

! IMPORTANT! In a twin installation, when using one combined EVC system display, the display must be configured as a **"TWIN"** before auto configuration is performed.

In a twin installation, when using two EVC system displays, the displays must be configured as **"PORT"** resp. **"STARBOARD"** before auto configuration is performed.

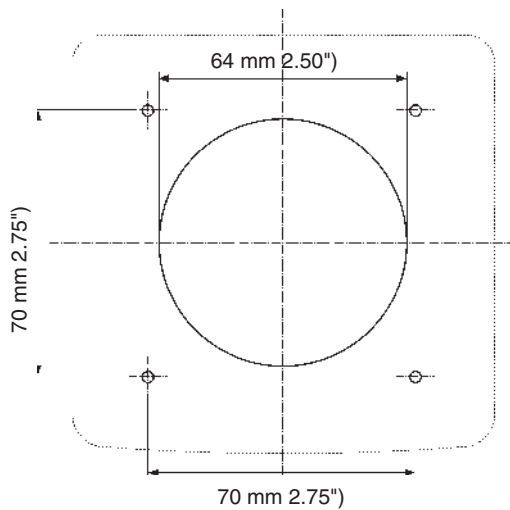
NOTE! The EVC-C system allows maximum one display connected to each HCU.

Location and fitting

NOTE! Allow adequate clearance behind the display for cable connection to ensure that the cable is not unduly stressed. Also ensure that there is sufficient length of cable to remove the unit for servicing purposes.

The instrument is usually installed on a dash board. It can be mounted from above or flush from under the dash board. Flush mounting demands tailor made fittings. Templates are included. Please refer to the **Templates for controls and panels** chapter.

NOTE! Cut out dimensions are nominal only and should be checked against physical units prior to machining.

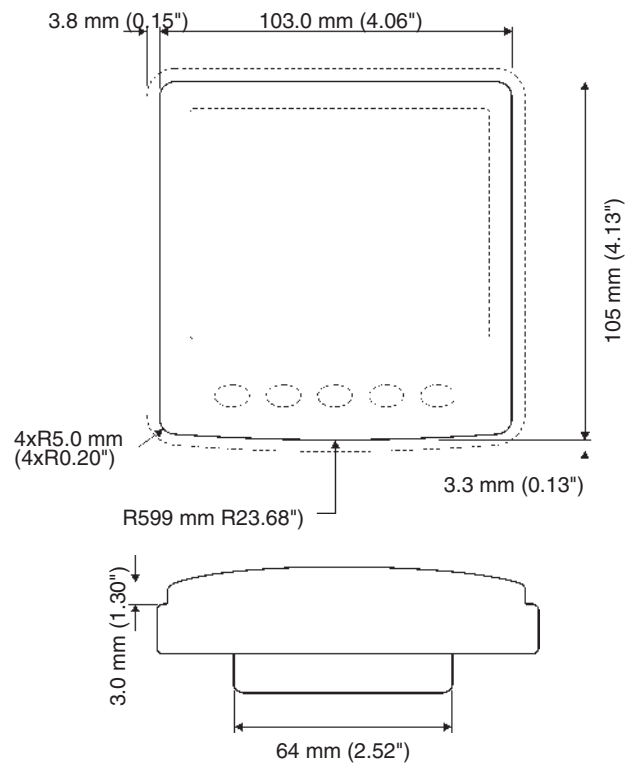
Mounting from above of dash board

Using the template as a guide, cut out the hole for the rear side with a diameter of 65 mm (2.6") and drill the four Ø 4.3 mm (0.17") holes for the studs.

Screw the four studs into the rear case. Longer M4 studs (not supplied) can be used if required.

Connect the cable to the rear of the unit.

Put the unit into position, then secure it by screwing the thumb nuts onto the studs.

Flush-mounted display

Make a hole for the display using the template enclosed with the installation kits. Use tailor made fittings. Also refer to the ***Templates for controls and panels*** chapter .

The insert depth is 3 mm (0.12") .

Connection Single installation

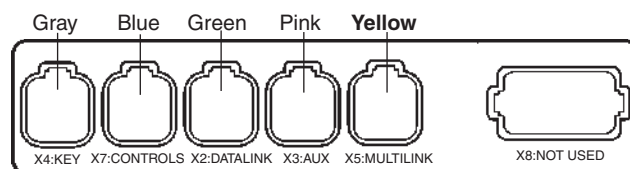
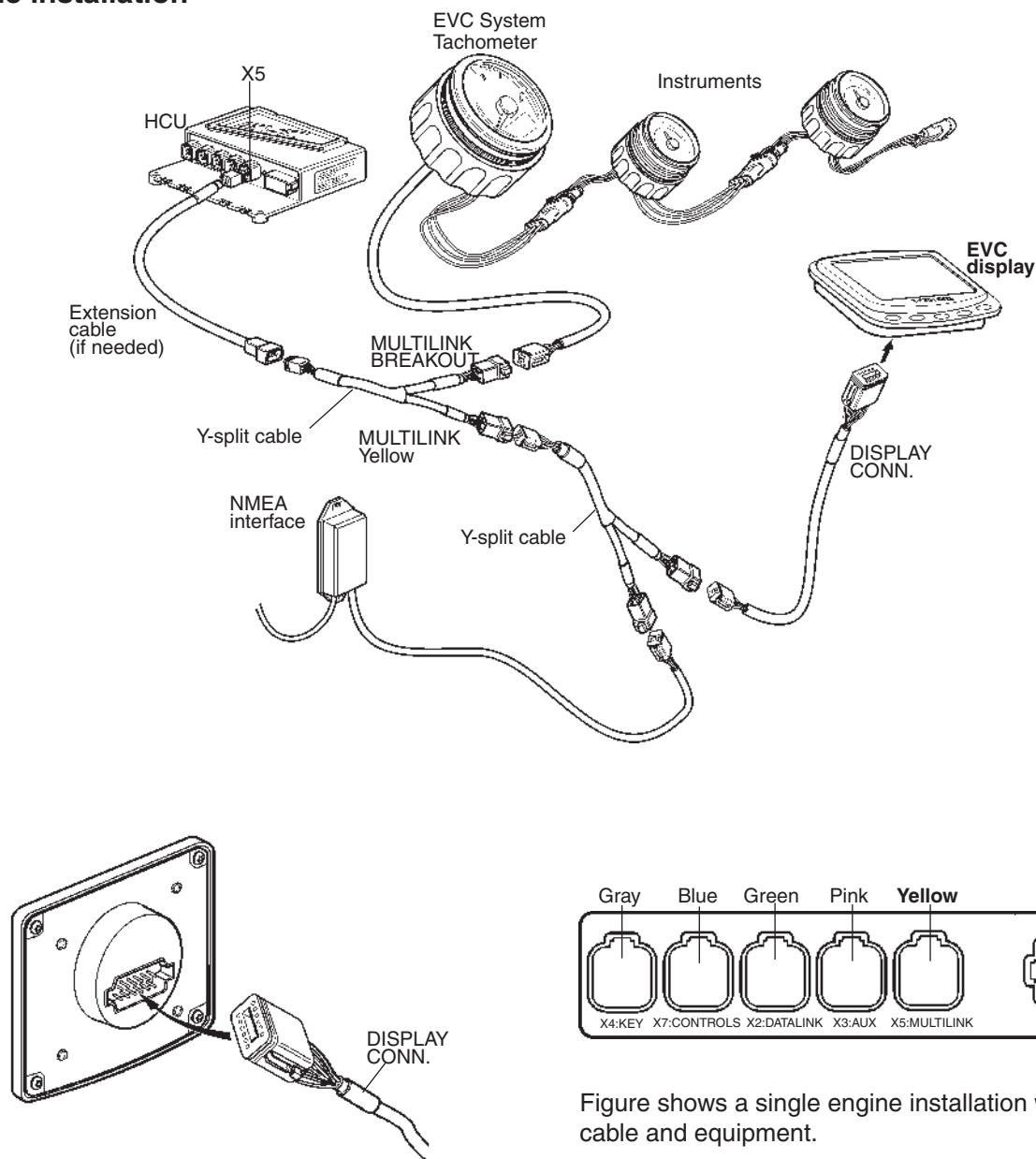


Figure shows a single engine installation with Y-split cable and equipment.

Connect the Y-split socket to HCU X5 connector.

NOTE! In a single installation an EVC display or equipment such as an NMEA interface or a multisensor can be connected on **either** the MULTILINK or the MULTILINK BREAKOUT connector.

⚠ IMPORTANT! A MULTILINK BREAKOUT connection should never be left open (not connected). In such a case, disconnect the Y-split cable.

Connection Twin installation

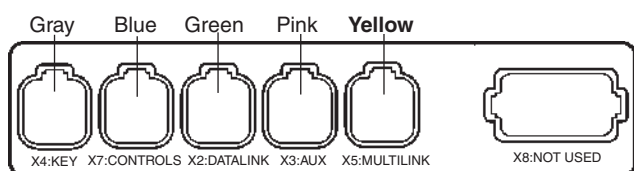
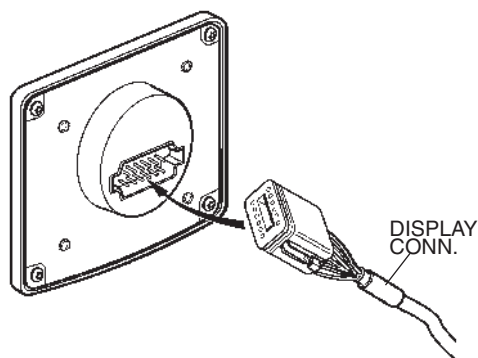
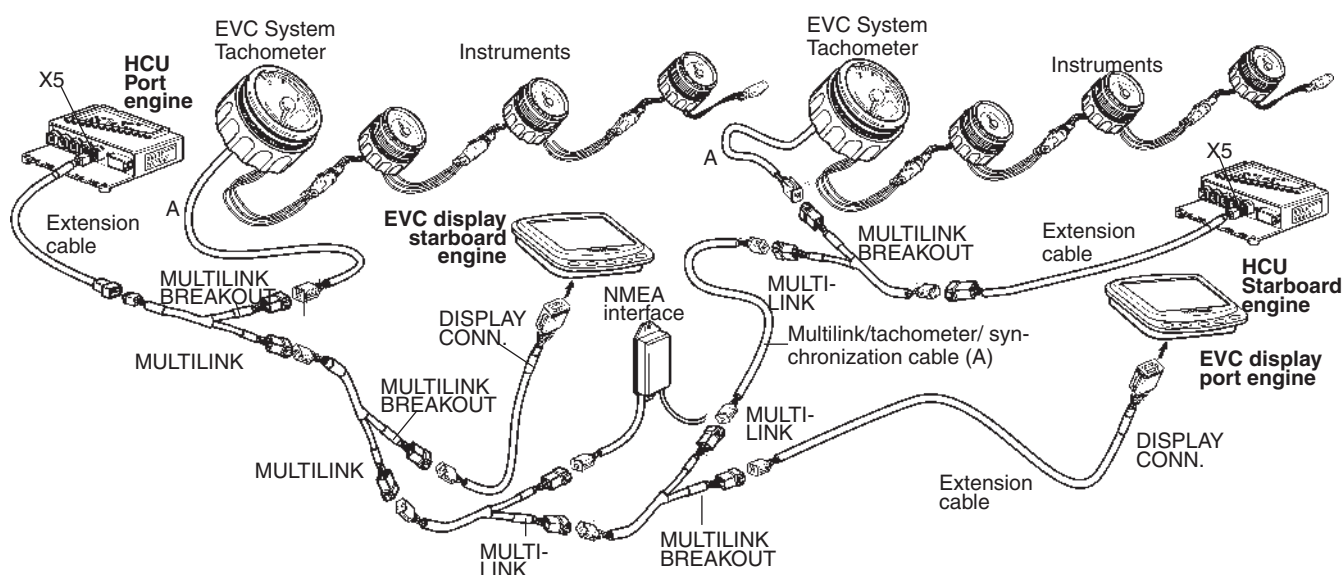


Figure shows a twin engine installation with Y-split cable and synchronisation cable.

Connect the Y-split socket to HCU X5 connector.

⚠ IMPORTANT! Connect the display cable to the Y-split marked MULTILINK BREAKOUT (yellow PVC-coating).
Connect the sync.cable to the branch marked MULTILINK (yellow marking sleeve).

Try to keep the cable runs as short as possible to reduce the risk of voltage drop and interference.

NOTE! An extension cable, length: 1.5, 3, 5, 7, 9, 11 m (5, 10, 16, 23, 30, 36 ft) may be used between HCU or Y-split cable and the display cable.

NOTE! The EVC system allows maximum one display per helm station (HCU).

⚠ IMPORTANT! In a twin installation, when using one combined EVC system display, the display must be configured as **"TWIN"** before auto configuration is performed.

In a twin installation, when using two EVC system displays, the displays must be configured as **"PORT"** resp. **"STARBOARD"** before auto configuration is performed.

⚠ IMPORTANT! All cable runs should be kept at least 300 mm from other cables carrying RF (Radio Frequency) or pulse signals.

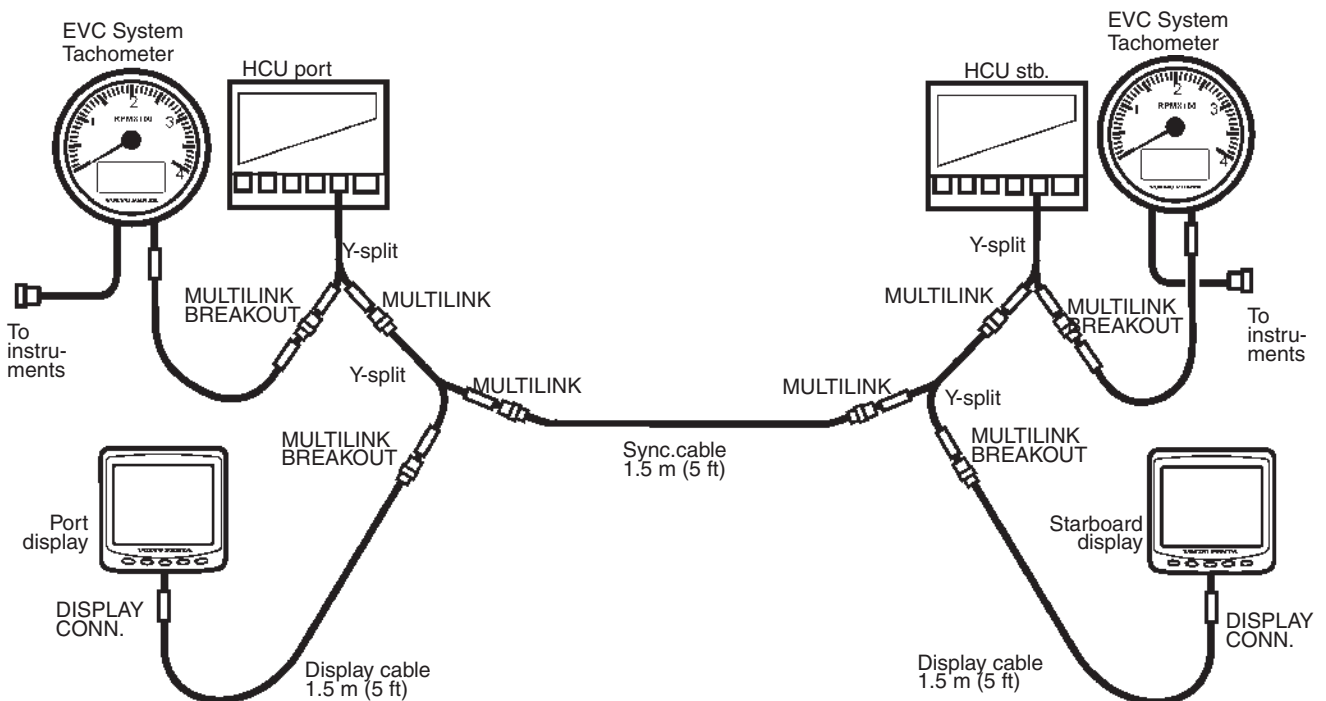
⚠ IMPORTANT! A MULTILINK BREAKOUT connection should never be left open (not connected). In such a case, disconnect the Y-split cable.

Various installation examples:

- Single installation one display
- Twin installation two displays
- Twin installation one combined display

⚠ IMPORTANT! In a twin installation, when using one combined EVC system display, the display must be configured as a “**TWIN**” before auto configuration is performed.

In a twin installation, when using two EVC system displays, the displays must be configured as “**PORT**” resp. “**STARBOARD**” before auto configuration is performed.



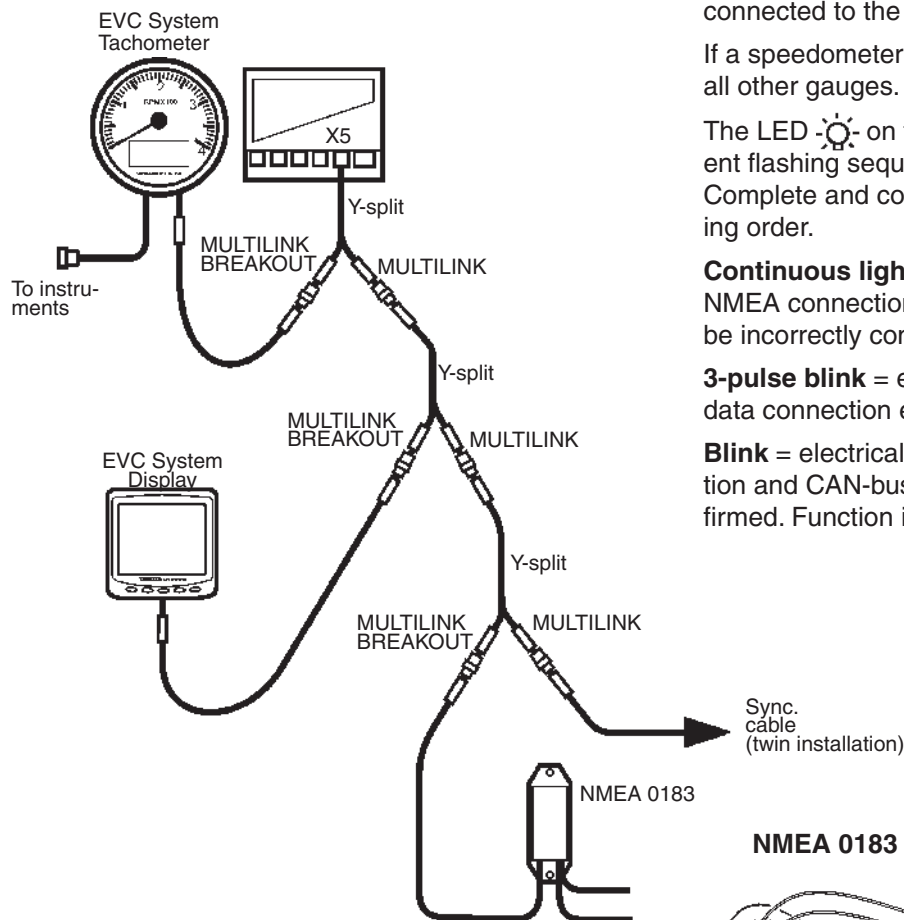
The figure shows a twin installation with two displays, one for each engine. Note that one display can also be used for two engines.

⚠ IMPORTANT! A MULTILINK BREAKOUT connection should never be left open (not connected). In such a case, disconnect the Y-split cable.

NMEA 0183 interface

For information about boat speed, to be presented on an instrument and in the EVC display, a boat speed signal must come from a GPS receiver or similar. An NMEA interface must be installed to supply the information to the EVC system. The signal coming from the GPS must comply with NMEA 0183. The NMEA interface will not provide any information to an external display.

NOTE! Only one NMEA interface per boat is allowed.



NMEA messages

Speed over ground.

The "speed over ground" data will be sourced from NMEA 0183 RMC or VTG message.

Speed through water.

The "speed through water" data will be sourced from NMEA 0183 VHW message.

NOTE! "Speed over ground" has the highest priority compare to "speed through water". "Speed over ground" is shown when both parameters are available.

! IMPORTANT! The "speed" function must be "ON" in the EVC system display.

It is not allowed to install both an NMEA 0183 interface and an NMEA 2000 interface in the same boat.

The NMEA-interface must be connected to the HCU X5 (yellow) connector. When a display is connected to the system use a Y-split cable and the MULTILINK BREAKOUT connection.

In a twin engine installation the sync. cable shall be connected to the MULTILINK connection.

If a speedometer is used it should be connected as all other gauges.

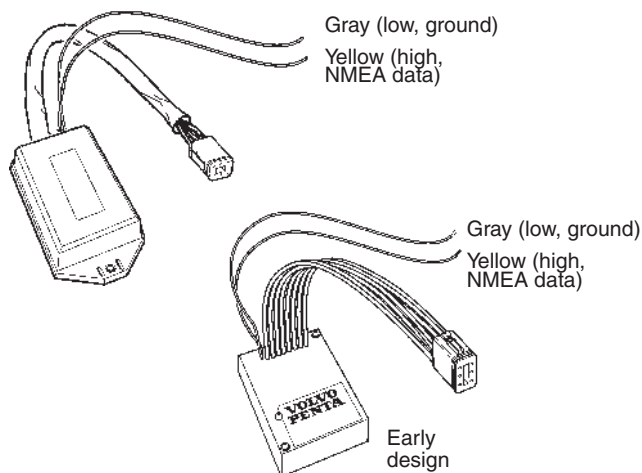
The LED -  - on the NMEA-unit will show different flashing sequences to define different functions. Complete and confirm the connections in the following order.

Continuous light = electrical power supply but no NMEA connection established. The NMEA-unit could be incorrectly connected .

3-pulse blink = electrical power supply and NMEA-data connection established and confirmed.

Blink = electrical power supply, NMEA data connection and CAN-bus connection established and confirmed. Function is correct.

NMEA 0183

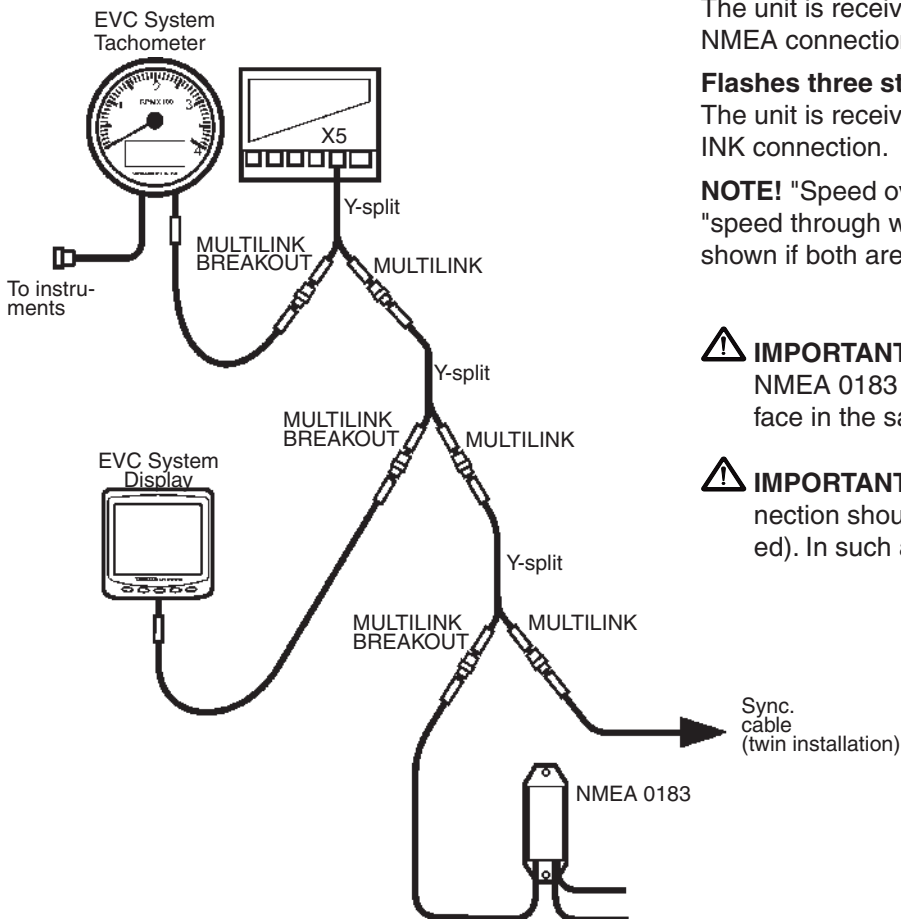


! IMPORTANT! A MULTILINK BREAKOUT connection should never be left open (not connected). In such a case, disconnect the Y-split cable.

NMEA 2000 interface

For information about boat speed, to be presented on an instrument and in the EVC display, a boat speed signal must come from a GPS receiver or a multisensor.

NOTE! Only one NMEA interface per boat is allowed.



Diagnostic NMEA 2000 Gateway LED

Constant lit

The unit is powered up but receives no communication from any side.

Flashes on-off repeatedly

The unit is receiving and transmitting valid NMEA and MULTILINK data. Function is correct.

Flashes two strobes and then off repeatedly

The unit is receiving MULTILINK data but has no NMEA connection.

Flashes three strobes and then off repeatedly

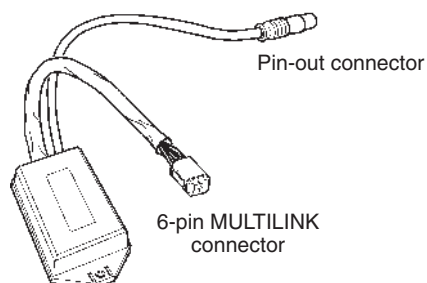
The unit is receiving NMEA data but has no MULTILINK connection.

NOTE! "Speed over ground" has higher priority than "speed through water", i.e. "speed over ground" is shown if both are available.

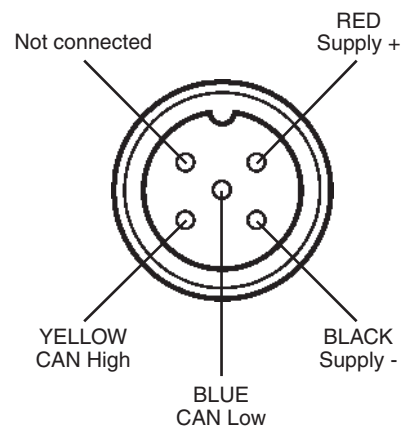
! IMPORTANT! It is not allowed to install both an NMEA 0183 interface and an NMEA 2000 interface in the same boat.

! IMPORTANT! A MULTILINK BREAKOUT connection should never be left open (not connected). In such a case, disconnect the Y-split cable.

NMEA 2000



Pin-out connector



Parameter list

The NMEA 2000 interface supports the following parameters on NMEA 2000. The number of parameters generated is depending on the engine system.

Output signals

Engine parameters rapid PGN 127488

- Engine speed
- Engine boost pressure Only available if sensor is installed
- Powertrim position Only available if sensor is installed

Engine parameters dynamic

PGN 127489

- Engine oil pressure Only available if sensor is installed
- Engine oil temperature Only available if sensor is installed
- Engine coolant temperature Only available if sensor is installed
- Battery voltage
- Engine fuel rate (requires trip computer software)
- Engine runtime
- Engine coolant pressure Only available if sensor is installed
- Engine fuel delivery pressure Only available if sensor is installed
- High coolant temperature
- Low oil pressure
- Low oil level
- Low battery voltage
- Low coolant water level
- Water in fuel indicator

Transmission parameters dynamic

PGN 127493

- Transmission oil pressure Only available if sensor is installed
- Transmission oil temperature Only available if sensor is installed

Fluid level PGN 127505

- Fuel level/fuel Only available if sensor is installed
- Fluid level/fresh water Only available if sensor is installed

Rudder PGN 127245

- Rudder position Only available if sensor is installed

Speed (out) PGN 128259

- Speed through water Only available if sensor is installed

Water depth PGN 128267

- Water depth Only available if sensor is installed

Environmental parameters

PGN 130310

- Water temperature Only available if sensor is installed

Input signals from NMEA 2000

Speed PGN 128259

- Speed through water

COG & SOG Rapid PGN 129026

- Speed over ground
- Course over ground
- Course over ground reference

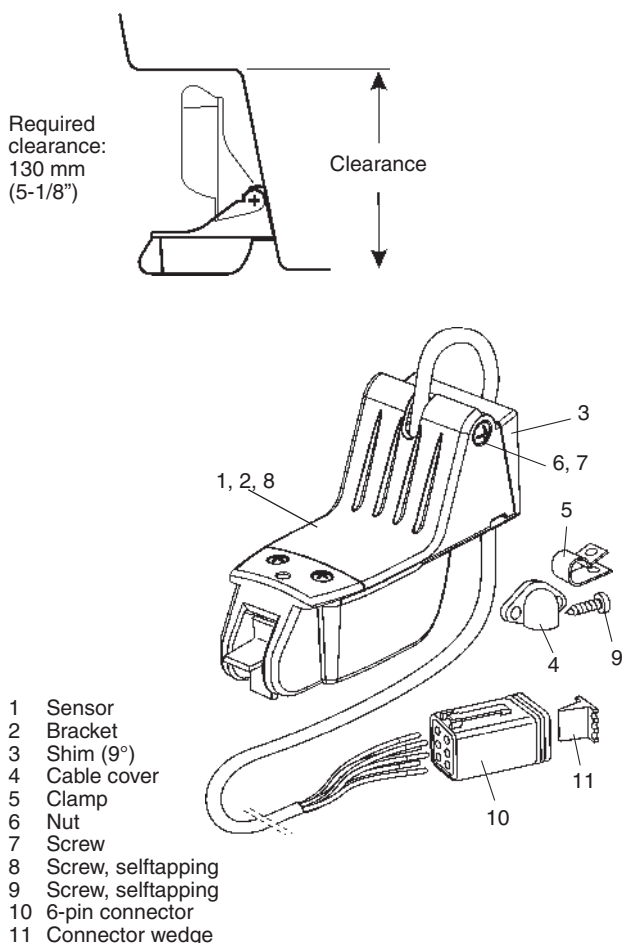
Vessel heading PGN 127250

- Vessel heading
- Sensor reference

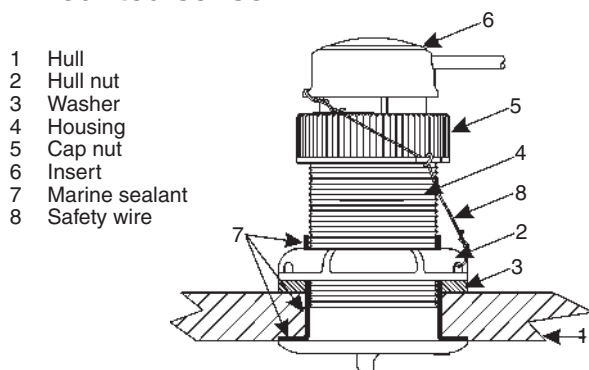
Multisensor

For a complete description of installation work and testing, please refer to **User and installation instructions** enclosed in the multisensor kit package.

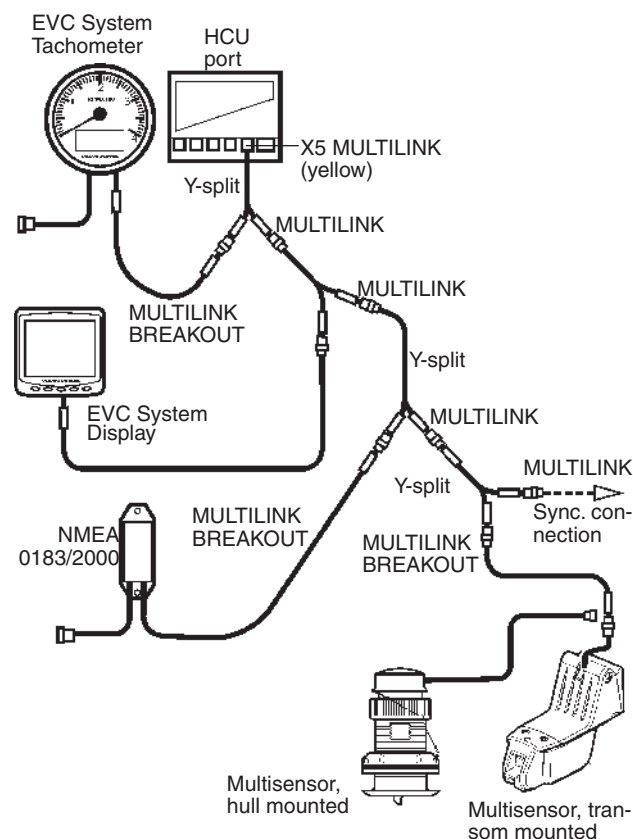
Transom mounted sensor



Hull mounted sensor



Connection to the EVC system



Multisensors are connected to the X5 MULTILINK connector, directly or via the Y-split, MULTILINK BREAKOUT cable (yellow PVC coating).

⚠ IMPORTANT! Always connect instruments and senders which are common for both engines, such as speedometer, rudder indicator, etc to **port** HCU. The port engine is the master engine in the EVC system.

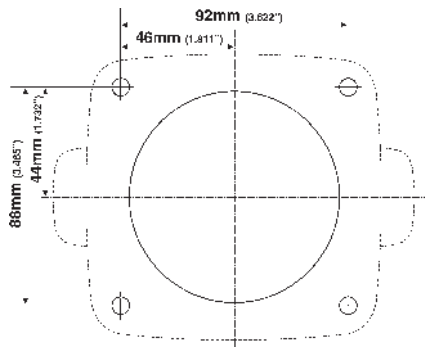
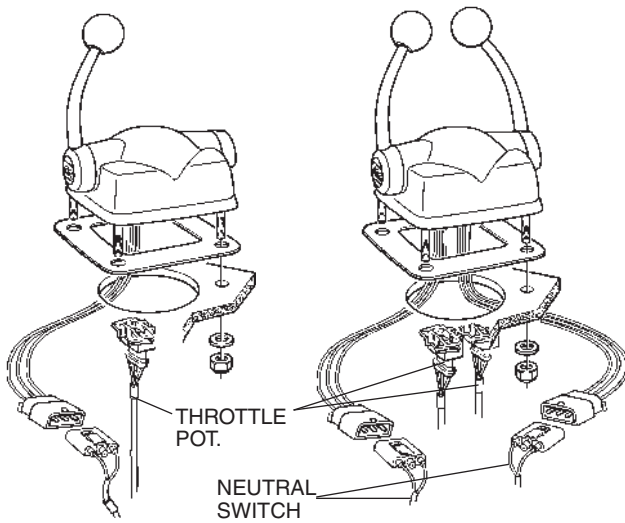
NOTE! If a multisensor and an NMEA interface is installed only the "Speed over ground" will be presented in the speedometer and the EVC display.

Calibration of boat speed

Please refer to chapter **Calibration and settings, EVC display**.

Controls, electronic Top mounted

Please refer to the **Mechanical controls** chapter for installation of mechanical controls.



Drill holes according to template. Please refer to the **Templates for controls and panels** chapter.

Remove protective film from the gasket and glue the gasket to the dashboard.

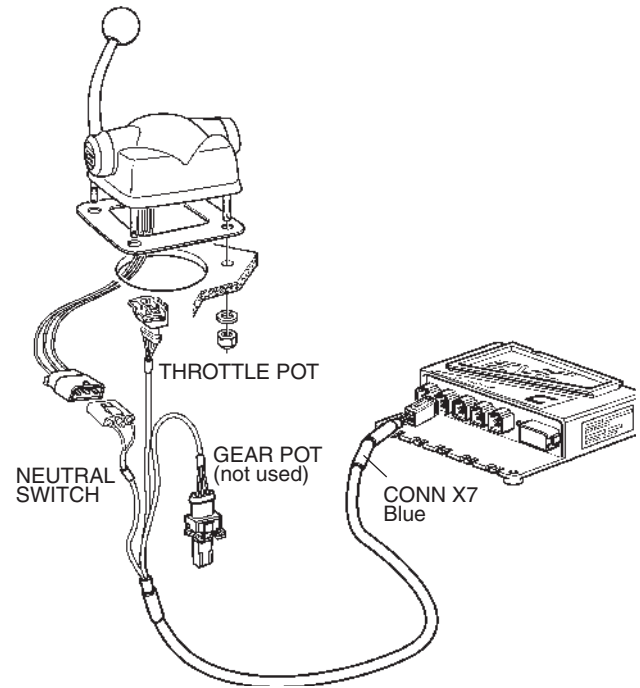
Install the connector/connectors marked "THROTTLE POT." to the control.

Install the connector/connectors marked "NEUTRAL SWITCH" to the control.

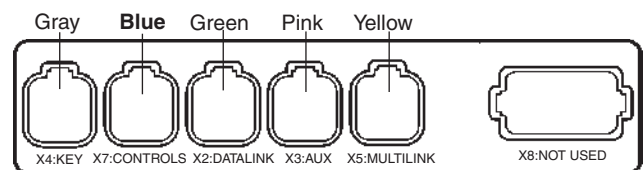
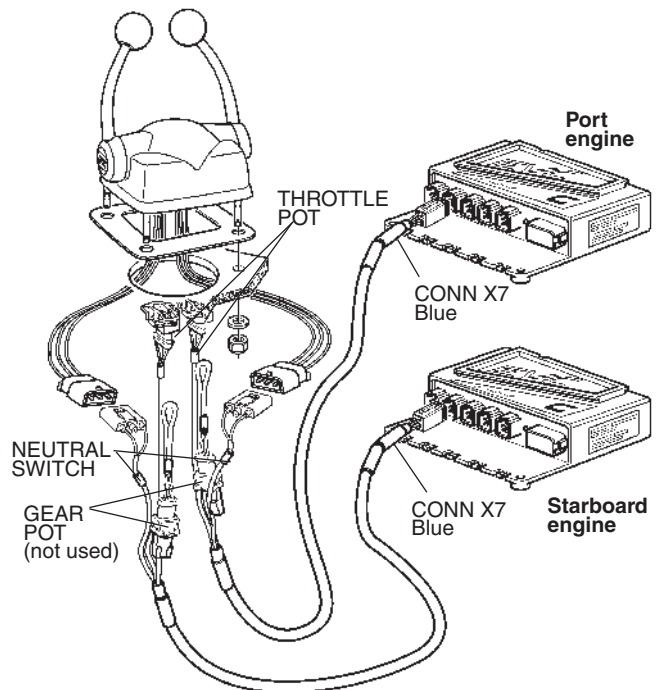
NOTE! The connectors marked GEAR POT are not used in this type of controls.

Fit the control to the dashboard.

Single engine control



Twin engine controls

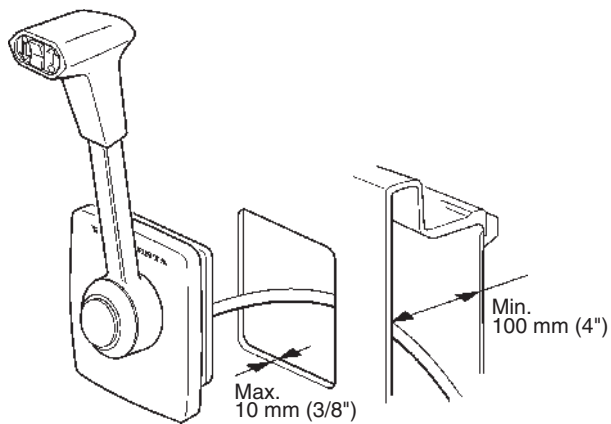


The control cables should be connected to the X7: CONTROLS (blue) connector in the HCU.

! IMPORTANT! No extension cables are allowed to the control lever cable.

Controls, electronic Side mounted

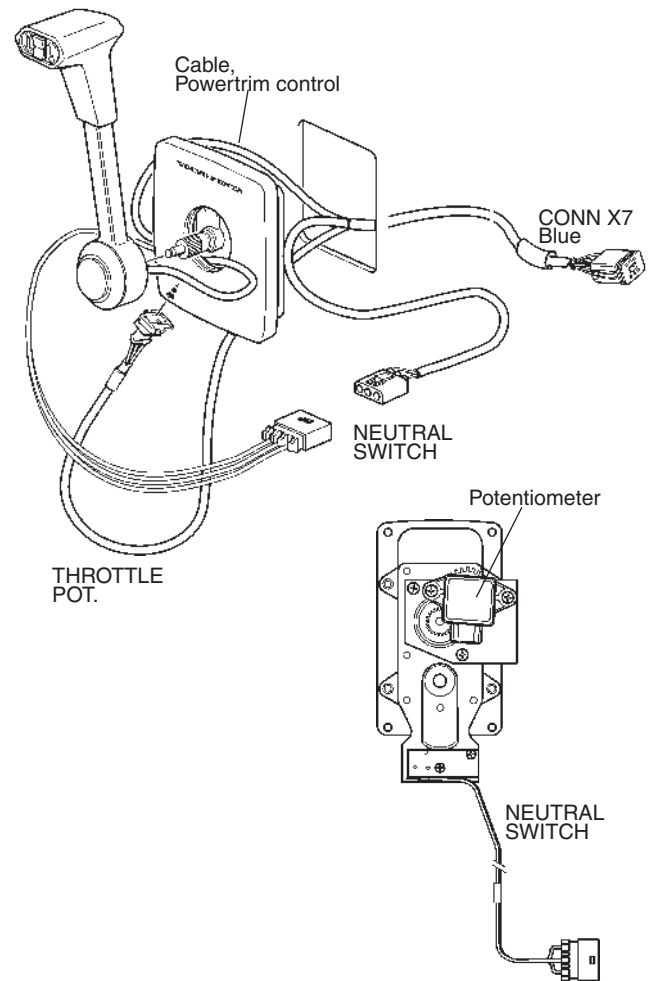
Standard mounting



Make holes in the bulkhead according to template.
Please refer to the ***Templates for controls and panels*** chapter.

Maximum bulkhead thickness: 10 mm (3/8").
Minimum space inside bulkhead: 100 mm (4").

Control including Powertrim function



Route the cable harness and connectors through the holes in the plastic cover, the mounting plate and the bulkhead.

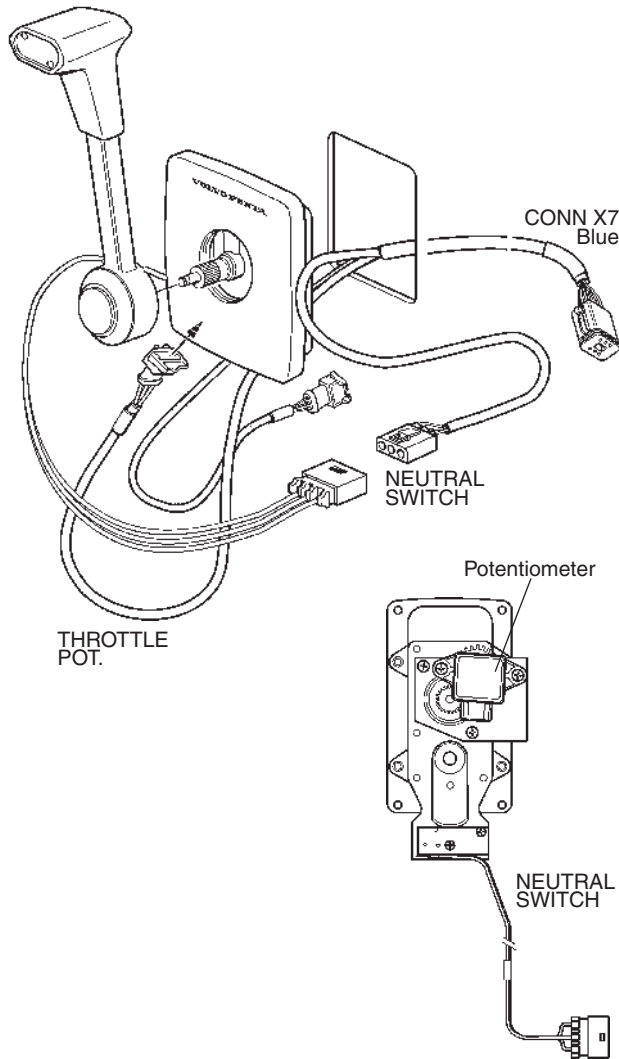
Connect the connector marked "THROTTLE POT." to the potentiometer on rear of the mounting plate.

Fit the connector marked NEUTRAL SWITCH to the pig tail.

Fit the mounting plate on the bulkhead using four screws. Install the cover and the shift lever.

Connect the cable marked CONN X7 to the HCU X7 connection (blue).

Control without Powertrim function



Route the cable through the hole in the the bulkhead.
Connect the connector marked "THROTTLE POT." to the potentiometer on rear of the control. The other connectors are clamped to the harness.

Fit the connector marked NEUTRAL SWITCH to the pig tail.

Fit the mounting plate on the bulkhead using four screws. Install the cover and the shift lever.

Connect the cable marked CONN X7 to the HCU X7 connection (blue).

Controls, electronic Side mounted, type XACT

Control including Powertrim function

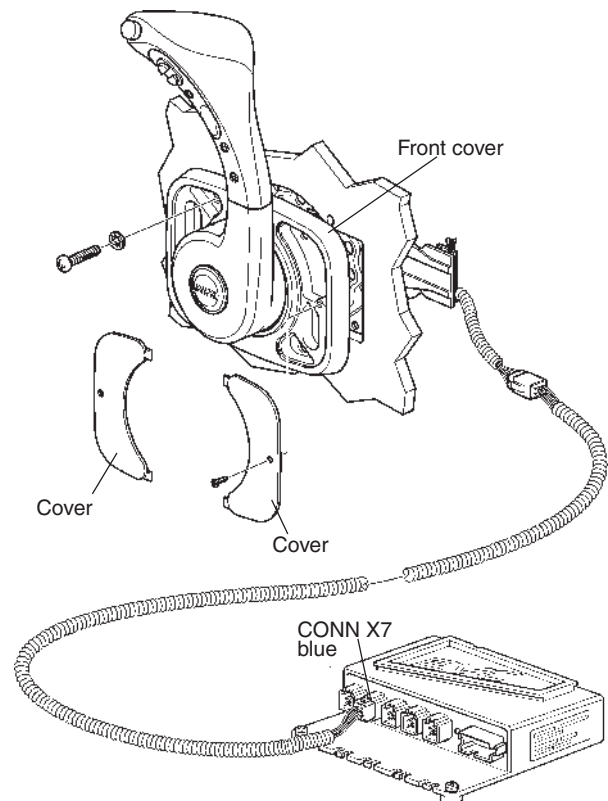
Make holes in the bulkhead according to template.
Please refer to the **Templates for controls and panels** chapter.

Maximum bulkhead thickness: 19 mm (3/4").
Minimum space inside bulkhead: 90 mm (3 1/2").

Choose a mounting location for the control mechanism that will provide comfortable operation and unobstructed movement of the Control lever (forward and reverse positions). Check that the control mechanisms have sufficient space behind the panel.

Make a hole for the control mechanism and drill screw holes using the scaled mounting template.
Please refer to the **Templates for controls and panels** chapter.

Insert the control assembly through the hole.



Fix the control mechanism and front cover with washers and screws. Please refer to figure.

Fix the covers with screws.

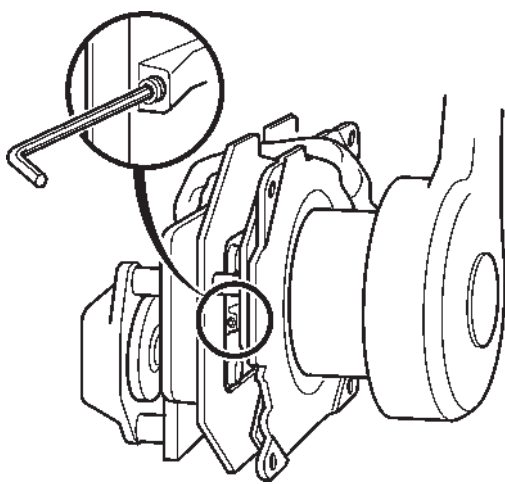
Connect the cable from the control assembly to the HCU connector X7 (blue).

Calibrate the control lever. Please refer to chapter **Calibration**.

NOTE! If your boat is not equipped with an emergency stop switch and it falls into one of the following categories, installation of an emergency stop switch is recommended:

- High performance sport boats or small run boats.
- Boats with sensitive steering.
- Boats where the distance from the top of the gunwale down to the driver's seat is less than one foot (30 cm)

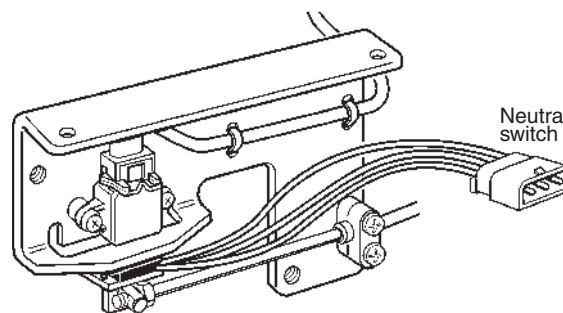
Lever friction adjustment



The lever friction can be adjusted with screw. Turn the screw clockwise to increase drag on the control lever and counterclockwise to decrease drag on the control lever.

NOTE! The friction must be adjusted only when the control lever is in the throttle range. Do not adjust the friction with the control in neutral.

Adapter for mechanical controls



Using an adapter for mechanical controls will enable you to use any mechanical control in combination with an EVC engine and electrically or mechanically shifted reverse gear. The adapter will transfer the mechanical push-pull movement into an electric signal. A neutral switch is fitted on the adapter.

Install the control adapter as close as possible to the control station to reduce the amount of force needed to move the control and make sure the location is dry and easy accessible.

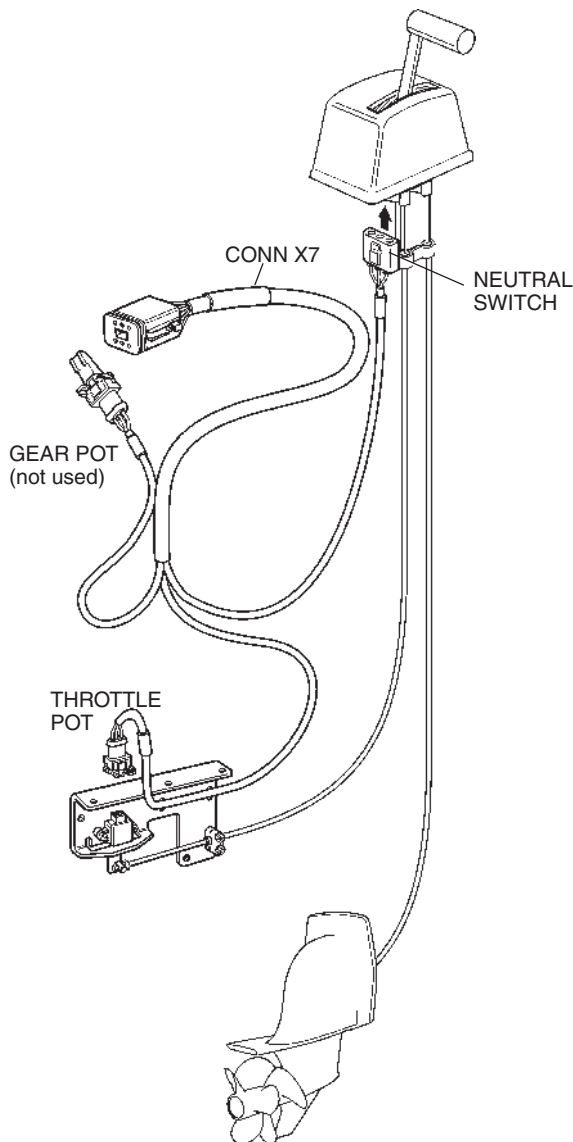
If the adapter has to be installed far away from the control station there is an extension cable available in 5 m (16.5 ft) and 9 m (29.5 ft) lengths.

Mechanically shifted transmission

In an installation with a mechanically operated reverse gear or drive, one adapter per engine on each control station is needed for throttle operation. The mechanical cable from the shifting control should be routed to the reverse gear or drive.

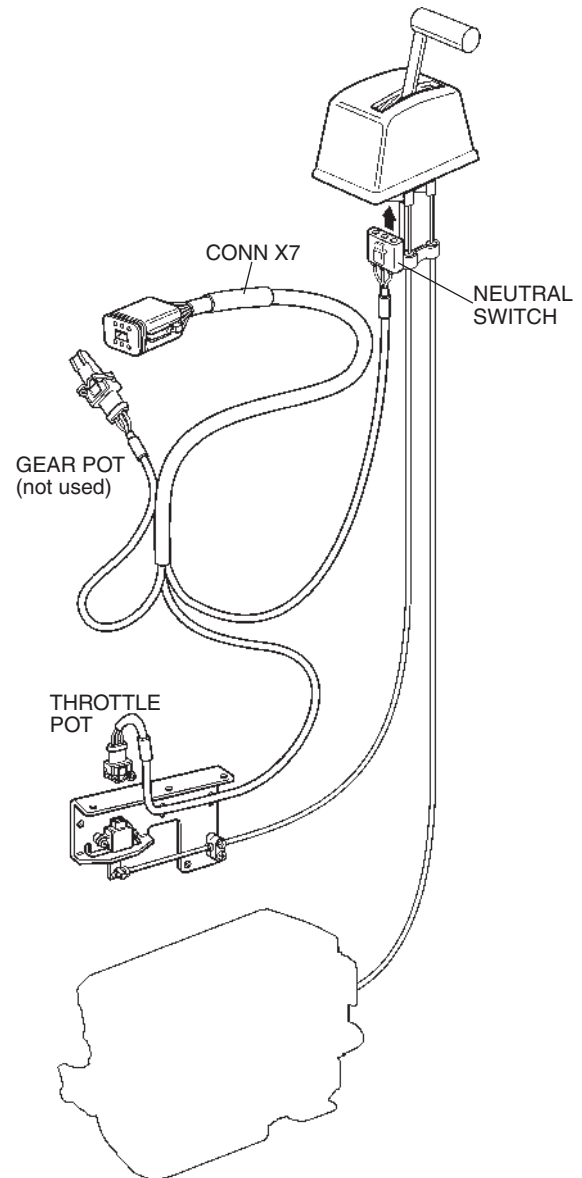
Connect the cable marked THROTTLE POT to the adapter. The EVC system also needs a signal from a neutral switch which shall be installed on each remote control and connected to the control cable harness marked NEUTRAL SWITCH. The switch shall be closed in neutral position.

Drive DPH/DPR



NOTE! No extensions are allowed to the control lever cable.

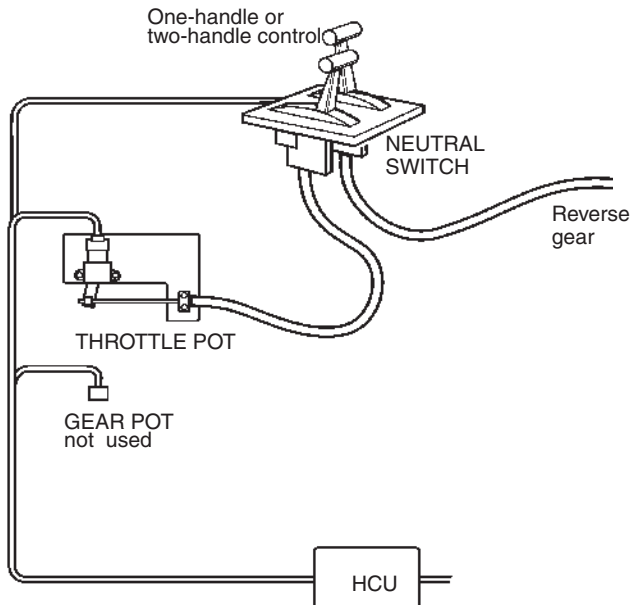
Reverse gear



NOTE! No extensions are allowed to the control lever cable.

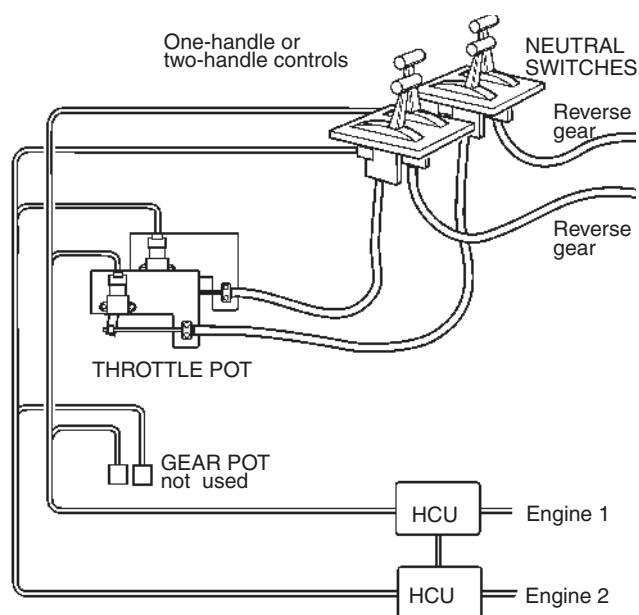
Single installation Mechanical controls and mechanical gearshift.

NOTE! Neutral switches must always be used on main and alternative control stations.



Twin engine installation Mechanical controls and mechanical gearshift

NOTE! Neutral position switch must always be used on main and alternative control stations.

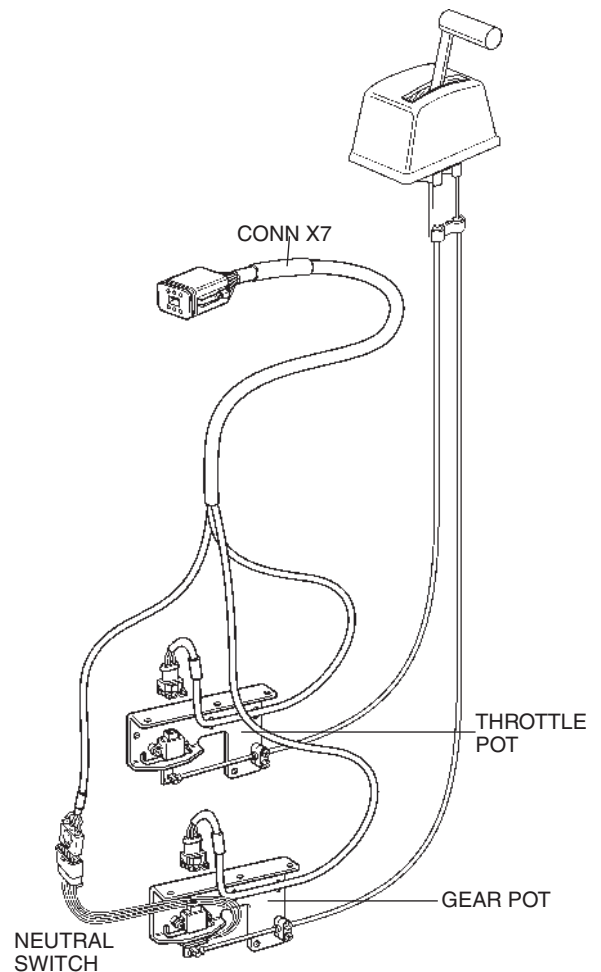


Electrically shifted transmission

In an installation with electrically operated reverse gear or drive, two adapters per engine are needed on each control station, one for speed (throttle) and one for shifting.

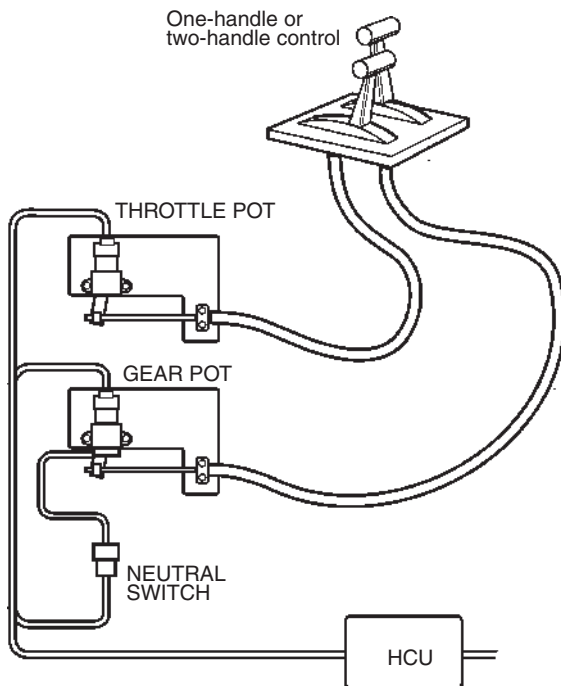
Connect the cable marked THROTTLE POT to the engine speed adapter and the the connector marked GEAR POT to the gear shifting adapter .

NOTE! The neutral switch connector is connected to the GEAR POT adapter.

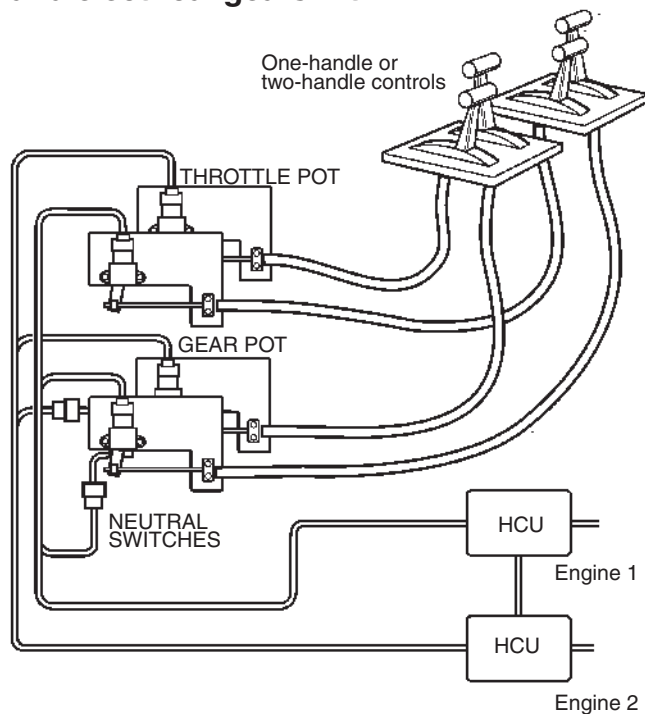


NOTE! No extensions are allowed to the control lever cable.

Single installation Mechanical controls and electrical gearshift



Twin engine installation Mechanical controls and electrical gearshift



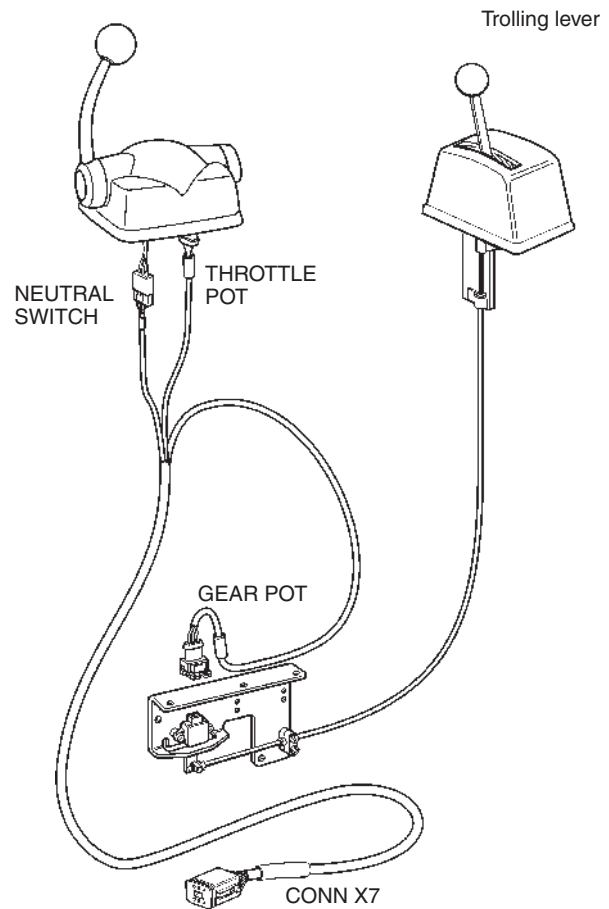
Mechanical lever for electrically controlled trolling. Electrical throttle and gearshift

This installation has a mechanical trolling lever connected to an adapter. The GEAR POT. connector is connected to the adapter potentiometer.

The THROTTLE POT connector is connected to an electronic control lever for throttle control and gear shifting.

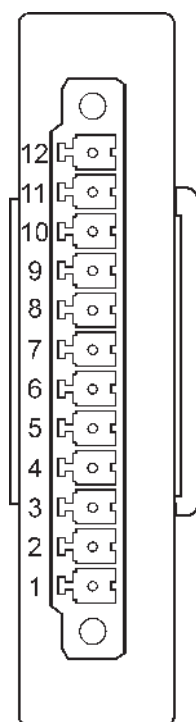
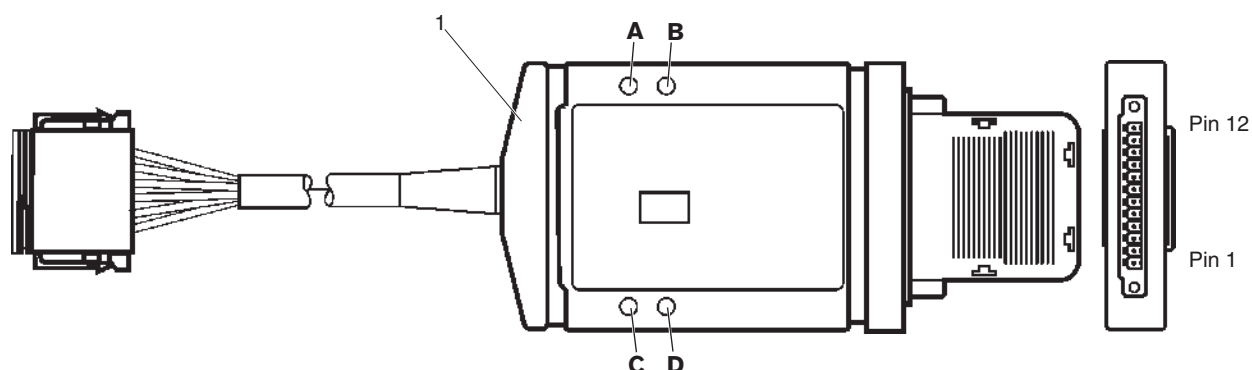
The neutral switch is connected to the lever for throttle and gear.

The cable harness is connected to X7 on the HCU.



NOTE! No extensions are allowed to the control lever cable.

Interfaces for the EVC-C system, 4–20 mA



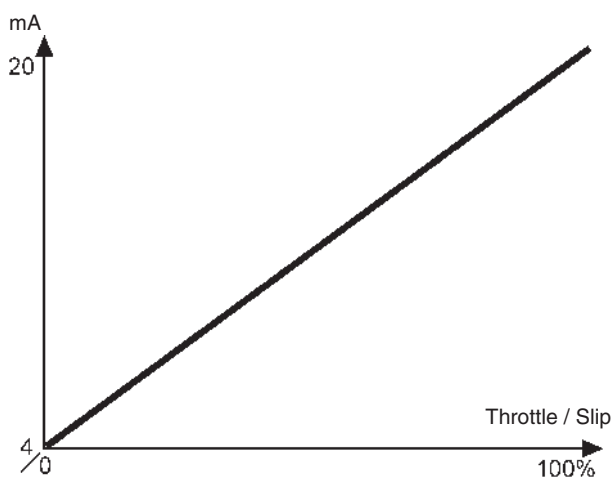
- Pin 12: - Negative
- Pin 11: + 10-28 VDC
- Pin 10: CLOSED : Output (7-8)
- Pin 9: OPEN : Input (1-6)
- Pin 8: - Slip out 200-600 ohm
- Pin 7: + Slip out 4-20 mA
- Pin 6: - Slip 200 ohm
- Pin 5: + Slip 4-20 mA
- Pin 4: REV 10-28 VDC = Engage
- Pin 3: FWD 10-28 VDC = Engage
- Pin 2: - Throttle 200 ohm
- Pin 1: + Throttle 4-20 mA

Description

The interface makes it possible for Volvo Penta customers to choose controls from other suppliers than Volvo Penta, to control the accelerator, gear and slip on Volvo Penta EVC-C engines.

⚠ IMPORTANT! Volvo Penta has developed and tested the entire EVC system and its components. However, components supplied from manufacturers other than Volvo Penta, or incorrectly installed components can make the system fail to work correctly. In these cases, Volvo Penta does not accept any responsibility.

NOTE! The interface functions for both 12 V and 24 V installations.

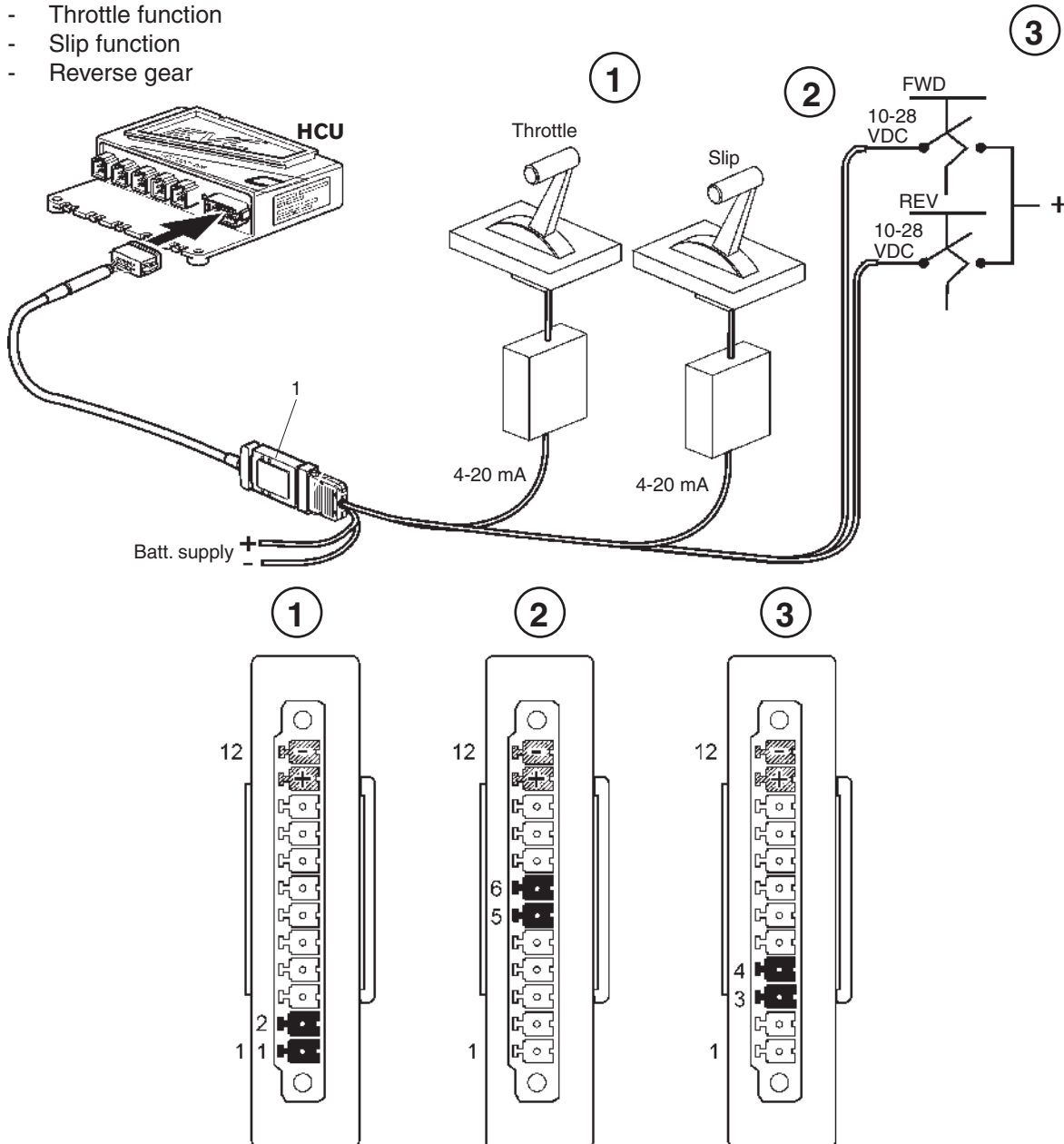


Input interface, 4–20 mA

Input interface to aftermarket control systems that support 4–20 mA. No calibration is needed. The following functions are available.

NOTE! The slip and reverse functions must not be connected if only throttle control is required.

- Throttle function
- Slip function
- Reverse gear



Installation order (Interface In)

NOTE! The interface works at different speeds/ baud rates, depending on whether it is used as an in or out interface.

Activate the "Lever type" parameter in the HCU, using VODIA.

Connect the control cables to the screw terminal on the interface (1) as in the table and figure.

NOTE! The specified input signal levels are required for the interface to work correctly.

Install the accompanying strain relief.

Connect the interface to the 12-pin connector on the HCU, as in the figure.

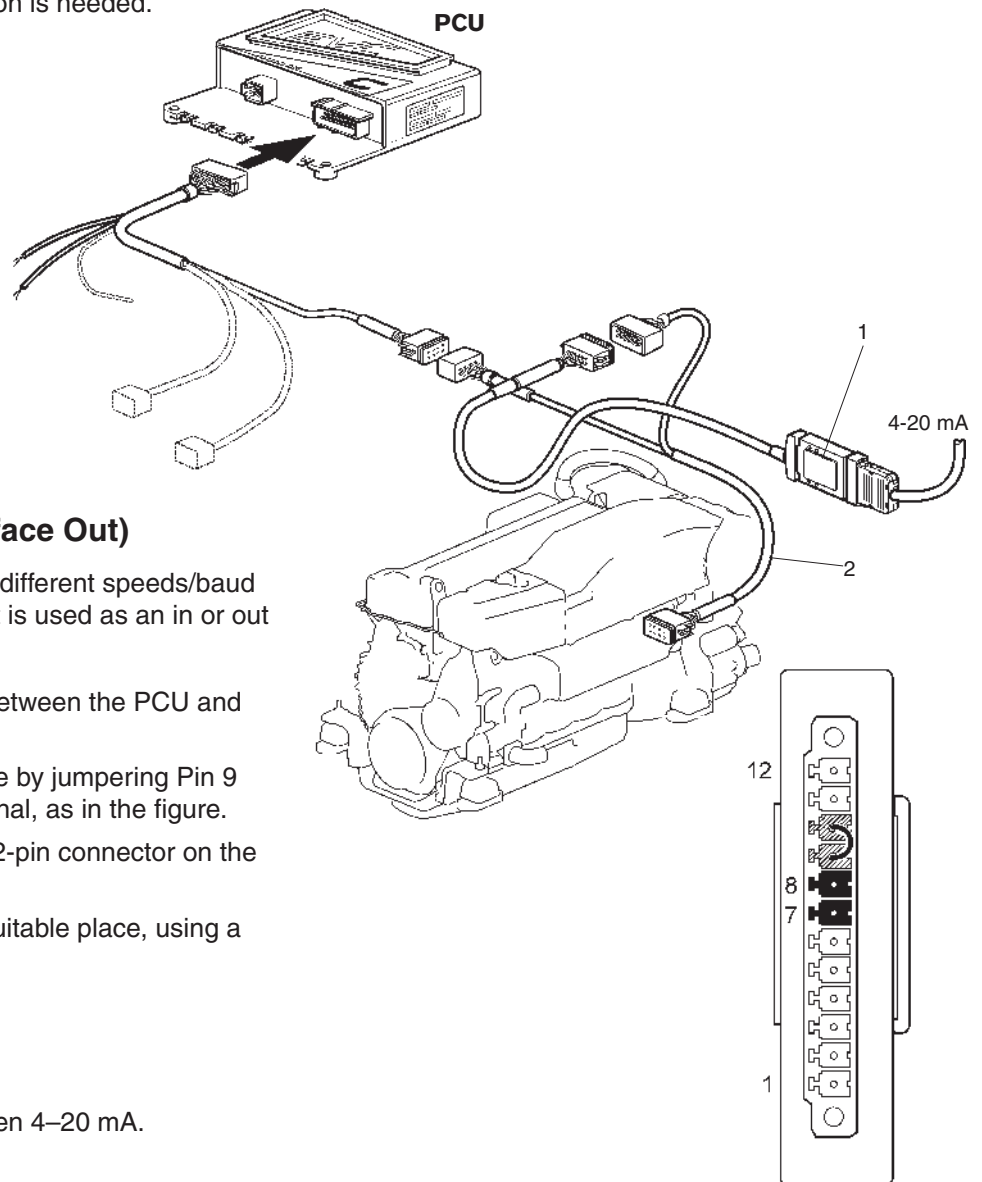
NOTE! Fix the interface in a suitable place, using a tie wrap or screw.

Do an auto configuration of the system. Please refer to the EVC-C installation manual for more information.

Output interface, 4–20 mA

Output interface to aftermarket control systems that support 4–20 mA. No calibration is needed.

- Slip function



Installation order (Interface Out)

NOTE! The interface works at different speeds/ baud rates, depending on whether it is used as an in or out interface.

Connect the Y connector (2) between the PCU and the engine, as in the figure.

Change the interface baud rate by jumpering Pin 9 and Pin 10 on the screw terminal, as in the figure.

Connect the interface to the 12-pin connector on the Y connector, as in the figure.

NOTE! Fix the interface in a suitable place, using a tie wrap or screw.

Throttle diode (A):

Constant light -
Input signal is valid, i.e. between 4–20 mA.

Flashes (10 Hz) -
Input signal is < 4 mA or > 21 mA.

Switched off -
Other cases.

Slip diode (B):

Constant light -
Input signal for slip is valid, i.e. between 4-20 mA.

Flashes (10 Hz) -
Input signal is < 4 mA or > 21 mA.

Switched off -
Other cases.

NOTE! Also applies to the Out interface.

Gear diode (C):

Constant light -
Input signal for Reverse or Forward is > 6 V.

Flashes (10 Hz) -
Input signal for Reverse and Forward is > 6 V (at the same time).

Switched off -
Other cases.

Power diode (D):

Constant light -
The unit has power supply.

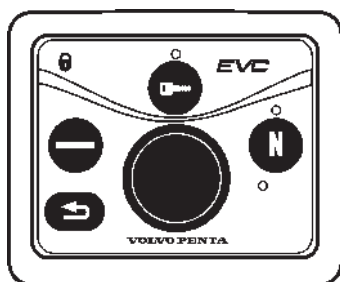
Flashes (1 Hz) -
No communication on the CAN bus.

Flashes (10 Hz) -
Communication on the CAN bus.

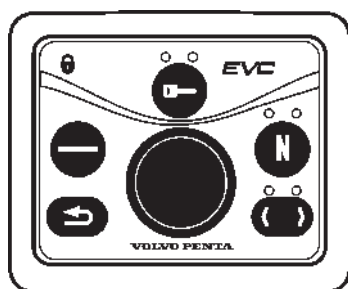
Switched off -
Other cases.

EVC control panels

The control panel is used in combination with the EVC system tachometer. The tachometer display shows operating information and menus that can be navigated from the control panel. EVC control panel is available in two versions, for single or double engine installations.



Single installation



Twin installation

ACTIVE STATION BUTTON

Used to activate and lock the control panel and the helm station.

Indication (red):

Off: Control panel not activated.

Lit: Control panel activated.

Flashing: Control panel not activated due to the control lever not being in neutral or the system has been locked from another control panel.

STATION LOCK INDICATION

The padlock symbol lights if the control panel is locked manually by depressing the -button.

Lit: The system is locked and the engine can only be controlled from the activated control panel.

NEUTRAL BUTTON

Used to activate "warming up mode" and increase engine speed without engaging the gear.

Also used for activating the Volvo Penta Lowspeed function (option).

Indication (green):

Off: Drive/reverse gear engaged.

Lit: Control lever in neutral.

Flashes: Drive/reverse gear disengaged or system in calibration mode.

NAVIGATION WHEEL

Used to navigate through the menus shown on the tachometer EVC system display. Navigate through the menus by turning the wheel. Depress the wheel to confirm a selection.

TACHOMETER DISPLAY SELECTION (Twin installation, port or starboard tachometer)

Is used to select which of the engines menu systems should be navigable from the control panel. The menu is shown on the display of the corresponding engines tachometer. Select port or starboard.

Indication (red/green):

Off: Not possible to navigate in menu.

Lit: Possible to navigate in menu for selected engine, port (red), starboard (green).

Flashing: OEM mode activated.

MULTIFUNCTION BUTTON

Used to increase or decrease the instrument's and panel's backlighting.

Depress the button for at least 1 second to turn the backlighting on or off. The backlighting can be adjusted in five stages by pressing the multifunction button.

If the button is pressed on a inactive control panel, operating information is shown on the display(s) and it is possible to navigate in the menus.

BACK BUTTON

Push to step backwards in the menu.

 **IMPORTANT!** Always press the buttons firmly, and for at least one second each time.

Calibration and settings

General

Auto configuration, lever calibration and initializing of the EVC display must be done after installation is completed.

Auto configuration means that the system detects and defines all the components included in the system and creates a data file.

NOTE! Auto configuration shall always be done when there are any changes in the EVC system, e. g. the system is extended or rebuilt.

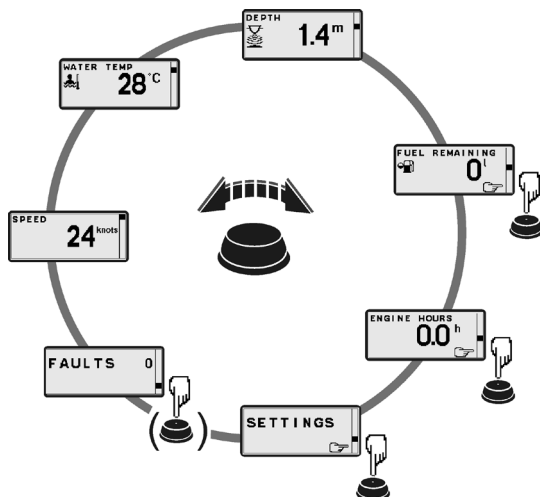
Through the calibration routine the control lever positions and the idle rpm are defined for the EVC system. If a control lever has been replaced, the new one must be calibrated.

NOTE! If auto configuration and control calibration is not done, the engine cannot be started.

! IMPORTANT! For all setting procedures:
Activate helm station by pushing the ACTIVE STATION BUTTON on the EVC panel.

! IMPORTANT! Always press the different buttons firmly and at least for one second each time.

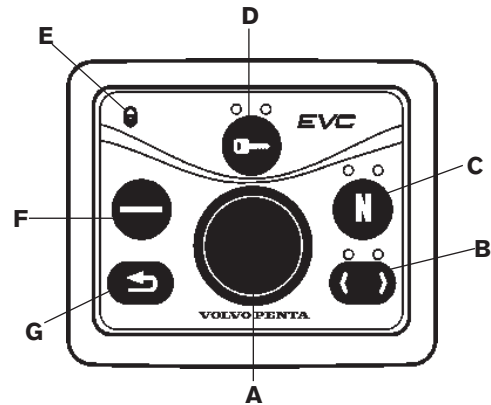
Menu system



NOTE! If there are no faults registered, the FAULT LIST will not be available in the MAIN MENU.

At power-up Volvo Penta logotype will be shown in the display. After a few seconds MAIN MENU will appear.

Navigate MAIN MENU by turning NAVIGATION WHEEL clockwise or counter clockwise. Views with pointing hand-symbol indicates SUB MENU. Push NAVIGATION WHEEL.



(Twin engine is shown)

A. NAVIGATION WHEEL

Select: Turn navigation wheel to select sub menu or select setting.

Enter: Push navigation wheel to reach selected submenu.

Confirm: Push navigation wheel to confirm setting

B. TACHOMETER DISPLAY SELECTION

(twin installations, port/stb.)

Indication LEDs red/green

NOTE! LED(s) indicates which EVC system tachometer/EVC system display the EVC control panel controls, port or starboard side.

C. NEUTRAL BUTTON

Confirming

Volvo Penta Lowspeed

Powertrim override (DPH/DPR)

Warming up

Indication LED

- Constant light: Neutral

- No light: FWD/REV

- Flashing: Calibration mode or Warming up mode

D. ACTIVE STATION BUTTON

Activate helm station

Indication LED(s) red

- Constant light: Active station

- No light: Inactive station

- Flashing: Attempt to take station permissible

E. STATION LOCK INDICATION

If lit, the system is locked and the engine can only be controlled from the activated control panel

F. MULTIFUNCTION BUTTON

Push to increase or decrease the instrument's and panel's backlighting

- Dimmer

- Auto configuration (together with BACK BUTTON)

- Monitoring helm

G. BACK BUTTON

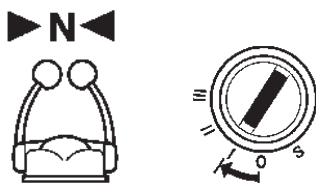
Push to step backwards in the menu

- Menu structure

- Auto configuration (together with MULTIFUNCTION BUTTON)

Calibration mode

Preparations



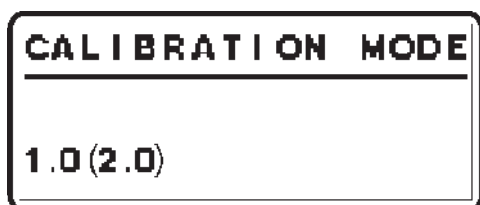
- Turn main switch(s) on.
- Turn starter key(s) to position I.
- Control lever(s) in neutral position.

Enter calibration mode

Procedure is the same for single/twin installations and for main/secondary helm respectively.

1. Push and hold NAVIGATION WHEEL and BACK BUTTON until a signal from buzzer is heard and calibration mode pop-up screen is shown in tachometer display/EVC system display.

Release buttons.



2. Calibration mode is indicated with Neutral LED/ LEDs flashing and pop-up screen in tachometer display/EVC system display.

NOTE! When entering calibration mode in an EVC^{EC}-C system with a never before used EVC system display, the text “**CALIBRATION MODE**” will not appear on the display. The text “**INCORRECT DATA-BASE**” will be shown on the EVC system display.

NOTE! The first digit varies depending on system configuration.

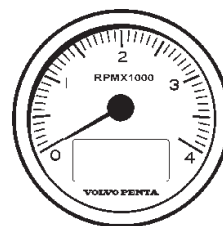
1.0 indicates a single lever control.

2.0 indicates separate throttle/gear or additional trolling levers.

NOTE! The system exits from calibration mode after 45 seconds if no actions occur.

Auto configuration

EVC system tachometer



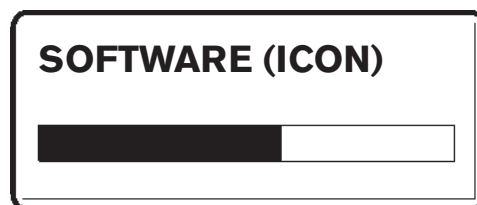
Auto configuration is the EVC system self-identification. Auto configuration should be performed when the system is started for the first time or after system updates.

NOTE! A twin installation requires one auto configuration to each engine. **Start with port engine.**

NOTE! In an twin installation when using both EVC system tachometer and EVC system display, please refer to section **Auto configuration - EVC system display** before auto configuration is performed.

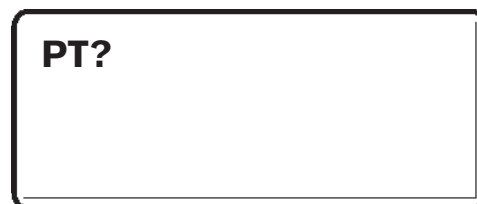
1. Turn starter key to position I (**ignition on**).
Twin installation: Start with port engine (**starboard engine - ignition off**).
2. Enter calibration mode.
3. Push and hold BACK BUTTON and MULTI-FUNCTION BUTTON until buzzer signal and LEDs light up.

Release buttons.



4. Self identification and software download starts. The procedure may take **several minutes** depending on software download to the tachometer display/EVC system display.

NOTE! The EVC system starts to download software to all tachometers followed by the EVC system displays. When downloading software no information will be presented in the displays and all LEDs are off. If the tachometer has never been used status bars will be shown on the tachometer display. First the “**SOFTWARE**” status bar will be shown and afterwards the “**ICON**” status bar.



Wait until PT? appears and follow instructions in step 5–7 or 8–10.

Tachometer configuration

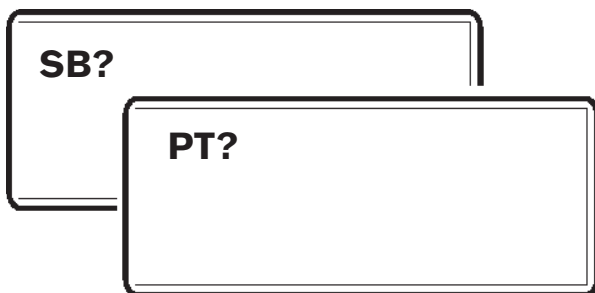
Perform step 5–7 for single installation alt. step 8–10 for twin installation.

Single installation (step 5–7)

5. The tachometer display will read “PT?”. Confirm by pushing NAVIGATION WHEEL.
6. Wait until “PTIS” disappears from tachometer display and MAIN MENU appears.
7. Auto configuration is finished.

Twin installation (step 8–10)

8. One of the tachometer displays will read “PT?” (port engine).
If this tachometer is connected to port engine: Confirm by pushing NAVIGATION WHEEL.



If not: Use BACK BUTTON to move “PT?” to the corresponding tachometer display. Confirm by pushing NAVIGATION WHEEL.

“PTIS” is shown in display.

9. The other tachometer display will read “SB?” (starboard engine) Confirm by pushing NAVIGATION WHEEL.
“SBIS” is shown in display.
10. Wait until “PTIS”/“SBIS” disappears from tachometer display and MAIN MENU appears.

NOTE! Additional helm station

Repeat step 5–7 or 8–10 for each additional helm station.

11. Auto configuration for port engine is finished.
Turn starter key to position 0 (ignition off).

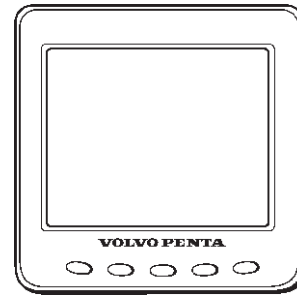
Starboard engine

Repeat step 1–4 for the starboard engine (**port engine - ignition off**)

NOTE! No information will be presented in the tachometer display window during auto configuration. The procedure may take **several minutes**. When the auto configuration is finished, the system returns to MAIN MENU (indicated by NEUTRAL BUTTON LED).

Auto configuration

EVC system display



Auto configuration is the EVC system self-identification. Auto configuration should be performed when the system is started for the first time or after system updates.

NOTE! A twin installation requires one auto configuration to each engine. **Start with port engine.**

⚠ IMPORTANT! In a twin installation, when using one combined EVC system display, the display must be configured as “TWIN” before auto configuration is performed.

In a twin installation, when using two EVC system displays, the displays must be configured as “PORT” resp. “STARBOARD” before auto configuration is performed.

1. Turn starter key to position I (**ignition on**).
Twin installation: Start with port engine (**starboard engine - ignition off**).
2. Enter calibration mode.
3. Push and hold BACK BUTTON and MULTI-FUNCTION BUTTON until buzzer signal and LEDs light up.
Release buttons.
4. Self identification and software download starts. The procedure may take **several minutes** depending on software download to the EVC system display.

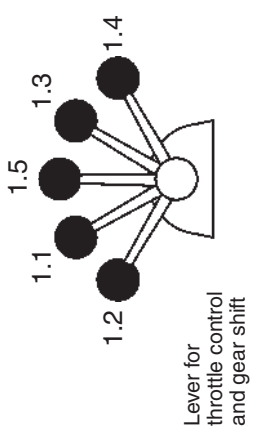
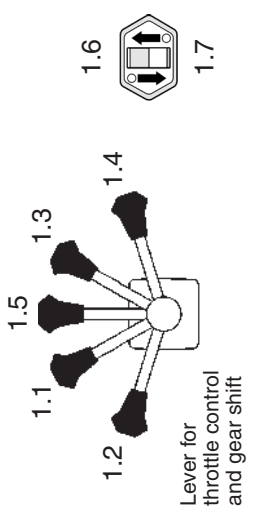
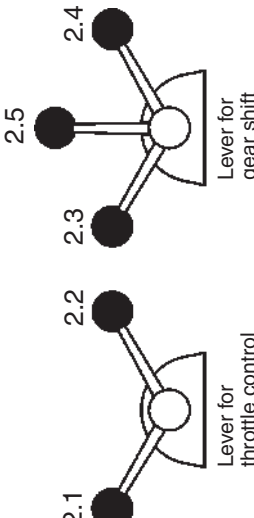
NOTE! The EVC system starts to download software to all tachometers followed by the EVC system displays. When downloading software no information will be presented in the displays and all LEDs are off. If the displays have never been used the text “**UP-LOADING DATABASE**” will appear on the displays.

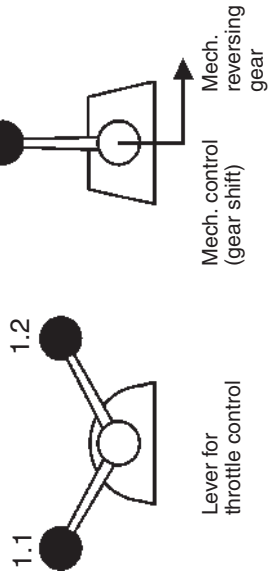
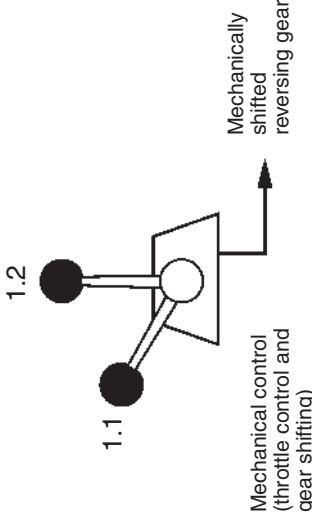
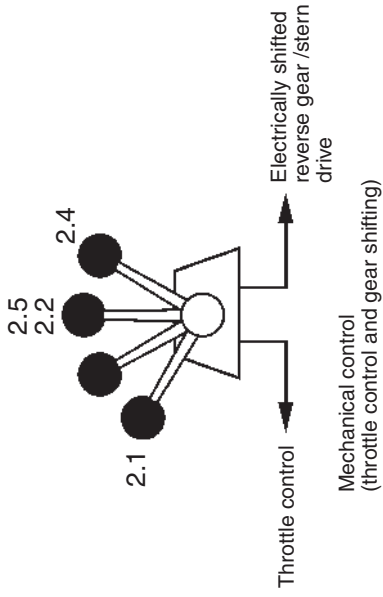
5. When the auto configuration is finished, the system returns to MAIN MENU (indicated by NEUTRAL BUTTON LED).

Twin installation

Repeat step 1–5 for the starboard engine (**port engine - ignition off**). When the auto configuration is finished, the system returns to MAIN MENU (indicated by NEUTRAL BUTTON LED).

Combinations of control levers for EVC. Summary, calibration

Controls	Notes	Number of levers and calibration positions shown in the tachometer display	Calibration order
Single lever control. Top mounted or side mounted	Combined throttle control and gear shift. Connectors marked THROTTLE POT and NEUTRAL SWITCH to the control alt. to an adapter. Connectors marked GEAR POT are not used.	1.0 – 1.5	 1.1 FORWARDS – idle 1.2 FORWARDS – full throttle 1.3 REVERSE – idle 1.4 REVERSE – full throttle 1.5 NEUTRAL – idle
Single lever control with Powertrim buttons. Side mounted	Combined throttle control and gear shift. Connectors marked THROTTLE POT. and NEUTRAL SWITCH to the control.	1.0 – 1.7	 1.1 FORWARDS – idle 1.2 FORWARDS – full throttle 1.3 REVERSE – idle 1.4 REVERSE – full throttle 1.5 NEUTRAL – idle 1.6 UP 1.7 DOWN
Two lever control.	Throttle control and gear shift on separate levers. Connectors marked THROTTLE POT. to lever for throttle control. Connector marked GEAR POT. and NEUTRAL SWITCH to lever for gear shift.	2.0 – 2.5	 2.1 Full throttle 2.2 Idling 2.3 FORWARDS 2.4 REVERSE 2.5 NEUTRAL 2.6 Lever for throttle control 2.7 Lever for gear shift

Controls	Notes	Number of levers and calibration positions shown in the tachometer display	Calibration order
Two lever control. One neutral position switch	Mechanical reverse gear. Only throttle control. Connector marked NEUTRAL SWITCH connected to the neutral position switch to prevent the engine from being started with a gear engaged. Connector marked THROTTLE POT. to lever for throttle control. Connector marked GEAR POT. is not used.	1.0 – 1.2	 1.1 Full throttle 1.2 Idling Neutral position switch: Closed = Neutral position Open = Gear engaged Note. The neutral position switch must be closed during calibration.
Mechanical single lever control for both throttle control and gear shift, incl. neutral position switch.	Throttle control and gear shift in one lever. Mechanically shifted reverse gear or stern drive. Connector marked NEUTRAL SWITCH connected to the neutral position switch to prevent the engine from being started with a gear engaged. Connector marked THROTTLE POT. connected to an adapter. Connector marked GEAR POT. is not used.	1.0 – 1.2	 1.1 FORWARDS – full throttle 1.2 NEUTRAL – idle Neutral position switch: Closed = Neutral position Open = Gear engaged Note. The neutral position switch must be closed during calibration.
Mechanical single lever control for both throttle control and gear shift. Two control cables and two control adapters.	Throttle control and gear shift in one lever. Electrically shifted reverse gear or stern drive. Connector marked NEUTRAL SWITCH connected to an adapter to prevent the engine from being started with a gear engaged. Connector marked THROTTLE POT. connected to an adapter. Connector marked GEAR POT. connected to an adapter.	2.0 – 2.5	 2.1 FORWARDS – full throttle 2.2 NEUTRAL – idle 2.3 FORWARDS – idle 2.4 REVERSE – idle 2.5 NEUTRAL – idle Neutral position switch: Closed = Neutral position Open = Gear engaged Note. The neutral position switch must be closed during calibration.

Lever calibration

Electronic lever control – top and side mounted

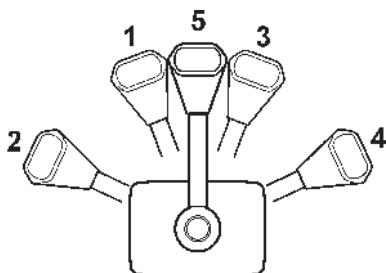
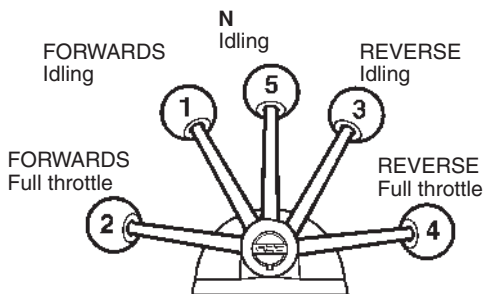
Single and twin installations

NOTE! The following description applies to Volvo Penta's electronic controls.

NOTE! If the controls for two engines are calibrated, both levers should be calibrated at the same time, to give the same lever travel/positions for both engines.



1. Enter calibration mode
1.0 is shown on the tachometer display.
NOTE! 1.0 indicates a single lever control.
2. Move the lever to the forward idling (1).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.1 is shown on the tachometer display.



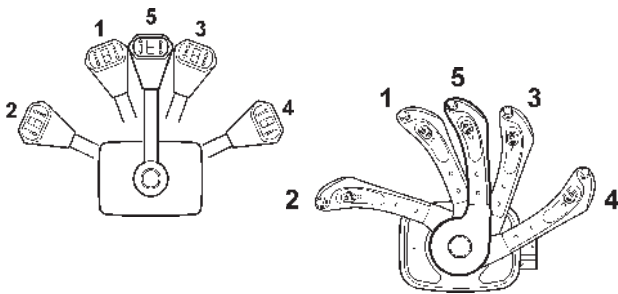
3. Move the lever to the position for full throttle forward (2).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.2 is shown on the tachometer display.
4. Move the lever to the reverse idle position (3).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.3 is shown on the tachometer display.
5. Move the lever to the reverse full throttle position (4).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.4 is shown on the tachometer display.
6. Move the control lever to neutral position (5).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.5 is shown on the tachometer display.
7. Push NEUTRAL BUTTON to exit lever calibration. The green LED(s) by the neutral button will show steady light and the system returns to MAIN MENU.

Side mounted electronic control with Powertrim buttons

Single installations

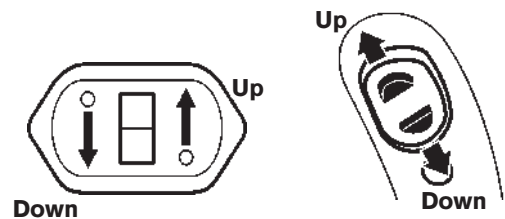


NOTE! The following description applies to Volvo Penta's electronic controls.



1. Enter calibration mode
1.0 is shown on the tachometer display.
NOTE! 1.0 indicates a single lever control.
2. Move the lever to the forward idling (1).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.1 is shown on the tachometer display.
3. Move the lever to the position for full throttle forward (2).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.2 is shown on the tachometer display.

4. Move the lever to the reverse idle position (3).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.3 is shown on the tachometer display.
5. Move the lever to the reverse full throttle position (4).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.4 is shown on the tachometer display.
6. Move the lever to neutral position (5).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.5 is shown on the tachometer display.



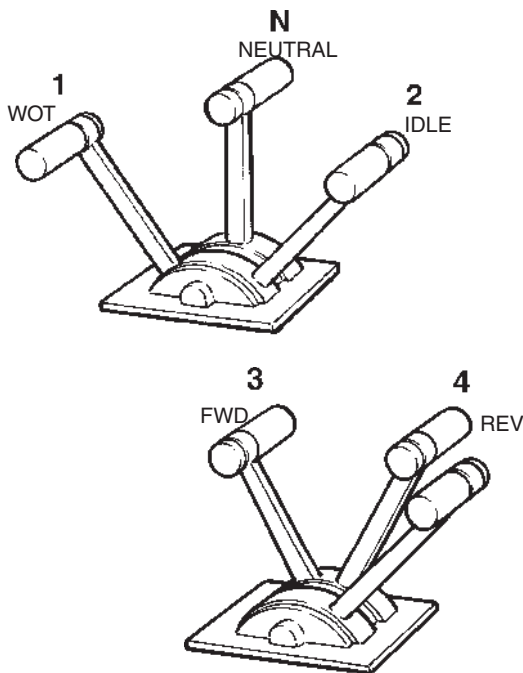
7. Continue calibration by pressing the UP button for the Powertrim.
Keep the button depressed and confirm by pressing the neutral button N. Release the UP button.
1.6 is shown on the tachometer display.
8. Continue calibration by pressing the DOWN button for the Powertrim.
Keep the button depressed and confirm by pressing the neutral button N. Release the DOWN button.
1.7 is shown on the tachometer display.
9. Lever calibration is completed. The green LED(s) by the neutral button will show steady light and the system returns to MAIN MENU.

Mechanical two lever control. Single and twin installations. Electrical throttle and electrically shifted reverse gear

NOTE! If the controls for two engines are calibrated, both levers should be calibrated at the same time, to give the same lever travel/positions for both engines.



1. Enter calibration mode
2.0 is shown on the tachometer display.
NOTE! 1.0 indicates a twin lever control.



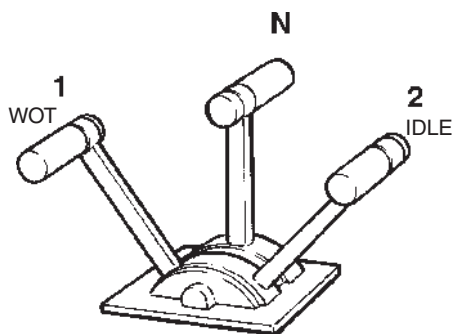
2. Move the throttle lever to the position for full throttle forwards WOT (1).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.1 is shown on the tachometer display.
3. Move the throttle lever to the idling position IDLE (2).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.2 is shown on the tachometer display.
4. Move the shift lever to the forward position FWD (3).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.3 is shown on the tachometer display.
5. Move the shift lever to the reverse position REV (4).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.4 is shown on the tachometer display.
6. Move the control lever to neutral position N (5).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.5 is shown on the tachometer display.
7. Push NEUTRAL BUTTON to exit lever calibration. The green LED(s) by the neutral button will show steady light and the system returns to MAIN MENU.

Mechanical two lever control. Single and twin installations. Electrical throttle and mechanically shifted reverse gear

NOTE! If the controls for two engines are calibrated, both levers should be calibrated at the same time, to give the same lever travel/positions for both engines.

Preparations:

Gear shift lever in neutral N position. (Neutral switch is closed.)



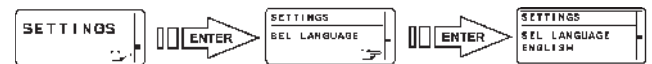
1. Enter calibration mode
1.0 is shown on the tachometer display.
NOTE! 2.0 indicates a twin lever control.
2. Move the throttle lever to the position for full throttle forwards WOT (1).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.1 is shown on the tachometer display.
3. Move the throttle lever to the idling position IDLE (2).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
1.2 is shown on the tachometer display.
4. Push NEUTRAL BUTTON to exit lever calibration. The green LED(s) by the neutral button will show steady light and the system returns to MAIN MENU.

Select language and units

NOTE! Language and unit settings must be performed in all EVC system tachometers and EVC system displays.

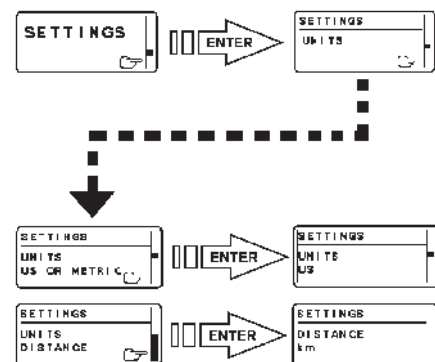
1. Activate helm station by pushing the ACTIVE STATION BUTTON on the EVC panel.
2. Select and enter SETTINGS from MAIN MENU.

Language



3. Select and enter SEL LANGUAGE.
4. Select and confirm the appropriate language.

Units



5. Select and enter UNITS.
Select UNITS US OR METRIC.
6. Select and confirm the appropriate unit (US or metric).
7. Select and enter UNITS DISTANCE.
8. Select and confirm the appropriate unit for distance (km, NM, MILES).
9. Push BACK BUTTON twice to return to MAIN MENU.

Powertrim calibration D4, D6

⚠ IMPORTANT! Powertrim calibration must be performed. If not, the Powertrim function will not be activated and the engine(s) can not be started.

NOTE! Side mounted controls with Powertrim buttons: Lever calibration must be carried out before the Powertrim calibration is performed. If not, the Powertrim function will not be activated.

NOTE! It is enough just to calibrate the Powertrim for one of the helm stations. The EVC system stores the trim positions.

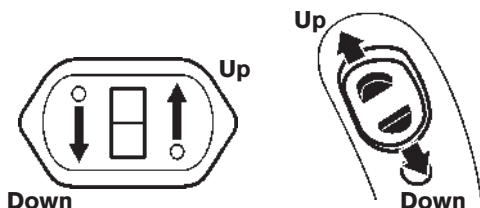
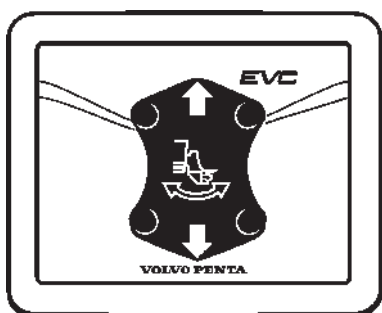
NOTE! Do not run the engine during Powertrim calibration.

NOTE! Twin installation: The Powertrim for both drives should be calibrated at the same time.

1. Activate helm station by pushing the ACTIVE STATION BUTTON.



2. Enter calibration mode



CALIBRATION

**POWERTRIM
SET MAX POS**

3. Push the Powertrim UP button. Pop-up in display indicates POWERTRIM SET MAX POS.
4. Trim the drive to the desired maximum tilt position.
Confirm the position by pushing NEUTRAL BUTTON.

⚠ IMPORTANT! POWERTRIM MAX POS should be approx. 100 mm (4") from the physical stop (bathing platform etc.).

CALIBRATION

**POWERTRIM
SET MIN POS**

5. Pop-up in display indicates POWERTRIM SET MIN POS.
6. Push the Powertrim DOWN button and lower the drive to its lowest position (physical stop).
Confirm the position by pushing NEUTRAL BUTTON.
7. Calibration is completed. The system automatically returns to MAIN MENU after a few seconds.

Check transom angle

The factory setting is for a transom angle of 13°.

If the transom angle is $\geq 15^\circ$ or $\leq 11^\circ$, the transom angle setting must be adjusted. The reason is that the built-in limits for drive positions will result in undesirable offset positions.

NOTE! The adjustment is handled only by the VODIA tool.

Powertrim Assistance, PTA D4, D6 (option)

The Powertrim Assistant adjust trim angle automatically according to engine speed (rpm). It is possible to set five trim angles at five different engine speeds (Idle speed included).

PTA calibration

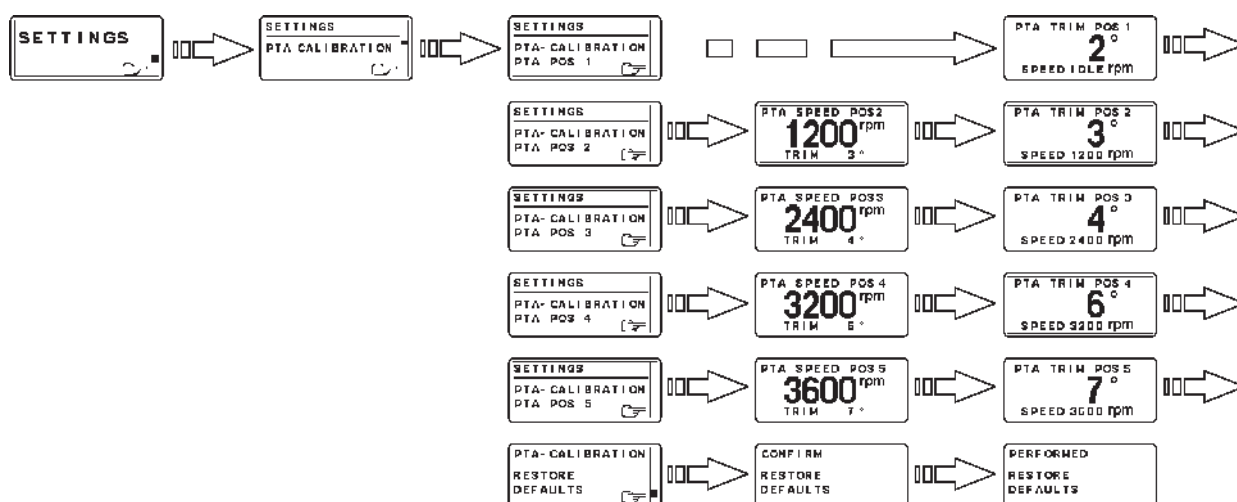
1. Activate helm station by pushing the ACTIVE STATION BUTTON.
2. Select SETTINGS from MAIN MENU by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter SETTINGS MENU.
3. Select PTA CALIBRATION and push NAVIGATION WHEEL.

4. Select PTA CALIBRATION POSITION (1-5) by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter selected PTA CALIBRATION POSITION.
5. Set RPM for PTA CALIBRATION POSITION by turning NAVIGATION WHEEL and confirm by pushing NAVIGATION WHEEL.

NOTE! RPM can not be set for PTA CALIBRATION POSITION 1, idling speed.

6. Set TRIM ANGLE for selected PTA CALIBRATION POSITION by turning NAVIGATION WHEEL and confirm by pushing NAVIGATION WHEEL.

Use the same procedure for all PTA CALIBRATION POSITIONS (1-5). Push BACK BUTTON to return to SETTINGS MENU.



Default values for D4 and D6 engines

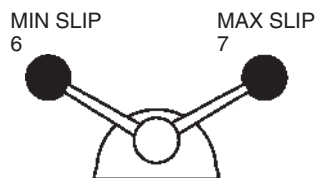
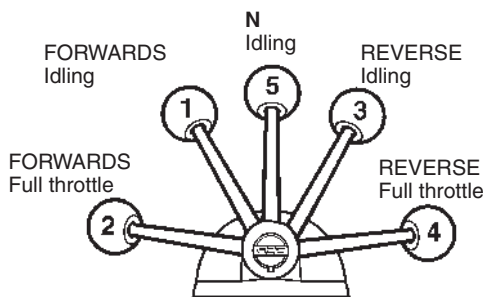
Step	Engine rpm	Drive angle degree
1	Idle–2499	- 3
2	2500–2999	0
3	3000–3199	+1
4	3200–3499	+1
5	3500–WOT	+1

Trolling calibration

NOTE! If the controls for two engines are calibrated, both levers should be calibrated at the same time, to give the same lever travel/positions for both engines.



1. Enter calibration mode
2.0 is shown on the tachometer display.



2. Move the lever to the forward idling (1).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.1 is shown on the tachometer display.
3. Move the lever to the position for full throttle forward (2).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.2 is shown on the tachometer display.
4. Move the lever to the reverse idle position (3).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.3 is shown on the tachometer display.

5. Move the lever to the reverse full throttle position (4).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.4 is shown on the tachometer display.
6. Move the control lever to neutral position (5).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.5 is shown on the tachometer display.
7. Move the control lever for trolling to MIN SLIP position (6).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.6 is shown on the tachometer display.
8. Move the control lever for trolling to MAX SLIP position (7).
Release the lever and confirm the position by pushing NEUTRAL BUTTON.
2.7 is shown on the tachometer display.
9. Push NEUTRAL BUTTON to exit lever calibration. The green LED(s) by the neutral button will show steady light and the system returns to MAIN MENU.
10. Move the control lever to MIN slip position.

Slip calibration Volvo Penta Lowspeed/trolling D4, D6, D9, D12

⚠ WARNING! This procedure requires engine running at idle speed and with gear engagement. Moor the boat in a proper and safety way.

⚠ WARNING! During the calibration sequence forward gear will automatically be engaged and disengaged for several times.



1. Enter calibration mode



2. Push and hold MULTIFUNCTION button and NEUTRAL button for 5 seconds to enter SLIP CALIBRATION.

Display reads CALIBRATION SLIP 6.1.



3. Start engine and engage gear. Calibration starts automatically.

Display reads CALIBRATION SLIP 6.2.

⚠ WARNING! The slip function will now be calibrated. During the calibration sequence forward gear will automatically be engaged and disengaged for several times.

NOTE! The time the system needs for slip calibration may vary from **5–20 minutes** depending on transmission type.



4. When calibration is ready display reads CALIBRATION SLIP 6.3.
5. Move the control lever to neutral position.
6. Push the NEUTRAL BUTTON.
Stop the engine, system power down.

Idling speed calibration (If needed)

NOTE! When calibrating idling speed the Full Throttle Forwards position on the lever corresponds to maximum idling speed.

NOTE! D4 and D6 engines only:

Idling speed adjusting can only be done when the engine temperature is more than 40°C (104°F). When temperature is below 40°C (104°F) only Warming Up mode is activated.

1. Activate helm station by pushing the ACTIVE STATION BUTTON on the EVC panel.
2. Enter calibration mode.
3. Start the engine.



Pop-up in display indicates:

IDLE SPEED SET RPM

4. Adjust the idling speed with the control lever. Idling speed can be adjusted to a value between:

D4 engines	700–750 rpm
D6 engines	600–650 rpm
D9 engines	500–750 rpm
D12 engines	500–700 rpm (MP), 500–800 rpm (MH)
D16 engines	550–600 rpm

Confirm rpm by pushing the NEUTRAL BUTTON.
5. Move lever to neutral position and stop the engine.

Settings, general

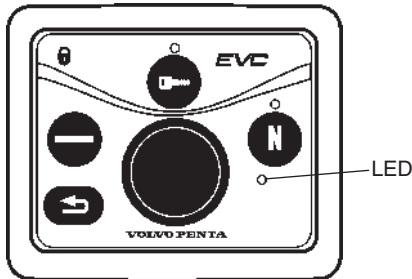
NOTE! For all setting procedures:

Activate helm station by pushing the ACTIVE STATION BUTTON on the EVC panel.

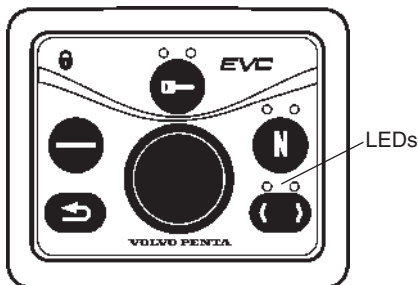
OEM-mode

Enter OEM-mode

NOTE! Always exit OEM-mode before changing helm station.



Single installation



Twin installation



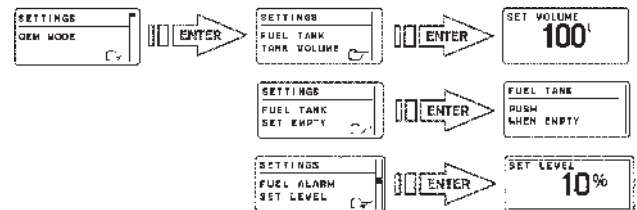
1. Enter OEM-mode by pushing the MULTIFUNCTION BUTTON for at least 5 seconds.
2. The red (red/green) LED(s) is flashing and pop-up screen OEM MODE ACTIVATED is shown for approx. 5 seconds.
In **twin installations** one of the tachometer display is activated. To change tachometer, push TACHOMETER SELECTION BUTTON.

Exit OEM-mode

3. Exit OEM-mode by pushing the MULTIFUNCTION BUTTON for at least 5 seconds. The red (red/green) LED(s) stops flashing. Pop up screen is shown in display for approx. 5 seconds.

Fuel tank settings

1. Activate helm station by pushing the ACTIVE STATION BUTTON.
2. Enter OEM-mode
3. Select and enter SETTINGS from MAIN MENU. Select and enter OEM MODE from SETTINGS.



Fuel tank volume setting

4. Select and enter FUEL TANK TANK VOLUME.
5. Set the fuel tank volume by turning the NAVIGATION WHEEL to an appropriate value and confirm by pushing.

Empty fuel tank setting

NOTE! The fuel tank must be empty.

6. Select and enter FUEL TANK SET EMPTY.
7. Confirm empty tank in the PUSH WHEN EMPTY window.

Fuel alarm (if needed)

NOTE! The default level of the fuel alarm is set to 0% of the tank volume, which means that the alarm is off. For the alarm to function, the desired alarm level must be set.

8. Select FUEL ALARM SET LEVEL. Push NAVIGATION WHEEL.
9. Set the level (in %) by turning the NAVIGATION WHEEL clockwise or counter-clockwise to an appropriate value and confirm by pushing the NAVIGATION WHEEL.

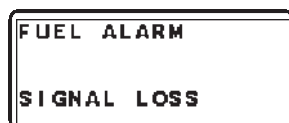
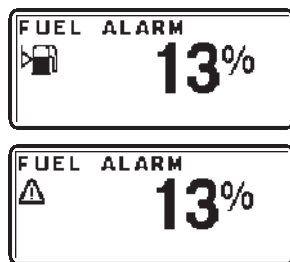
Fuel tank calibration

Full tank calibration

NOTE! A FULL TANK CALIBRATION requires that FUEL TANK EMPTY has been set.

When FULL TANK CALIBRATION is selected, the fuel level sender is calibrated in two steps. Empty and full. This only gives a very rough estimation of the fuel level. Therefore all trip data concerning and based on, remaining fuel volume should be recognized as approximated values only.

1. Activate helm station by pushing the ACTIVE STATION BUTTON.
1. Select SETTINGS from MAIN MENU by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter SETTINGS MENU.
2. Select FUEL TANK CALIBRATION and push NAVIGATION WHEEL.
3. Select FULL TANK CALIBRATION by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter FULL TANK CALIBRATION.
4. Fill fuel tank and push NAVIGATION WHEEL.
Push BACK BUTTON to return to SETTINGS MENU.



Fuel alarm pop-up

The fuel level alarm pop-up will appear when the fuel level is lower than fuel alarm setpoint. The pop-up shows the percentage of fuel remaining.

Acknowledge fuel alarm by pushing NAVIGATION WHEEL.

Fuel level alarm pop-up will re-appear every 10 minutes until the fuel level in tank is higher than fuel alarm setpoint.

Fuel level signal loss

If the fuel level has been set and the fuel level signal is lost, for instance in the case of sensor malfunction, the fuel level alarm signal loss pop-up will appear.

Fuel multipoint calibration

When FUEL MULTIPOINT CALIBRATION is selected, the fuel level sender is calibrated in five equally divided steps; 20 % full (pos 1), 40 % full (pos 2), 60 % full (pos 3), 80 % full (pos 4), 100 % full (pos 5).

NOTE! TO perform multipoint calibration, fuel tank must be less than 20% full. If calibration skips POS 1 and goes directly to POS 2, the fuel tank contains too much fuel and the calibration will not be correct.

1. Activate helm station by pushing the ACTIVE STATION BUTTON.
2. Select SETTINGS from MAIN MENU by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter SETTINGS MENU.
3. Select FUEL TANK CALIBRATION and push NAVIGATION WHEEL.
4. Select FUEL MULTIPOINT CALIBRATION by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter FUEL MULTIPOINT CALIBRATION.

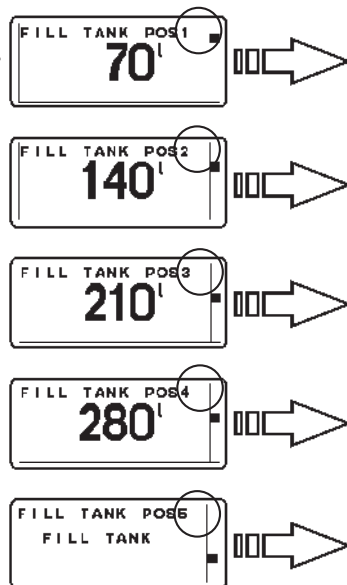


NOTE! The fuel multipoint calibration procedure differs depending on EVC software release:

- 5A. If the number after “POS” in the display is flashing:

Fill fuel tank with displayed volume (POS 1) and push NAVIGATION WHEEL. Add fuel (do not reset the pump) up to displayed volume for each POS until the tank is filled.

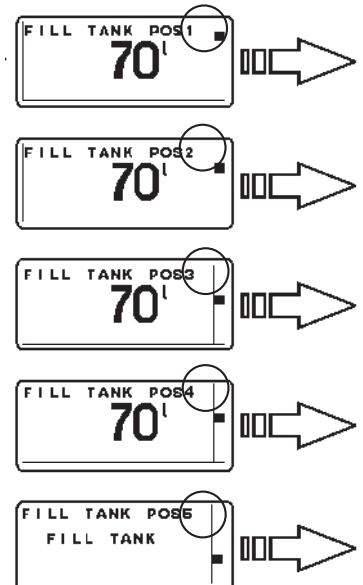
6. Push BACK BUTTON to return to SETTINGS MENU.



- 5B. If the number after “POS” is **not** flashing:

Fill fuel tank with displayed volume (POS 1) and push NAVIGATION WHEEL. Repeat procedure for each POS until the tank is filled.

6. Push BACK BUTTON to return to SETTINGS MENU.



Multisensor calibration

Speed factor

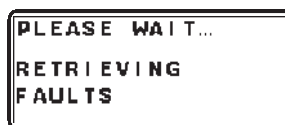
The speed factor for the boat's paddle wheel speed sensor can be adjusted at a resolution of 1% and is used by the EVC to apply a correction to the output from the speed sensor.

Set speed factor

Set speed factor while driving the boat. Compare displayed speed with speed data from GPS (or other boat) and adjust the speed factor until they correspond.

Adjust the speed factor by turning the NAVIGATION WHEEL.

Once adjustment value is reached, the data is stored by pushing NAVIGATION WHEEL.



Information message

Start attempt with gear engaged

The engine control lever must always be in neutral before starting. If not, this pop-up will be shown.

Approximated trip data

This pop-up will be shown if no multipoint fuel tank calibration is performed.

Retrieving faults

The EVC system is retrieving faults from its nodes.

Monitoring mode (inactive station)

An inactive station can show system information. Push MULTIFUNCTION BUTTON on the inactive station.

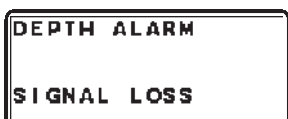
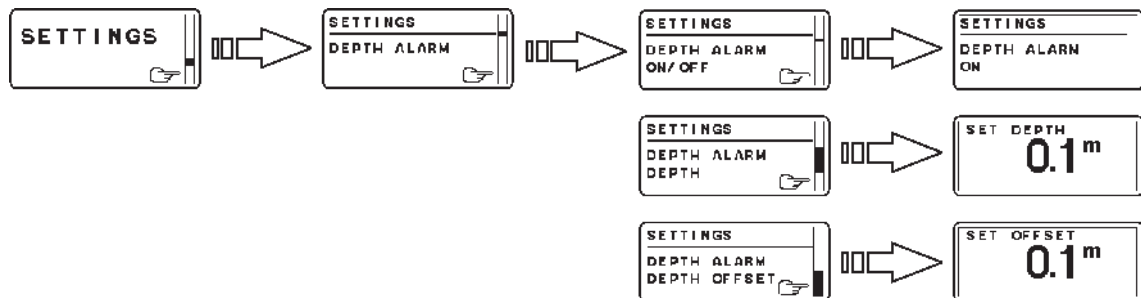
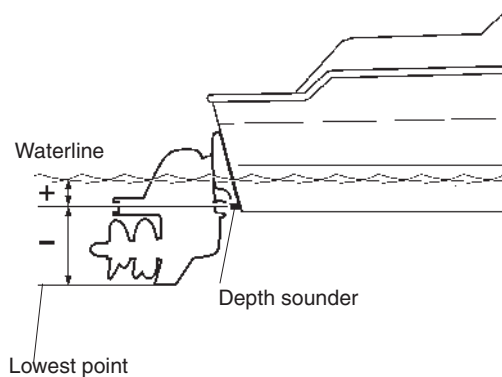
It is possible to navigate the menus when in monitoring mode.

Depth alarm (Option)

All depth alarm functions are accessed through this menu.

Requirements

- Activate helm station
- A multisensor needs to be installed
- A signal (approved) must be generated. This is shown in the EVC tachometer display or EVC system display.



DEPTH ALARM, ON/OFF

Depth alarm can be switched ON/OFF.

SET DEPTH

Adjust the depth alarm value by turning the NAVIGATION WHEEL. The value can be adjusted at a resolution of 0.1 m (1 ft).

Once adjustment value is reached, the data is stored by pushing NAVIGATION WHEEL.

DEPTH OFFSET

The depth sounder can be placed somewhere on the hull that gives another depth than the desired depth. You can then add or subtract a distance so that the display shows the depth from, for example, the lowest point on the boat, or from the surface.

Adjust the depth offset value by turning the NAVIGATION WHEEL. The value can be adjusted at a resolution of 0.1 m or 1 ft.

Once adjustment value is reached, the data is stored by pushing NAVIGATION WHEEL.

Depth alarm pop-up

The depth alarm pop-up will appear when the depth is less than the depth alarm setpoint. The pop-up shows the actual depth.

Acknowledge depth alarm by pushing NAVIGATION WHEEL.

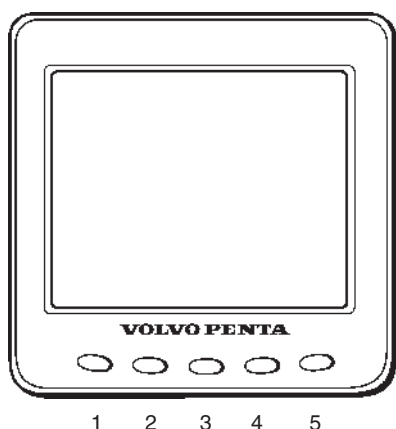
The depth alarm pop-up will re-appear every 30 seconds until the depth increases and exceeds the depth alarm setpoint.

Depth alarm signal loss

If the depth alarm is enabled and the depth signal is lost, for instance in the case of sensor malfunction, the depth alarm signal loss pop-up will appear.

EVC system display

Description



Volvo Penta display EVC system (EVC system display) is an instrument which displays operating information about the engine and allows you to communicate with the engine's electrical system.

Operation information is shown on an LCD display. The driver can select the display mode operative on the display with the aid of the five buttons on the front of the instrument.

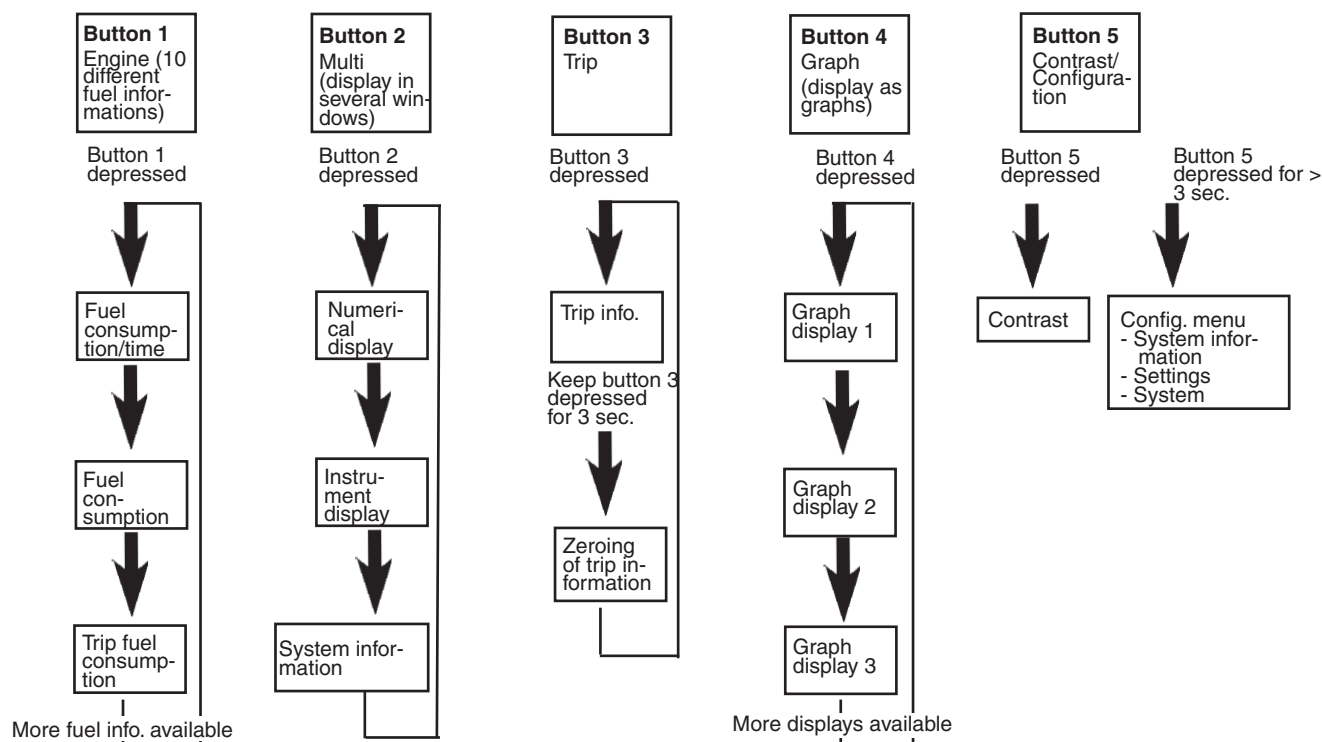
The four buttons at the furthest left are used to display operating information in different ways. The button at the furthest right is used to adjust the display contrast and to access the so-called configuration menu. Various settings etc. can be done in it. You can also use the configuration menu to reach the display mode SYSTEM INFORMATION (which can also be reached via button 2, please refer to the schedule below). This display mode functions in the same way as the display in the tachometer (EVC system tachometer).

Before the display is used, it may be necessary to modify the way that the display shows operating information, to comply with user requirements. You can see the settings that can be changed in the section about the configuration menu.

! IMPORTANT! In a twin installation, when using one combined EVC system display, the display must be configured as a **"TWIN"** before auto configuration is performed.

In a twin installation, when using two EVC system displays, the displays must be configured as **"PORT"** resp. **"STARBOARD"** before auto configuration is performed.

Structure of the display functions





Start image

This is the starting image that is shown on the display for a brief period after starting.

If the unit gives a constant audible warning after starting, the self-test has failed. The unit will still work, but may behave in an unexpected manner.

Symbols for operating information

	Engine speed		Turbocharge pressure (current)
	Coolant temperature		Induction air temperature
	Engine temperature		Exhaust temperature
	Fuel pump pressure		Voltage
	Oil pressure		Oil pressure, drive
	Coolant pressure		Oil temperature, drive
	Speed		Fuel level
	Fuel consumption/time		Differential pressure, oil filter

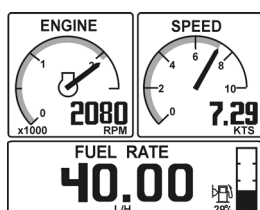


Figure for single engine installation

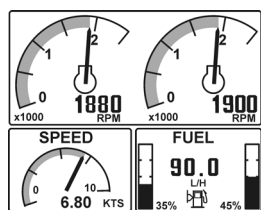
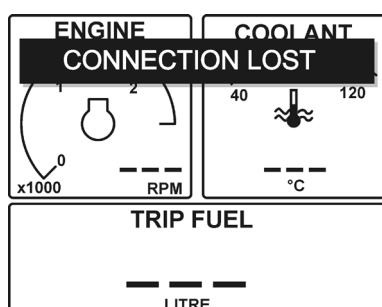


Figure for twin engine installation

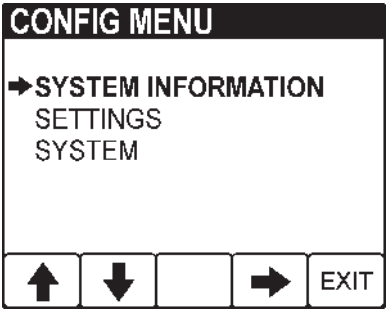
Display after starting screen

Display mode ENGINE (button 1) is always shown after the starting screen when the display is first started up (more information about this display mode can be found below in the instructions). Once the display has been used, it will always show the display mode when it starts up, that was selected when the display was last switched off.



Connection fault

If the display does not register transfer of operating information from the electrical system, the pop-up window will flash CONNECTION LOST. When operating information has been registered/reset, the pop-up window disappears.



Configuration menu (button 5)

(Depressed for longer than 3 s)

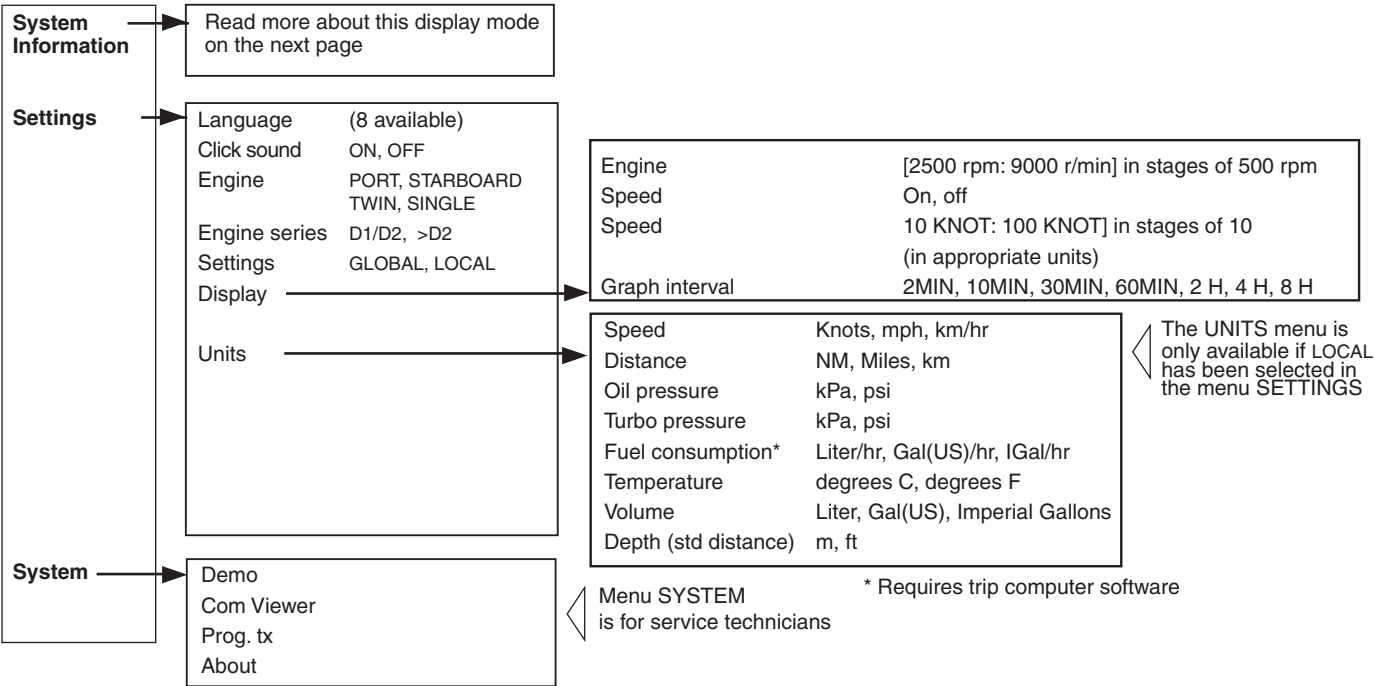
The configuration menu is used to:

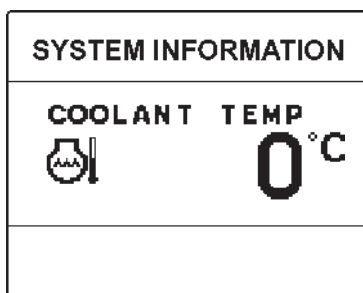
- access the display mode SYSTEM INFORMATION
- do various settings for the display
- reach information and functions for servicing the display

Please refer to the configuration menu structure below and read the following section, which explains each section in the menu.

NOTE! The port engine or both engines must have the ignition switched on when display settings are changed.

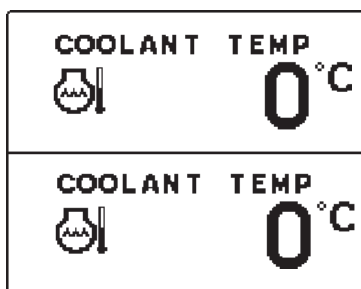
Configuration menu structure





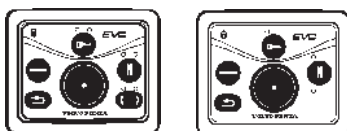
SYSTEM INFORMATION display mode for single engine installations

Port side

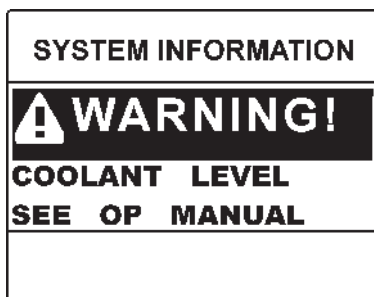


SYSTEM INFORMATION display mode for twin engine installations

Starboard side



Control panels



Alarm example

Display mode System Information

SYSTEM INFORMATION is a display mode that functions in the same way as the display in the tachometer (EVC system tachometer). You navigate round these functions, using the buttons on the free-standing control panel.

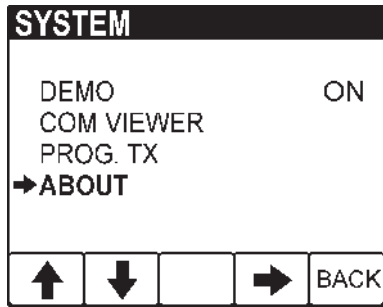
In display mode SYSTEM INFORMATION there are several functions:

- Display of operating information, information messages and alarm (NOTE! The display is adapted to suit the size of the panel in the tachometer).
- Settings for displaying operating information in this display mode.
- All calibrations.

Detailed instructions for the functions in display mode SYSTEM INFORMATION are found in the section about the tachometer in this owner's manual.

Information message and alarm

The display automatically switches to display mode SYSTEM INFORMATION when the electrical system needs to show information messages or alarms. Instructions about how information messages and alarms should be handled are found in the section about the tachometer and in the section "In case of emergency" in the operator's manual.



System

Menu SYSTEM is intended to provide the necessary functions and information for service technicians.

- **Demo:** Switches between demo mode ON/OFF
The unit is in normal operation mode when Demo is OFF.
- **Com Viewer:** Shows the latest messages received on the communication inputs
- **Prog tx:** Transfers the contents of the application program in the flash memory to other CANtrak units on the same CANbus link
- **About :** Shows the following information:
 - ID no:** Display serial number
 - Eeprom:** No. of writes to the EEPROM
 - Vers:** Software version number
 - Chk:** Flash memory checksum
 - Part no:** Volvo's part number for the software
 - Source:** Shows the source of the received data
 - Label:** Label allocated on the bus. Each unit on the same bus must have its own unique label.

Diagnostic function

The diagnostic function monitors and checks that the engine, stern drive/reversing gear and EVC system function normally.

The diagnostic function has the following tasks:

- Discover and localize malfunctions
- Notify that malfunctions have been discovered
- Give advice in fault finding
- Protect the engine and ensure continued operation when serious malfunctions are discovered.

The diagnostic function affects the engine in the following ways when:

1. The diagnostic function has discovered a minor malfunction which does not damage the engine.
Reaction: The engine is not affected.
2. The diagnostic function has discovered a serious malfunction which will not immediately damage the engine (e.g. high coolant temperature):
Reaction: Engine power is reduced till the relevant value is normalized.
3. The diagnostic function has discovered a serious malfunction which will cause serious engine damage.
Reaction: Engine power is reduced.
4. The diagnostic function has discovered a serious malfunction which makes it impossible to control the engine.
Reaction: The reversing gear/drive is disengaged and engine speed is cut to 1000 rpm.
It is possible to do an emergency shift: Please refer to the "Emergency shifting" section.
5. The diagnostic function has discovered a serious malfunction on the sterndrive shift mechanism or in the engine fuel injection system.
Reaction: Engine is stopped
It is possible to do an emergency shift: Please refer to the "Emergency shifting" section. In serious emergency it is also possible to start the engine with gear engaged after acknowledging the alarm.

Malfunction message engine and EVC-system

If the diagnostic function discovers a malfunction, it warns the driver by showing pop-ups in the tachometer display and the buzzer will sound.

Pop-ups will alternate between "cause of fault" and "measures to take".

To acknowledge the alarm, press NAVIGATION WHEEL. When the fault has been acknowledged, the buzzer will become silent. Press NAVIGATION WHEEL. The pop-up will disappear and normal display window will be shown.

NOTE! To enable engine start the alarm must be acknowledged.



Danger pop-up

If the Danger pop-up is shown during operation, a serious fault has occurred.

NOTE! Acknowledge the alarm and stop the engine at once.

Information regarding "cause of fault" and "measures to take" is found in chapter "Fault register".

Warning pop-up

If the Warning pop-up is shown during operation, a fault has occurred.

NOTE! Acknowledge the alarm and stop the engine at once.

Information regarding "cause of fault" and "measures to take" is found in chapter "Fault register".

Caution pop-up

If the Caution pop-up is shown during operation, a fault has occurred.

Acknowledge the alarm.

Information regarding "cause of fault" and "measures to take" is found in chapter "Fault register".

Faults list

A faults list can be viewed from the MAIN MENU in the tachometer, if a fault is registered.

When in MAIN MENU, select FAULTS by pushing NAVIGATION WHEEL. Number after FAULTS indicates number of faults stored in faults list. Show faults in faults list by turning NAVIGATION WHEEL.

Shown fault pop-ups will alternate between "cause of fault" and "measures to take".

More information regarding "cause of fault" and "measures to take" is found in chapter "Fault register".

Fault register

⚠ WARNING! Read the **Safety Precautions** chapter before starting work.

This implies that:

1. Faults which have been attended to or have disappeared are automatically erased.
2. Faults which have not been attended to must be acknowledged every time the system voltage is switched on.

Erasing faults in faults list

Any fault pop-up in the diagnostic function are automatically erased every time the starter key is turned to the stop position (S).



NOTE! Stop the engine and check that the ignition key(s) is(are) in position 0 in all control positions.



When system voltage is switched on again, the diagnostic function checks to see whether there are any faults in the EVC system. If this is the case, new fault pop-ups are shown.

NOTE! Fault codes can also be read from the EVC system display.

Explanation

Faults are presented with information about reason and proposed measures to be taken.

1.	2.	3.	
Description	 R		4.
Explanation:			
Reaction:			
Action:			

1. Description of current fault and measures to take.
2. Current warning lamp which flashes during an alarm. O/R means that an orange or red lamp flashes.
3. Audible warning
4. Current fault pop-up which is shown on the EVC tachometer display.

Engine speed

Explanation: Fault in engine speed sensor.

Reaction: Engine power is reduced.

Action:

- Please contact a Volvo Penta workshop.

⚠ DANGER!
ENGINE SPEED
SEE OP MANUAL

Water in fuel

Explanation: Water in water trap in fuel filters.

Reaction: None

Action:

- Empty the water trap underneath the fuel filters. Please refer to "Maintenance: Fuel system".
- Please contact a Volvo Penta workshop if the fault remains.

⚠ CAUTION!
WATER IN FUEL
SEE OP MANUAL

Seawater pressure

Explanation: Seawater pressure too low.

Reaction: Engine power is reduced.

Action:

- Check that the seawater filter is not blocked. Please refer to "Maintenance: Seawater system".
- Check the impeller in the sea water pump. Please refer to "Maintenance: Seawater system".
- Check that no leakage occurs.
- Please contact a Volvo Penta workshop if the fault remains.

⚠ WARNING!
SEA WATER PRESS.
SEE OP MANUAL

Air temperature

Explanation: Charge air temperature too high.

Reaction: Engine power is reduced.

Action:

- Please contact a Volvo Penta workshop.

⚠ WARNING!
AIR TEMP
SEE OP MANUAL

Coolant level

Explanation: Coolant level too low.

Reaction: Engine power is reduced.

Action:

- Check coolant level. Please refer to "Maintenance: Fresh water system".
- Check that no leakage occurs in auxiliary equipment connected to the engine cooling system.
- Please contact a Volvo Penta workshop if the fault remains.

⚠ WARNING!
COOLANT LEVEL
SEE OP MANUAL

Coolant pressure

Explanation: Coolant pressure too low.

Reaction: Engine power is reduced.

Action:

- Check the coolant level. Please refer to "Maintenance: Fresh water system".
- Check that the seawater filter is not blocked. Please refer to "Maintenance: Seawater system".
- Check the impeller in the seawater pump. Please refer to "Maintenance: Seawater system".
- Check that no leakage occurs.
- Check that no leakage occurs in auxiliary equipment connected to the engine cooling system.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!

COOLANT PRESS
SEE OP MANUAL

Coolant temperature

Explanation: Coolant temperature too high.

Reaction: Engine power is reduced.

Action:

- Check coolant level. Please refer to "Maintenance: Fresh water system".
- Check that the seawater filter is not blocked. Please refer to "Maintenance: Seawater system".
- Check the impeller in the seawater pump. Please refer to "Maintenance: Seawater system".
- Check that no leakage occurs.
- If the cooling water flow ceases, the exhaust hose should be inspected internally and replaced if the hose shows signs of damage.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!

COOLANT TEMP
SEE OP MANUAL

Fuel pressure

Explanation: Fuel pressure too low.

Reaction: Engine power is reduced.

Action:

- Check the fuel level.
- Open the fuel taps and check that no leakage occurs.
- Check that the fuel filters are not blocked. Please refer to "Maintenance: Fuel system"
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!

FUEL PRESSURE
SEE OP MANUAL

Fuel temperature

R

**Explanation: Fuel temperature too high.****Reaction:** Engine power is reduced.**Action:**

- Check the fuel level.
- Check fuel cooler.
- Check that no leakage occurs.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!
FUEL TEMPERATURE
SEE OP MANUAL

Engine oil level

R

**Explanation: Oil level too low.**

NOTE! In rough following seas or head seas, the system can incorrectly sense that the engine oil level is too low. If this happens, acknowledge the fault, and check the points below for safety reasons.

Reaction: Engine power is reduced.**Action:**

- Check the oil level in the engine. Please refer to "Maintenance: Lubrication system" to check and top the oil up.
- Check the oil filters. Please refer to "Maintenance: Lubrication system".
- Check that no leakage occurs.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!
ENGINE OIL LEVEL
SEE OP MANUAL

Engine oil pressure

R

**Explanation: Oil pressure too low.****Reaction:** Engine power is reduced.**Action:**

- Check the oil level in the engine. Please refer to "Maintenance: Lubrication" to check and top the oil up.
- Check that the oil filters are not blocked.
- Check that no leakage occurs.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!
ENGINE OIL PRESS
SEE OP MANUAL

Engine oil temperature

Explanation: Engine oil temperature too high.

Reaction: Engine power is reduced.

Action:

- Check the oil level. Please refer to "Maintenance: Lubrication system".
- Check that the oil filters are not blocked. Please refer to "Maintenance: Lubrication system".
- Check that no leakage occurs.
- Please contact a Volvo Penta workshop if the fault remains.

WARNING!
ENGINE OIL TEMP
SEE OP MANUAL

Engine oil filter

Explanation: Oil pressure differential too big.

Reaction: Engine power is reduced.

Action:

- Check that the oil filters are not blocked. Please refer to "Maintenance: Lubrication system".
- Please contact a Volvo Penta workshop if the fault remains.

WARNING!
ENG OIL FILTER
SEE OP MANUAL

Crankcase pressure

Explanation: Crankcase pressure too high.

Reaction: Engine power reduced.

Action:

- Check that the crankcase ventilation is not blocked. Please refer to "Maintenance: Engine, general".
- Please contact a Volvo Penta workshop if the fault remains.

WARNING!
CRANKCASE PRESS
SEE OP MANUAL

Exhaust temperature

Explanation: Exhaust temperature too high.

Reaction: Engine power is reduced.

Action:

- Please contact a Volvo Penta workshop.

WARNING!
EXHAUST TEMP
SEE OP MANUAL

Transmission oil pressure

Explanation: Transmission oil pressure too low.

Reaction: Engine power is reduced.

Action:

- Check oil level. Please refer to "Maintenance: Lubrication system".
- Check that the oil strainer is not blocked. Please refer to "Maintenance: Lubrication system".
- Check that no leakage occurs.
- Please contact a Volvo Penta workshop if the fault remains.

WARNING!
TRANSM. OIL PRESS
SEE OP MANUAL

Battery voltage

Explanation: Battery voltage too low.

Reaction:

Action:

- Check battery fluid level.
- Check belt tension.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!
BATTERY VOLTAGE
SEE OP MANUAL

Auxiliary stop

Explanation: External stop signal.

Reaction: Engine stops or can not be started

Action:

- Check emergency stop button. Reset if necessary. Please refer to "Stopping the engine: Emergency stop"
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!
AUXILIARY STOP
SEE OP MANUAL

Primary battery

Explanation: Poor battery or charging.

Reaction:

Action:

- Check battery fluid level.
- Check belt tension.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!
PRIMARY BATTERY
SEE OP MANUAL

Secondary battery

Explanation: Poor battery or charging.

Reaction:

Action:

- Check battery fluid level.
- Check belt tension.
- Please contact a Volvo Penta workshop if the fault remains.

! WARNING!
SECONDARY BATT
SEE OP MANUAL

30 V supply fuse

Explanation: Fuse is broken.

Reaction:

Action:

- Please contact a Volvo Penta workshop.

! WARNING!
30V SUPPLY FUSE
SEE OP MANUAL

EMS supply fuse	 R	
Explanation: Fuse is broken.		
Reaction:		
Action:		
Please contact a Volvo Penta workshop.		

WARNING!
EMS SUPPLY FUSE
SEE OP MANUAL

Extra supply fuse	 R	
Explanation: Fuse is broken.		
Reaction:		
Action:		
Please contact a Volvo Penta workshop.		

WARNING!
EXT. SUPPLY FUSE
SEE OP MANUAL

Powertrim	 O/R	
Explanation: Fault in Powertrim system.		
Reaction: Cannot change trim position .		
Action:		
- Emergency Trimming. Please refer to "In case of emergency: Emergency trimming". - Please contact a Volvo Penta workshop if the fault remains.		

WARNING!
POWERTRIM
FAULTS 0

CAUTION!
POWERTRIM
FAULTS 0

Check shift actuator	 R	
Explanation: Fault in shift actuator.		
Reaction: Cannot engage gears. Engine in emergency mode.		
Action:		
- Emergency shifting. Please refer to "In case of emergency: Emergency shifting". - Please contact a Volvo Penta workshop if the fault remains.		

WARNING!
CHECK
SHIFT ACTUATOR 0

Check control lever	 O/R	
Explanation: Fault in control lever.		
Reaction: Engine in emergency mode. Gear to neutral.		
Action:		
- Restart engine(s). - If the engine can not be operated from the chosen control panel, use an alternative control panel. - Please contact a Volvo Penta workshop if the fault remains.		

WARNING!
CHECK
CONTROL LEVER 0

CAUTION!
CHECK
CONTROL LEVER 0

Lever calibration

Explanation: Incorrect lever calibration.

Reaction: It is not possible to choose active helm station.

Action:

- Restart engine(s).
- Please contact a Volvo Penta workshop if the fault remains.

**Check EVC system**

Explanation: Internal fault in the EVC system.

Reaction: Engine power is reduced.

Action:

- Restart engine(s).
- If the engine can not be operated from the chosen control panel, use an alternative control panel.
- Please contact a Volvo Penta workshop if the fault remains.

**System failure**

Explanation: Miscellaneous fault.

Reaction:

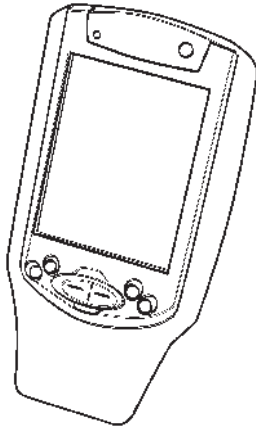
Action:

- Restart engine(s).
- Please contact a Volvo Penta workshop if the fault remains.



Parameter settings

Adjusting parameters



The VODIA diagnostic tool can be used to adjust EVC-parameters. This is done with the "**Parameter programming**" tool in the "**Service and maintenance**" menu.

VODIA is a Volvo Penta special tool. Complete tool part no. is **3838619**.

Once you have established contact with the system, you have to choose type of engine and there after the specific ECU (Engine Control Unit) in the drop down menu to show its adjustable parameters. VODIA only shows the adjustable parameters for one ECU at a time and only for an HCU if it is in **Service mode**.

To enter **Service mode**, press the MULTIFUNCTION BUTTON for at least 5 sec.

NOTE! Some of the parameters may require special authorization.

More information about handling the VODIA tool is given in the VODIA **Operator's Manual**.

Adjustable parameters

Transfer Under Way

Vodia text: "TransferUnderWay". This parameter is used to activate the **Transfer Under Way mode** which makes it possible to change the active station while gear is engaged. This function has to be activated in the PCU using the VODIA tool. This will affect all helm stations in the actual drive line, which means up to four possible HCUs (per drive line).

Activated for a PCU (MID 787).

Classified engine

Vodia text: "Classified engine".

This parameter is used to change the engine alarm function.

Activated for a PCU (MID187).

Volvo Penta Lowspeed

There are three adjustable parameters in the Volvo Penta lowspeed function:

- Maximum slip factor for VP Lowspeed
Vodia text: "MaxLowspeedSlip"
- Maximum slip factor for VP trolling
Vodia text: "MaxTrollingSlip"
- Upper lever limit for slip function at forward
Vodia text: "LeverFwdZeroSlip"
- Upper lever limit for slip function at reverse.
Vodia text: "LeverRevZeroSlip"
- Sets the gear ratio for the reverse gear.
Vodia text: "Gear ratio".
- VP Lowspeed mode at startup
Vodia text: "Low speed default setting"

Neutral beep

Vodia text: "NeutralBIP". This parameter makes it possible to activate or deactivate the function that gives a "beep" sound when the control lever is set to NEUTRAL position. The function is possible to activate individually for the helms (HCUs). When the function is desirable on all helms, you have to activate it in the PCU by using the VODIA tool. This will affect all helm stations in the actual drive line, which means up to four possible HCUs (per drive line).

Activated for a PCU (MID 187).

Lever type

Vodia text: "Lever type".

This parameter is used when the 4–20 mA interface is installed. Values "On"/"Off". "On" shall be set when the IN interface is used.

Activated for a HCU (MID164).

Transom angle (drive DPH/DPR)

Vodia text: "Transom angle". This parameter is used to adjust the transom angle estimated for the boat by the EVC system. Adjustment can be done without correcting the trim potentiometer on the drive shield. The potentiometer is used for powertrim functions and transmit information about drive trim positions to the EVC system.

Normal transom angle, that is default value, is 13°. If other values are needed, the transom angle can be adjusted between 8° and 25°.

Activated for a PCU (MID187).

Starting the engine

Make it a habit to give the engine and engine bay a visual check before starting. This will help you to quickly discover if anything abnormal has happened, or is about to happen. Also check that instruments and warning displays show normal values after you have started the engine.

To minimize starting smoke in cold starting, we recommend that a heater should be installed to warm the engine bay at temperatures below +5°C.

 **WARNING!** Never use start spray or similar products as a starting aid. Explosion risk!

 **IMPORTANT!** Also consult the *Operator's Manual* regarding information about starting and running the engine.

General information about starting

The engine control lever must always be in neutral before starting. The engine management system ensures that the engine receives the correct amount of fuel - even when the engine is cold.

The engine is pre-heated by the engine control unit, which allows the engine to crank several revolutions with the starter motor before fuel is injected. The colder the engine is, the more revolutions it makes. This raises the temperature in the combustion chambers, which ensures reliable starting and reduces starting smoke.

The idling speed is also governed by engine temperature, and is somewhat raised after a cold start.

Checklist

The following measures must be carried out before starting up the system:

- Complete calibration
- Initializing of EVC display/s
- Checking of fault codes

Running in

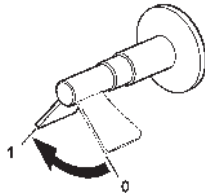
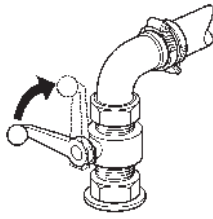
The engine must be running in for its first 10 operating hours:

Do not operate the engine at full load except for short periods.

Never run the engine at a constant engine speed for long periods.

Check oil level more often.

Please refer to the *Operator's manual* for more information.



Before starting

- Open the fuel tap
- Open the sea cock (reverse gear)
- Do the tasks under the “Daily before first start” heading in the maintenance schedule. Please refer to the **Operator's Manual**.
- Turn the main switches on.

⚠ IMPORTANT! Never disconnect the current using the main switches when the engine is running. This can damage the alternator.

- Start the engine room fan, if one is installed, and let it run for at least four minutes.
- Check that the amount of fuel aboard is enough for your planned voyage.
- Check the oil level.
- Lower the drive(s) if raised.

Starting method

Put the reverse gear/stern drive in neutral

Put the reverse gear in neutral by moving the control lever(s) to neutral at all helm stations.

Two lever control: Also check that the engine speed lever is in the idling position.

Turn the ignition on

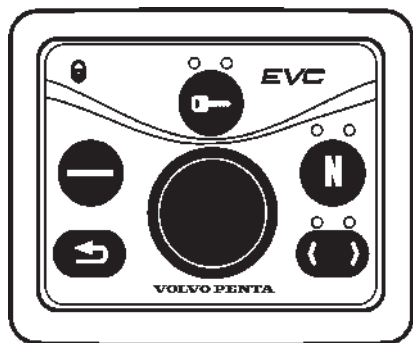
Turn the starter key to position I to switch the ignition on.

Examples:



Check the tachometer display

If a fault is registered it will be viewed in the tachometer display.



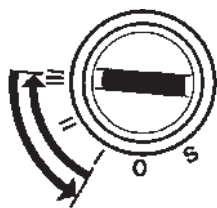
Activate the control panel and lock the system

Press the activation button for at least one second. When the button is released, the indication lights up to confirm that the control position is activated.

NOTE! If the indicator flashes, the control position has not been activated because the control lever(s) are not in the neutral position or the system has been locked from another control panel.

If the boat has more than one control panel/helm station, the system can be locked, so that the engine can only be controlled from the activated station. Press the activation button for a second further to lock the system. The padlock sign lights up in confirmation.

Unlock the system by pressing the activation button for one second. This can only be done from an activated control panel.

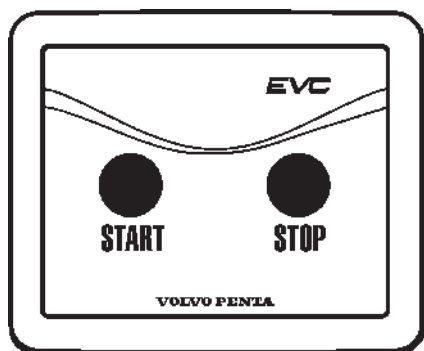


Start the engine

Start by using the ignition switch

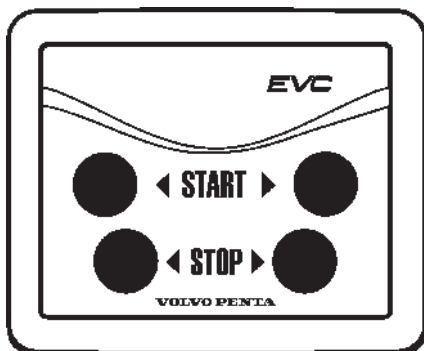
Turn the key to position III. Release the key and let it return to position I as soon as the engine has started. Stop cranking if the engine does not start within 20 seconds.

NOTE! If further start attempts are needed, the key must be turned back to position 0 first.



Starting by using the start button

Press the starter button. Release the button as soon as the engine has started. Please note that if you start from an alternative control station, the starter key at the main control station must be in position I. Stop cranking if the engine does not start within 20 seconds.



Overheating protection

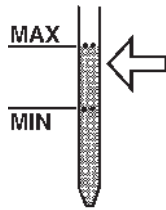
If the starter motor is engaged for its maximum activation time, the starter motor circuit is cut automatically to protect the starter motor from overheating. Leave the starter motor to cool for at least five minutes (if possible) before making a new start attempt.

Read the instruments and warm up the engine

Allow the engine to idle for the first ten seconds, and check that instruments and displays show normal values. Check that no alarms are displayed and that no warning lamps (optional) are flashing.

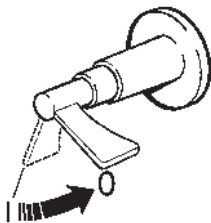
Then warm the engine up at low speed and low load, so that reaches normal operating temperature before full power is used.

⚠ IMPORTANT! Never race the engine when it is cold.



Check the oil level in the reverse gear

Check the oil level when the reversing gear has reached operating temperature.



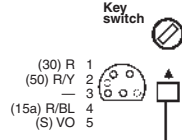
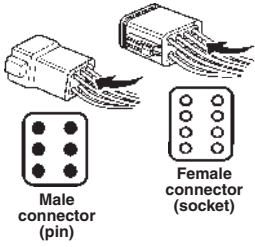
After stopping the engine

⚠ IMPORTANT! Make sure that the starter key is turned off (is in “0” position or removed) before main switches are switched off. Otherwise the electrical system could be damaged.

Wiring color and pin-out schematics

D4, D6 - DPH/DPR

All connectors (male and female) are viewed from cable side



Wire color coding

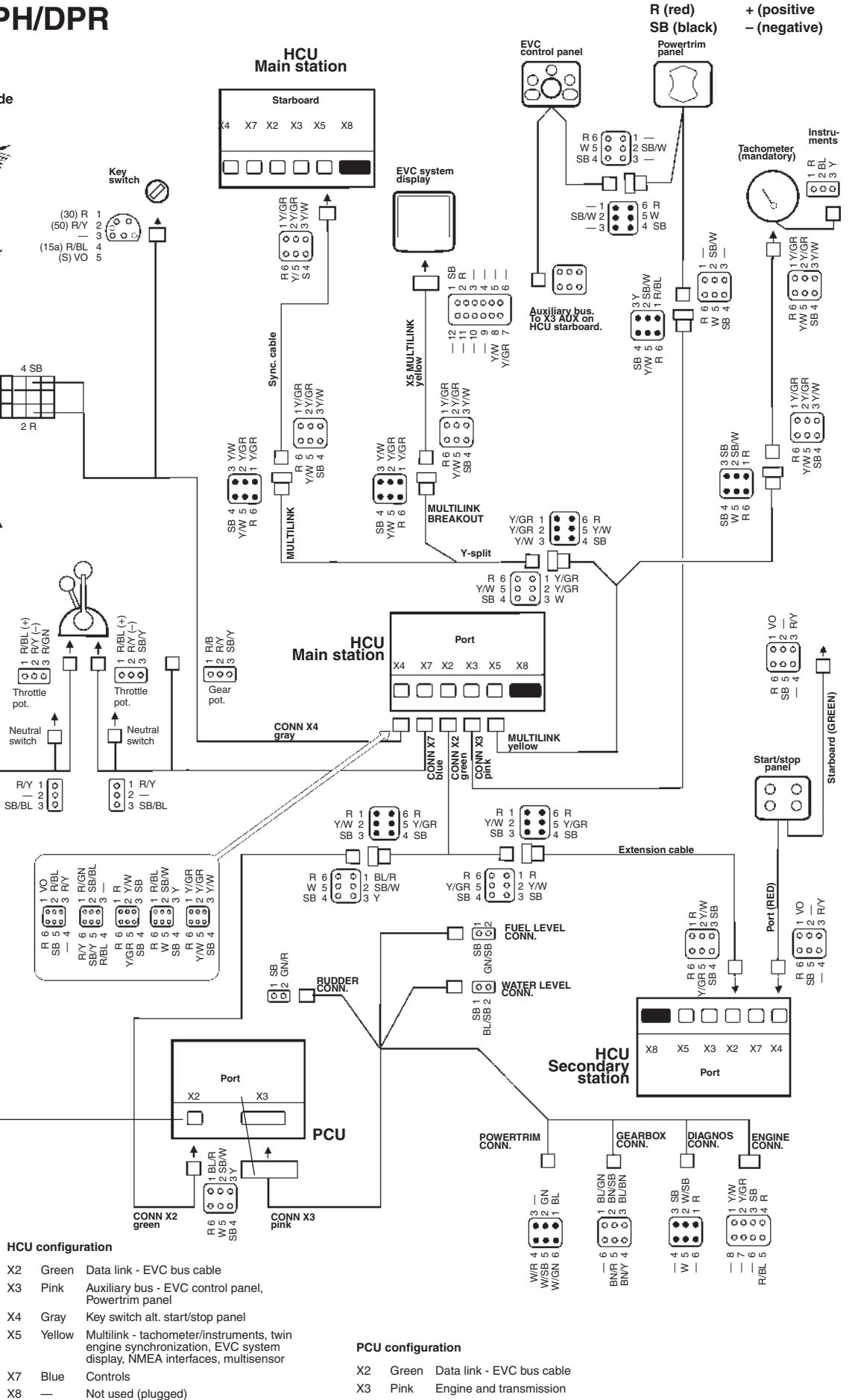
R	red
W	white
Y	yellow
P	pink
GR	gray
SB	black
BL	blue
LBL	light-blue
OR	orange
BN	brown
LBN	light-brown
GN	green
VO	violet
PU	purple

PCU X3 connector. Wire color and pin configuration. Drive DPH/DPR

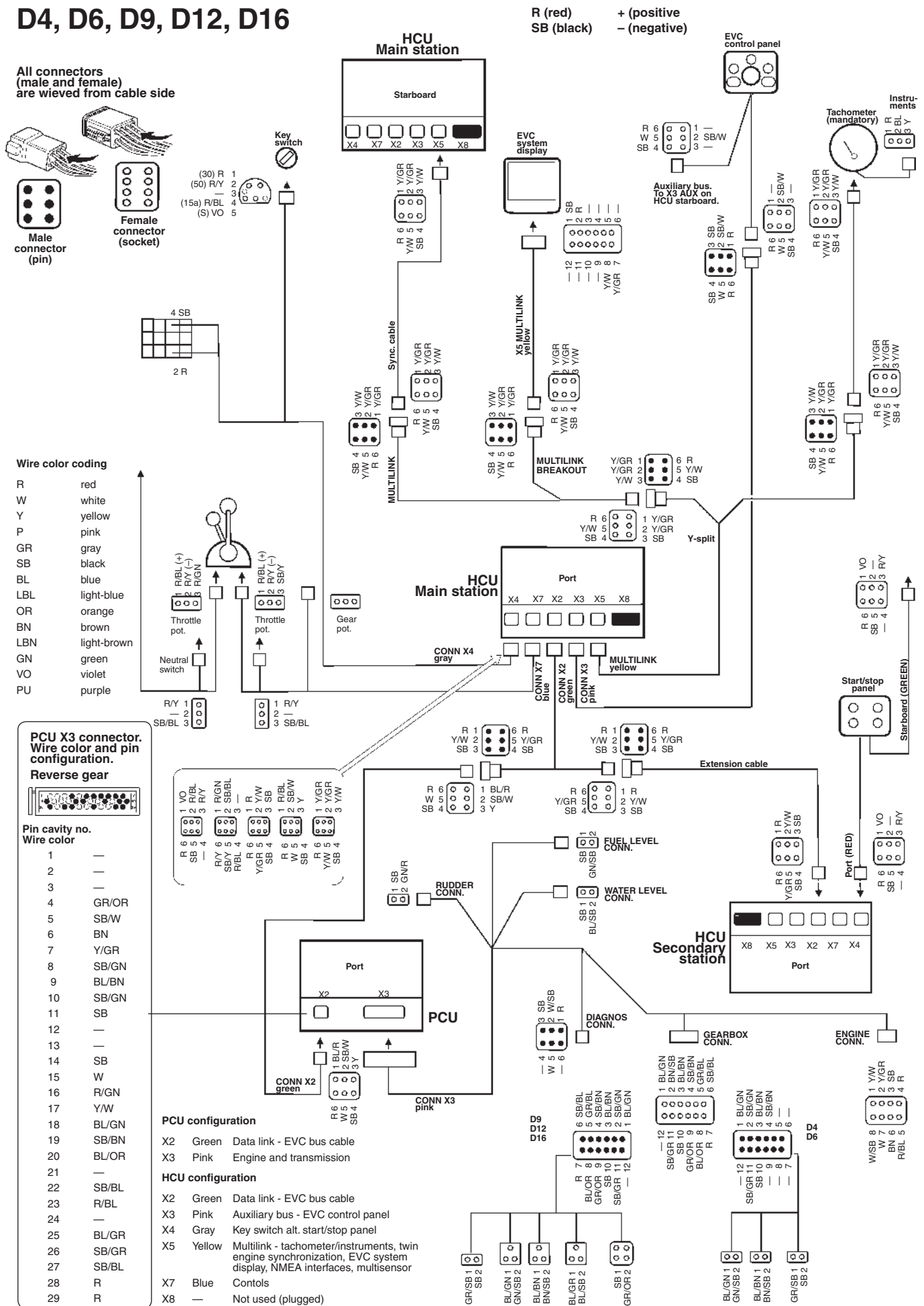


Pin cavity no. Wire color

1	SB/BN
2	SB/W
3	W/GN
4	—
5	SB/W
6	—
7	Y/GR
8	SB/GN
9	BL/BN
10	BL/BN
11	SB
12	R/W
13	R/BN
14	SB
15	W
16	R/GN
17	Y/W
18	BL/GN
19	BL/GN
20	—
21	Y/BN
22	BL
23	R/BL
24	—
25	GN
26	—
27	SB/BL
28	R
29	—



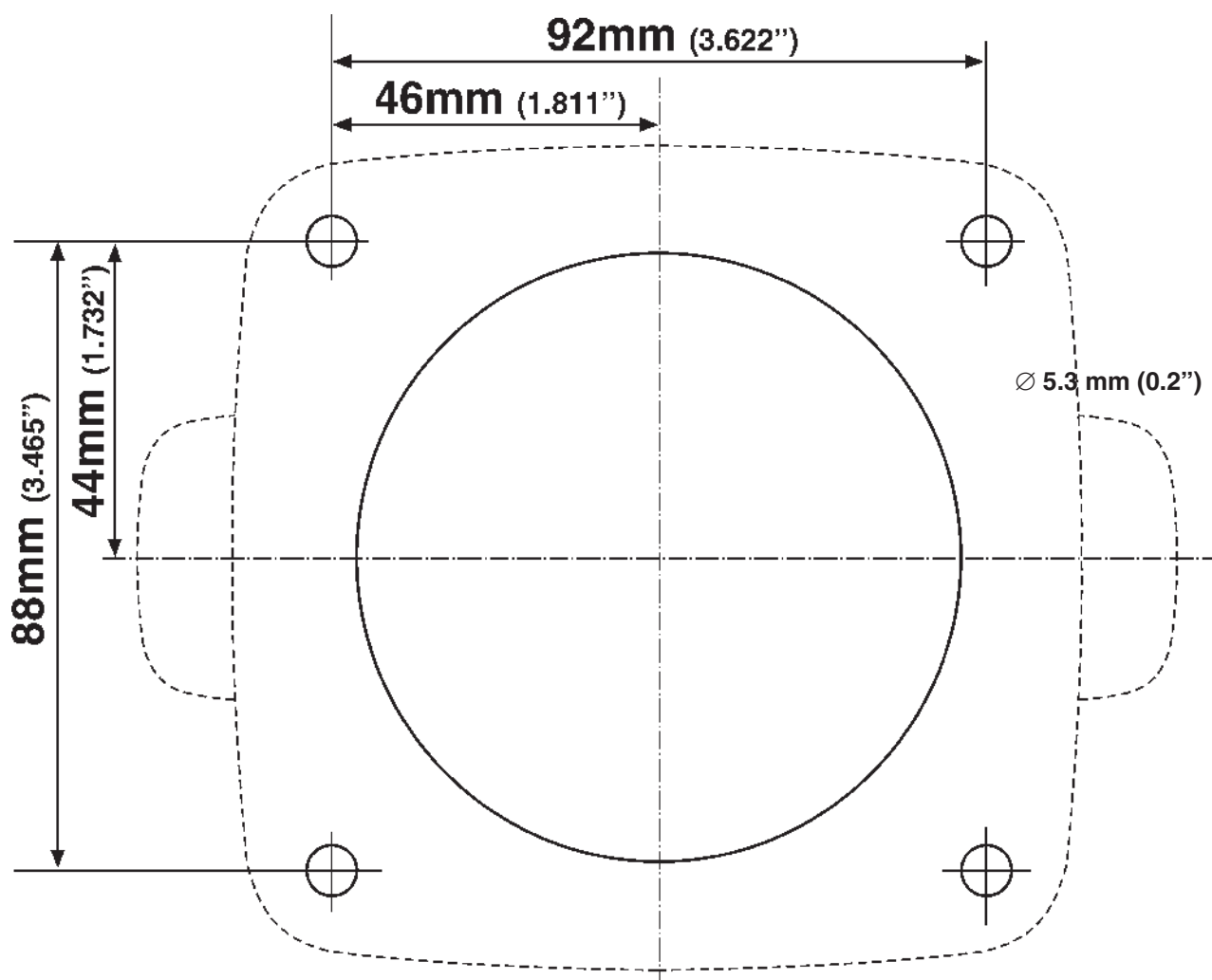
D4, D6, D9, D12, D16



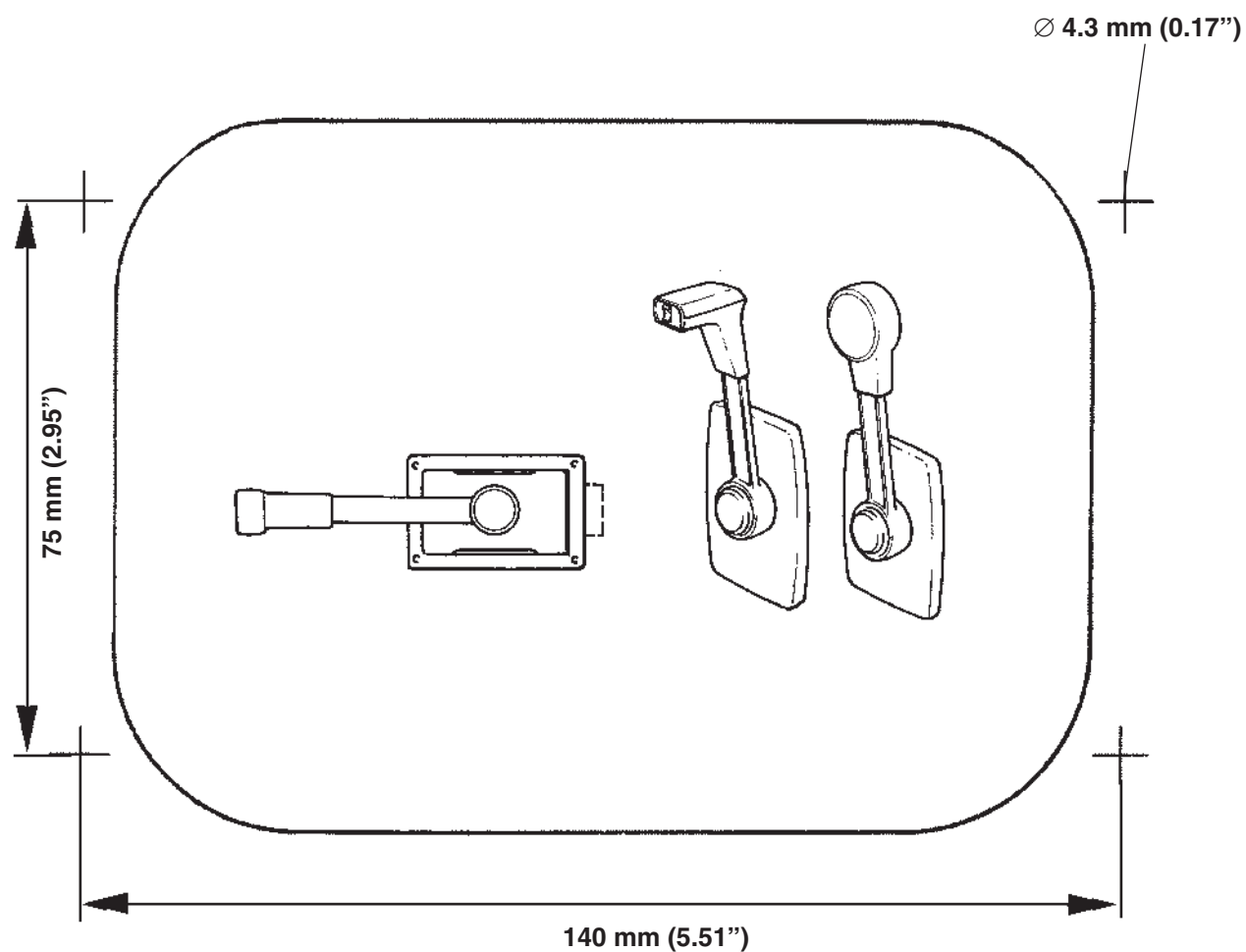
Templates for controls and panels

Control, top mounted.
Single and twin installations

SCALE 1:1



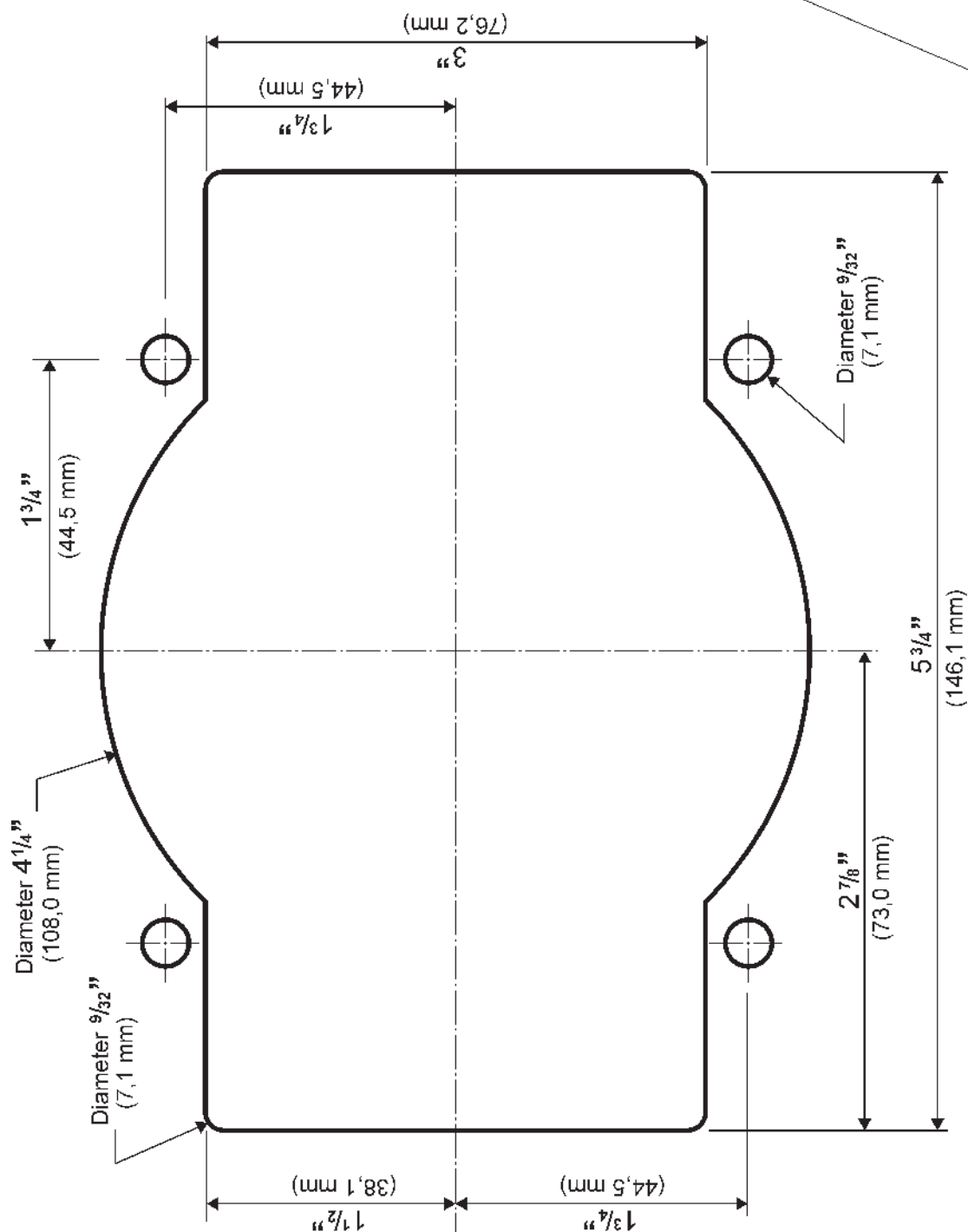
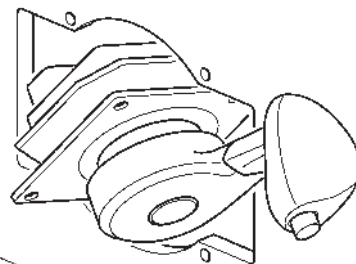
⚠ IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

Control, side mounted, type A**SCALE 1:1**

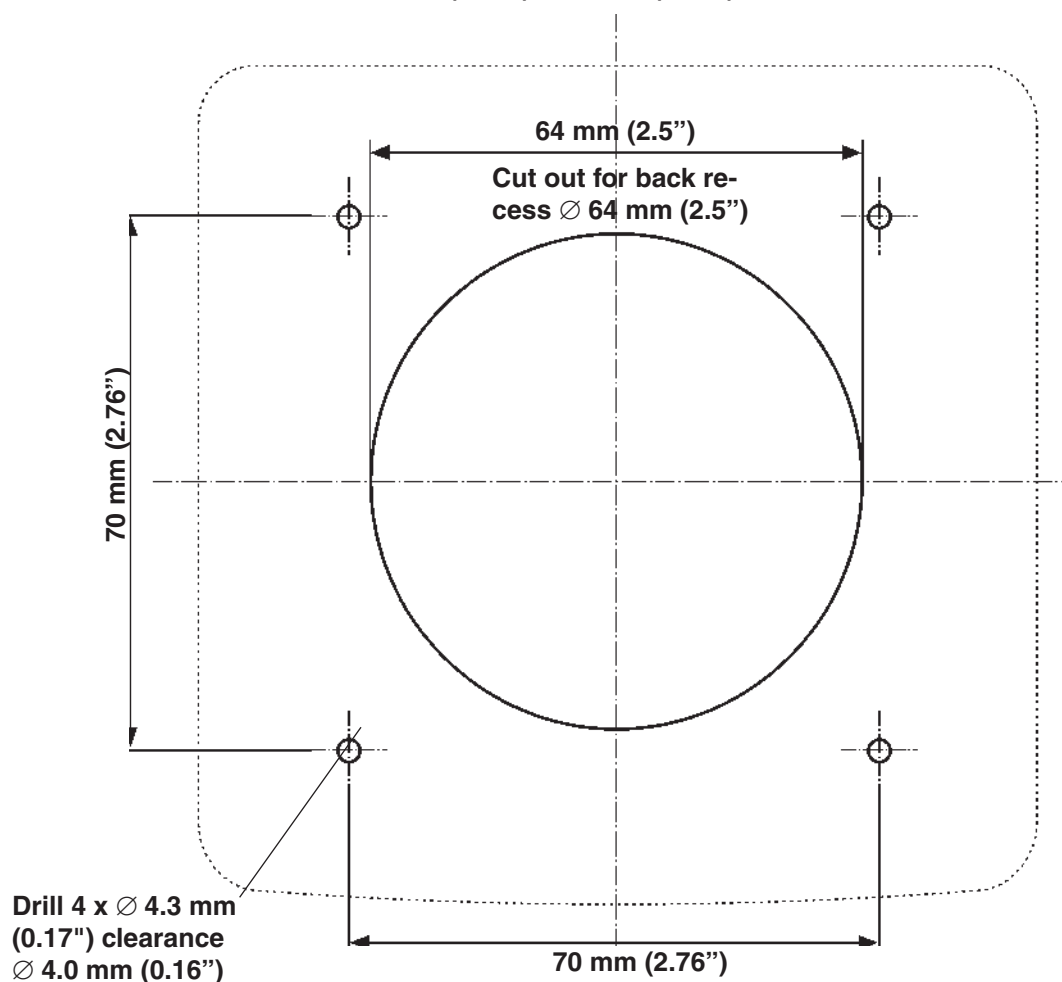
⚠ IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

Control, side mounted, type B

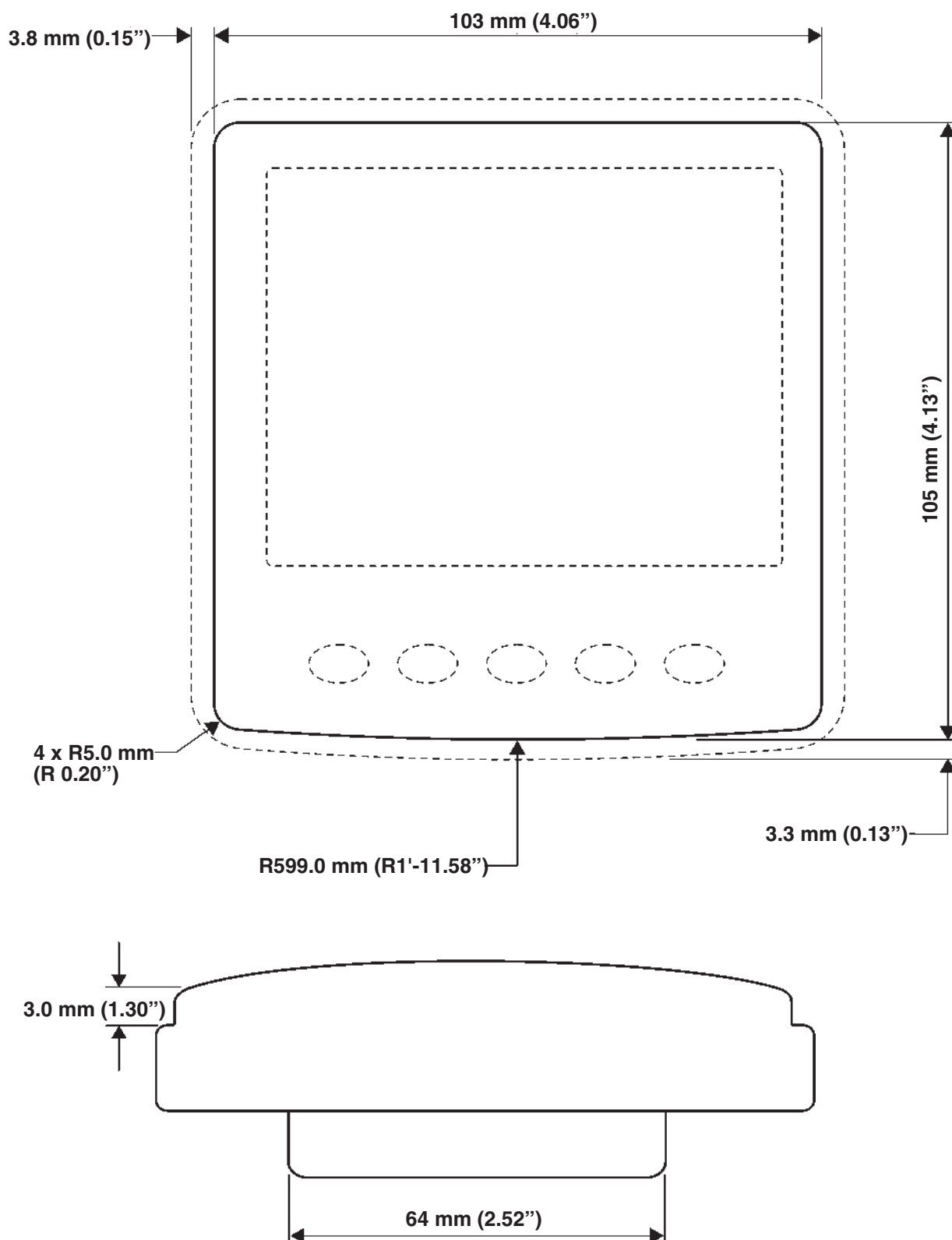
SCALE 1:1



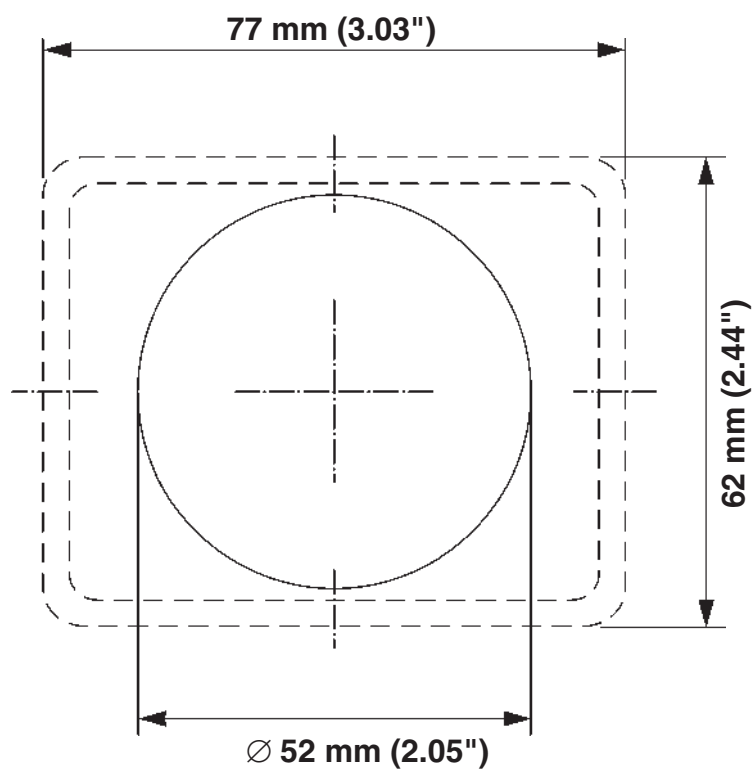
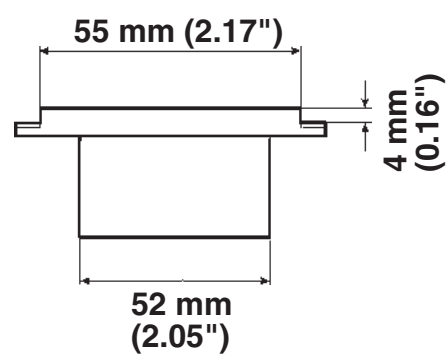
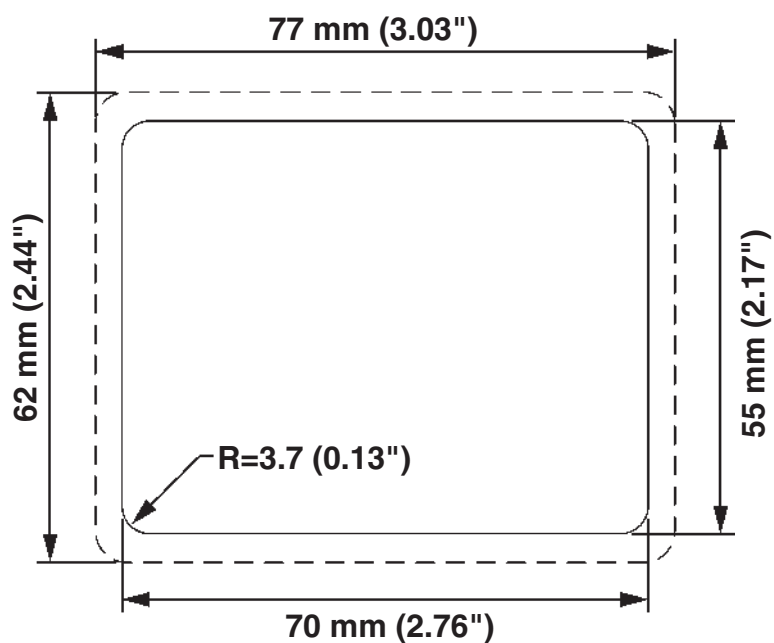
IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

EVC system display**SCALE 1:1****Overall size 110 mm (4.33") x 110 mm (4.33").****Fixing hole Positions****70 mm (2.76") x 70 mm (2.76").**

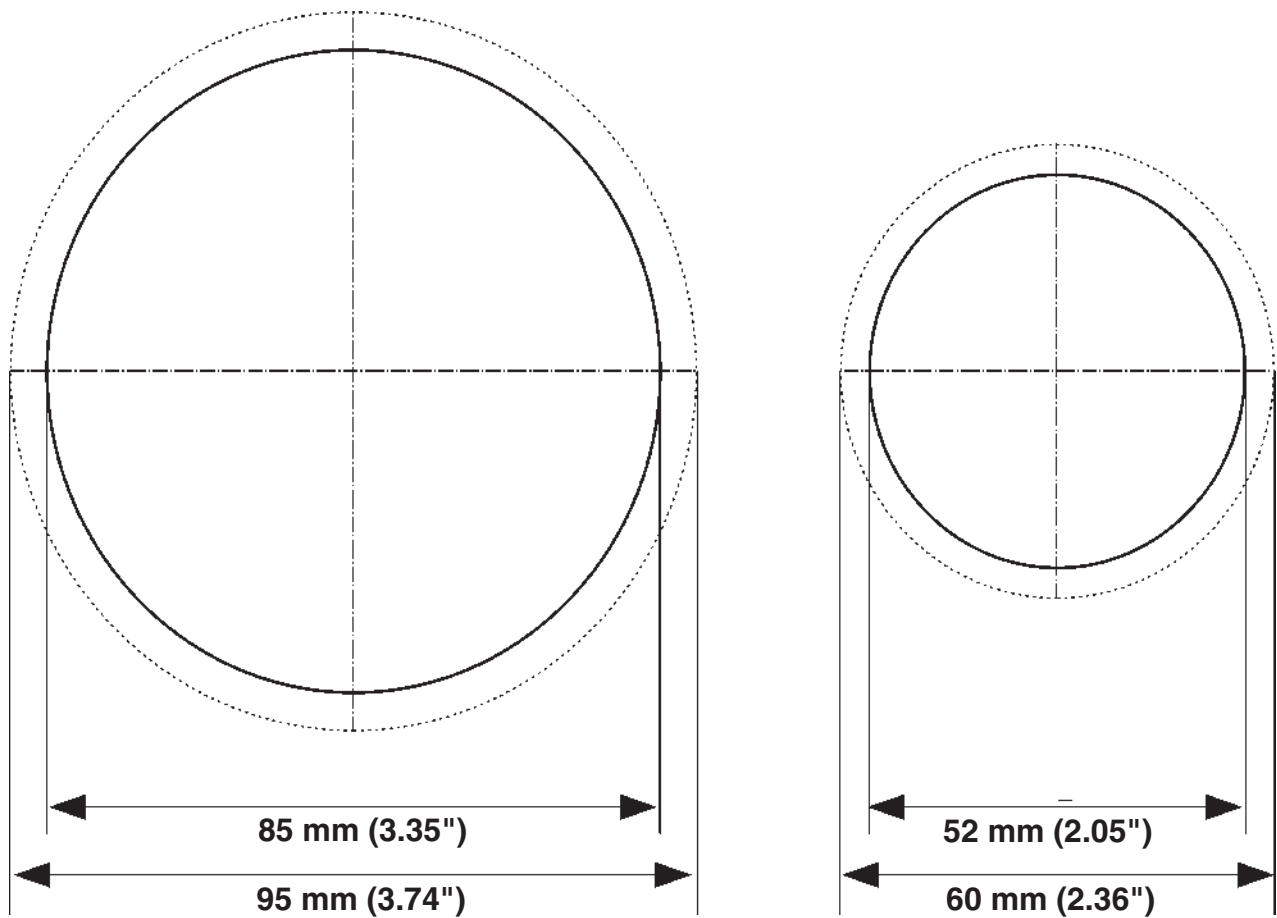
IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

EVC system display, flush-mounted**SCALE 1:1**

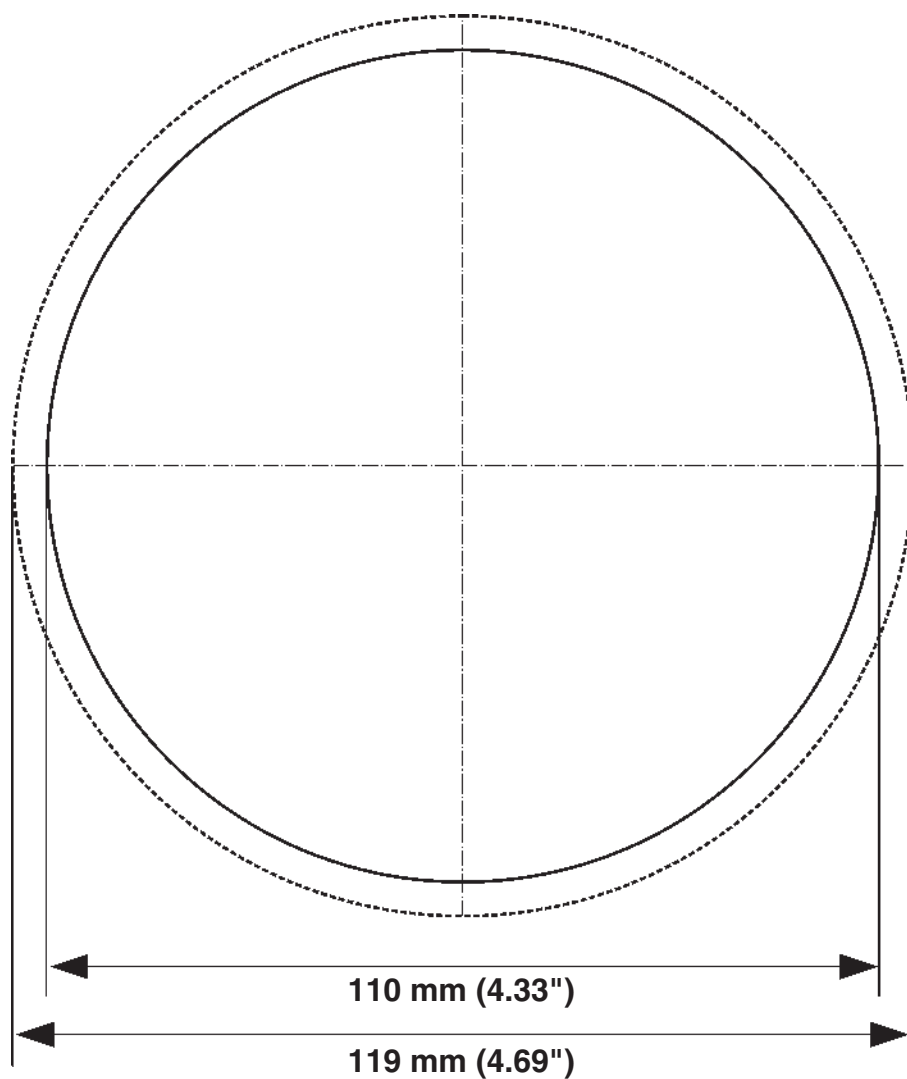
⚠ IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

Panel, frame-mounted**SCALE 1:1****Panel, flush-mounted**

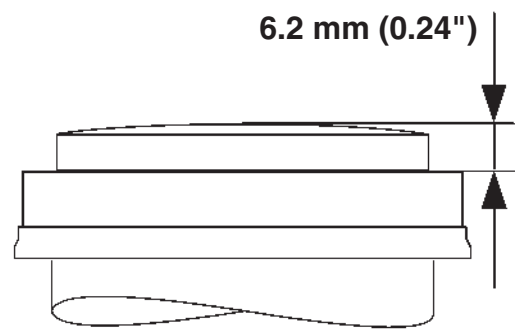
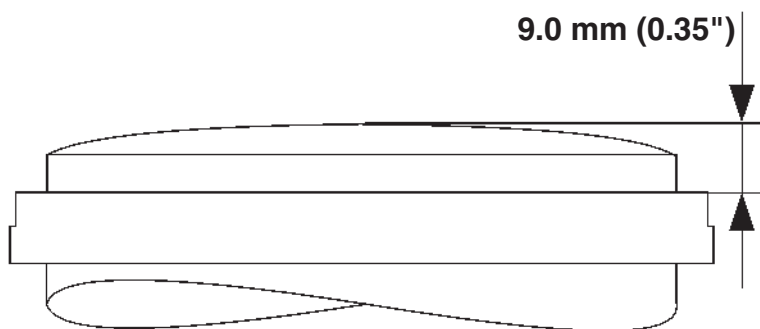
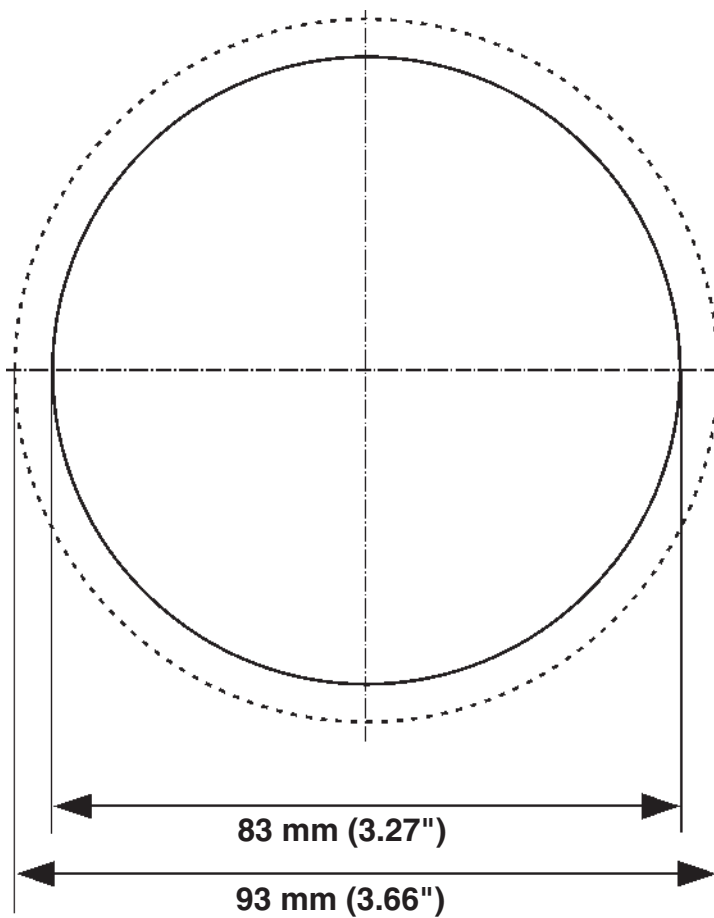
⚠ IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

Instruments, frame-mounted**SCALE 1:1**

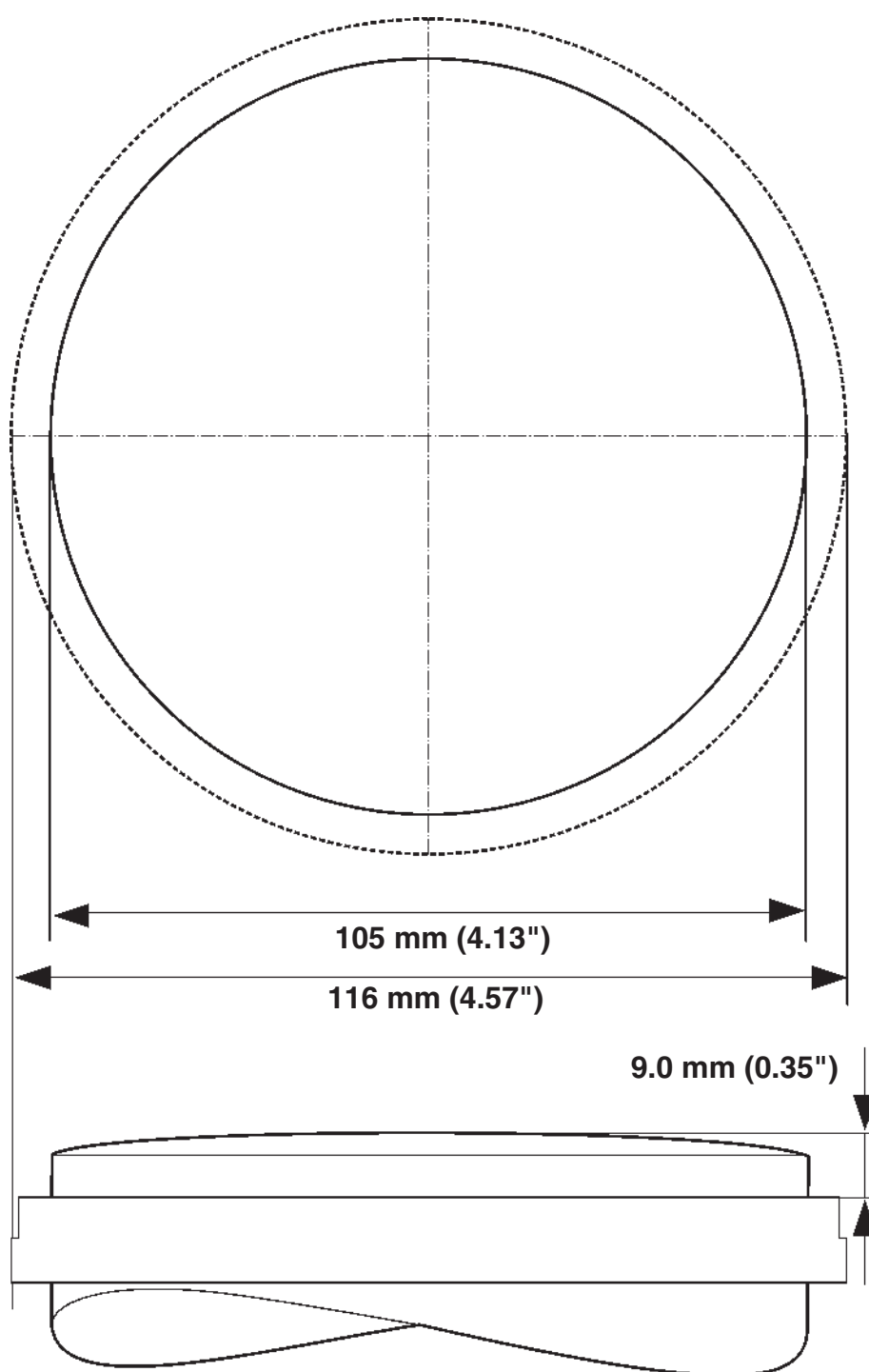
⚠ IMPORTANT! If this template has been photo-copied, check the dimensions before using it because photocopies can distort images slightly.

Instruments, frame-mounted**SCALE 1:1**

⚠ IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

Instruments, flush-mounted**SCALE 1:1**

⚠ IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

Instruments, flush-mounted**SCALE 1:1**

⚠ IMPORTANT! If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

Notes

References to Service Bulletins

[illegible]

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