Installation

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EVC^{EC}-C
Electronic Vessel Control

Volvo Penta IPS

Installation

Electronic Vessel Control EVC^{EC}-C Volvo Penta IPS 350/400/450/500/600

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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.

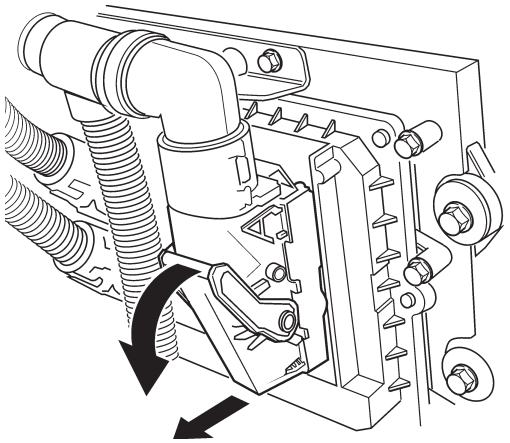
⚠ **IMPORTANT!** Used to draw your attention to something that can cause damage to or malfunction of a product or damage to property.

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.

⚠ **IMPORTANT!** Before carrying out electric arc welding, remove the connector from the engine control unit.

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.

⚠ 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 crankcase 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 responsability.

General information

About the Installation Manual

This publication is intended as a guide for the installation of the Electronic Vessel Control system (EVC) for Volvo Penta IPS 350, 400, 450, 500 and 600. 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.

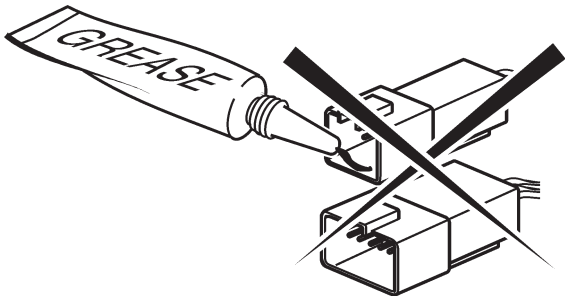
Plan installations with care

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.

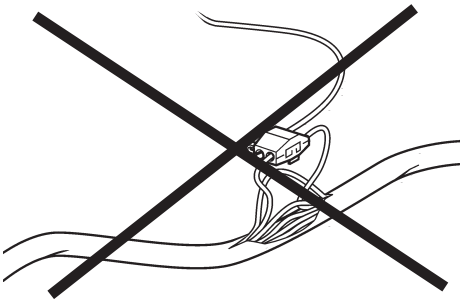
Plan the engine room so that it is easy to carry out routine service operations involving the replacement of components. Compare the engine Service Manual with the original drawings showing the dimensions.

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 this engine 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 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 as 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.

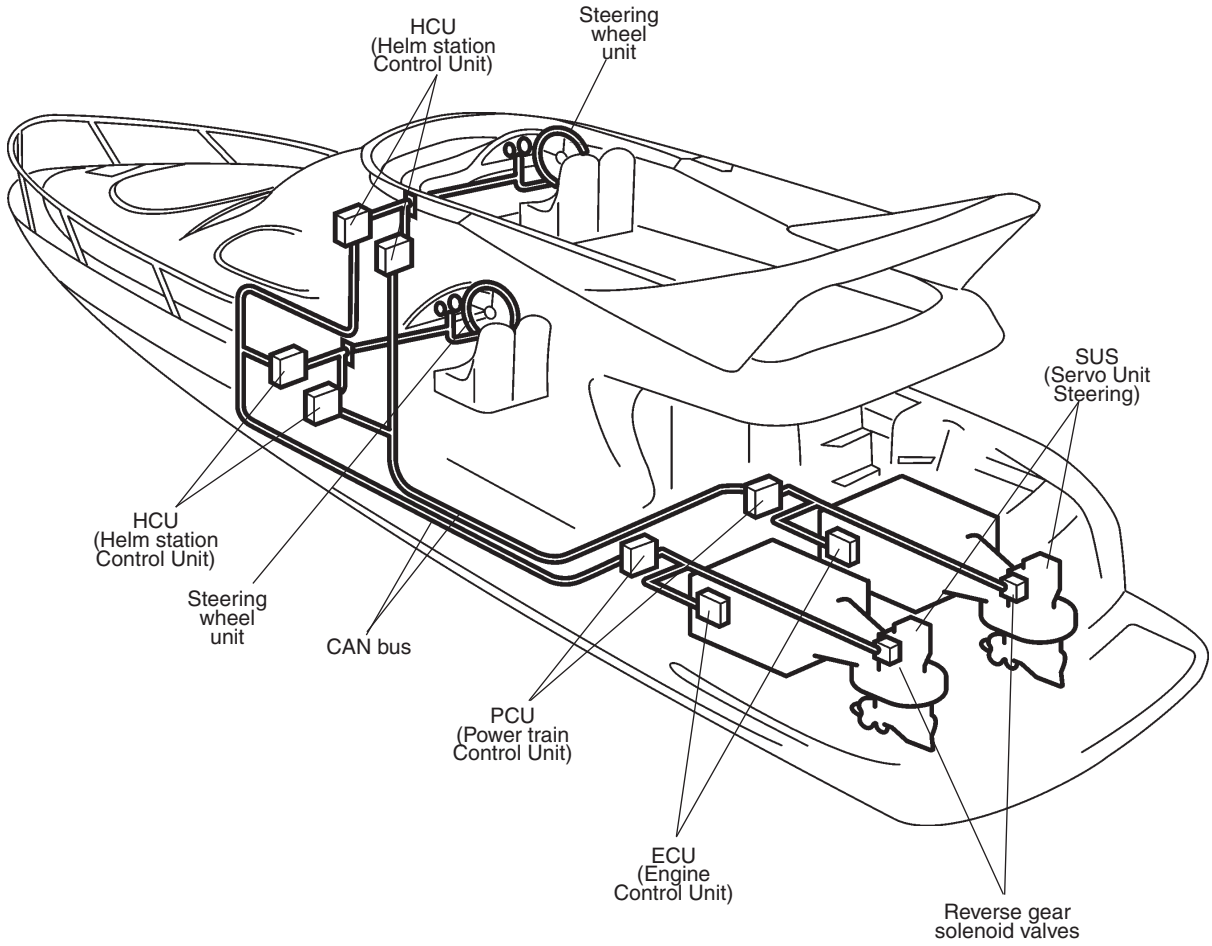
Conversion factors

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/kWh	g/hph lb/hph	0.736 0.00162	g/hph lb/hph	g/kWh g/kWh	1.36 616.78
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 mph	ft./s knots	3.281 0.869	ft./s knots	m/s mph	0.3048 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.

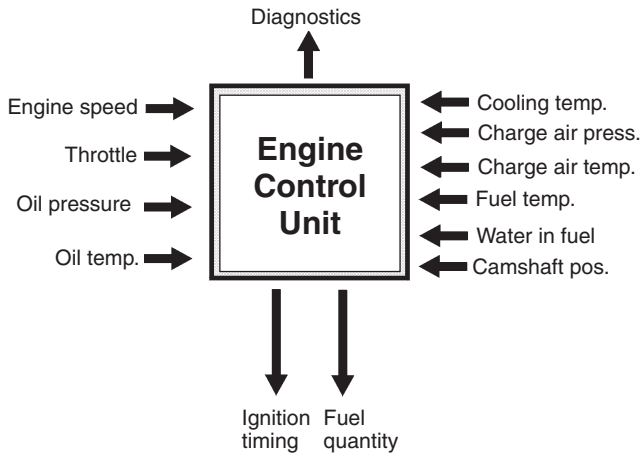
Engine monitoring and the EVC^{EC} system



Engine monitoring system

The engines are equipped with common rail system and electronically controlled injectors.

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 or a diagnostic tool.

Any fault is shown on the EVC system tachometer/ EVC system display and the VODIA diagnostic scan tool. The diagnostic tool supports 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

Steering system

The steering system is operated through the EVC system and gives a smooth and exact steering. It also provides options, which are not possible with a traditional steering system.

The helm steering unit sends an electrical signal via the EVC system to the servo unit fitted on the IPS.

The steering is progressive and the turn rate automatically adjusted to suit the actual boat speed for optimised comfort and boat handling.

For reliability, the steering system is built with redundancy: Two individual steering encoders in the steering wheel unit and communication between port and starboard EVC systems.

Engine speed and gear shift

Speed and gear shift control is handled electronically. The gear boxes have 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 options for station transfers in neutral position. Another safety feature is a helm station "lock function" to avoid unexcepted station transfers.

Engine synchronization

Engine synchronization results in better comfort, good fuel ecomomy 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.

Joystick

The joystick allows you to manoeuver the boat in low speed and with high precision. The joystick is connected to the steering CAN bus by the use of Y-split cables.

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).

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 consumtion, trip fuel consumption/time, remaining fuel, trip hours, trip distance, remaining distance to empty tank, remaining time until tank is empty.

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

The rudder indicator (drive leg position indicator) is a part of the IPS/EVC system. All you need is a gauge to connect to the instrument serial communication bus. The signal comes from the SUS.

Autopilot

The autopilot interface is connected to the EVC system. The interface supports auto pilot equipment of type Simrad and Raymarine.

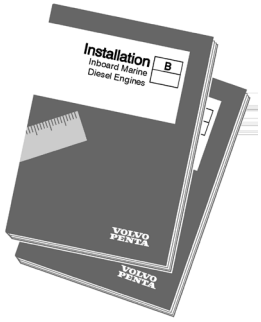
NMEA support

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

Boat speed, echo sounder and water temp (Multisensor)

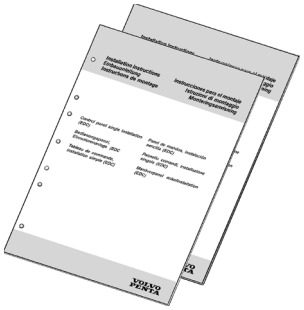
The multisensor is connected to the multilink cable. Data from the multisensor are shown in the EVC system display and the speedometer instrument.

Installation tools and literature



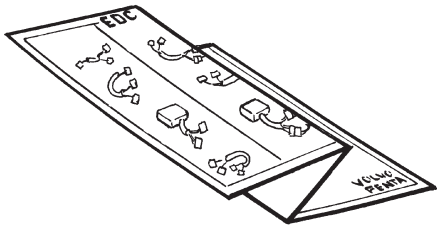
Installation manuals

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



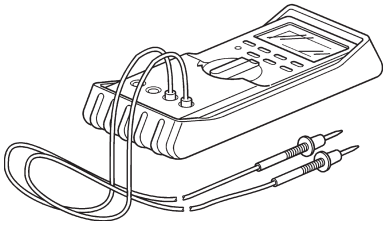
Installation instructions

Installation instructions are included in most kits.



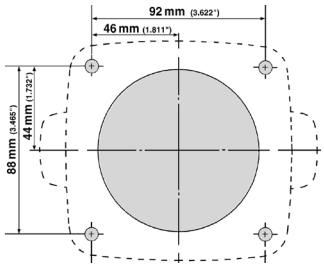
Poster

Installation procedure Electronic Vessel Control EVC Volvo Penta IPS



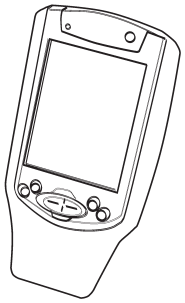
Multimeter

Special tool **9812519**



Templates for controls and panels

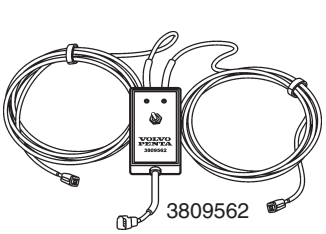
All installation instructions and templates are included in each kit. Please refer to the **Templates for controls and panels** chapter.

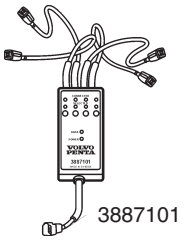


VODIA Diagnostic scan tool

The VODIA tool is used in diagnostic work to read fault codes in clear text. It is also used when calibrate the IPS drive leg positions and to log EVC parameters.

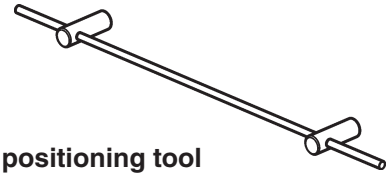
Please contact the Volvo Penta organization for ordering.





Switch box

Used together with the VODIA tool when calibrating the Volvo Penta IPS drive legs.
Special tool **3809562** or **3887101**



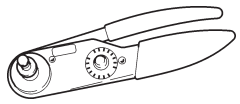
Drive center positioning tool

Used when calibrating the IPS drive legs.

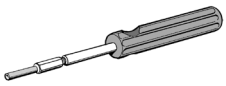
Special tool **3808507**

Other special equipment

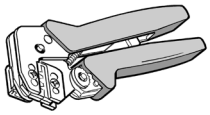
The tools below are intended for use in work on the cable harnesses of the engine. The tools are not included in Volvo Penta's range, they must be ordered from a local **AMP** or **Deutsch** dealer. If you experience problems in contacting a dealer, please contact Volvo Penta Quality Action Center for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



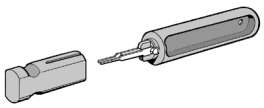
HDT-48-00



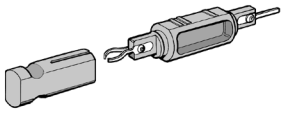
AMP 725 840



AMP 58 495

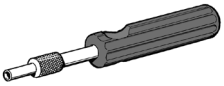


AMP 726 534



AMP 726 519

AMP 825 514



AMP 725 938

AMP 825 582

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

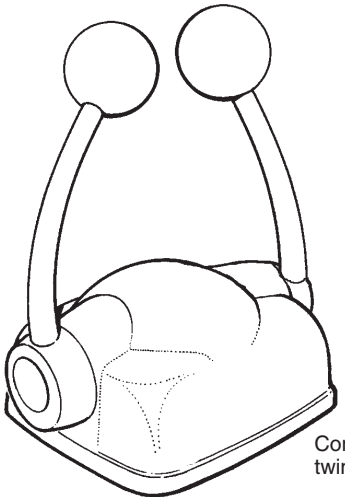
Deutsch service kit incl. connectors and crimping tool

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

Major components

Electronic controls

Top mounted controls

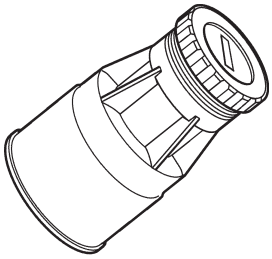


Controls,
twin installation

Lever controls for electronic control of engine speed and gear shifting. Available in black or stainless steel housing.

NOTE! From model year 2006 the controls are equipped with neutral switches.

Key switch, main station

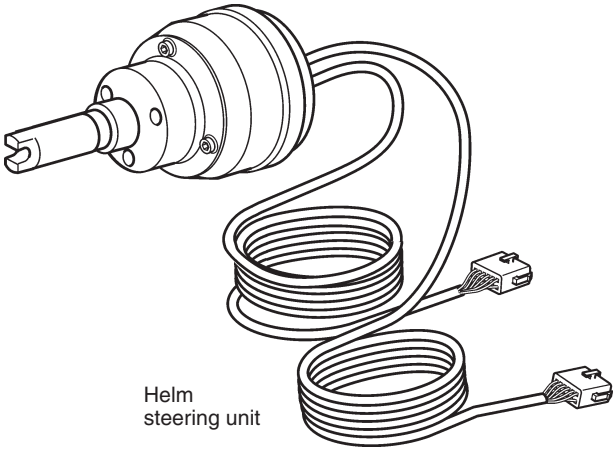


On the main helm station a key switch kit to power up the system and start/stop the engine must be installed.

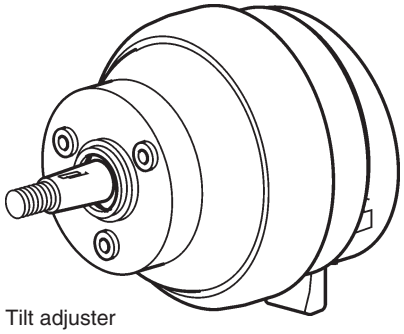
The kit for twin installations has two switches which can be operated with the same key.

Steering system

Helm steering unit including wheel tilt adjuster



Helm
steering unit



Tilt adjuster

The helm steering unit has a number of position sensors and two cable harnesses, length 2.5 m (8.2 ft). The cables are connected to the HCUs.

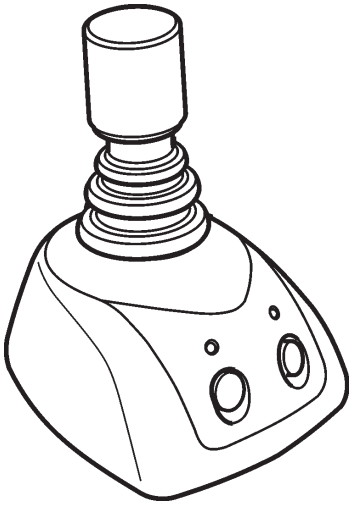
No extension cables are allowed in the steering system.

The tilt adjuster is mounted on the helm steering unit. It makes it possible to tilt and lock the wheel ± 24° in steps of 12°.

⚠ **IMPORTANT!** The tilt adjuster is mandatory. Always mount the tilt adjuster to the steering unit.

The conical end of the shaft is compliant with both UNI EN 288848 and ABYC P21.

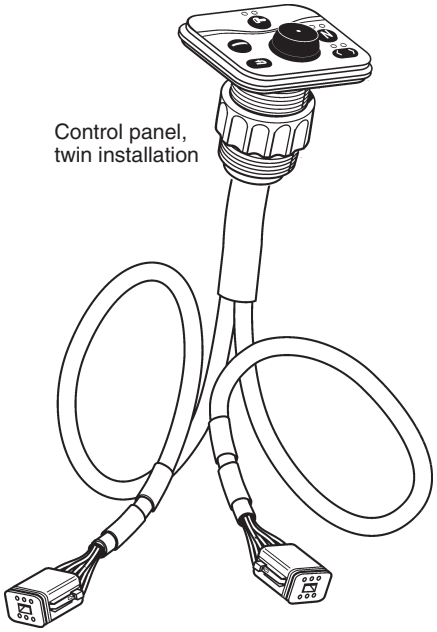
Joystick steering unit (option)



The joystick unit is connected to the steering system (the CAN bus) by the use of Y-split cables, length 2.5 m (8.2 ft). The mounting hole diameter is 52 mm (2.05").

No extension cables are allowed.

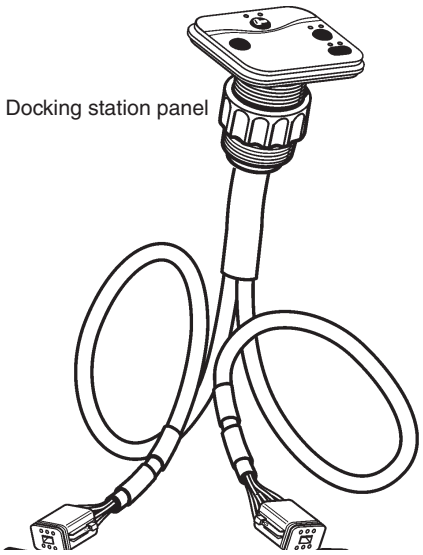
EVC control panel



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.

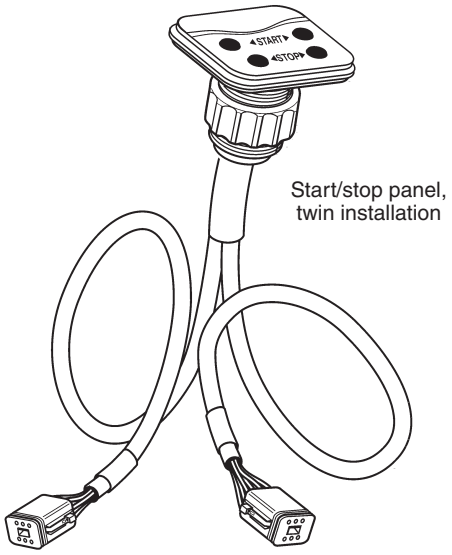
Docking station panel



A docking station panel is required to start/stop the engines from a docking station.

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 engines from a secondary helm station. Volvo Penta recommend a start/stop panel on the secondary station but a key switch may be used.

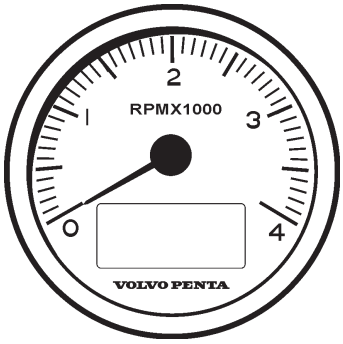
The panel can be mounted with a frame or flush on dashboard. The panels are supplied with all necessary connections.

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.

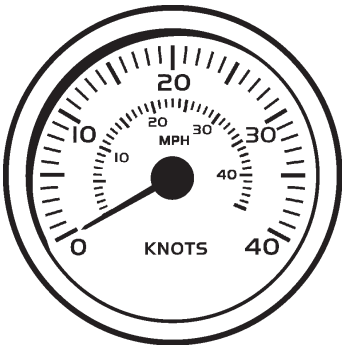
Some of the most common instrument types are shown below.



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

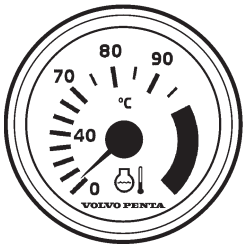
The EVC system tachometer has an integrated buzzer and a communication LCD showing alarms, diagnosis data and information about the system.

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

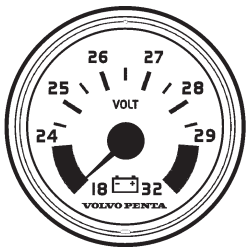


Speedometer
∅ 85 mm (3.35")
∅ 110 mm (4.33")
(knots, mph)

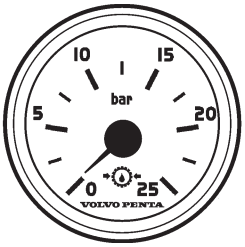
Engine oil pressure
∅ 52 mm (2.05")
(bar alt. psi)



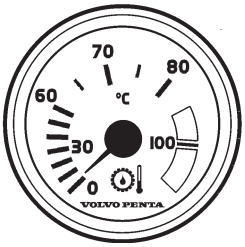
Coolant temperature
∅ 52 mm (2.05")
(°C alt. °F)



Voltage
∅ 52 mm (2.05")
(12V alt. 24V)



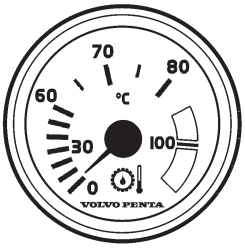
Oil pressure, transmission
∅ 52 mm (2.05")
(bar alt. psi)



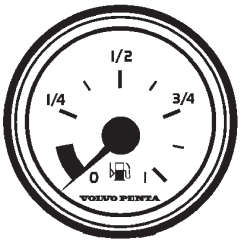
Oil temperature, transmission
∅ 52 mm (2.05")
(°C alt. °F)

Rudder indicator instrument
∅ 52 mm (2.05").

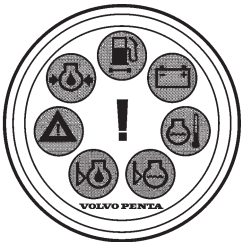
Supported internally in the IPS-unit (SUS). The SUS sends information about rudder position to the rudder indicator. No special sender is needed.



Oil temperature, transmission
∅ 52 mm (2.05")
(°C alt. °F)



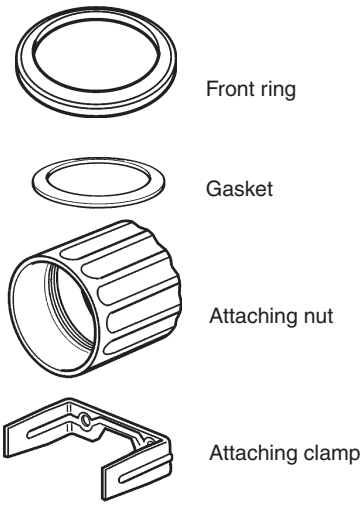
Fuel level
∅ 52 mm (2.05")



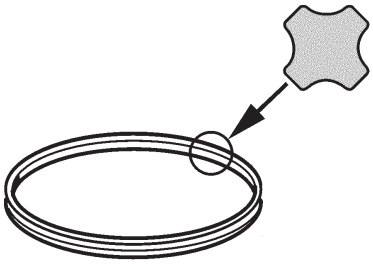
Alarm panel (option)
∅ 52 mm (2.05")

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.

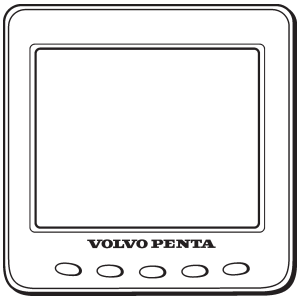


Gasket for flush mounted instruments



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

EVC system display, including cable



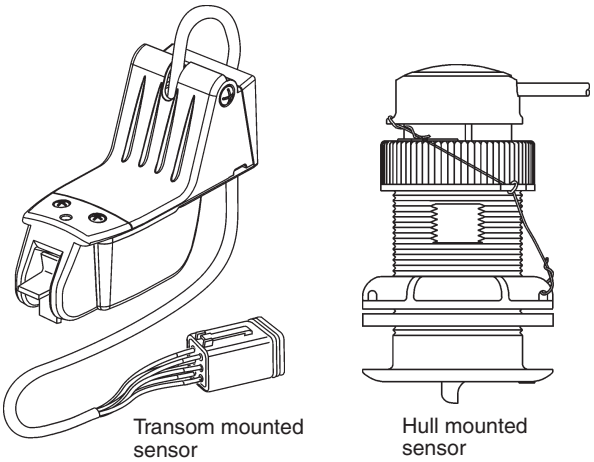
The Volvo Penta EVC system display is an on-board instrument for indication of engine operating values, boat speed and other data. The display consists of a self-contained, computerised unit for fixed installation on a dash board. A Liquid Crystal Display (LCD) screen is used for data presentation.

The EVC 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.

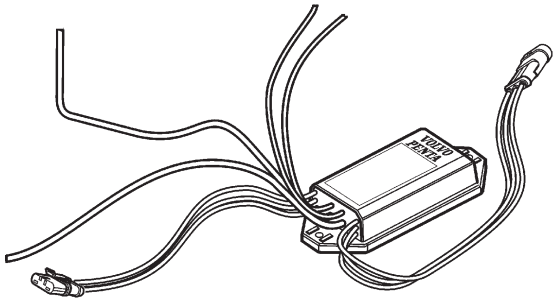
⚠ **IMPORTANT!** An EVC display can be connected together with a tachometer. The display can also substitute a tachometer. The EVC system must have either a tachometer or a display.

Multisensors



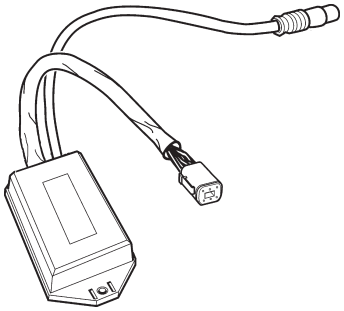
The multisensor is available in two designs, for transom mounting and for hull mounting. The multisensor submits data of boat speed, water depth and water temperature. Data can be shown in the EVC display. The speed data is also available in an instrument (speedometer).

Auxiliary dimmer unit (ADU)



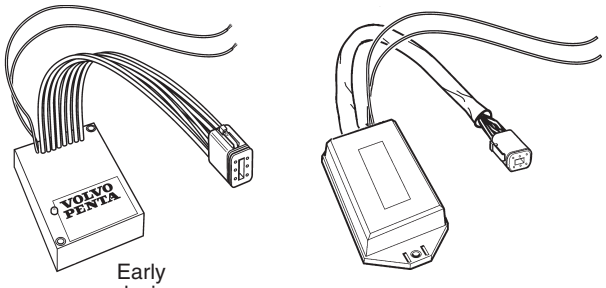
Dimmer for instrument lights in auxilliary instruments and equipment. Instruments not supported by the EVC system (third party instruments). The function is controlled by the multifunction button (⊖)on the EVC control panel.

Autopilot gateway



This gateway is an interface to an autopilot that supports the IPS steering system.

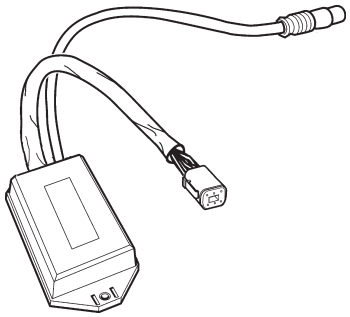
NMEA 0183 interface



Early design

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.

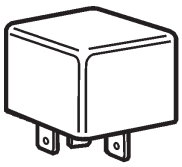
NMEA 2000 interface



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.

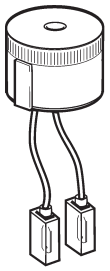
Relay for external accessories



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

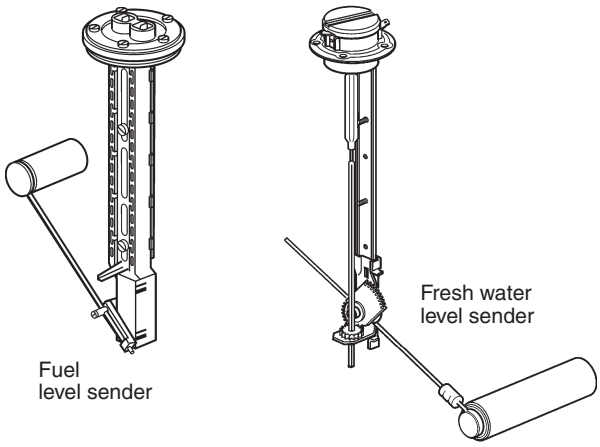
Relay 12 V, 20A
Relay 24 V, 20A

Buzzer (option)



The buzzer is to be mounted in a consealed place, prefeably 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").

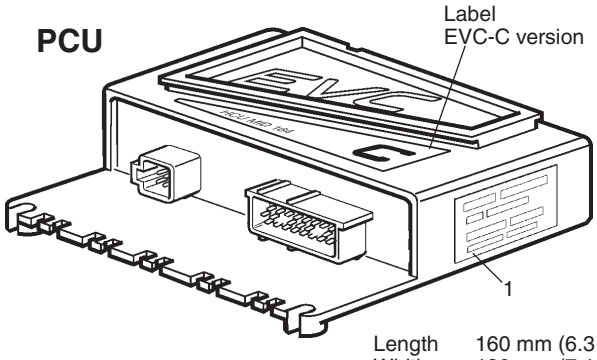
Fuel level sender resistance (two types):
3 –180 ohms, 3 ohms = empty tank
240 – 30 ohms, 240 ohms = empty tank

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.

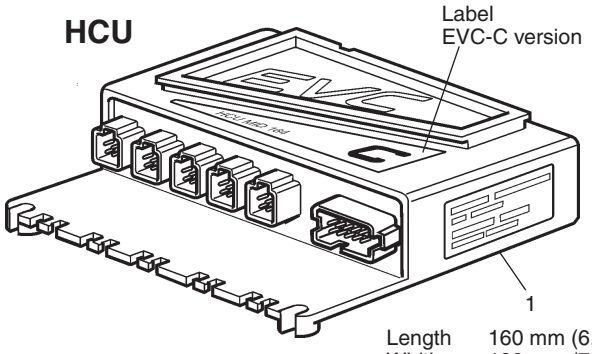
Power train control unit, PCU
Helm station control unit, HCU

PCU



Length	160 mm (6.3 ")
Width	180 mm (7.1 ")
Heigth	65 mm (2.6 ")

HCU



Length	160 mm (6.3 ")
Width	180 mm (7.1 ")
Heigth	65 mm (2.6 ")

The PCU node is to be located in the engine room. The PCU communicates with the engine and the IPS unit. 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.

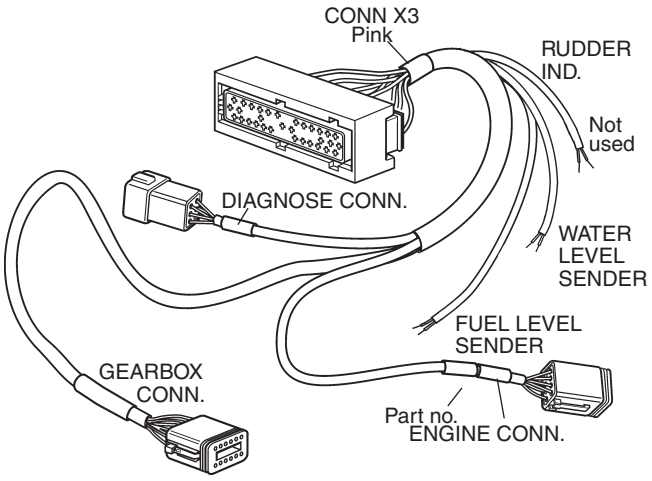
⚠ **IMPORTANT!** On the PCU and HCU there is a label (1), with serial no. and chassis identification. There are also corresponding labels on the engine. The reason for having individually programmed PCU:s and HCU:s is that the software must correspond to each engine specification or helm specification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

The chassis id. number on the PCU and HCU shall correspond to the chassis id. number on the engine and on the Steering Unit Servo (SUS).

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

Cables and cable harnesses

Engine/transmission cable, 29-pin

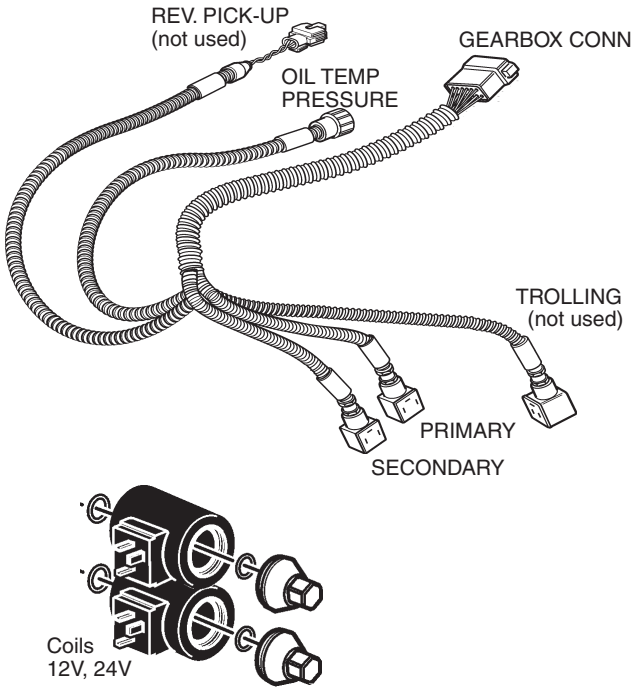


The cable connects the PCU to the engine, IPS unit (gear box), fuel level sender (black PVC-coating) and fresh water sender (blue PVC-coating).

The harness also has a diagnostic connector to the VODIA diagnostic tool.

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

Transmission cable, 12-pin included solenoid coils

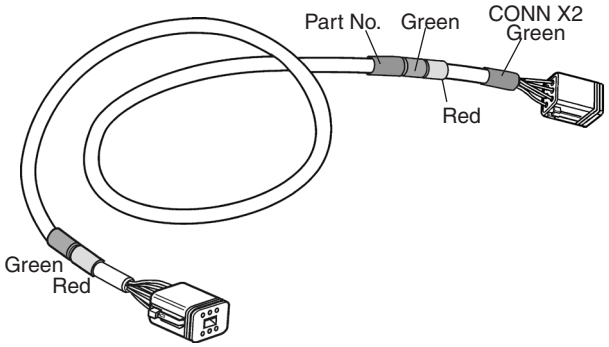


The cable harness connects the gear shift solenoids and the oil temperature and pressure sender on the IPS unit to the EVC system. The harness kit also includes the two connectors/coils to the solenoid valves (12V or 24V), including O-rings.

The coils have to be mounted prior to connection of the harness.

Harness length, m (ft): 1.3 (4)

Standard bus cable, 6-pin

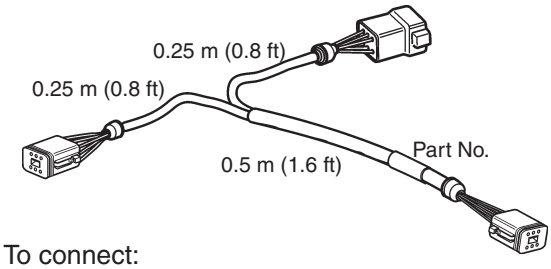


The cable must only be used to connect the PCU to the HCU.

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

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

Y-connector, EVC bus cable, 6-pin

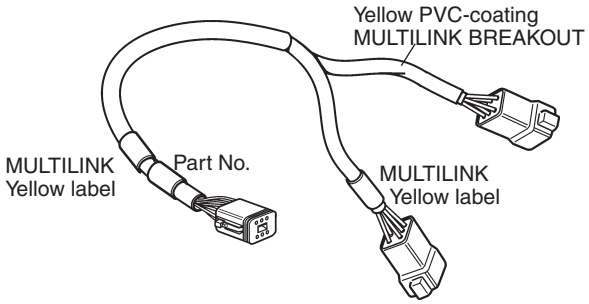


To connect:

- standard bus cable to HCU in systems with secondary helm stations.
- steering cable at the PCU to the Steering Unit Servo

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

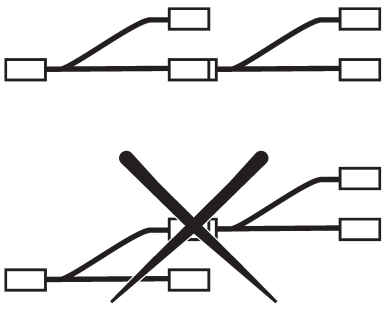
Y-split multilink, 6-pin



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

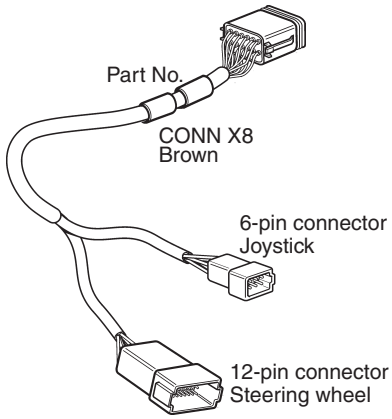
Length, m (ft): 0.5 (1.6)

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



NOTE! Do not install a HCU or another Y-split to the MULTILINK BREAKOUT (yellow PVC-coating). If more than one Y-split cable is needed connect them in chain, MULTILINK to MULTILINK.

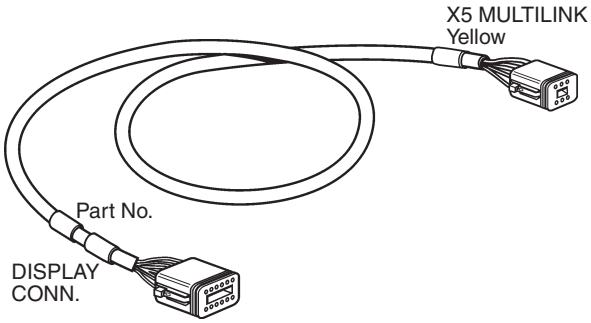
Y-split steering, 12-pin/6-pin



To connect the cables from the helm steering unit and the joystick to the HCU X8:Steering connection.

Length, m (ft): 0.5 (1.6)

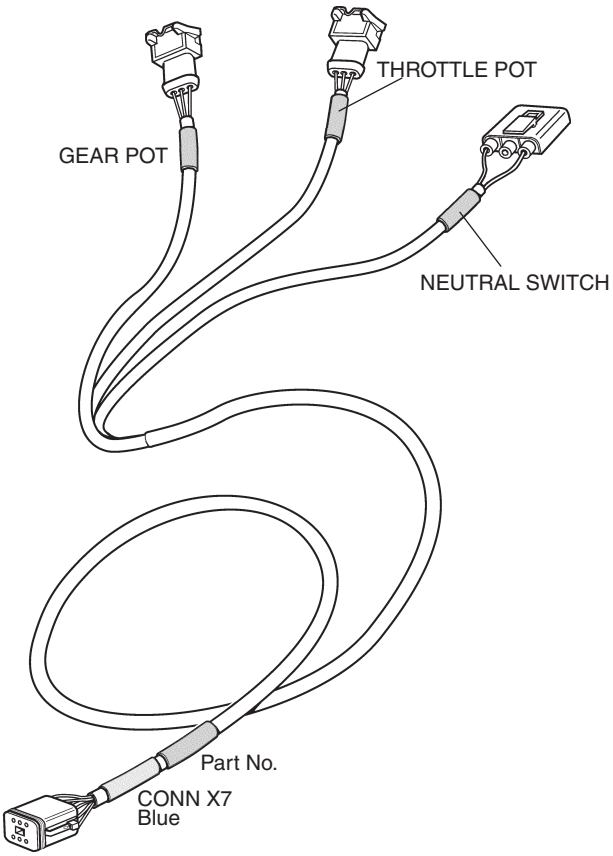
Display cable, 6-pin/12-pin



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.

Length, m (ft): 1.5 (5)

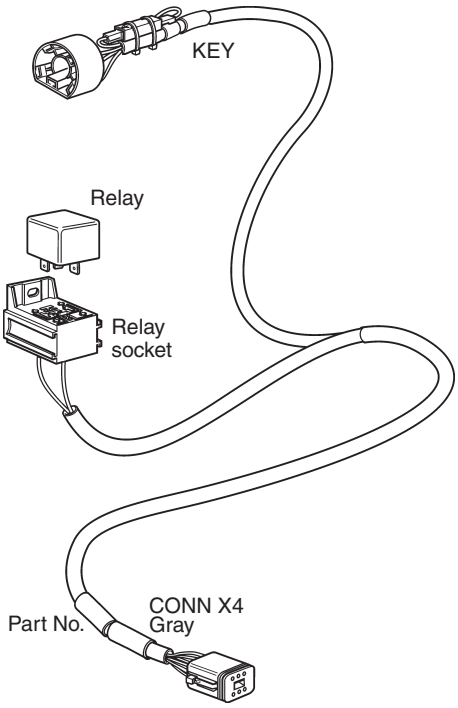
Control lever cable, 6-pin



Connects the controls to the HCU.

Length, m (ft): 1.5 (5)

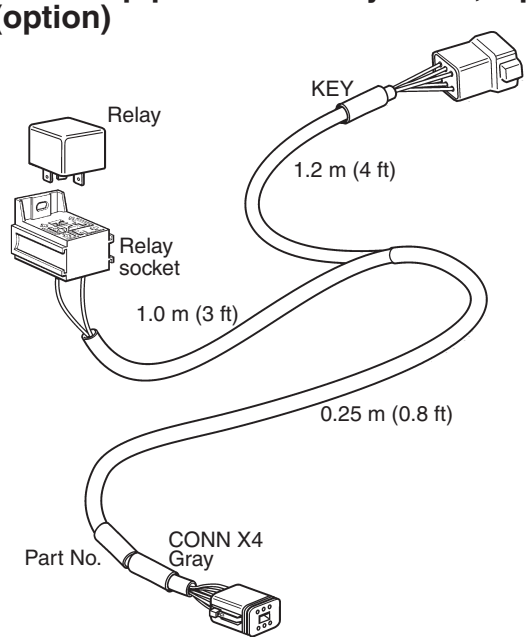
Key switch and relay cable, 6-pin



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. Relay has to be ordered separately.

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

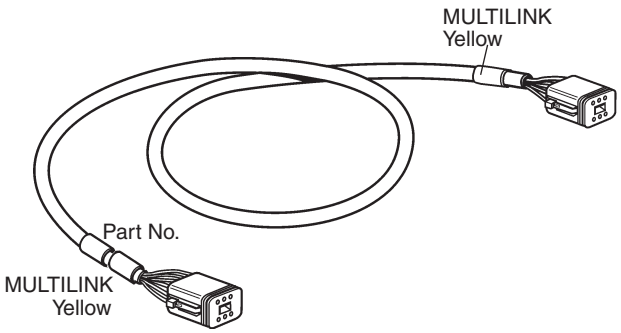
Start/stop panel and relay cable, 6-pin (option)



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): See figure.

Multilink/tachometer and synchronization cable, 6-pin



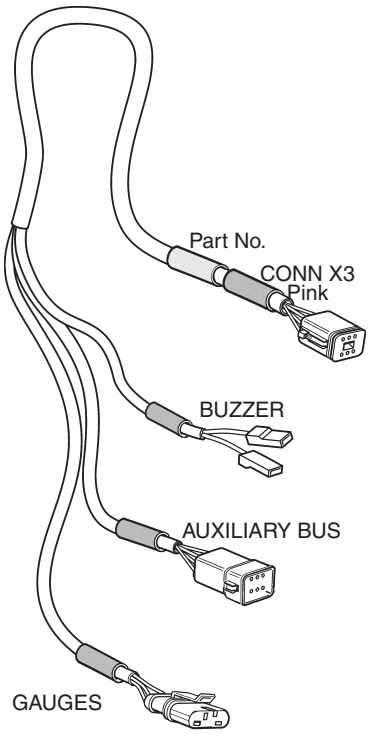
This cable has female/female connectors. It is used to connect the tachometer to the multilink chain.

The cable is also used to connect the starboard and port HCUs, to synchronize the engines.

Two female connectors.

Length, m (ft): 1.5 (5)

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

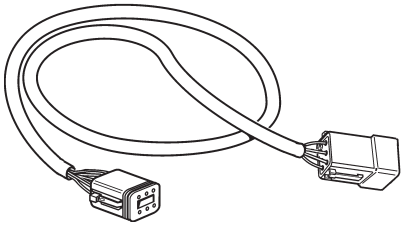


This cable harness is used when an EVC display substitutes a tachometer and/or when you need an additional buzzer. The harness connects the HCU to the instrument bus cable (easy link), the auxiliary bus and the buzzer .

Length, m (ft): 1.5 (5)

Extension cables

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.

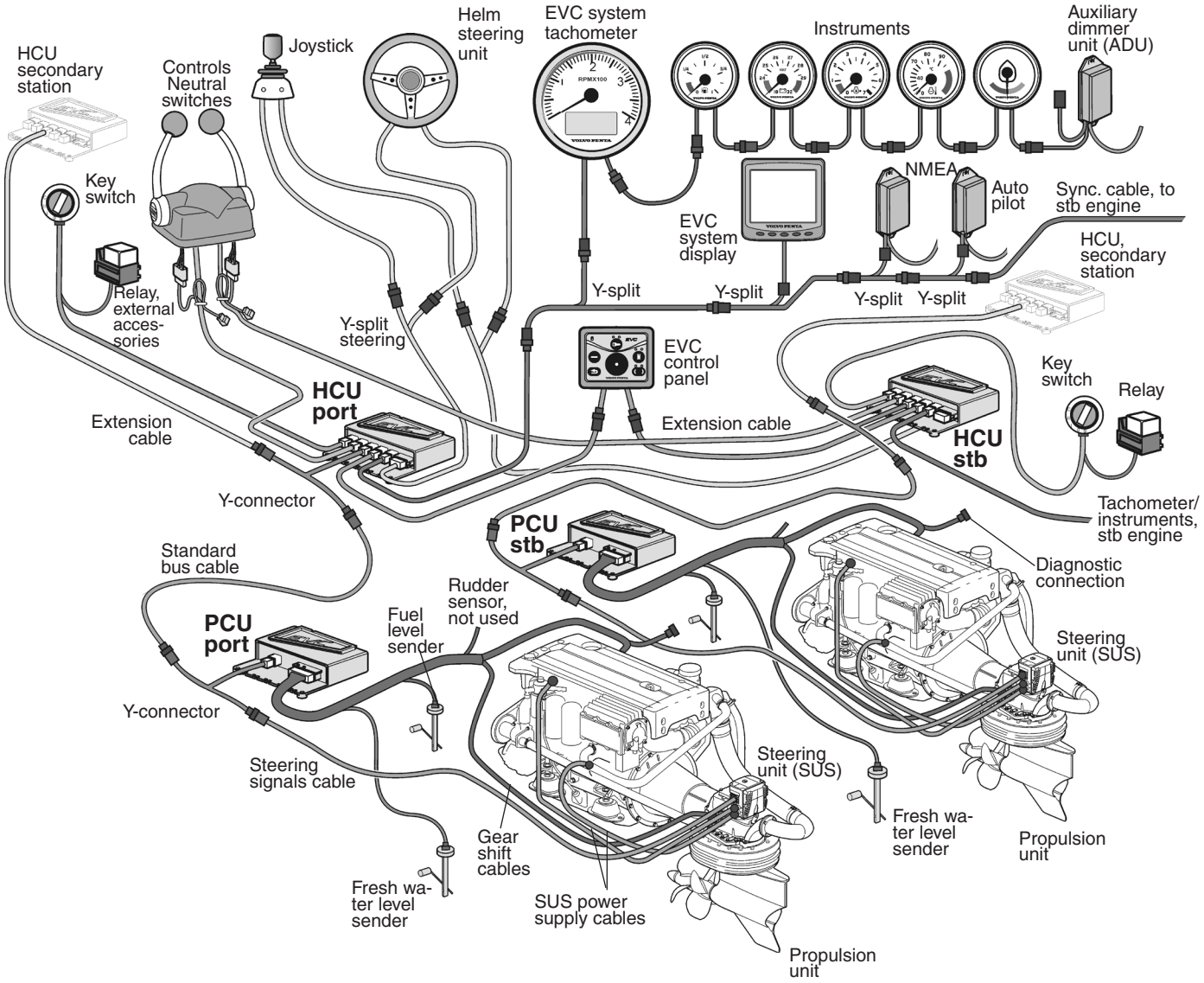
Length m: 1.5, 3, 5, 7, 9, 11
Length ft: 5, 10, 16, 23, 30, 36

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



NOTE! The nodes are always located close to the components they control. A power train node, the Power train 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.

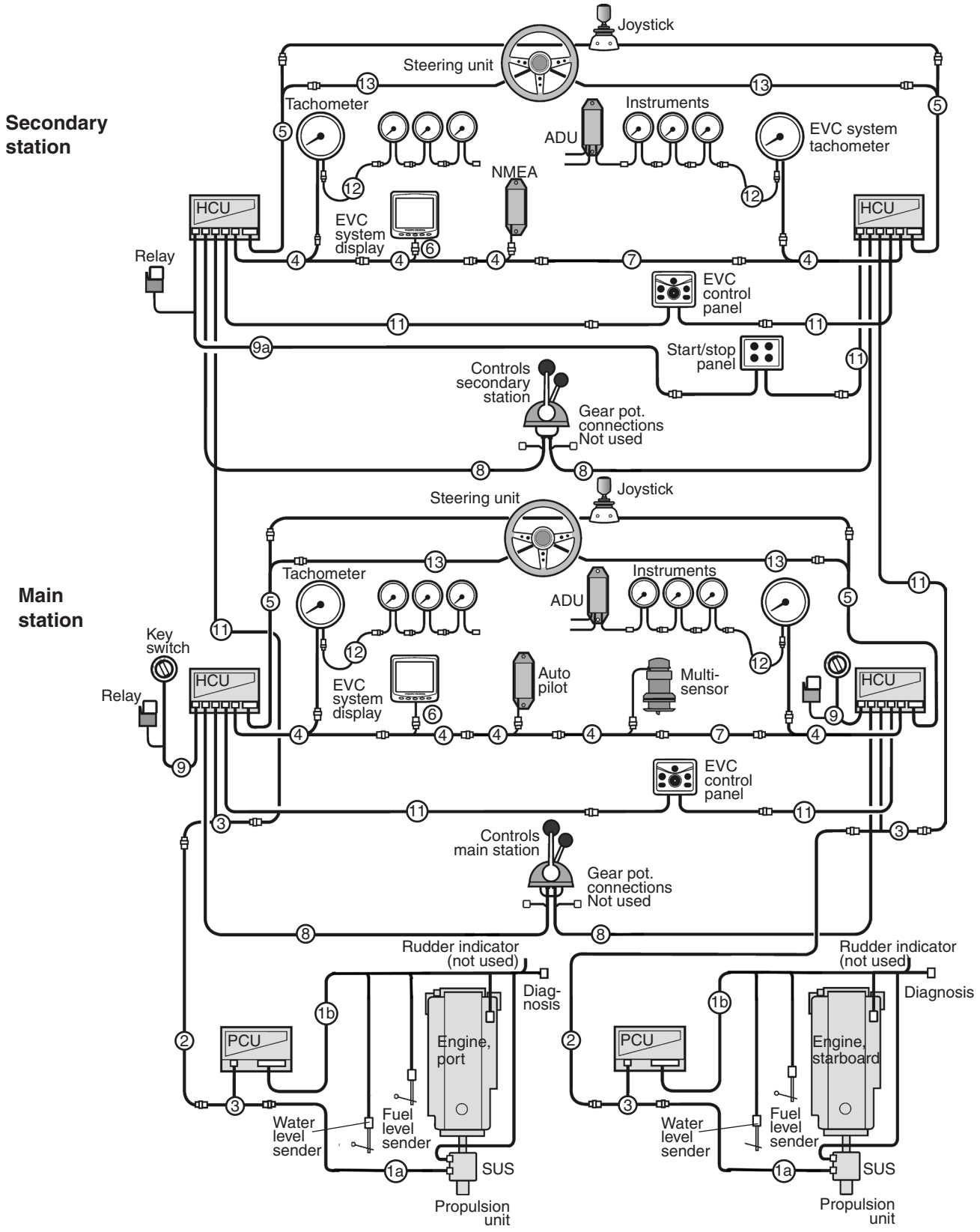
Choose cable lengths to minimize the number of connectors and never locate a connection in a non accessible area.

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.

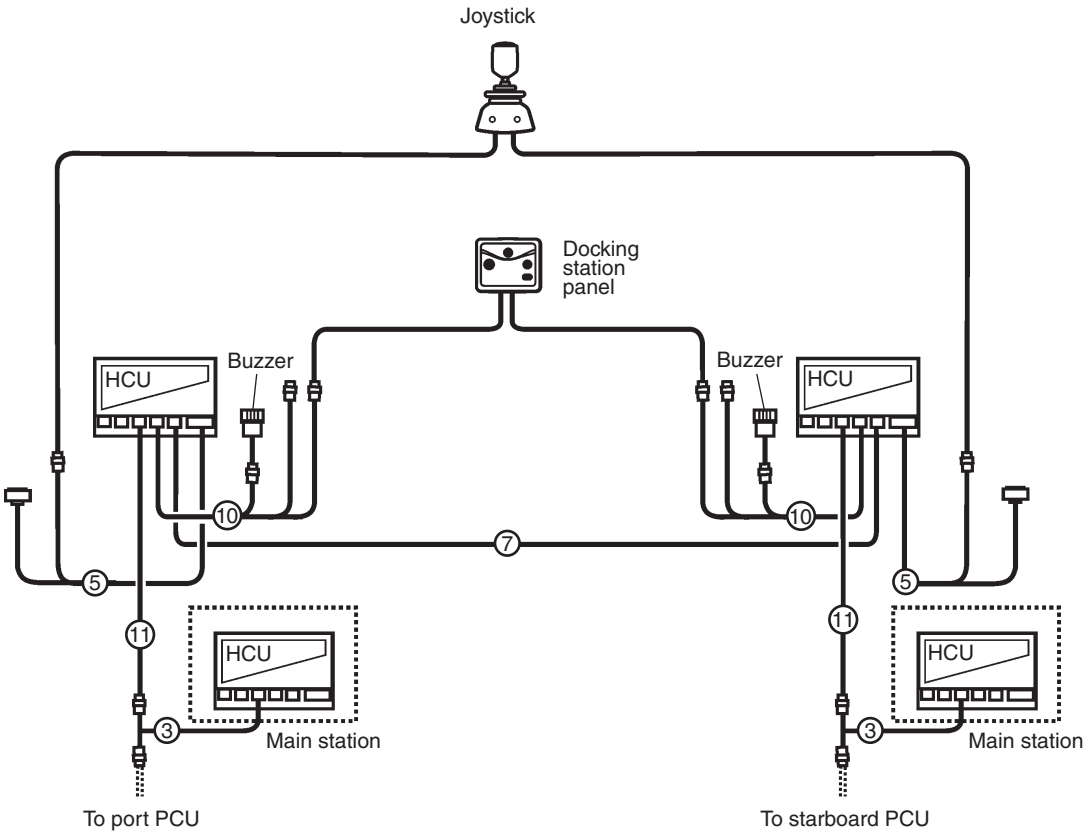
⚠ **IMPORTANT!** Always make sure that the locking mechanism between the male and female connectors closes with a click. This guarantees a water-tight correct closure.

⚠ **IMPORTANT!** Only use grease on gear shift solenoid and power supply connections. Other connections should not be greased.

Cable routing



Docking station



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 always be positioned above the alternator position.

Avoid connections hidden behind fixed panels etc.

For item figures, please refer to table.

Cables and cable harnesses

Pos. in figure on previous pages		m	ft
1a.	Gear shift cable, 12-pin	2.0	6
1b.	PCU–Engine/transmission cable, 29-pin	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.	Y-split steering 12-pin/6-pin, to be used as: Connection of HCU to steering wheel and joystick	 0.5	 1.6
6.	Display cable 6-pin/12-pin, to be used as: Connection of EVC-display to HCU or to the multilink chain (Y-split cable)	1.0	3
7.	Multilink/tachometer and synchronization, 6-pin	1.5	5
8.	Control lever, 6-pin *)	1.5	5
9.	Key switch and relay, 6-pin	1.0	3
9a.	Start/stop control panel and relay, 6-pin	1.0	3
10.	Instrument, panels and auxiliary bus, 6-pin (option)	1.5	5
11.	Extension cables, 6-pin *) to be used as: EVC bus cable EVC control panel Multilink connections Multilink breakout connections HCU–Key switch cable HCU–Start/stop control panel cable Synchronization cable EVC system display, multisensor NMEA interface 0183 and 2000	1.5 3.0 5.0 7.0 9.0 11.0	5 10 16 23 30 36
12.	Extension cables, 3-pin to be used as: Instrument cable	1.0 3.0	3 10
13.	Steering pig-tail cable, 12-pin	2.5	8

*) **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.

6-pin

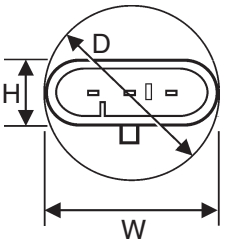
H = 21 mm (0.82 in.)
W = 23 mm (0.88 in.)
D = 32 mm (1.26 in.)

8-pin

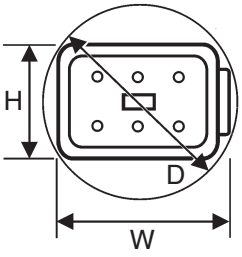
H = 25 mm (0.99 in.)
W = 37 mm (1.44 in.)
D = 45 mm (1.77 in.)

12-pin

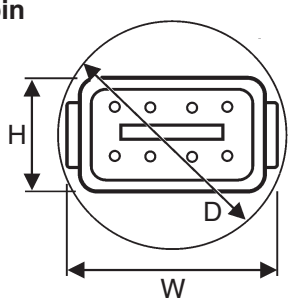
H = 23 mm (0.88 in.)
W = 41 mm (1.62 in.)
D = 48 mm (1.90 in.)



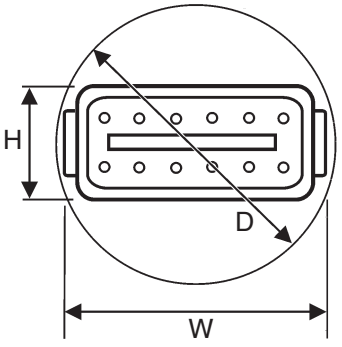
3-pin



6-pin



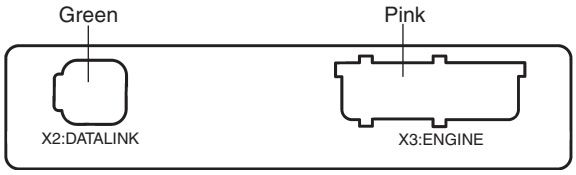
8-pin



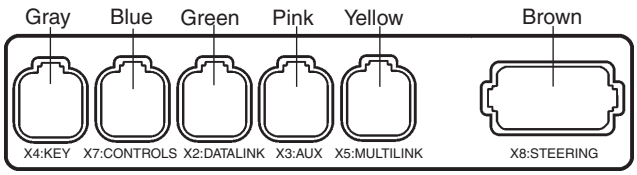
12-pin

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! HCUs with connector X8 plugged and marked X8: NOT USED cannot be used in an IPS system (only in AQ and inboard systems).

Starboard and port engine

The EVC control panel cables are color coded, red (port) and green (starboard) 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.

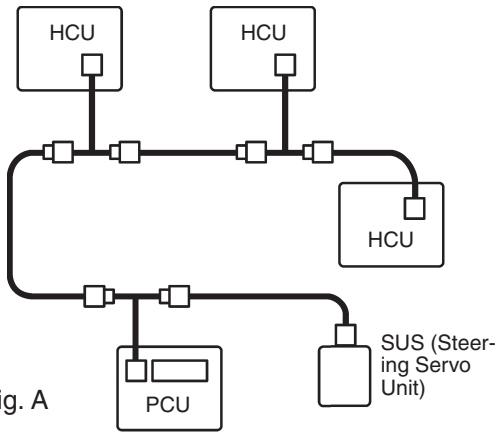


Fig. A

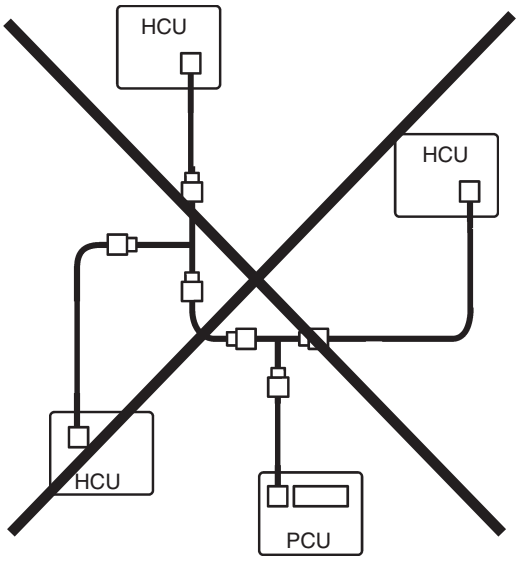
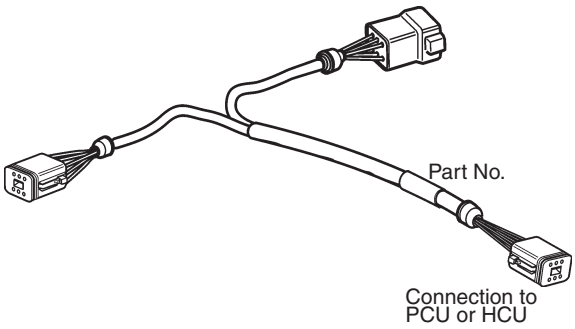


Fig. B

The nodes must be conneced 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.

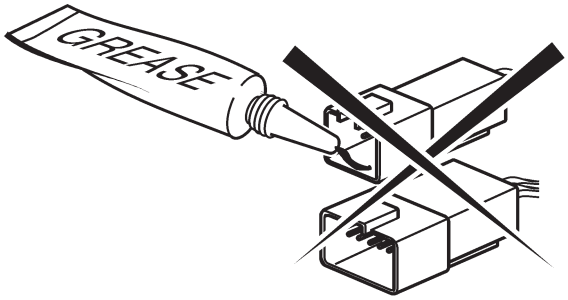
Figure A to the left illustrates a correctly designed network including three helm stations. Figure B gives an example of an incorrect network with long branches.



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.

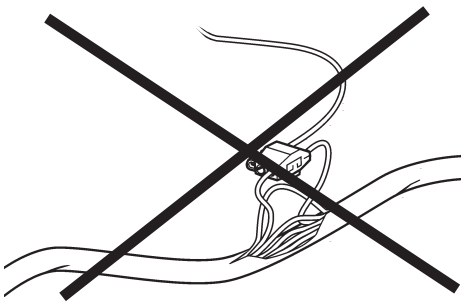
⚠ **IMPORTANT!** Note that the Y-connector always is connected directly to a node without use of any extension cable.

Important



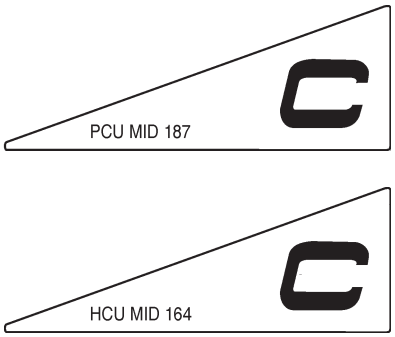
⚠ **IMPORTANT!** Never use any kind of grease in the EVC connectors.

⚠ **IMPORTANT!** Check that the locking mechanism on the connectors are properly secured by a click sound. This will guarantee a watertight and correct connection.



⚠ **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.

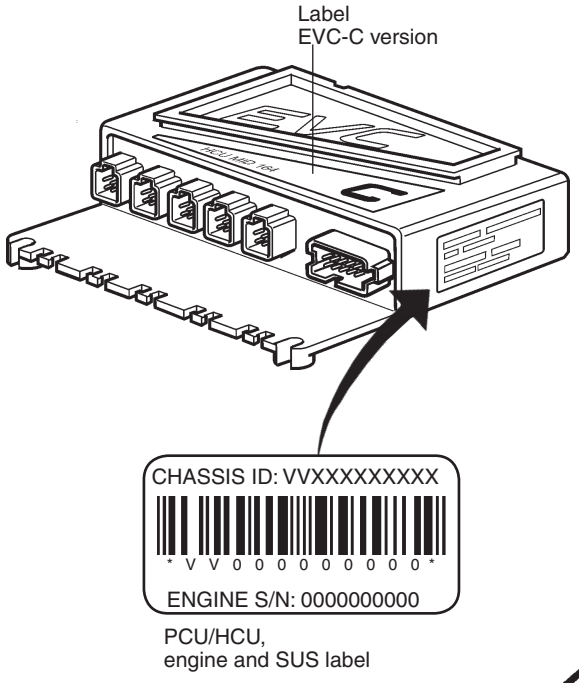
Identification of the PCU, HCU and SUS



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	**PCU MID 187**
On the HCU unit	**HCU MID 164**

NOTE! New and old hardware are not interchangeable.



Each PCU, HCU and SUS in the EVC system is programmed to communicate with a specific engine. Software can vary depending on engine type, equipment, parameter setting, etc. Prior to installationIt is therefore important to identify the different nodes.

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

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 engine and SUS labels.

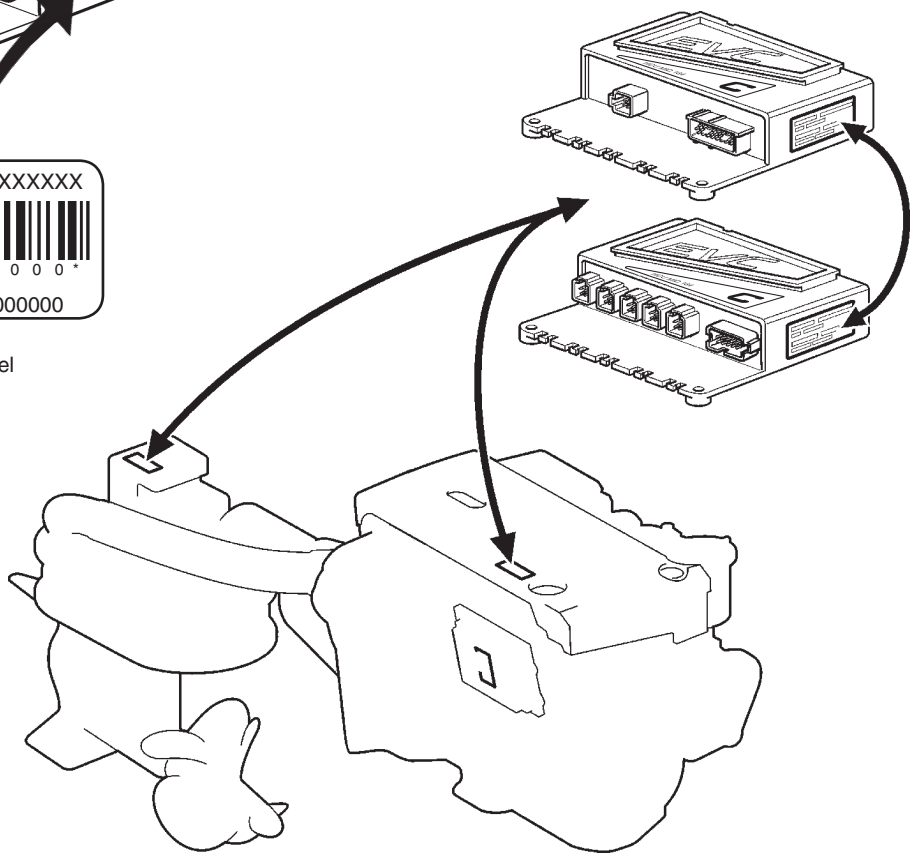
The CHASSIS ID. number on the node labels are also intended for the Volvo Penta organisation for identification of the system in the VODIA diagnostic tool.

The CHASSIS ID. can also be shown in the tachometer and 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. Alarm indication will also be shown in the EVC system display and the fault indicator lamp in the alarm gauge will lit up with an orange light. (Alarm gauge is optional.)

Gears cannot be engaged.



Installation procedure, engine room

Location and mounting of the PCU and HCU

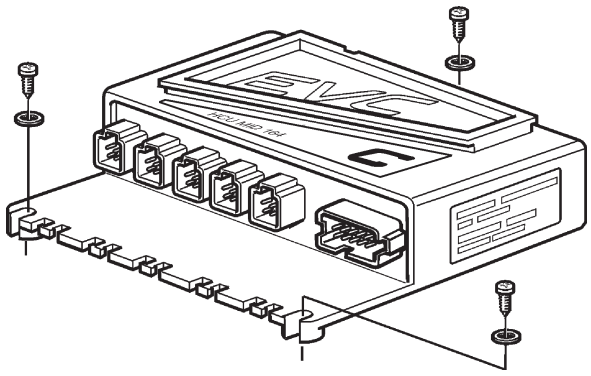
PCU location

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.

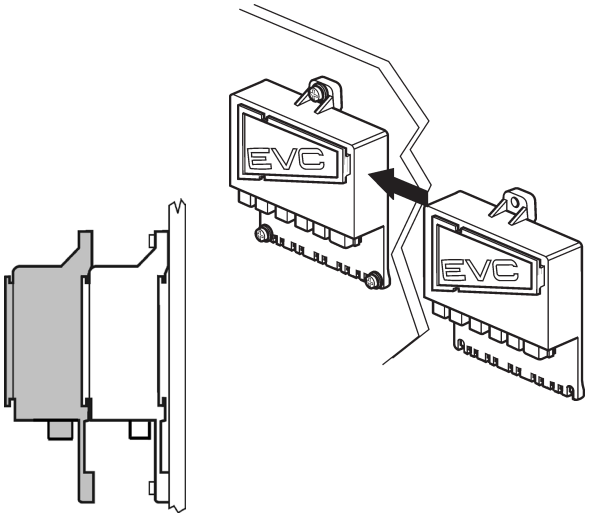
Mounting



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

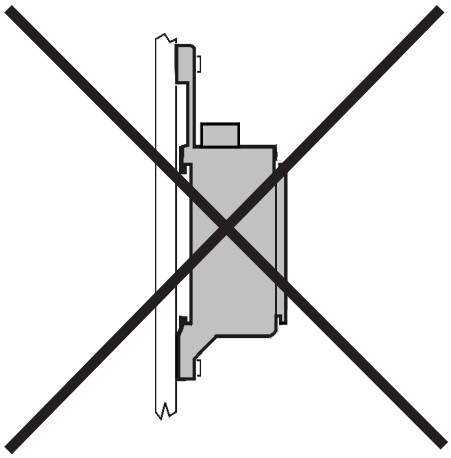
Cables shall be lead into the PCU/HCU in a way such that no water can enter into the units or the cable harnesses.

NOTE! The HCUs 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 1 m (3 ft).



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

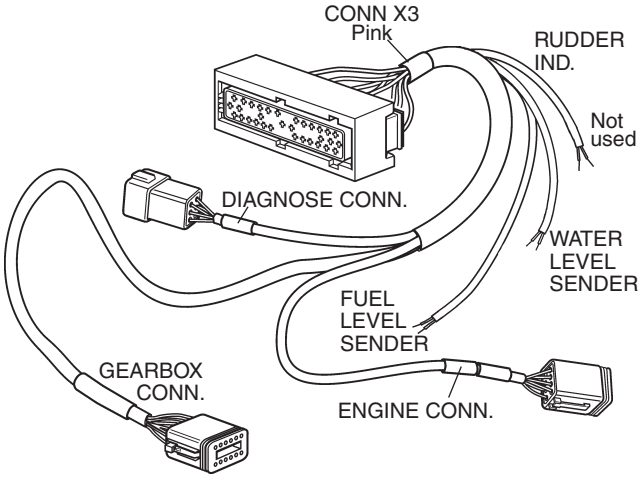
NOTE! Maximum two units are to be stacked.



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

Engine–PCU cable

This cable harness has connectors to:



- PCU
- engine monitoring system (ENGINE CONN.)
- gear shift solenoids on the IPS-unit (GEARBOX CONN.)
- diagnosis system (DIAGNOSE CONN.)
- fuel level sender (FUEL LEVEL SENDER)
- fresh water level sender (WATER LEVEL SENDER)

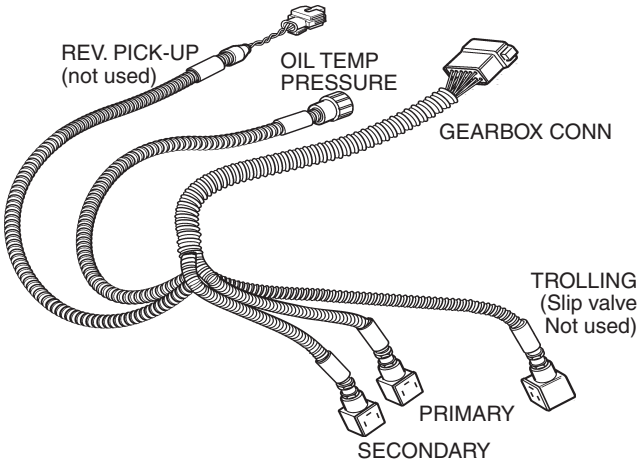
The cable harness is connected to the PCU through the 29-pin connector (CONN X3).

Connect the cable harness to engine connectors according to markings.

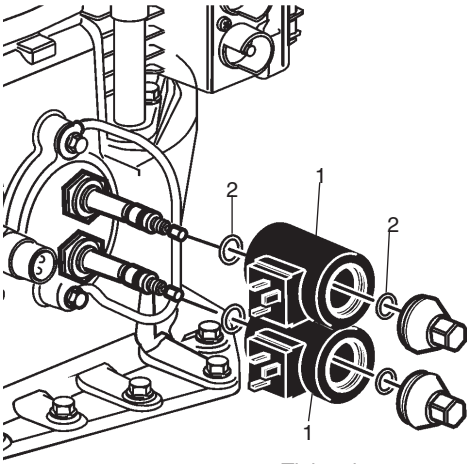
Clamp the cable properly to the engine and to the PCU.

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

Transmission cable including solenoid coils



The cable harness has connectors to the gear shift solenoides on the IPS unit, PRIMARY (P) and SECONDARY (S), to the oil temperature and pressure sender on the IPS unit and to the engine – PCU cable. TROLLING and REV. PICK-UP connectors are not used.



Tightening torque:
10–14 Nm (7–10 lb.ft.)

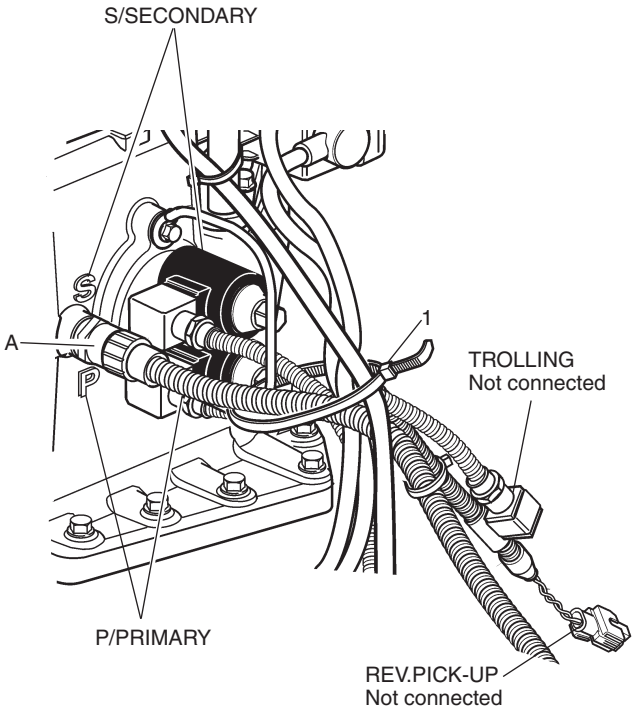
The coils/pin connectors (1) are not mounted on the solenoid valves but delivered together with the transmission cable harness. Coils can be of 12V or 24V type.

NOTE!
- The two O-rings (2) on each coil.
- Check that all O-rings are in place. The O-rings have different dimensions
- Check coil voltage, 12/24 V

Mount the coils/connectors.

NOTE! The position of coils considering cable socket connectors.

Tightening torque: **10–13 Nm (7–10 lb.ft.**)



NOTE! Check the markings P (PRIMARY) and S (SECONDARY) on the gearbox housing.

Connect the cables PRIMARY and SECONDARY to the solenoids and clamp them properly.

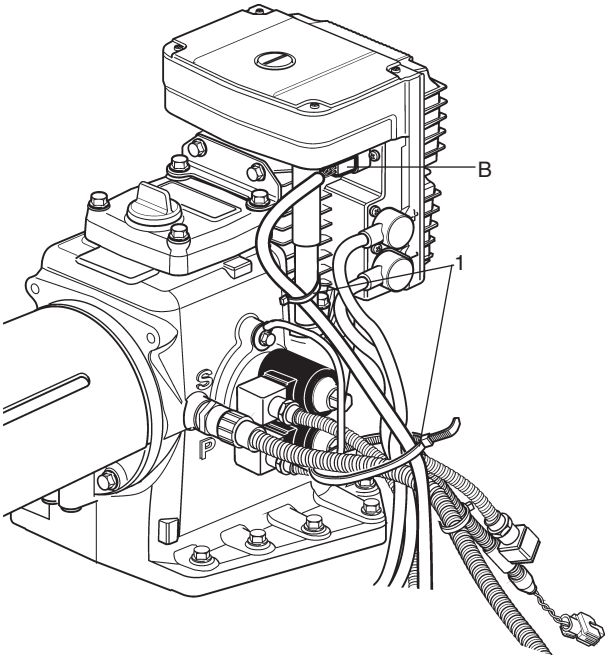
Clamp the cable/connector marked TROLLING properly using stripes. The connector is not used. Insulate the connector.

Connect cable (A) to oil temperature and pressure sender.

⚠ **IMPORTANT!** Secure and clamp all cables properly. Fit strain reliefs (1) around all cables and secure them to the metal bar protecting the solenoids. Clamp and insulate cables that are not in use.

Steering cables

Connection to the SUS (Servo Unit Steering)



The cable for steering signals from the HCU/PCU is connected to the 6-pin connector (B) on the Servo Unit Steering (SUS).

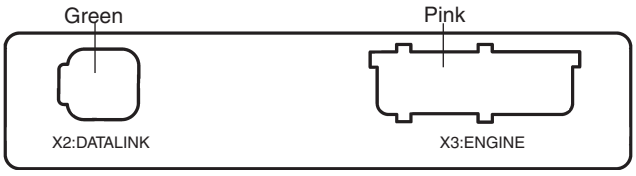
⚠ **IMPORTANT!** Secure and clamp the steering cables properly. Fit strain reliefs (1) around the cables.

Power supply

For power supply connections to the Servo Unit Steering (SUS), please refer to **Installation Marine Diesel Engines Drive DPH, DPR, Volvo Penta IPS, Inboard D4, D6.**

PCU installation

PCU label

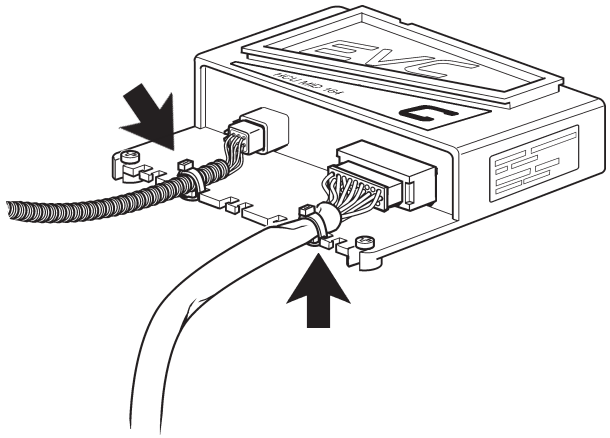


X2 Green Data link – EVC bus cable

X3 Pink Engine and transmission

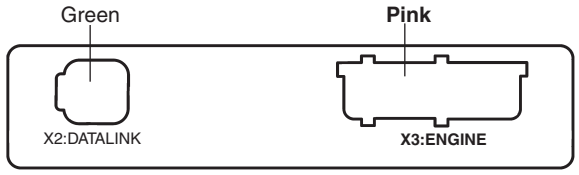
There is a label on the PCU showing the connectors with marking and color coding.

⚠ **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

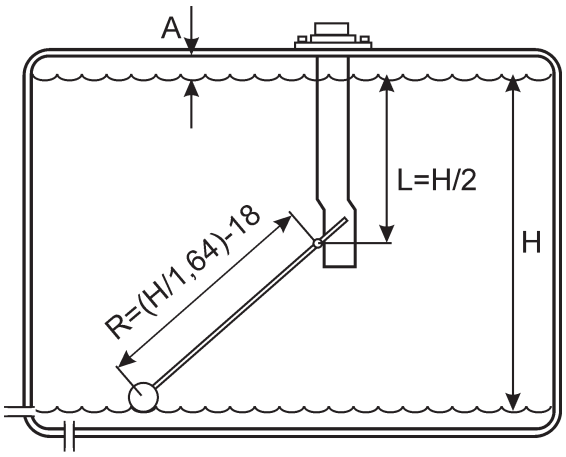
The Volvo Penta fuel and fresh water level senders are suitable for a max. tank depth (H max) of 600 mm (23"). If the tank is deeper, use another sender but note that this sender must have the following resistance scales:

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 freshwater sender. Corrosion problems can occur.

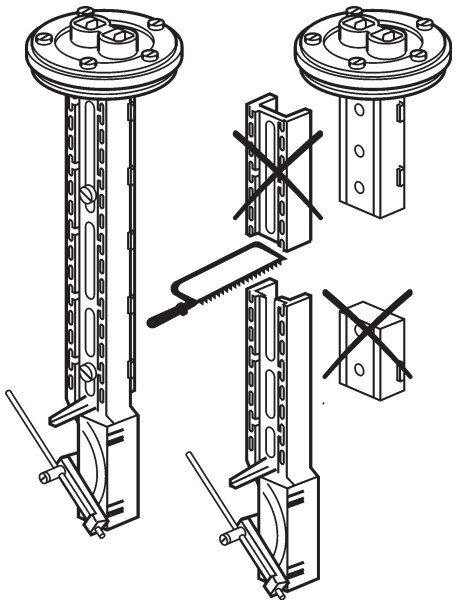
Make a hole for the sender in the fluid tank, diameter 60 mm. Locate the hole so that the float can move freely inside the tank.

NOTE! Clean all burrs out of the tank.

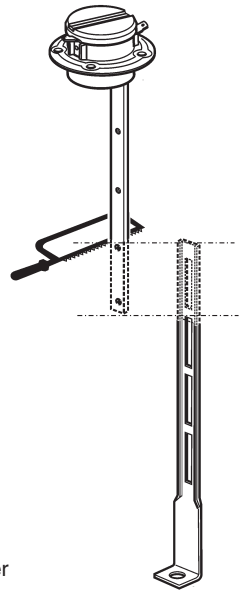
Adjust sensor length (L=H/2) on the basis of the min. and max. fluid levels. Then do not to forget to extend the sensor length by the gap (A). The gap (A) between the tank and the maximum level must not be less than 40 mm.

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.

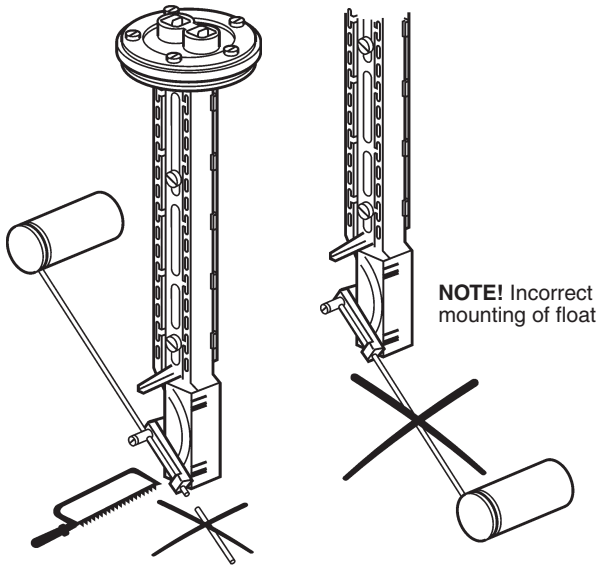


Fuel level sender

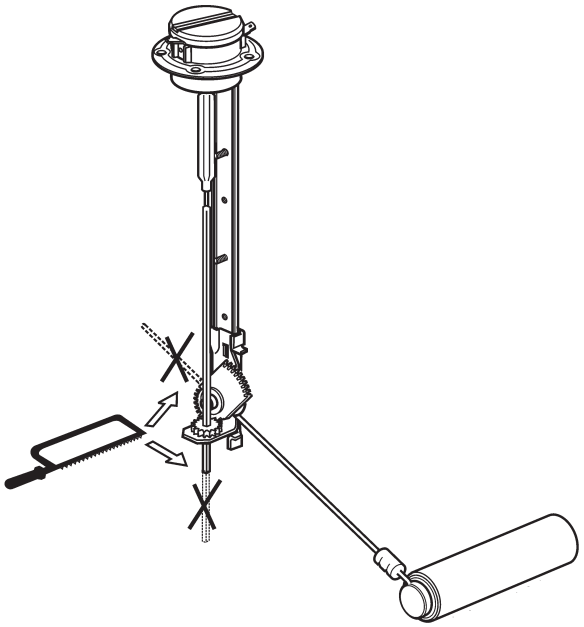


Fresh water level sender

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



Fuel level sender



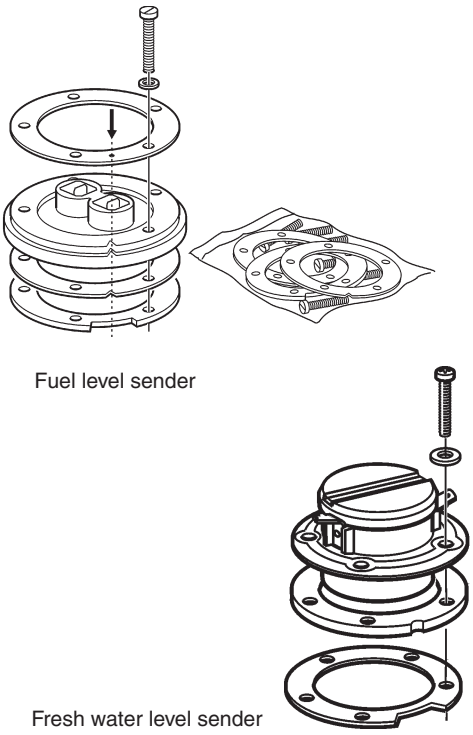
Fresh water level sender

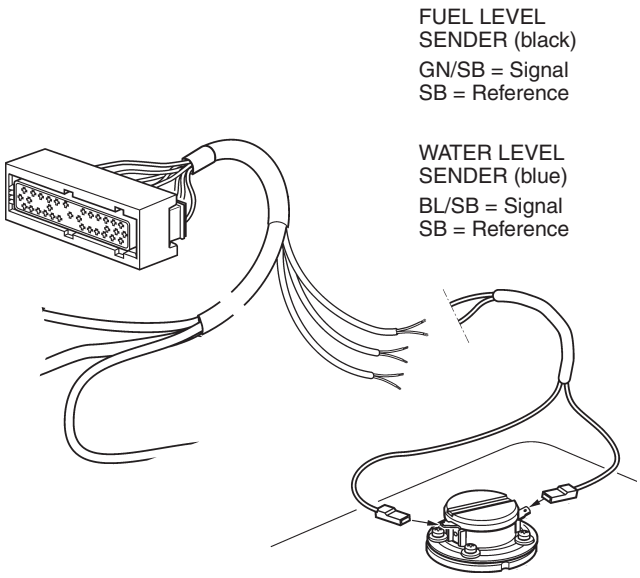
If the minimum sensor length is too long, you can cut it to a suitable length.

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.





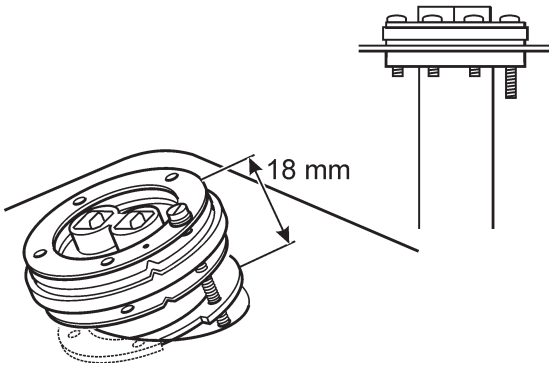
The level sender cables are connected to the EVC system via the engine-PCU Sender cable harness.

Connect the black (fuel level sender) or blue (water level ender) cable to the terminal marked ⊥ (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.

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

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.



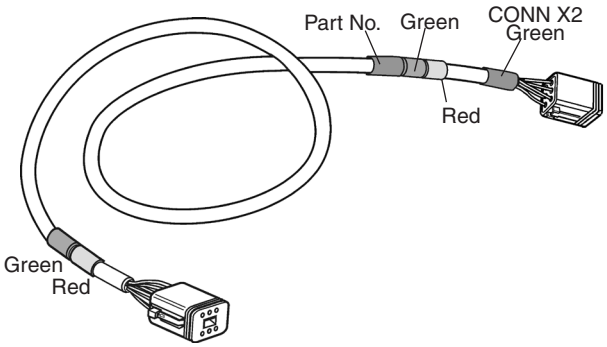
Lower the sensor with float and the ring with tapped holes down into the tank. The rubber seal must be outside the tank. Align the sensor so that the float has free movement inside the tank. Tighten the long screw so that the seals and the ring with the tapped holes come into place.
Install the remaining screws and tighten all of them simultaneously.

Setting of low fuel alarm

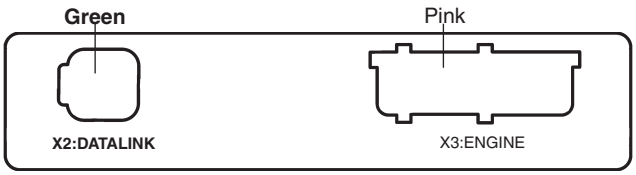
Setting (on/off) of the fuel alarm is made via the EVC system tachometer/display and the EVC control panel. Please refer to the **Calibration and settings** section in this manual.

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

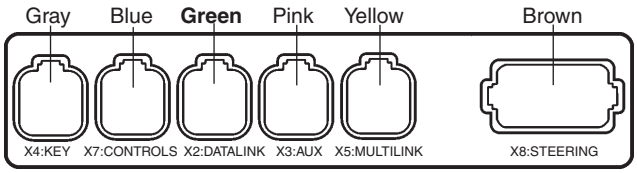
Standard bus cable PCU–HCU



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.

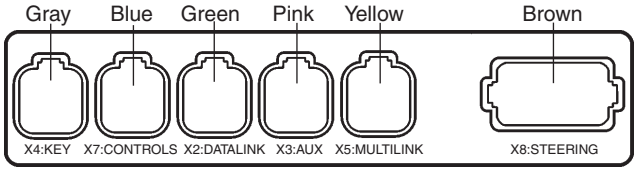
NOTE! The cable has female connections on both ends and cannot be used as an extension.

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

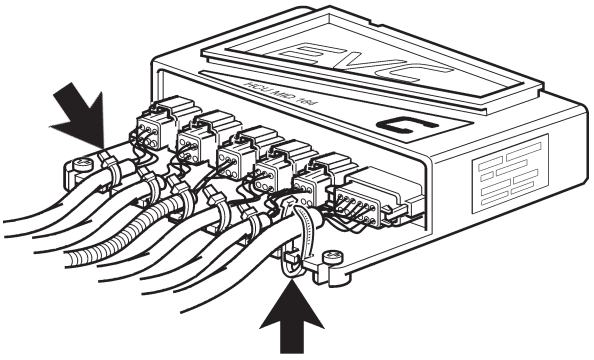
HCU label



X2	Green	Data link – EVC bus cable
X3	Pink	Auxliliary bus – EVC control panel,
X4	Gray	Key switch or start/stop panel
X5	Yellow	Multilink – Tachometer/instruments, EVC system display, NMEA interface, multisensor
X7	Blue	Controls
X8	Brown	Steering – Steering signals from steering wheel unit to the HCU

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

⚠ **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.



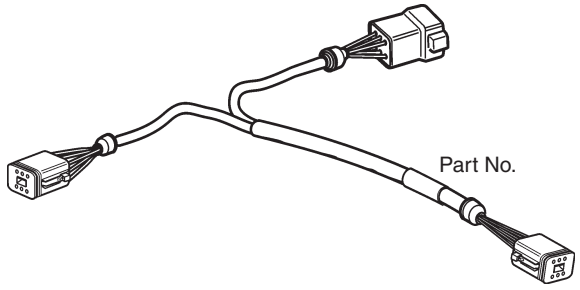
Mount strain reliefs as shown in the illustration above.

⚠ **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.

Installation procedure, helm

Y-connector location

The T-connnector 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.

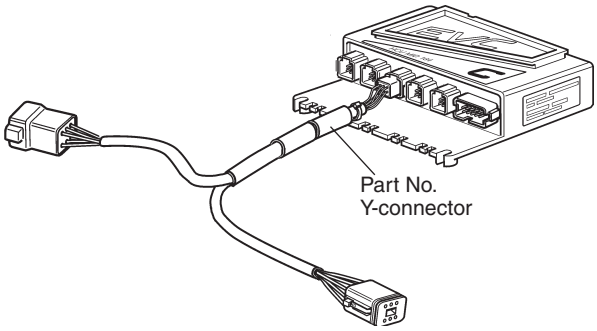
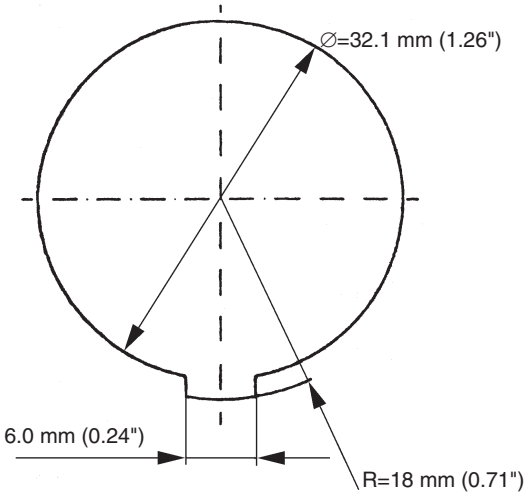


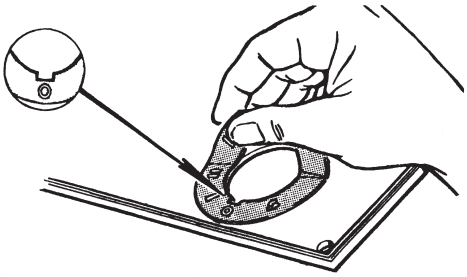
Figure shows the Y-connector fitted to a HCU.

Key switch and relay for external accessories

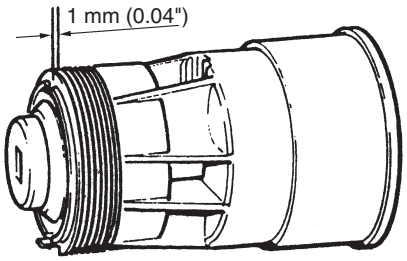
⚠ **IMPORTANT!** There must always be one key switch to operate each engine. The key switch shall be connected to the main helm station. On additional helm stations start/stop panels should be used .



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

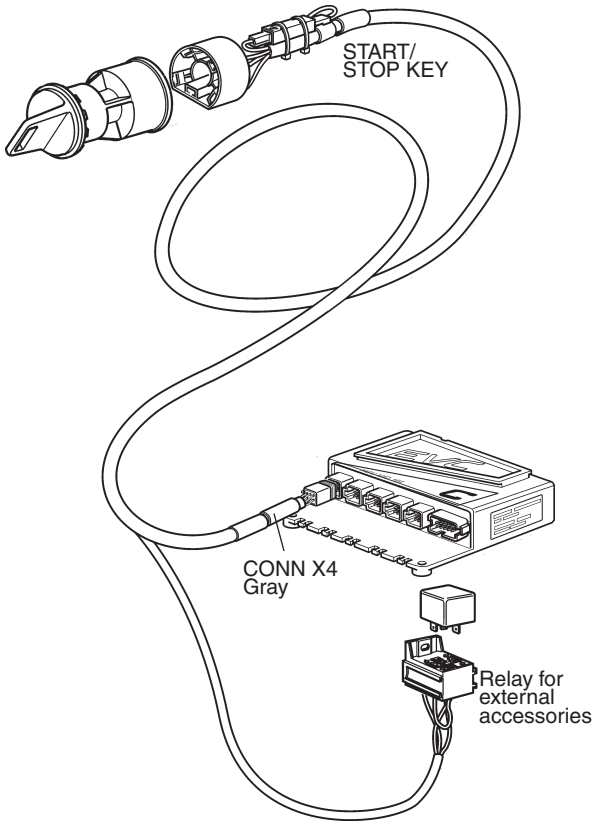


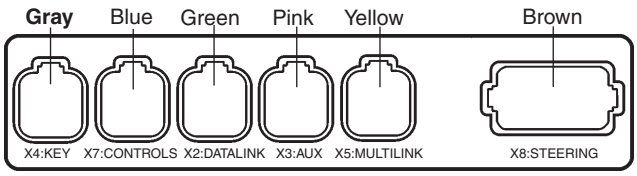
Fix the adhesive label.



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) togheter with the relay socket for external accessories.

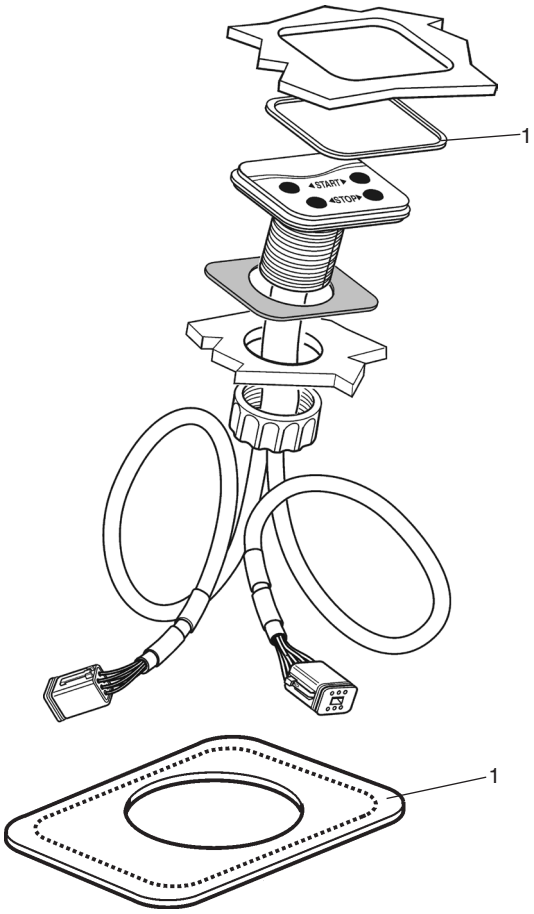
Start/stop panel

Use the 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



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 .

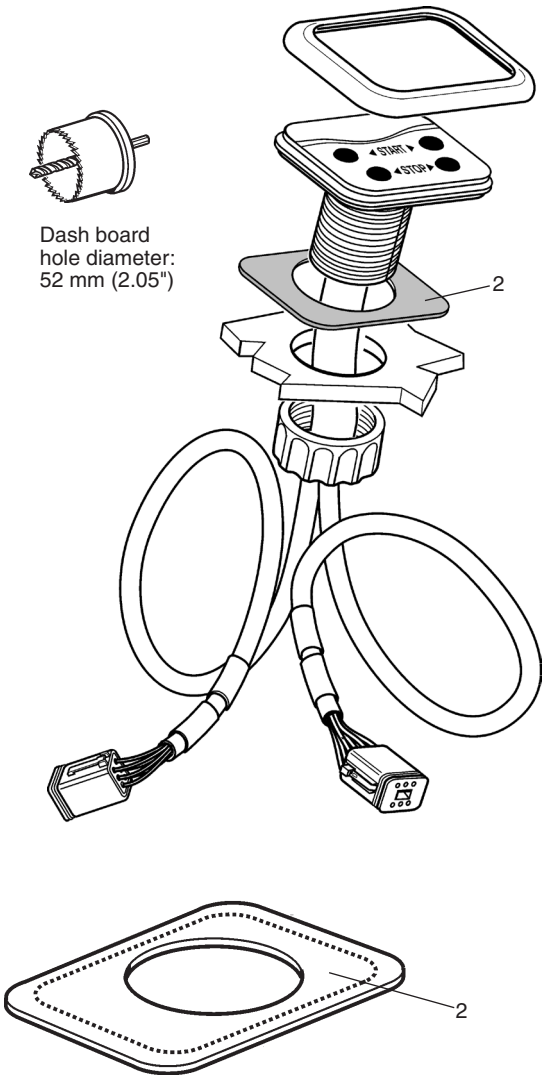
The insert depth is 4 mm (0.16") including gasket.

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

Install the panel as illustrated in the figure.

NOTE! It is important that the self adhesive gasket (2) is fitted properly in the panel recess.

Frame-mounted panel



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

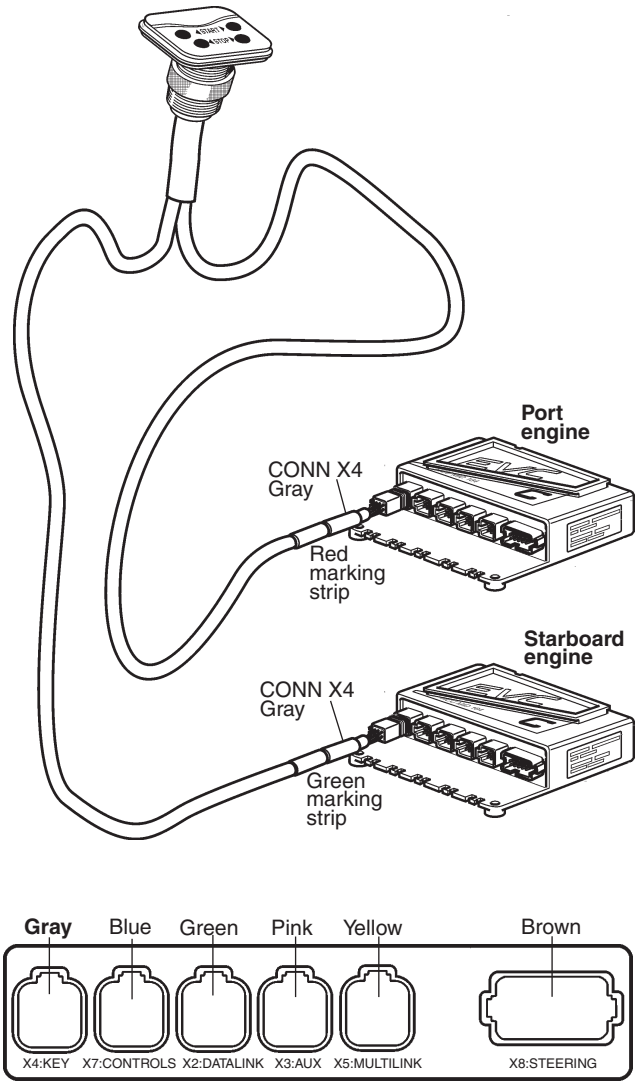
Separate the inner part of the gasket (2) from the outher part. Remove the protective paper and fit the gasket on the under side of the panel.

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

NOTE! It is important that the self adhesive gasket (2) is fitted properly on the under side of the panel.

Connection to the HCU

Twin engine panel

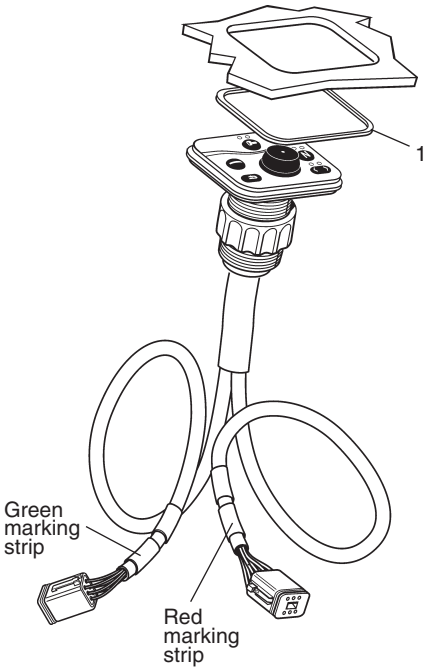


Connect the start/stop control panel cable to the connector marked X4:KEY (gray) on the HCU.

⚠ **IMPORTANT!** Install the **green** cable to starboard HCU and the **red** cable to port HCU.

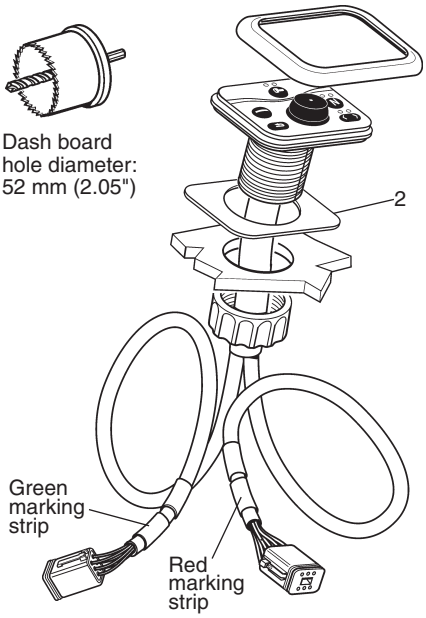
EVC control panel

Flush-mounted panel



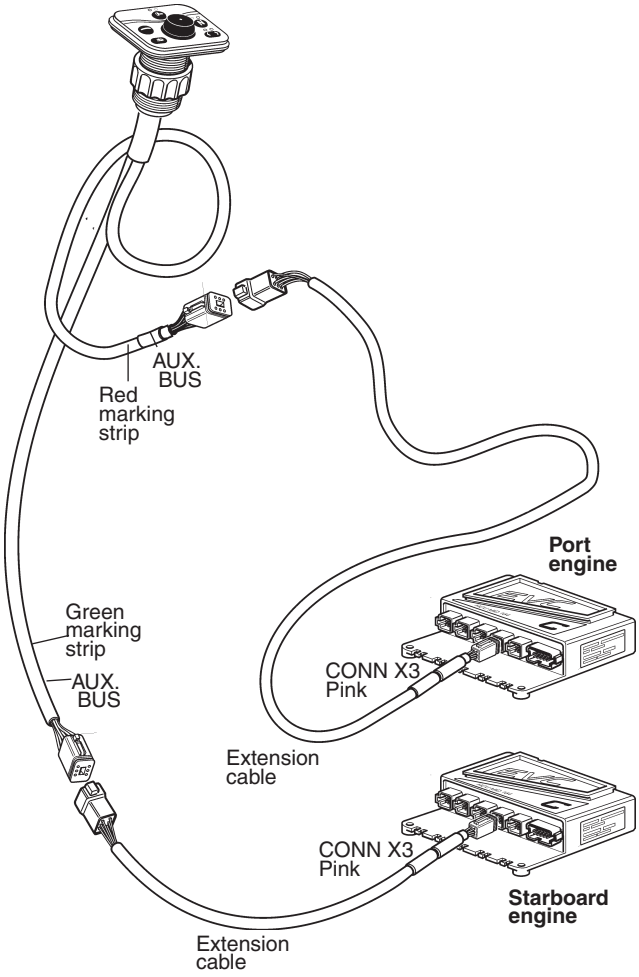
Refer to the **Start/stop panel** section for assembling instructions. Figure shows a panel for twin engine installation.

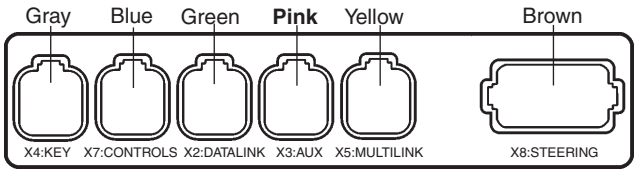
Frame-mounted panel



Refer to the **Start/stop panel** section for assembling instructions. Figure shows a panel for twin engine installation.

Connection





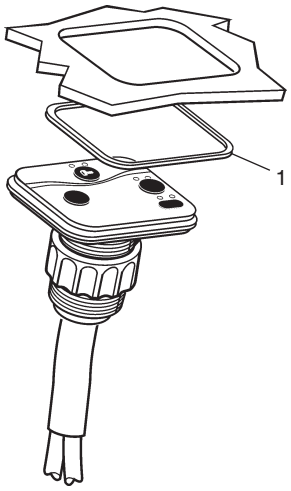
Connect the EVC control panel cable to the connector marked AUXILIARY BUS on the instrument cable harnesses on the HCUs, **red colored** cable coating to port and **green colored** cable coating to starboard engines.

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.

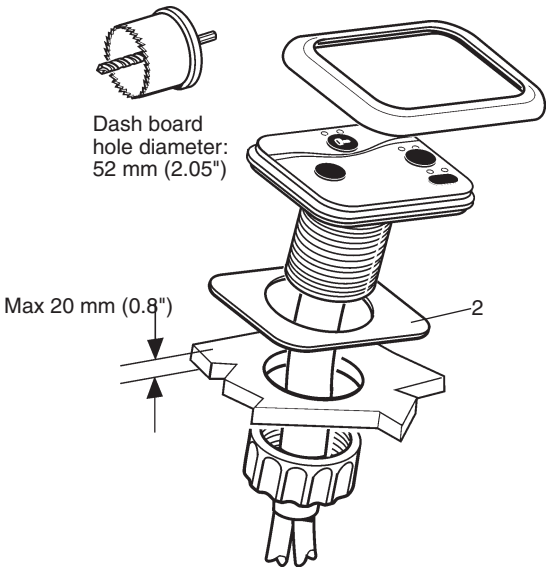
Docking station panel

Flush-mounted panel



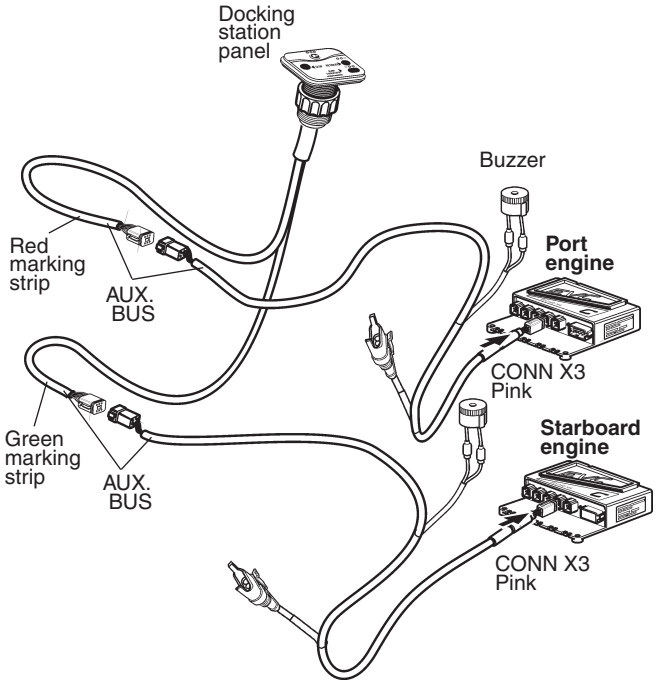
Refer to the **Start/stop panel** section for assembling instructions. Figure shows a panel for twin engine installation.

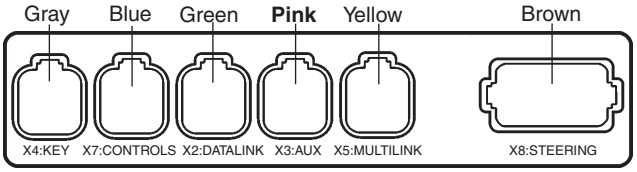
Frame-mounted panel



Refer to the **Start/stop panel** section for assembling instructions. Figure shows a panel for twin engine installation.

Connection



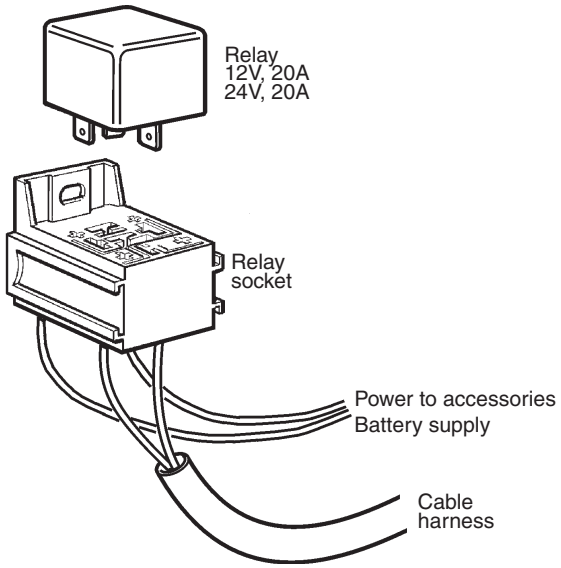


Connect the docking station panel cable to the connector marked AUXILIARY BUS on the instrument cable harnesses on the HCUs, **red colored** cable coating to port and **green colored** cable coating to starboard engines.

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.

Relay for external accessories

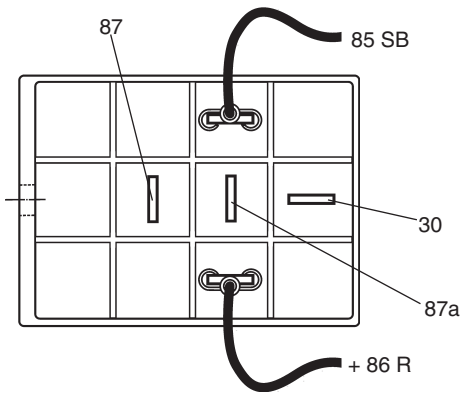


The relay controls the power supply to external accessories. The relay position (open or closed) and the power supply depend on the key switch position. The relay is normally open and there is no power when key switch is in the OFF position.

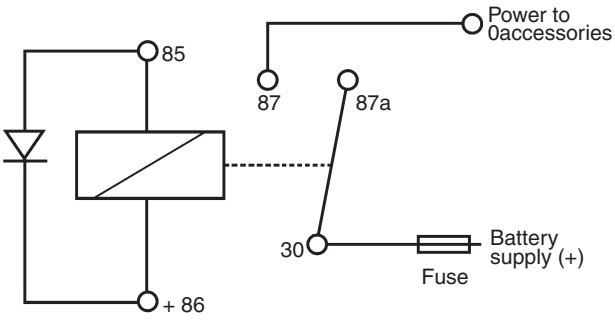
The relay cable and the relay can also be fitted to a secondary helm station with a start/stop control panel. In such an installation the relay is activated by the key switch on the main helm station.

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.

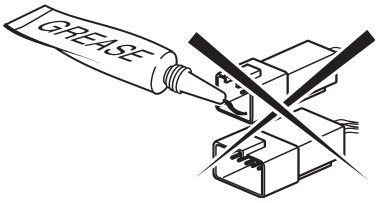
Connect external accessories to pin 87 which will supply power when the key switch is ON.

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.

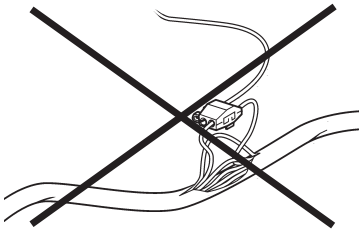
Maximum output is:
12 V 240 W
24 V 480 W

⚠ **IMPORTANT!**



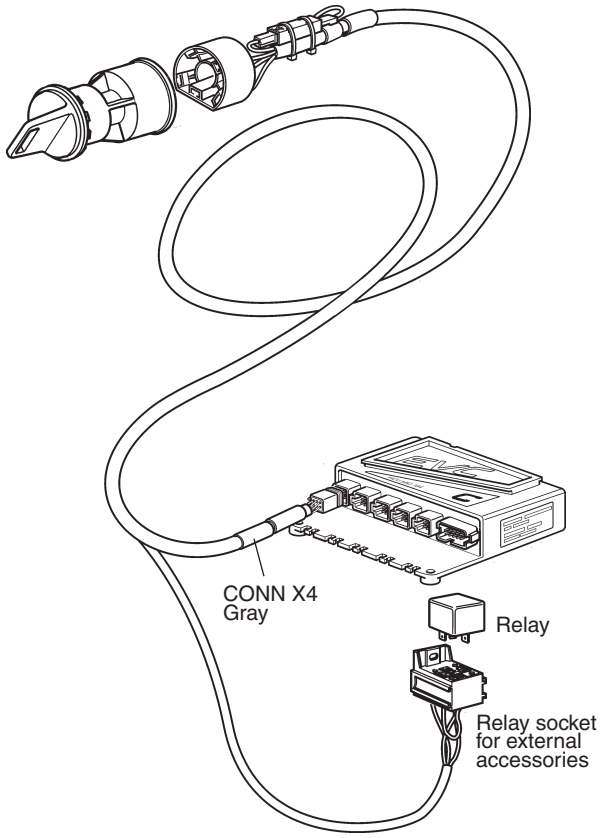
Never use any kind of grease in the EVC connectors.

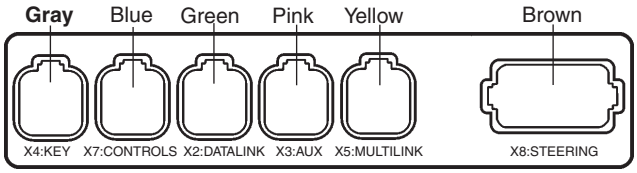
⚠ **IMPORTANT!**



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

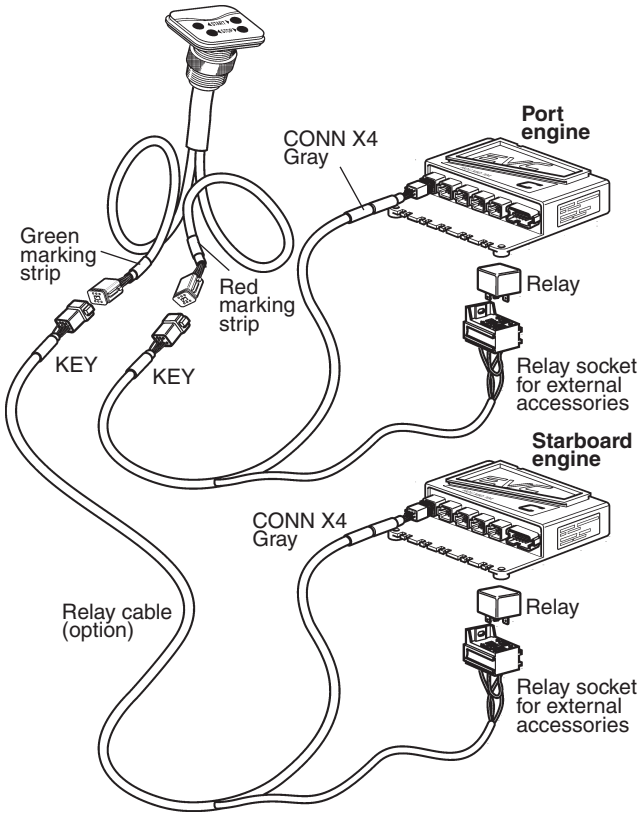
Connection to the HCU when using a key switch

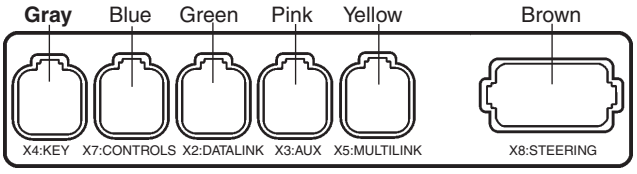




The relay socket is permanently connected to the cable for the key switch. The key switch cable is connected to the HCU, X4:KEY connection (gray).

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).

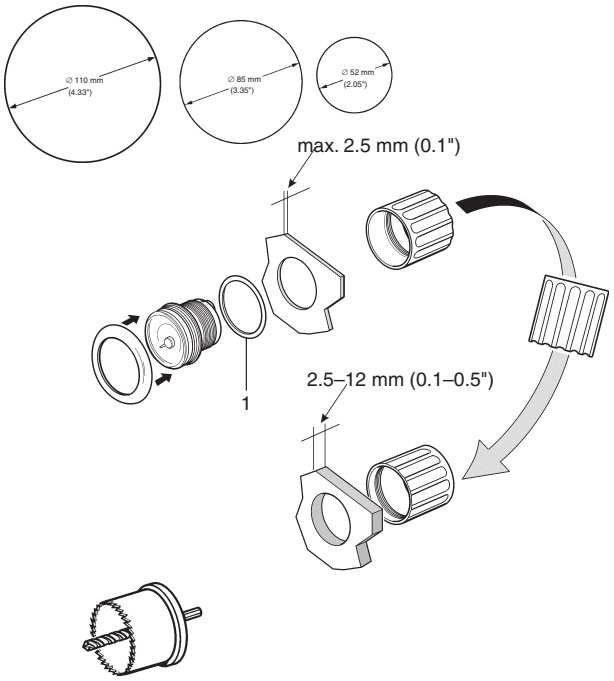
The cable harness is option. The connector on the harness is marked KEY and the harness is connected to the HCU, X4:KEY connection (gray).

Instruments

Choose dry suitable places for the instruments. 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



Dash board
hole diameters:
110 mm (4.33") tachometer, speedometer
85 mm (3.35") tachometer, speedometer
52 mm (2.05") all other instruments

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** on the next page.

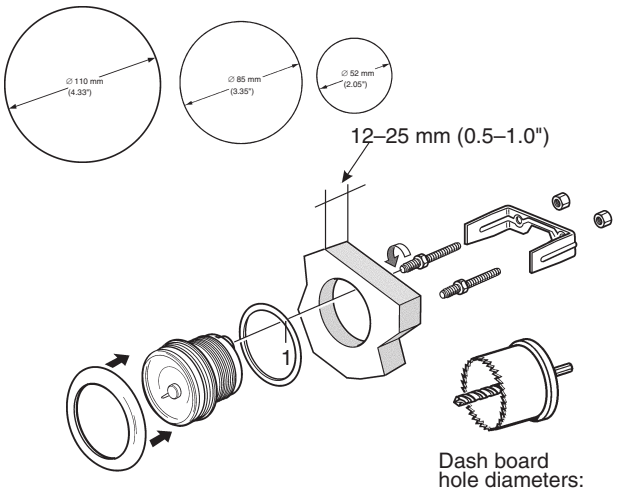
Make a hole, diameter 110 mm (4.33"), 85 mm (3.35") or 52 mm (2.05") depending on the type of instrument.

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.**



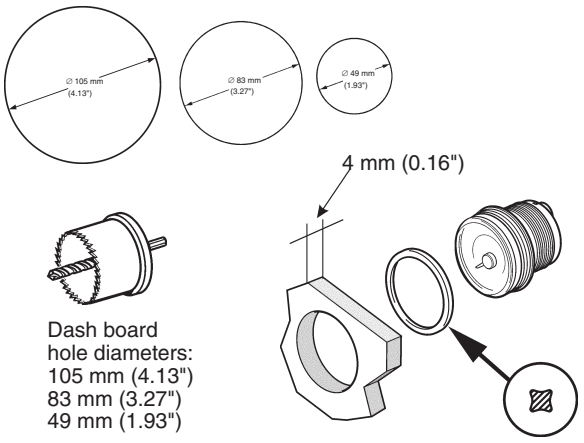
Dash board
hole diameters:
110 mm (4.33")
85 mm (3.35")
52 mm (2.05")

Make a hole, diameter 110 mm (4.33"), 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 dashboard.

Flush-mounted instrument

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



Dash board
hole diameters:
105 mm (4.13")
83 mm (3.27")
49 mm (1.93")

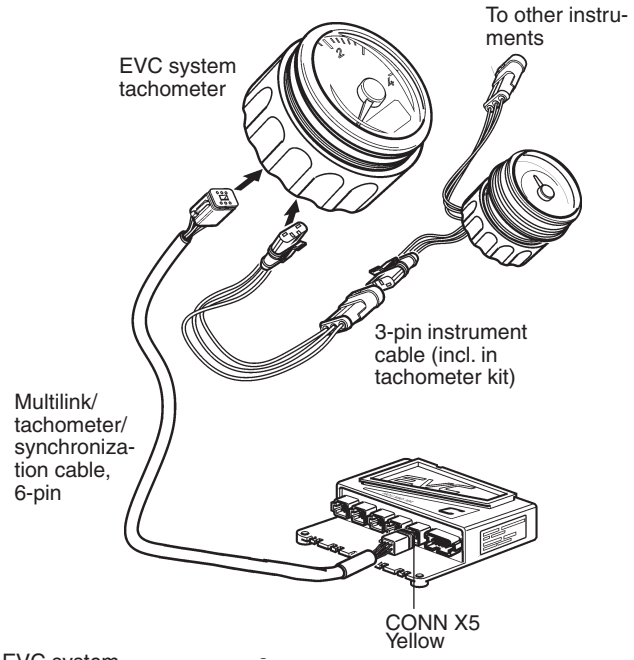
Insert depth should be 4 mm (0.16").

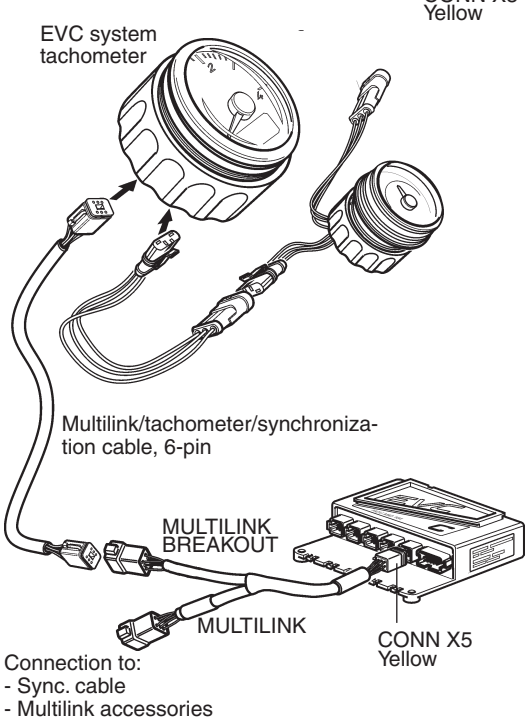
Make a hole, diameter 105 mm (4.13"), 83 mm (3.27") or 49 mm (1.93") depending on type of instrument.

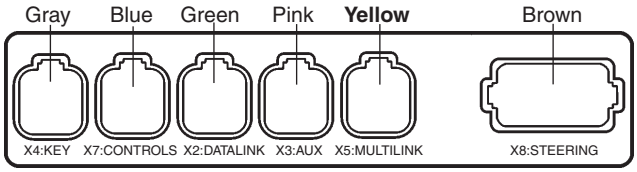
Place the sealing ring (X-ring) between the dashboard and the instrument.

Fit the instrument.

Connection of EVC system tachometer and other instruments

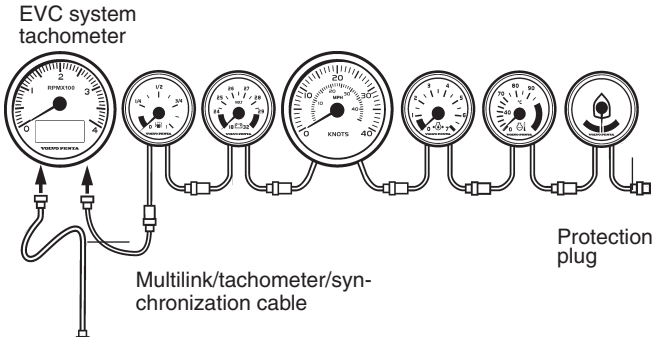


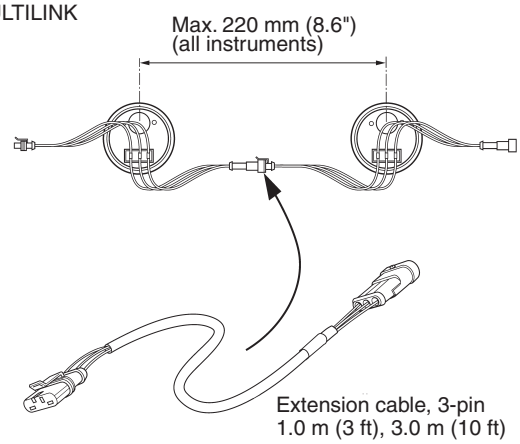




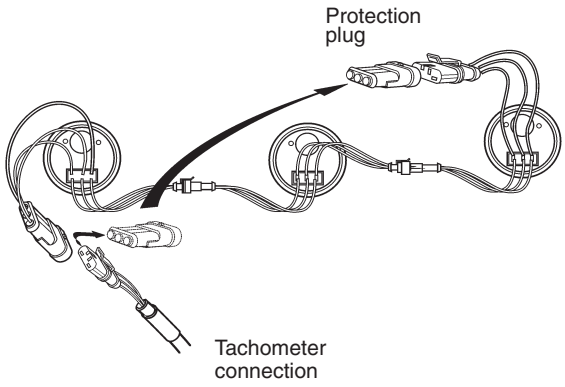
Connect the EVC system tachometer to the HCU connection X5 (yellow). Connect directly to X5 using a multilink/synchronization cable.

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





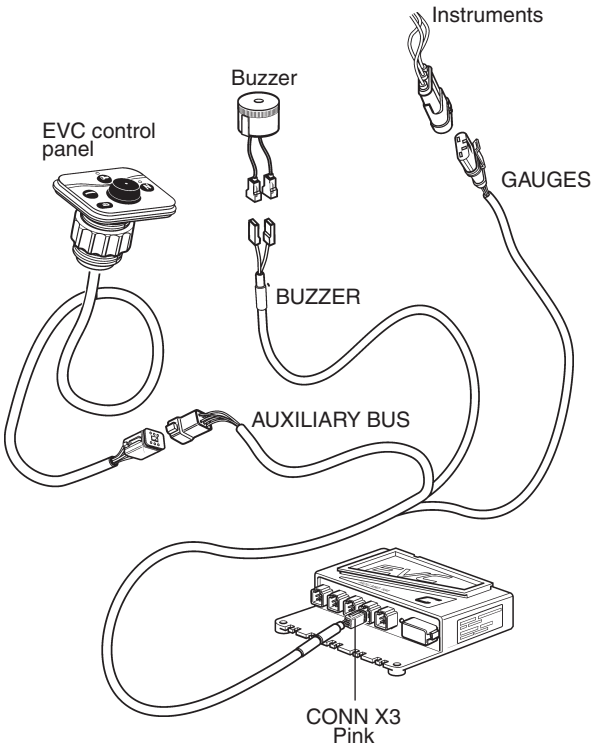
Connect the other instruments to the 3-pin EasyLink connector in the tachometer.

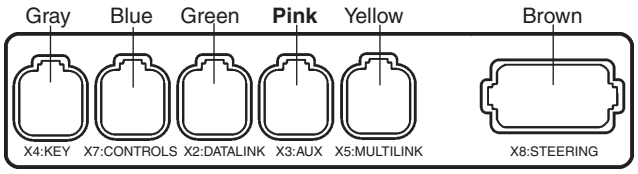


⚠ **IMPORTANT!** Always plug the open end of the instrument cable to prevent corrosion. Use the plug attached to the cable harness.

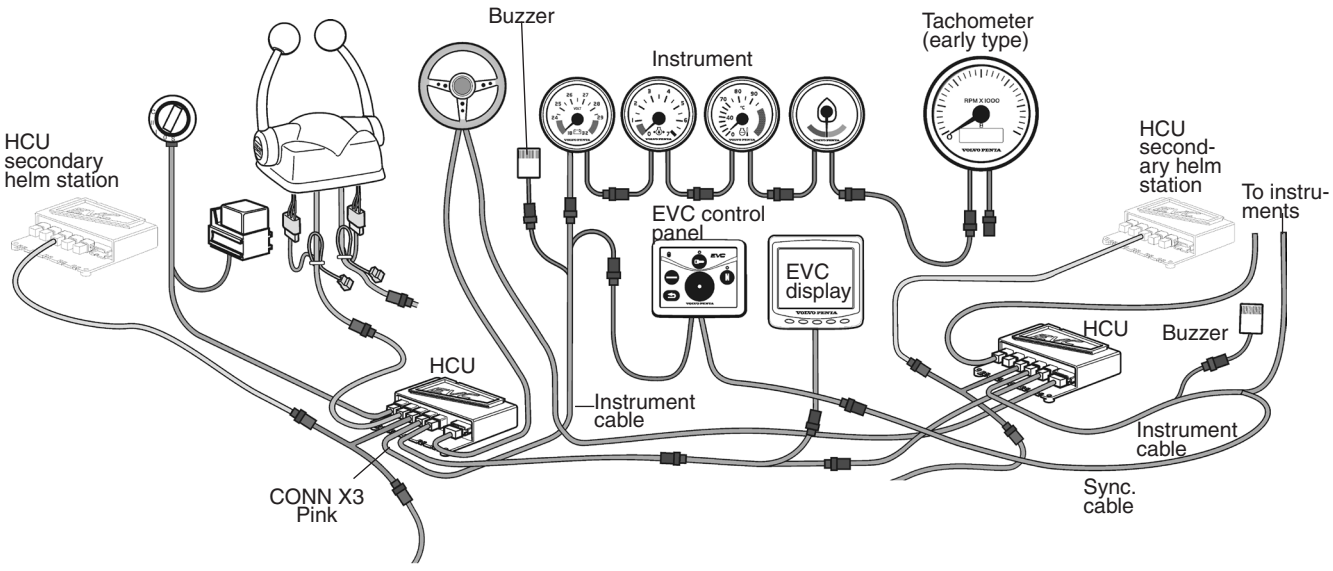
⚠ **IMPORTANT!** Do not install an Y-split cable without having the MULTLINK BREAKOUT connected.

Instrument 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.

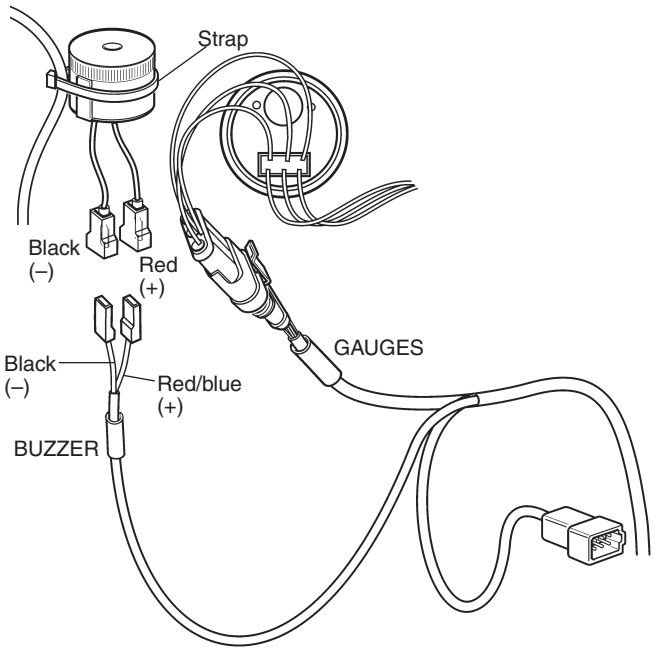
The cable can also be used for an additional buzzer when the EVC system includes an EVC system tachometer.

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 the 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 straps.

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 (–).

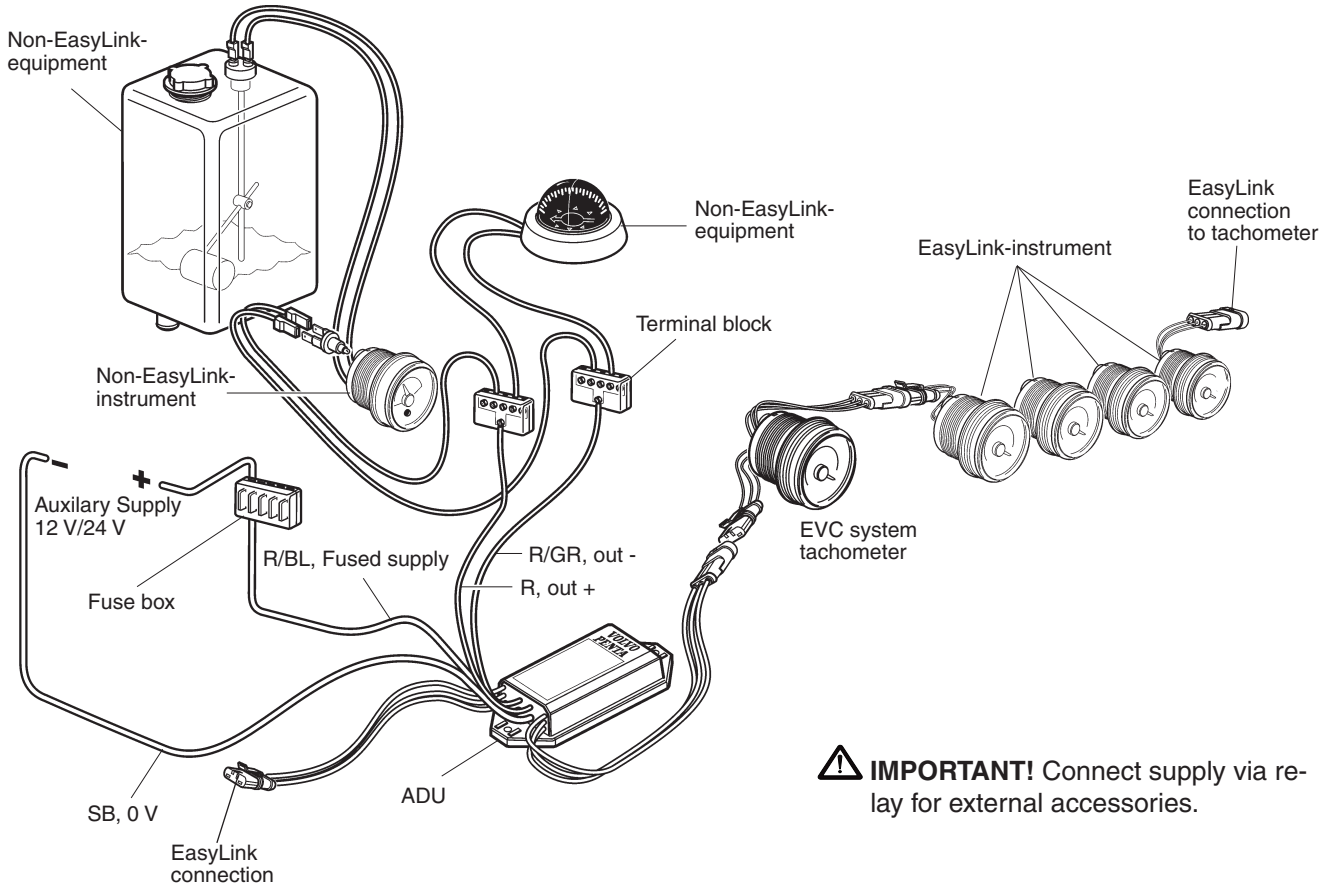
Auxiliary dimmer unit (ADU)

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.

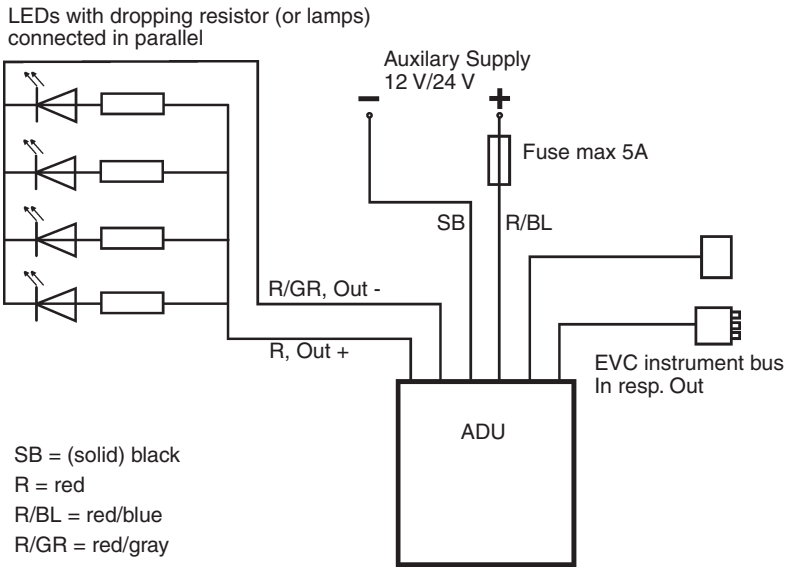
The ADU can be fitted anywhere along the chain of other EasyLink instruments. See the figure below.

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).

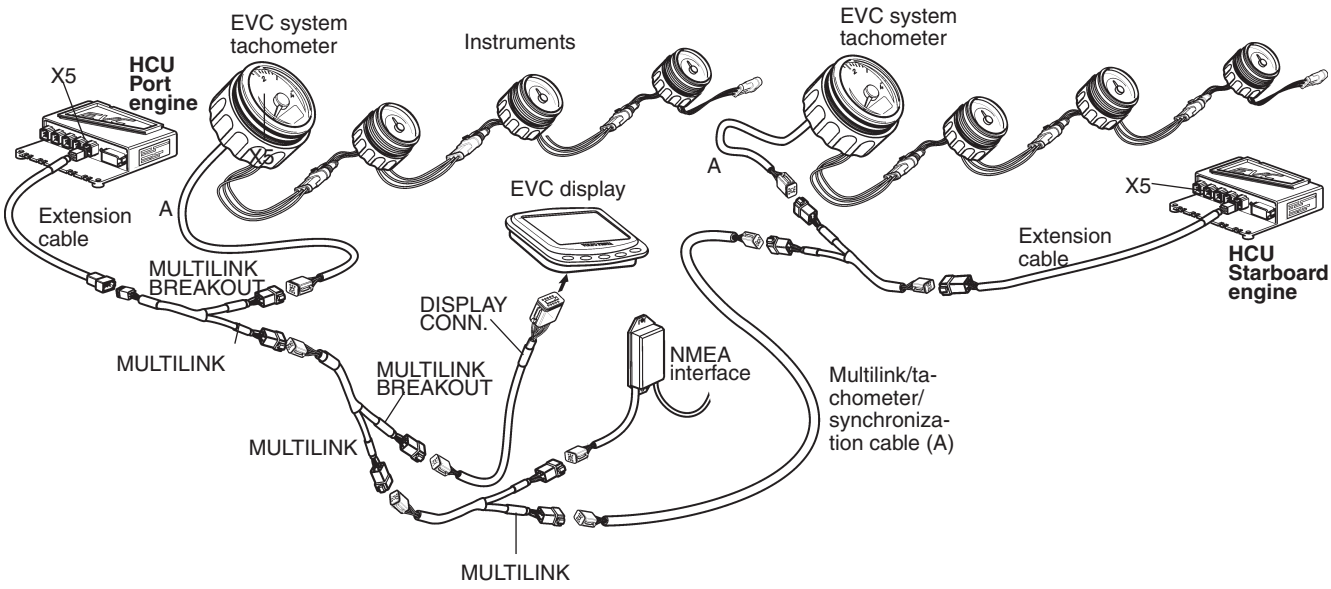
When attaching to the auxilary + supply, an extra fuse of max 5 A must be used. See positioning in figure below



⚠ **IMPORTANT!** Connect supply via relay for external accessories.

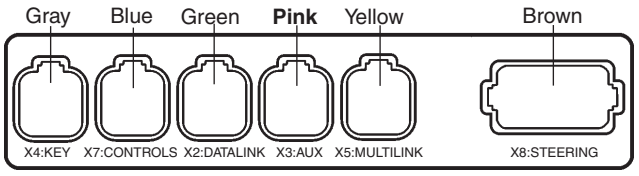


Synchronizing cable, twin installations



To synchronize the engines a synchronizing cable 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.



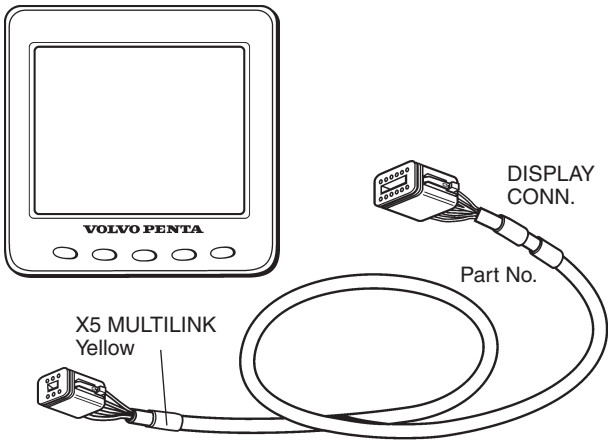
The syncronizing cable is a part of the multilink chain connected to X5: MULTILINK (yellow) on each HCU. See figure above.

⚠ **IMPORTANT!** There must be a syncronizing cable installed between the HCUs on all helm sations.

⚠ **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 syncronizing 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 system must have either a tachometer or a display.

The following information is available in the EVC 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
- Fuel rate
- Engine power trim
- Sea water pressure
- Trip data: (fuel rate, fuel consumption, fuel consumption/time, trip fuel consumtion, trip fuel consumption/time, remaining fuel, trip hours, trip distance, remaining distance to empty tank, remain ing 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 per helm station (HCU).

Location and fitting

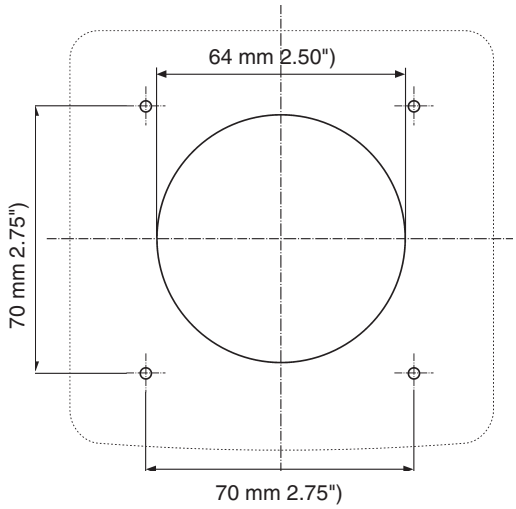
NOTE! Allow adequate clearance behind the display for cable connection to ensure that the cable is not unduly stressed. Also ensure that there is sufficient length of cable to remove the unit for servicing purposes.

The instrument is usually installed on a dash board. It can be mounted from above or flush from under the dash board. Flash 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



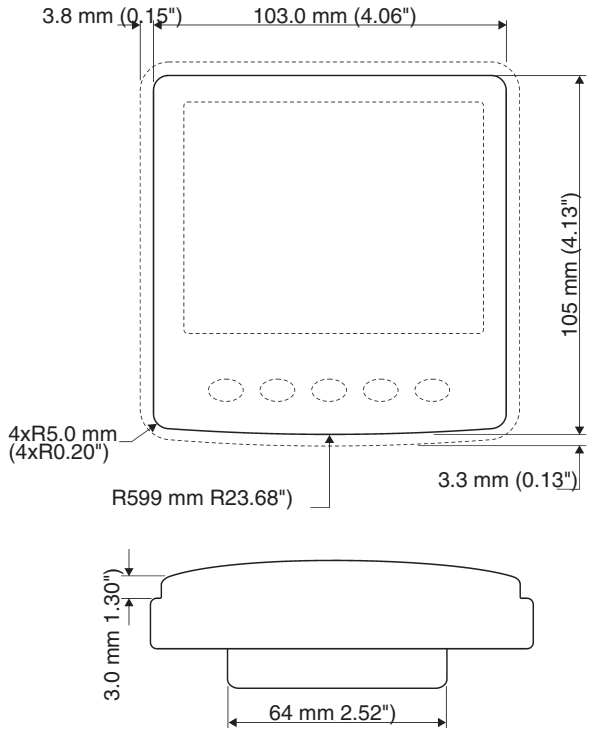
rear side with a diameter of 65 mm (2.56") and drill the four Ø 4.3 mm (0.17") holes for the studs. See the **Templates for controls and panels** chapter .

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.

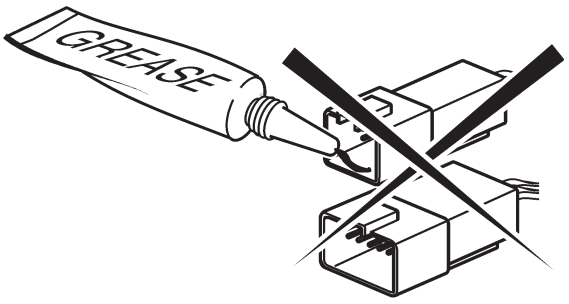
Put the unit into position, then secure it by screwing the thumb nuts onto the studs.

Flush-mounted display

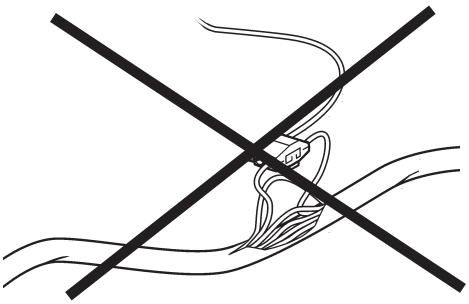


Make a hole for the display using the template enclosed with the installation kits. Use tailor made fittings. Also refer to the **Templates for controls and panels** chapter .

The insert depth is 3 mm (0.12") .

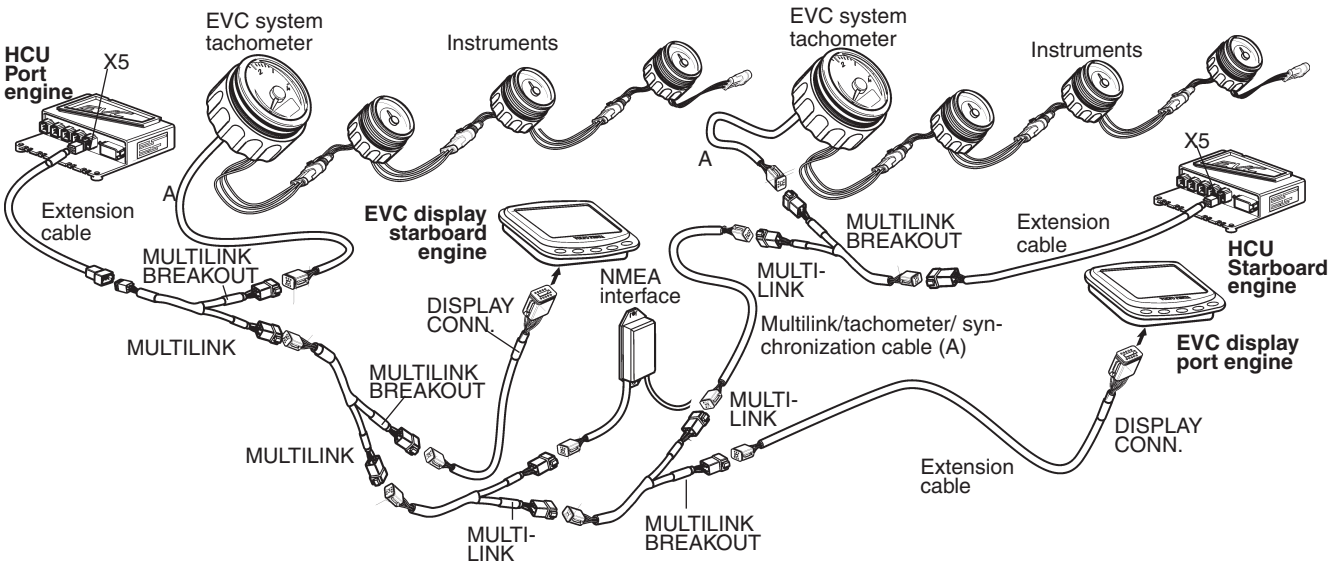


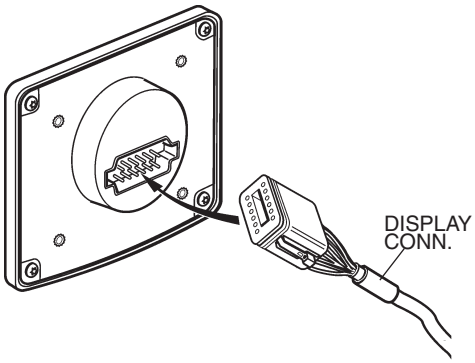
⚠ **IMPORTANT!** Never use any kind of grease in the EVC connectors.



⚠ **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.

Connection





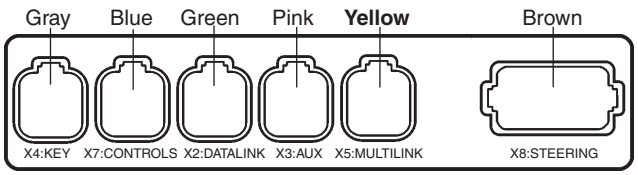


Figure shows a twin engine installation with Y-split cable and synchronization cable.

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. The maximum recommended cable run length of 20 m for Multilink cables should not be exceeded.

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 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.

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

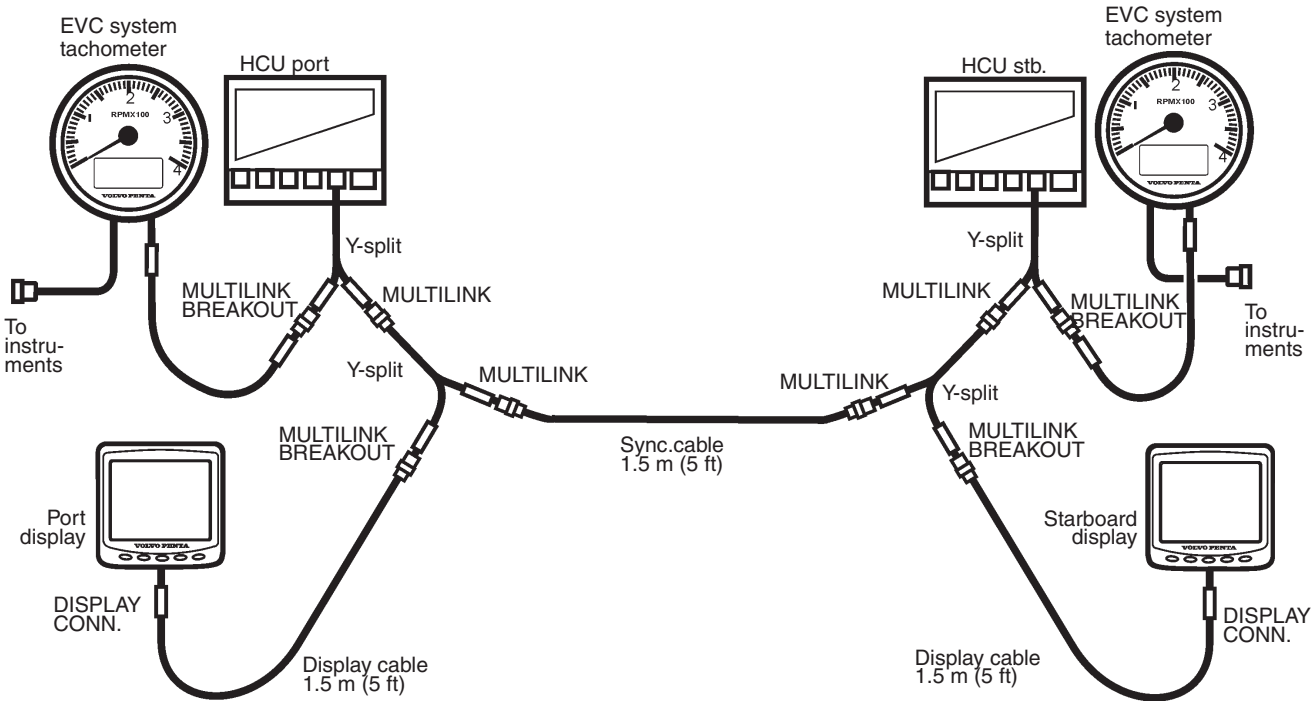
⚠ **IMPORTANT!** A MULTILINK BREAKOUT connection should never be left open (not connected). In such a case, disconnect the Y-split cable.

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.

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

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

Speed through water.
The ”Speed through water” data will be sourced from NMEA 0183 VHW message.

⚠ **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.

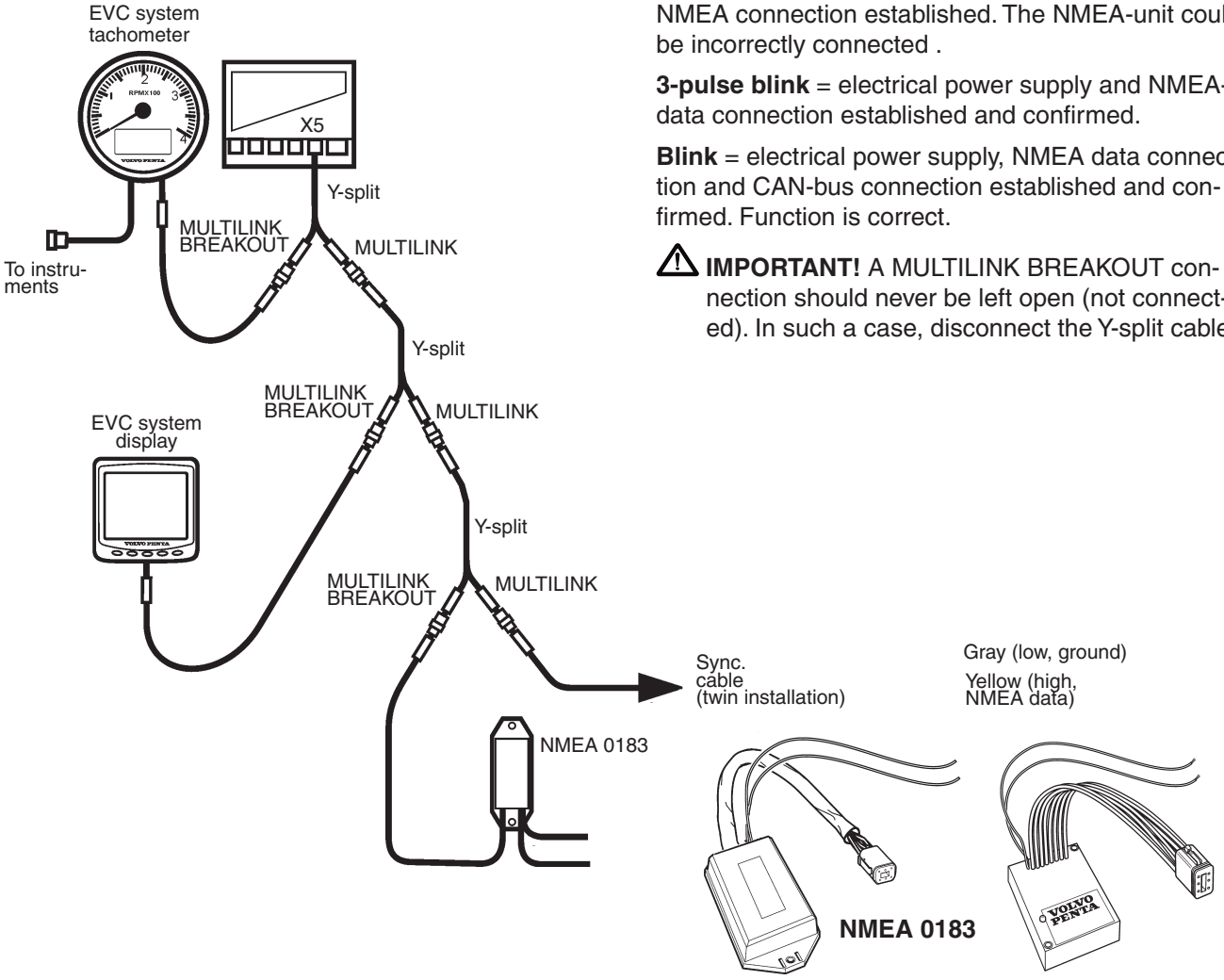
The LED -☼- on the NMEA-unit will show different flashing sequences to define different functions. Complete and confirm the connections in the following order.

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.

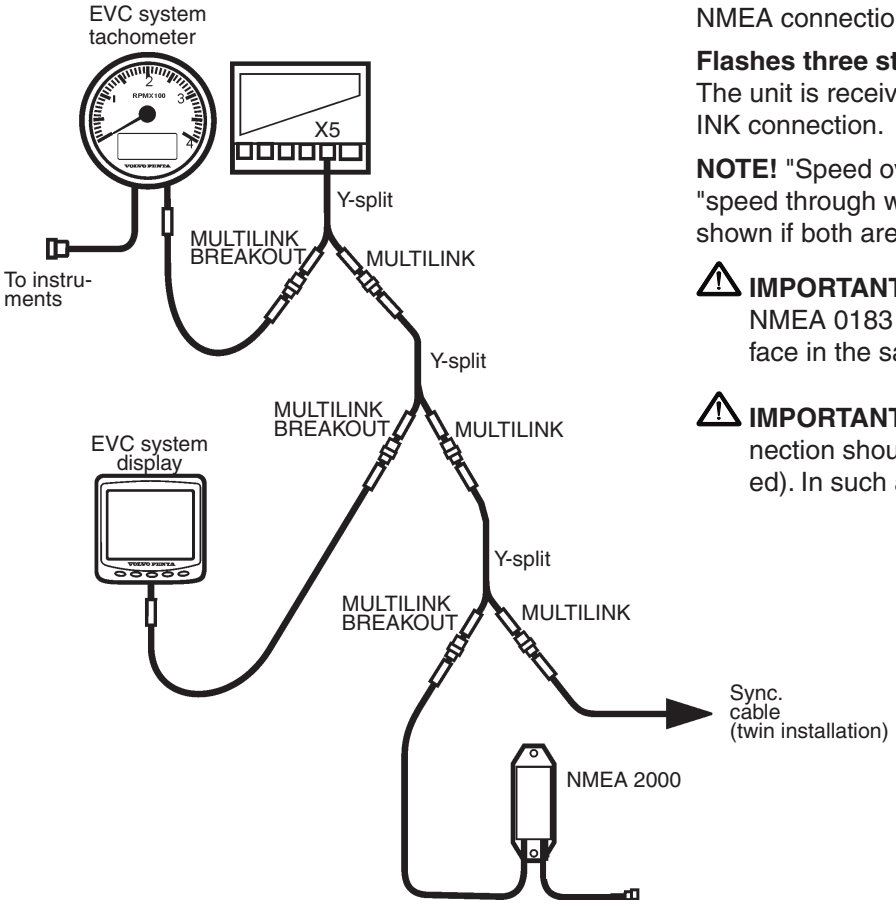
⚠ **IMPORTANT!** A MULTILINK BREAKOUT connection should never be left open (not connected). In such a case, disconnect the Y-split cable.



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

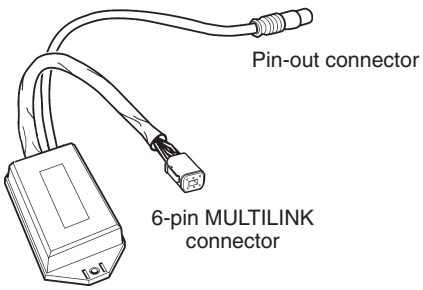
Flashes three strobes and than off repeatedly
The unit is receiving NMEA data but has no MULTILINK connection.

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

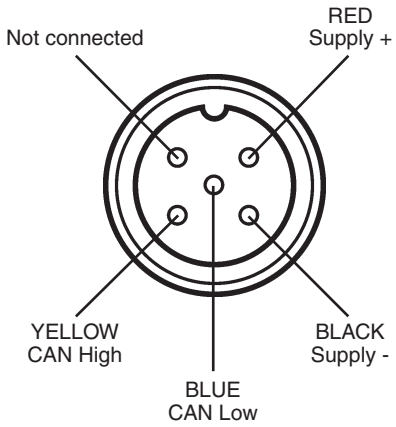
⚠ **IMPORTANT!** It is not allowed to install both an NMEA 0183 interface and an NMEA 2000 interface in the same boat.

⚠ **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

Environmetal parameters
PGN 130310
- Water temperature — Only available if sensor is installed

Input signals from NMEA 2000

Speed PGN 128259
- Speed through water

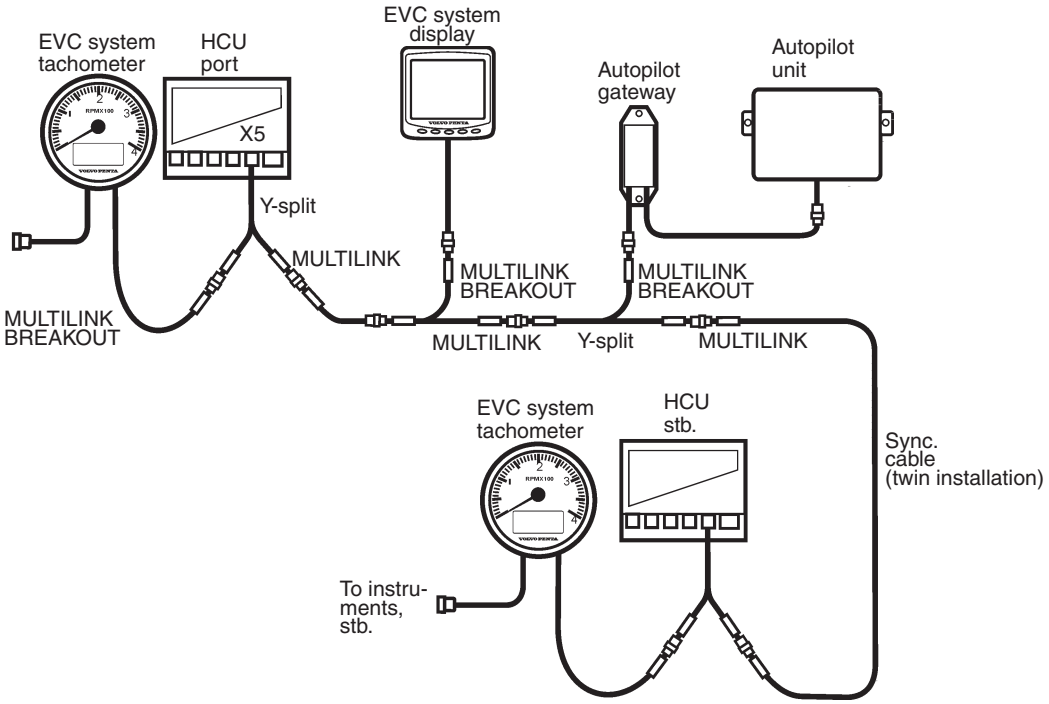
COG & SOG Rapid PGN 129026
- Speed over ground
- Course over ground
- Course over ground reference

Vessel heading PGN 127250
- Vessel heading
- Sensor reference

Autopilot gateway

The autopilot gateway (5) is useful only in IPS installations. The interface is connected to the IPS/EVC system through an Y-split cable MULTILINK BREAKOUT connection.

⚠ **IMPORTANT!** Only the MULTILINK BREAKOUT part of the Y- split cable (1) shall be connected to the EVC system display or the Autopilot-interface



Connect the connector marked MULTILINK BREAKOUT on the Y-split cable to the Autopilot gateway connector (6-pin).

Connect the remaining Autopilot gateway connector to the Autopilot unit (third part equipment).

Autopilot LED (1)

Constant lit -
The autopilot is powered up.

Diagnostic (Autopilot-interface) LED (2)

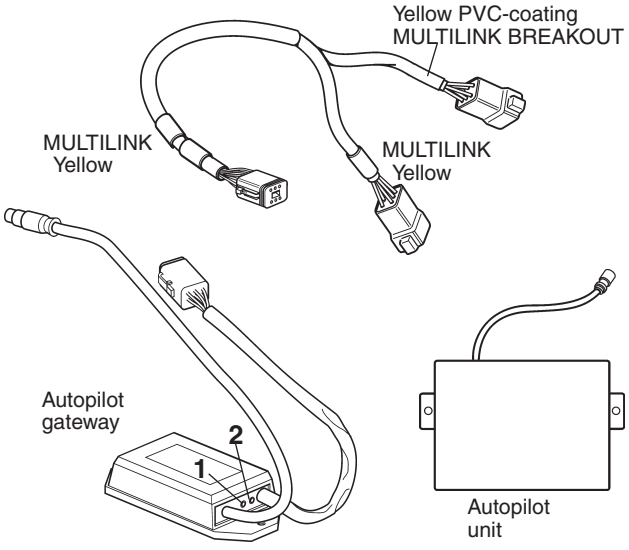
Constant lit -
The unit is powered up but receives no communication from any side.

Flashes on off repeatedly -
The unit is receiving and transmitting valid AUTOPILOT and MULTILINK data.

Flashes 2 strobes and then off repeatedly -
The unit is receiving MULTILINK data but has no AUTOPILOT connection

Flashes 3 strobes and then off repeatedly -
The unit is receiving AUTOPILOT data but has no MULTILINK connection.

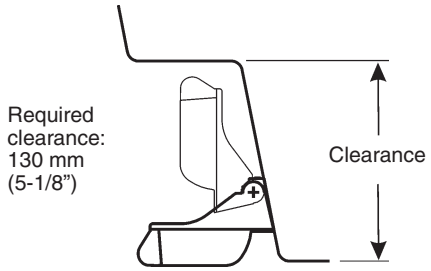
NOTE! An autopilot gateway can coexist with an NMEA interface.

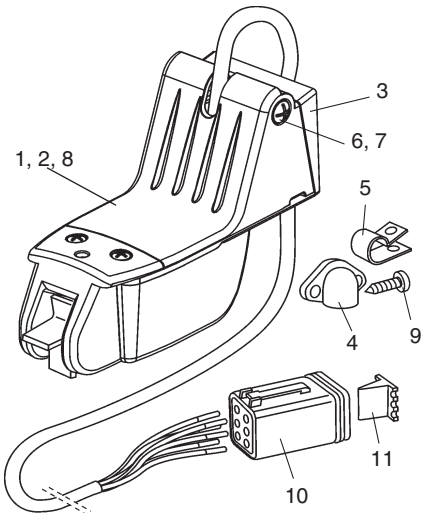


Multisensor

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

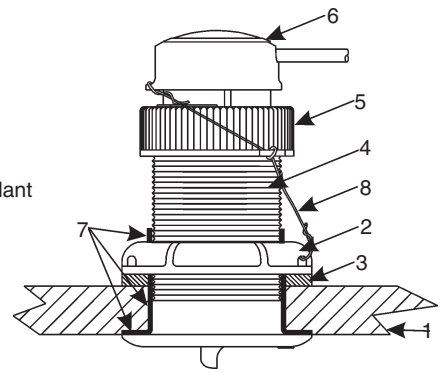
Transom mounted sensor





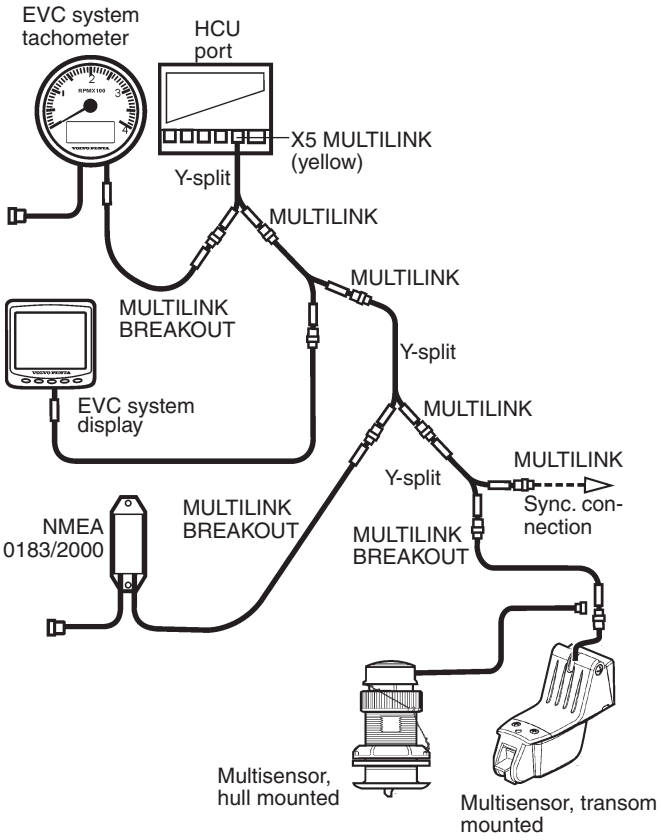
1 Sensor
2 Bracket
3 Shim (9°)
4 Cable cover
5 Clamp
6 Nut
7 Screw
8 Screw, selftapping
9 Screw, selftapping
10 6-pin connector
11 Connector wedge

Hull mounted sensor



1 Hull
2 Hull nut
3 Washer
4 Housing
5 Cap nut
6 Insert
7 Marine sealant
8 Safety wire

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).

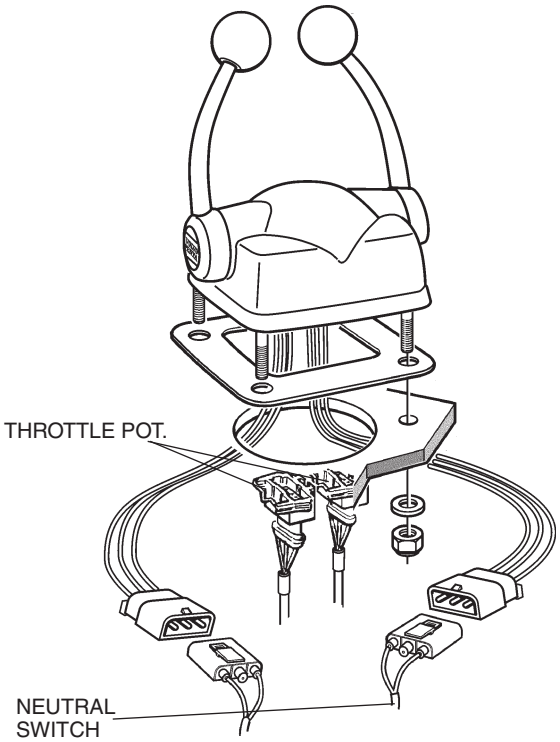
⚠ **IMPORTANT!** Always connect instruments and senders which are common for both engines, such as speedometer, rudder indicator etc to **port** HCU. The port engine is the master engine in the EVC system.

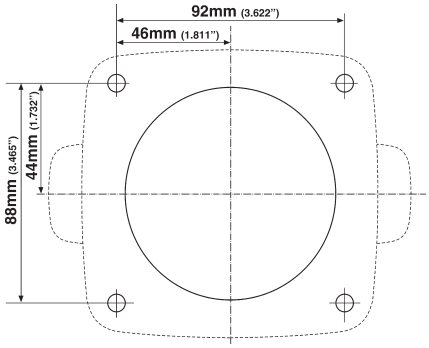
NOTE! If a multisensor and an NMEA interface is installed only the "Speed over ground" will be presented in the speedometer and the EVC system display.

Calibration of boat speed

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

Controls, electronic Top mounted





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

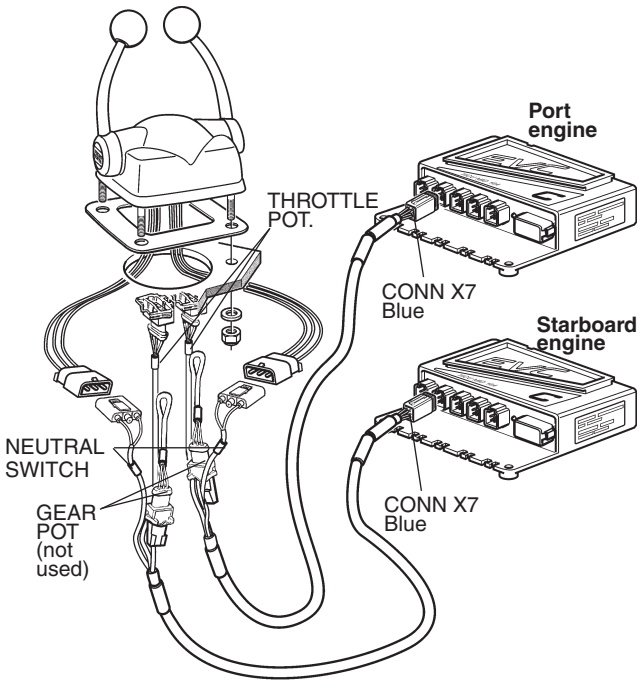
Remove protective film from the gasket and glue the gasket to the dashboard.

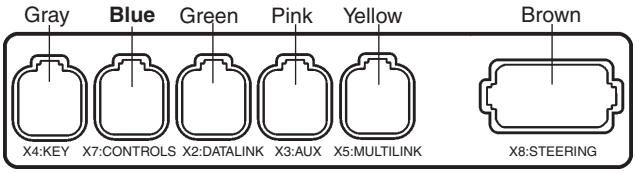
Install the connectors marked “THROTTLE POT.” to the controls.

Install the connectors marked “NEUTRAL SWITCH.” to the controls.

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

Fit the control to the dashboard.





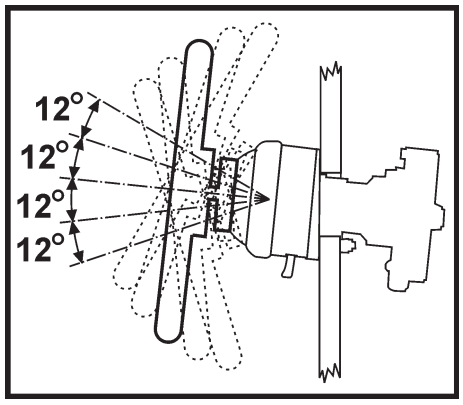
The control cables should be connected to the X7: CONTROLS (blue) connector in the HCU.

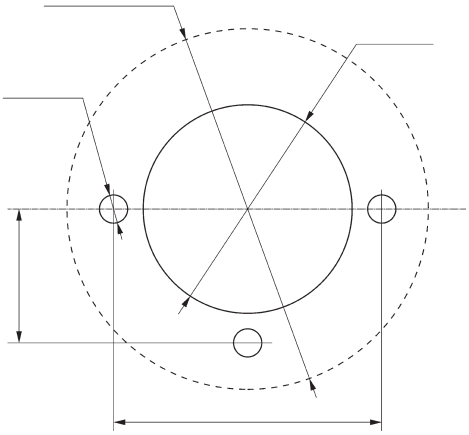
⚠ **IMPORTANT!** No extension cables are allowed to the control lever cable.

Steering system

Installing the steering wheel unit (steering wheel hub)

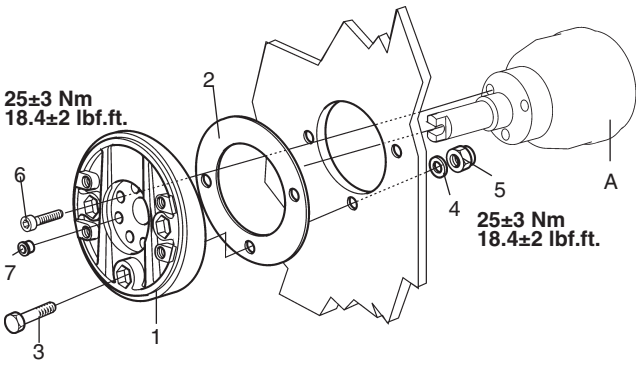
IMPORTANT!
Magnetic compass safe distance is 1000 mm (39").
There must be space for the steering wheel to be adjusted in all positions as in fig. The steering wheel may have a diameter of up to 400 mm (16") and its hub may have a height of up to 130 mm (5").
There must be room for the steering unit and, its cable, wire or hose runs.





1. Mark out and drill the holes for the bracket (1) using the template. Scale hole templates are included in the **Templates for controls and panels** chapter.

IMPORTANT!
The holes for the bracket are aligned differently, depending on whether the steering wheel bracket should be installed vertically or horizontally.



2. Install the gasket (2) and bracket (1) on the instrument panel with three screws (3), washes (4) and nuts (5) as in illustration.

Tightening torque: **25±3 Nm (18.4±2.2 lbf ft).**

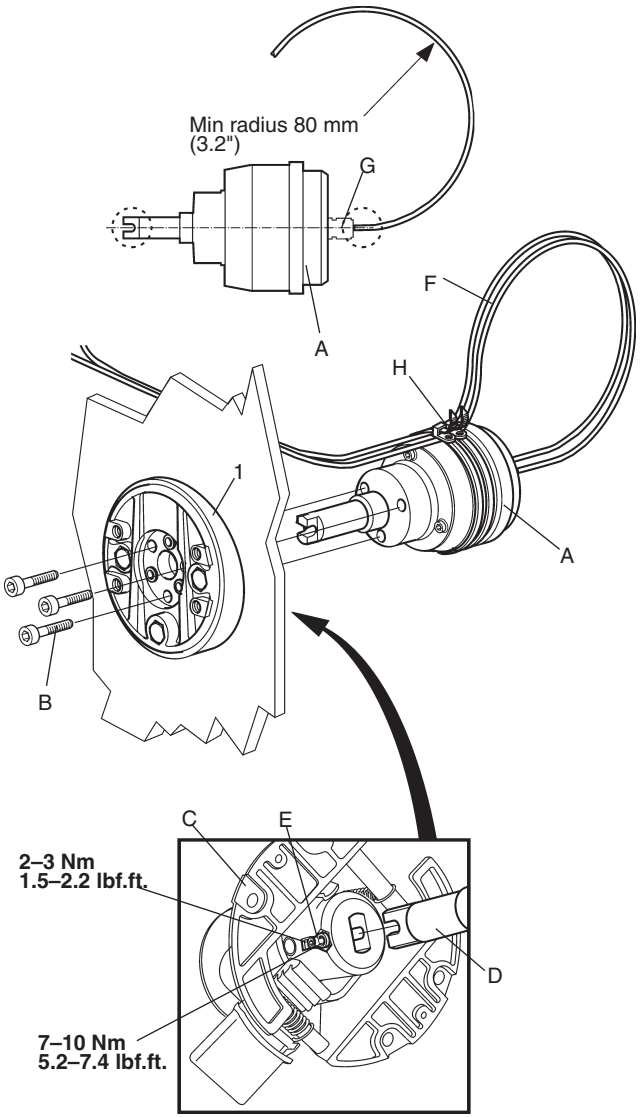
3. Install steering wheel unit (A) with three screws (6) as in figure.

Tightening torque: **25±3 Nm (18.4±2.2 lbf ft).**

Install plugs (7) in the un-used holes as in figure.

IMPORTANT! The screws must be clean from grease and oil. The steering unit must be supported securely during installation.

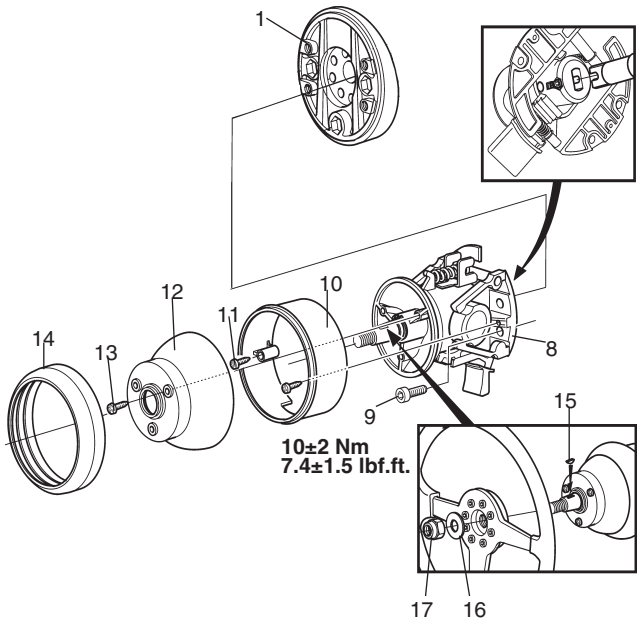
The steering unit can be installed in 8 positions.



⚠ **IMPORTANT!** Cable connector (G) should be parallel with the spindle, to avoid subjecting it to mechanical side forces. Smallest permissible bending radius for the cables is 80 mm (3.2 "). The cables must not be subjected to strain during or after installation. The cables should be fixed to protect them from sharp bends and vibration.The cables must not be exposed to temperatures exceeding 70°C (158°F). There are no extension cables to the steering cables.

Installing the steering wheel adjuster

4. Install the steering wheel adjuster as follows: Undo both screws (E) in the steering wheel adjuster's universal joint approx. 1-2 turns. Place the steering wheel adjuster on the steering wheel hub shaft (the forked end is inserted into the universal joint) and then mount the steering wheel adjuster onto the bracket (1).



5. Install the steering wheel adjuster (8) on bracket (1) with screw (9) as in illustration.

Tightening torque: **10±2 Nm (7.4±1.5 lbf ft).**

6. Finish by tightening the screws (E) in the universal joint.

Tightening torque:
Small screw 2-3 Nm (1.5-2.2 lbf ft)
Large screw 7-10 Nm (5.2-7.4 lbf ft).

7. Fix the signal cables (F) to the steering wheel hub with cable ties (H) as in illustration.

8. Install the fixed cover (10) using screws (11) as in illustration. Install the movable cover (12) using screws (13) as in illustration.

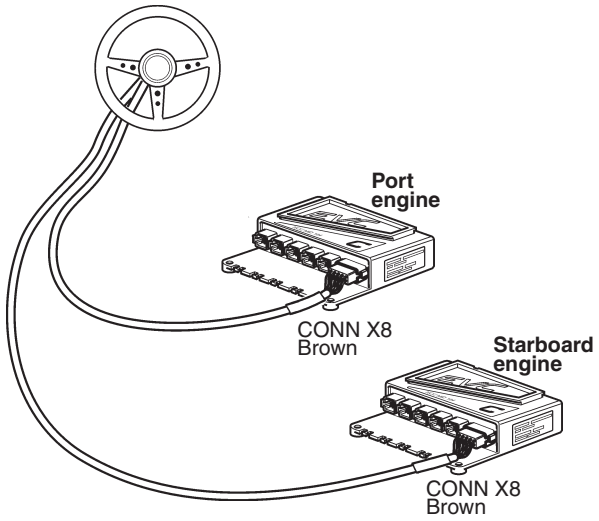
9. Install the seal moulding (14) in the groove in the fixed cover (10) as in the illustration.

10. Install the key (15) in the groove in the steering wheel adjuster spindle. Install the steering wheel with washer (16) and nut (17) as in the illustration.

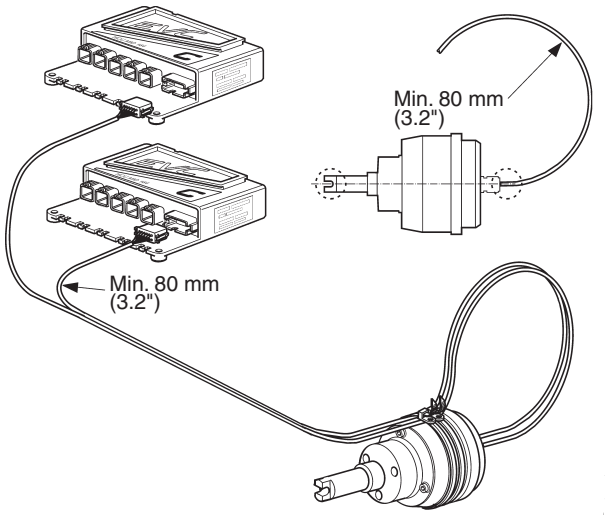
NOTE! The conical end of steering wheel shaft is compliant with both UNI EN 28848 and ABYC P21.

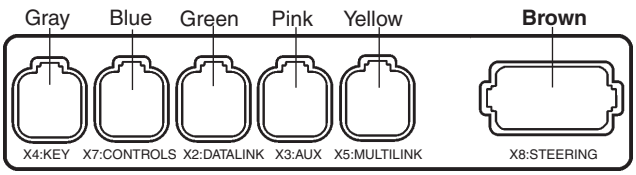
NOTE! Also see Installation instructions included in the **Steering wheel hub kit** and the **Steering wheel adjuster** kit.

Connection to HCUs



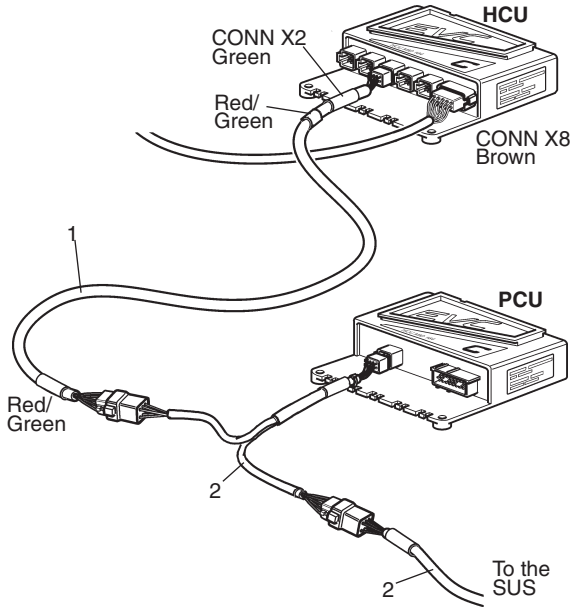
The two steering cables from the steering wheel unit shall be connected to the HCU connection X8: STEERING (brown) starboard and port. It is of no importance which cable is routed to starboard or port HCU.





⚠ **IMPORTANT!** Note the smallest permissible bending radius of the steering cables: 80 mm (3.2").
The cables must not be subjected to strain.
The cables should be propely clamped to protect them from sharp bends and vibrations.
The cables must not be exposed to temperatures exceeding 70°C (158°F)

Connection HCUs – PCUs



Steering signals are sent via the EVC-bus cable (1) to the Servo Unit Steering (SUS). An Y-connection (2) is used to lead the steering signals past the PCU.

⚠ **IMPORTANT!** There must not be any extension cables between the steering wheel unit and the HCUs.

Joystick unit

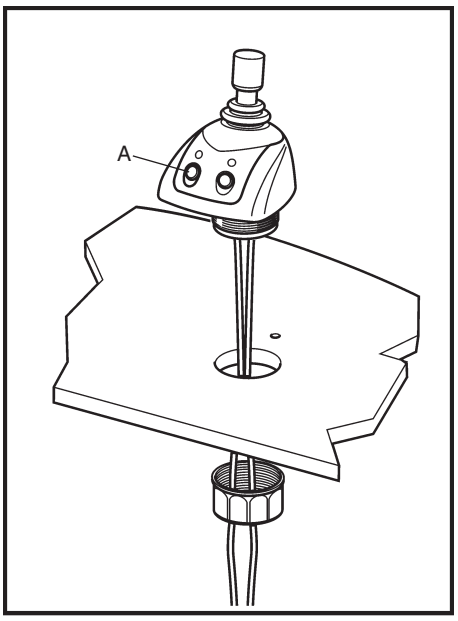
Installation

⚠ **IMPORTANT!** Only one joystick per control station can be installed.

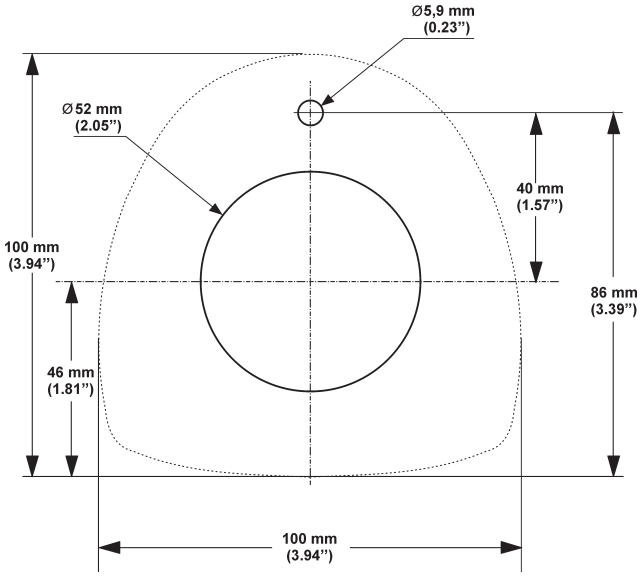
Decide where to put the joystick.

NOTE! Remember the following when you install the joystick:

- Install the joystick on a horizontal surface.
- Think about the operating position. Make sure that there is space to support the operator's hand and forearm.
- Make sure that the distance to the instruments and the other controls is sufficient, so their functionality is not affected.

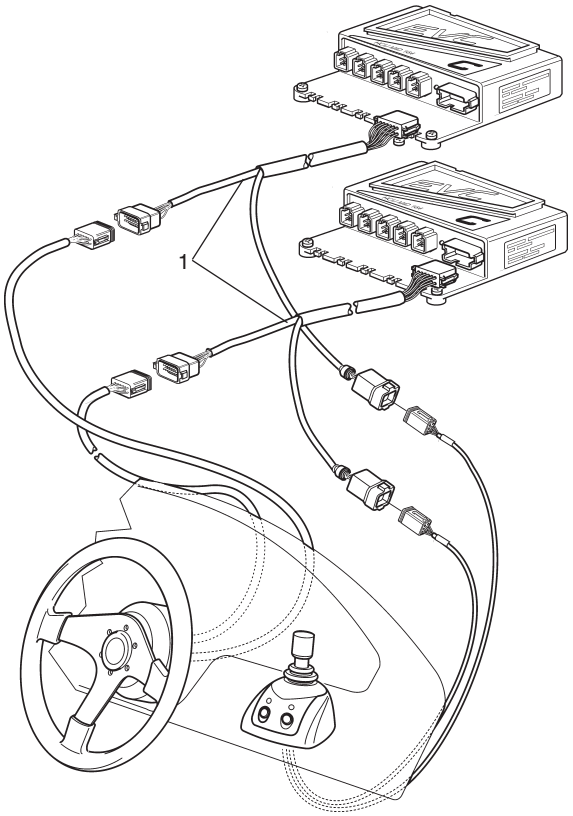


Install the joystick on the instrument panel as in the illustration. The thickness of the instrument panel must not be greater than 25 mm.

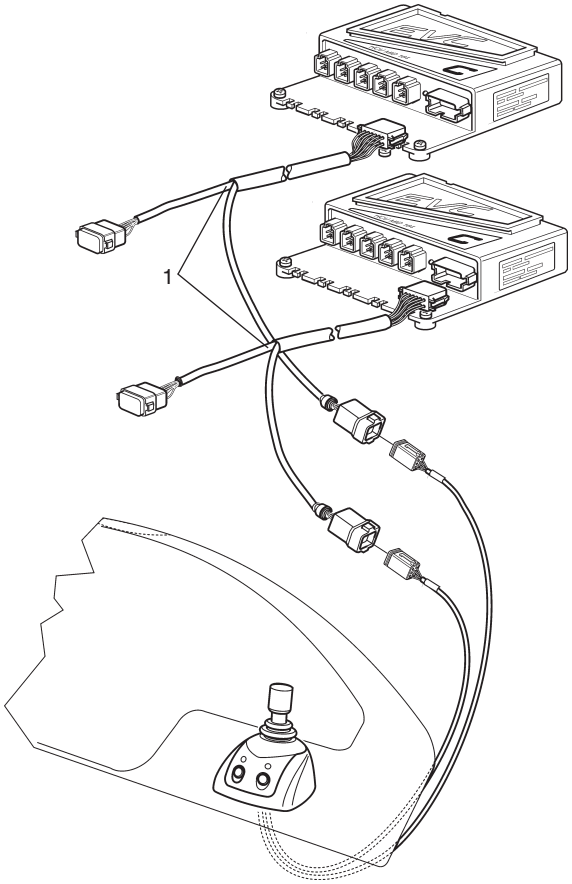


Mark out and make holes for the joystick. A full size template is located in the back of this installation instruction.

Installation, main/secondary station



Installation, docking station



Connection

Connect branch connectors (1) between the steering wheel control unit (only main/secondary station) and the HCU units as in the illustration. Connect the signal cable from the joystick to the T-junction.

⚠ **IMPORTANT!** Make sure that the locking mechanism between the connectors closes with a click. This guarantees a water-tight, correct closure.

When the installation is completed, an auto configuration must be done. Please refer to chapter **Calibration and settings.**

NOTE! If the boat is retrofitted with a Volvo Penta IPS Joystick, new software must be ordered and installed before auto configuration is done. The procedure differs, depending on the EVC version. Please refer to the “Installation of new software” section.

Calibrate the joystick. Please refer to the “**Calibrating the joystick**” section.

Installation of new software

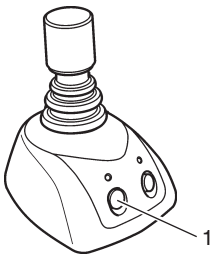
Visit the ”VODIA web site” and click the ”Conversion kit” link.

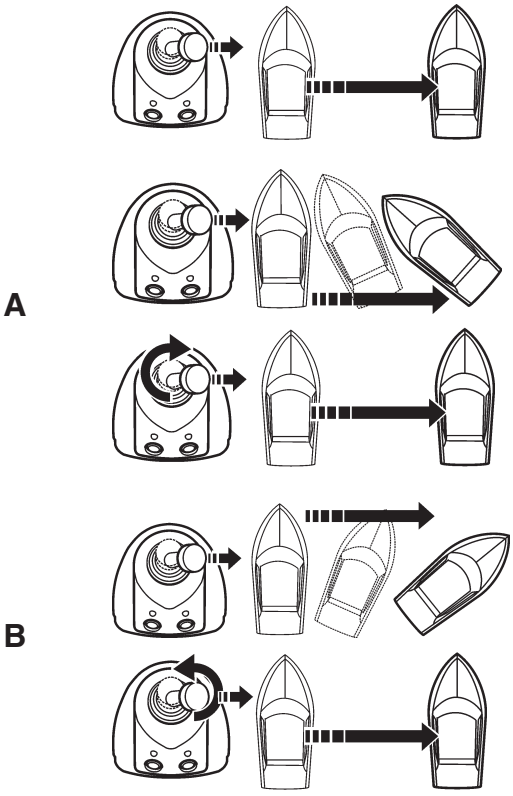
Order a conversion kit for activation of the Volvo Penta IPS Joystick function (order one per driveline).

Once the order has been completed, click the ”Control unit programming” link.

Download and program the ordered kits into the powertrain control units (PCU), using VODIA. All kits are downloaded and programmed in as a ”package” (one ”package” for each unit).

NOTE! Program all PCUs.





Calibrating the joystick

This calibration only needs to be performed if the boat movement does not corresponds to the movement of the joystick.

Calibrate the joystick as follows:

⚠ **IMPORTANT!** When calibrating the joystick function the boat must be operated in open water and under safe conditions. Avoid performing the calibration in strong winds or sea-current as such conditions may affect the outcome of the calibration.

NOTE! Calibration only needs to be done in one direction, port or starboard.

1. Enable docking function.
2. Push both the buttons on the joystick and hold them down for 5 seconds or more. A sound signal indicates that the system is in calibration mode. The NEUTRAL BUTTON LEDs starts to flash.
3. Move the joystick to one of its end positions. Correct the boat's incorrect movement by turning and/or moving the joystick as illustrated in examples A-D.

NOTE! Combinations of the examples shown can occur.

NOTE! Let the boat move for quite a long distance during the calibration routine. Hold the joystick in position.

4. When the boat is moving directly sideways, depress the docking button (1). The new calibration is stored and is confirmed with a beep.
5. Release the joystick. The system is now in normal docking function.

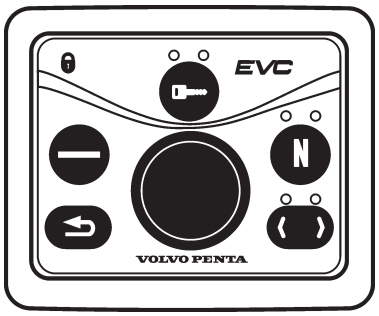
Joystick calibration is now complete.

NOTE! It is always possible to reset the calibration as follows.

1. Enable docking function.
2. Push the buttons on the joystick and hold them down for 5 seconds or more. A sound signal indicates that the system is in calibration mode. The LEDs above the neutral button starts to flash and the LED above the docking button lights up.
3. Push the docking button (1). Calibration is reset and this is confirmed with a beep.
4. The system is now in normal docking function.

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. Control panel EVC is available in two versions, for single or double engine installations.



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.

Flashes: 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.

Indication (green):

Off: Drive/reverse gear engaged.

Lit: Control lever in neutral.

Flashing: 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.

Docking station panel

The docking station panel allows stopping restarting of the engines and handling of faults when operating the boat from a docking station.

The docking function (maneuvering with the joystick) is enabled when the docking station is activated.

NOTE! Docking station can only be activated when the engines are running.

NOTE! Always push the buttons firmly for at least one second.

ACTIVE STATION BUTTON

Push this button on the docking station panel to activate and lock/unlock the docking station.

STOP and **START BUTTONS**

Push these buttons to stop or restart the engines.

NOTE! Both engines must be running when using the docking function.

Indication (white)

Off: Port engine / Starboard engine(s) are/is shut off.

Lit: Port engine / Starboard engine(s) are/is running.

Flashing (and accompanied with a buzzer): The engine(s) has stopped without a stop request. Silence the buzzer with the ALARM ACKNOWLEDGE BUTTON and restart the engine(s).

ALARM ACKNOWLEDGE BUTTON

Push the button to acknowledge an alarm of a fault. A fault is always indicated with a flashing LED above the button and more serious faults is also indicated with a buzzer. When the fault is acknowledged the LED will light continuously and the buzzer will silence. The fault pop-up must be read and acknowledged on a station that is equipped with displays.

NOTE! Enter Service mode by pushing the ALARM ACKNOWLEDGE BUTTON for at least 5 sec.

Indication (red):

Lit: Alarm (acknowledged)

Flashing: Alarm (not acknowledged) or Service mode

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.

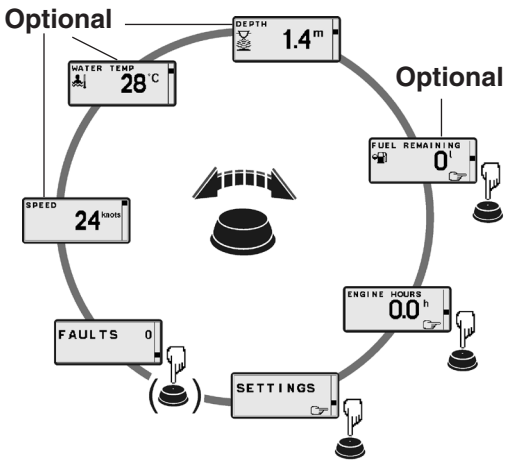
Through the calibration routine the control lever positions and the idle rpm are defined for the EVC system. If a control lever has been replaced, the new one must be calibrated.

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

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

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

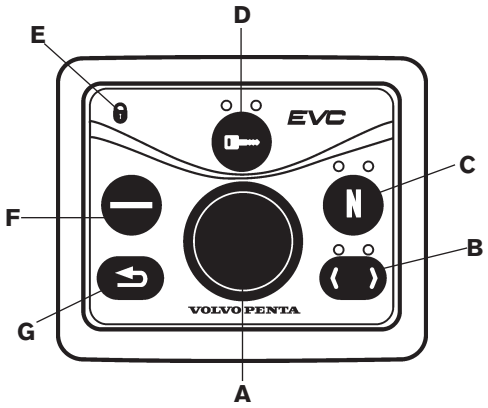
Menu system



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

At power-up Volvo Penta logotype will be shown in 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.



A. **NAVIGATION WHEEL**
Select: Turn navigation wheel to select sub menu or select setting.
Enter: Push navigation wheel to reach selected sub menu.
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
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 LEDs red
- Constant light: Station active
- No light: Station inactive
- Flashing: Attempt to take station not permissible

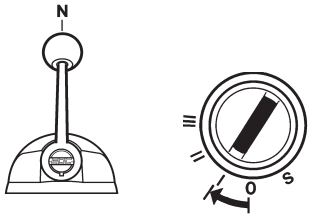
E. **STATION LOCK INDICATION**
If lit, the system is locked and the engine can only be controlled from the activated control panel

F. **MULTIFUNCTION BUTTON**
Push to increase or decrease the instrument's and panel's backlighting
- Dimmer
- Auto configuration (together with BACK BUTTON)
- Montoring 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 all helm stations 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 LEDs flashing and pop-up screen in tachometer display/EVC system display.

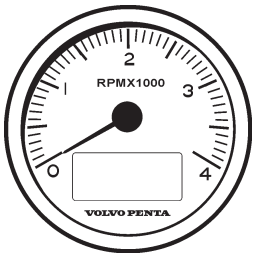
NOTE! When entering Calibration Mode in an EVC^{EC}-C system with a never before used EVC system display, the text "**CALIBRATION MODE**" will not appear on the display. The text "**INCORRECT DATABASE**" will be shown on the EVC system display.

NOTE! The first digit varies depending on system configuration.
1.0 indicates a single lever control.
2.0 indicates separate throttle/gear levers.

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

Auto configuration

EVC system tachometer



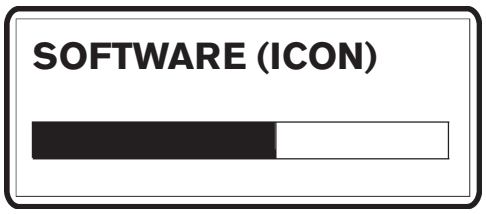
Auto configuration is the EVC system self-identification. Auto configuration should be performed when the system is started for the first time or after system updates.

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

NOTE! In an installation 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**). Start with port engine (**starboard engine - ignition off**).
2. Enter calibration mode.
3. Push and hold BACK BUTTON and MULTIFUNCTION BUTTON until buzzer signal and LEDs light up.

   Release buttons.

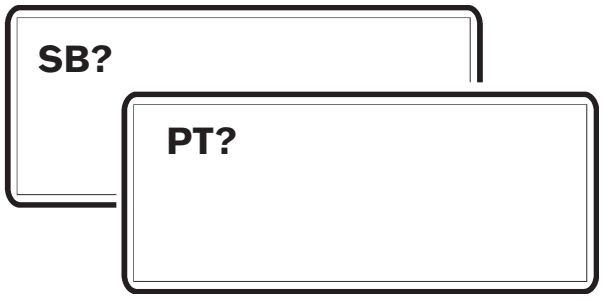


4. Self identification and software download starts. The procedure may take **several minutes** depending on software download to the tachometer display/EVC system display.

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 intructions in step 5–8

Tachometer configuration



5. 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.
6. The other tachometer display will read “**SB?**” (starboard engine). Confirm by pushing NAVIGATION WHEEL.

   “**SBIS**” is shown in display.
7. Wait until “**PTIS**”/”**SBIS**” disappears from tachometer display and MAIN MENU appears.

Additional helm station (s)

Repeat step 5–7 for each additional helm station.

8. 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, all displays must be configured as “**TWIN**” before auto configuration is performed.

In a twin installation. when using two EVC system displays, all 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 MULTIFUNCTION 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 “**UPLOADING DATABASE**” will appear on the displays.

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

Starboard engine

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).

Lever calibration

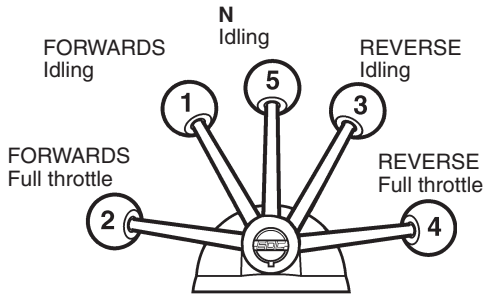
Electronic lever control – top mounted

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 NEUTRAL BUTTON LED(s) will show steady light and the system returns to MAIN MENU.

Select language and units

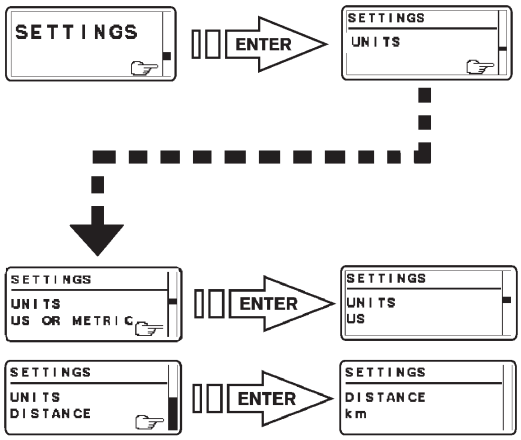
NOTE! Language and unit settings must be performed in all EVC system tachometers and EVC system displays.

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

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 control 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

Confirm rpm by pushing the NEUTRAL BUTTON.

5. Move lever to neutral position and stop the engine.

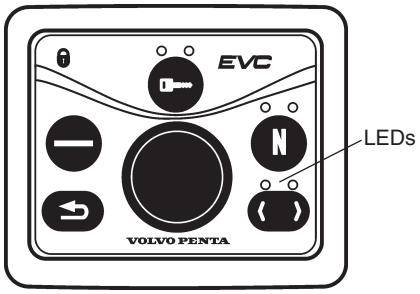
Settings, general

NOTE! For all setting procedures:

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

OEM-mode

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



Enter OEM-mode

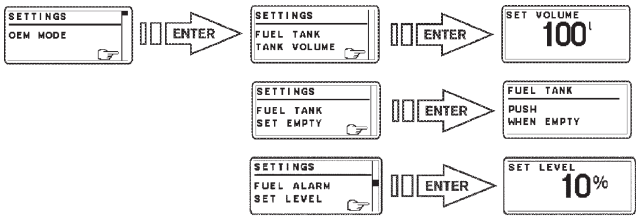
1. Activate helm station by pushing the ACTIVE STATION BUTTON.
2. Enter OEM-mode by pushing the MULTIFUNCTION BUTTON for at least 5 seconds.
3 The red/green LEDs is flashing and pop-up screen OEM MODE ACTIVATED is shown for approx. 5 seconds.
   In **twin installations** one of the tachometer display 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/green LEDs 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

There are two possible calibration methods for the fuel tank. One approximative, FULL TANK CALIBRATION, and one more accurate, FUEL MULTIPOINT CALIBRATION. A fuel level sender need to be installed.

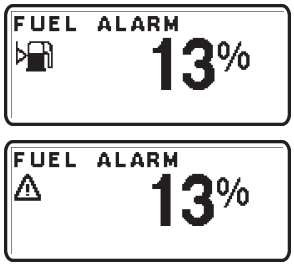
Full tank calibration

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.
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 FULL TANK CALIBRATION by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter FULL TANK CALIBRATION.
5. 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

NOTE! A FUEL MULTIPOINT CALIBRATION requires that FUEL TANK VOLUME and FUEL TANK EMPTY have been set.

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) and 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.

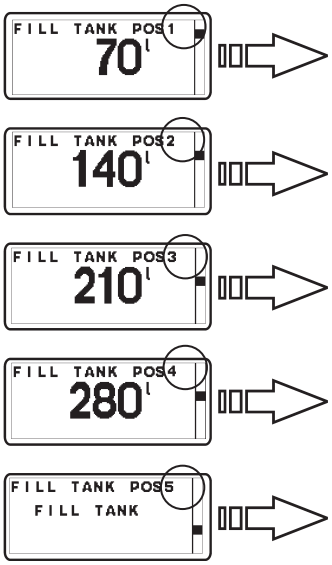
1. Activate helm station by pushing the ACTIVATION BUTTON.
2. Select SETTINGS from MAIN MENU by turning NAVIGATION WHEEL. Push NAVIGATION WHEEL to enter SETTINGS MENU.
3. Select FUEL TANK CALIBRATION and push NAVIGATION WHEEL.
4. Select FUEL MULTIPOINT CALIBRATION by turning NAVIGATION WHEEL. Push NAVIGATION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

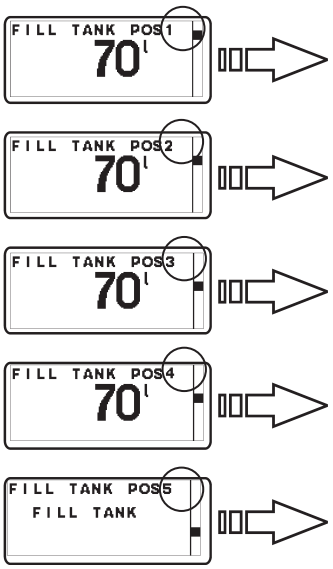
Push BACK BUTTON to return to SETTINGS MENU.



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.

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.

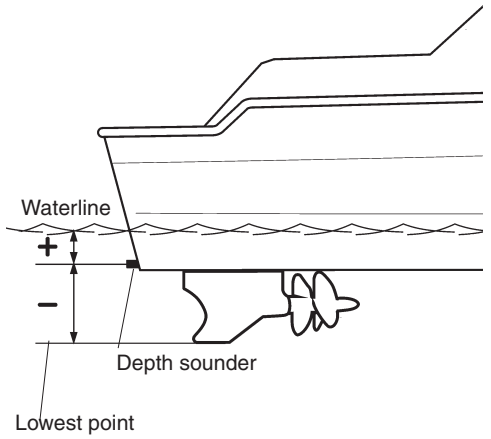
It is possible to navigate the menus when in monitoring mode.

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 units.

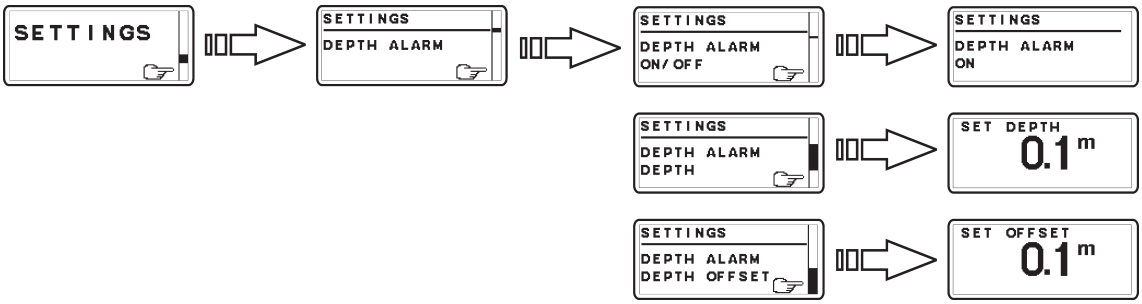
Once adjustment value is reached, the data is stored by pushing NAVIGATION WHEEL.

DEPTH OFFSET

The depth sounder can be placed anywhere on the hull. The location offset can be calibrated. 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.

Calibration.
Volvo Penta IPS drive leg positions

For a new Volvo Penta IPS installation it is necessary to carry out a **drive leg parallel calibration**.

If the Volvo Penta IPS unit or a vital part of the system has been replaced, you must carry out a **drive leg factory setting calibration**.

Following you will find a brief description of the calibration procedures. More information is given in the VODIA system for setting and calibration of the IPS drive legs.

⚠ **IMPORTANT!** If drive leg factory setting calibration or drive leg parallel calibration has not been performed, gear cannot be engaged.

Preconditions

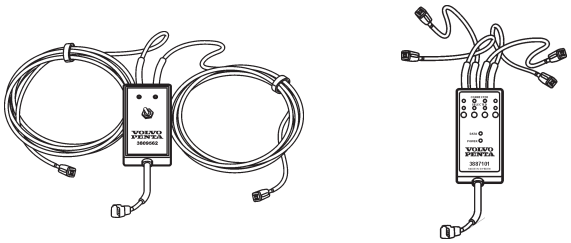
The boat must be out of the water

The batteries should be fully charged or on external power charge

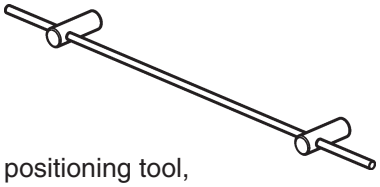
There should not be any persons or objects within operational range of the drive legs.

Special tools and equipment

VODIA
Diagnostic Scan Tool



Switch box,
part no. **3809562 / 3887101**

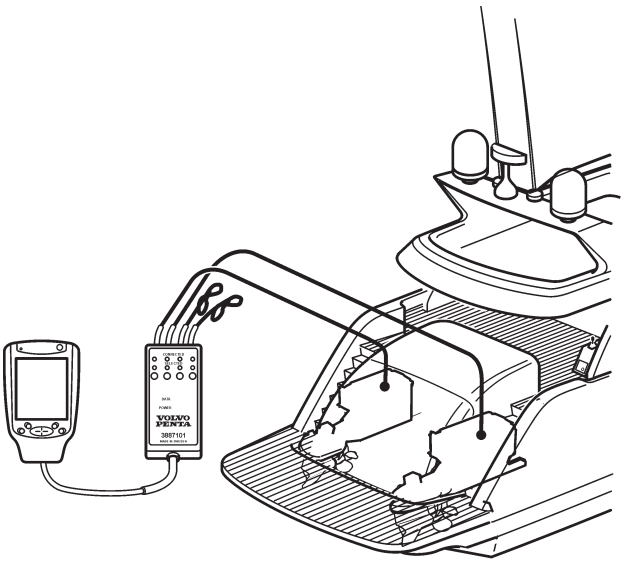


Drive center positioning tool,
part no. **3808507**

Drive leg factory setting calibration

The IPS units are always calibrated when delivered from factory or warehouse. Factory setting calibration shall be performed when a unit has been replaced or when a vital part of the system is changed, e.g. drive leg or resolver.

The calibration procedure is used for setting of the end postions of starboard and port drive legs.



The **switch box** (1) is connected to starboard and port engine diagnosis connection and the VODIA tool is connected to the switch box. The switch box makes it possible to switch between the drive legs during the operation.

The drive legs are then set and calibrated by following the IPS operations in the VODIA system.

⚠ **IMPORTANT!** This operation must always be followed by the **Parallel calibration** procedure.

Drive leg parallel calibration

This calibration routine is accomplished after the factory setting. It is used to calibrate the relative position between starboard and port drive legs (drive legs parallel to the boat keel).

The boat must be out of water and you need a switch box and the special drive center position tool to carry out this routine.

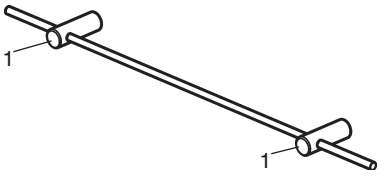
The **switch box** is connected to starboard and port engine diagnosis connectioon and to the VODIA tool.

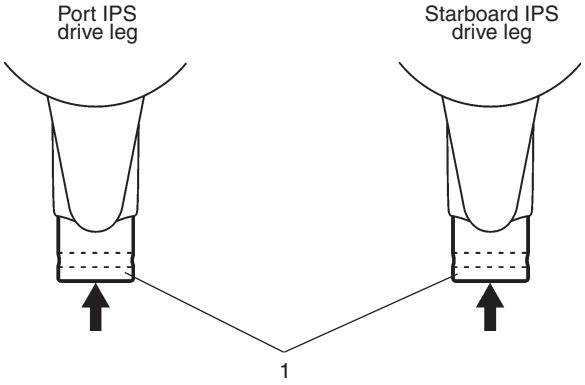
The **drive center positioning tool** is used when positioning the drive legs in parallel and parallel to the keel of the boat.

⚠ **IMPORTANT!** When the engines are not running, the drive legs are not in parallel with the keel but pointing slightly toe-in. Do not use the drive center positioning tool when not in calibration mode.

The drive legs are then set and calibrated by using the IPS operations in the VODIA system.

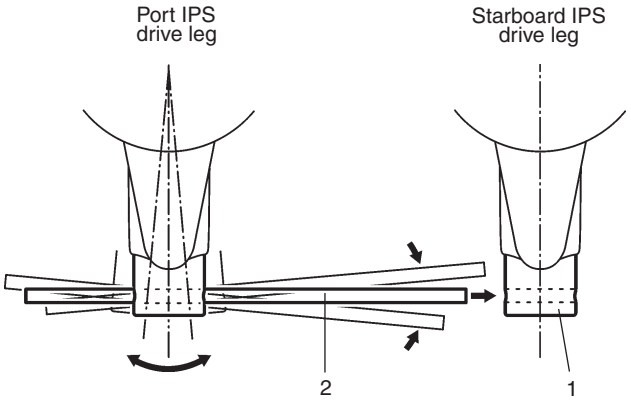
Using the positioning tool, 3808507





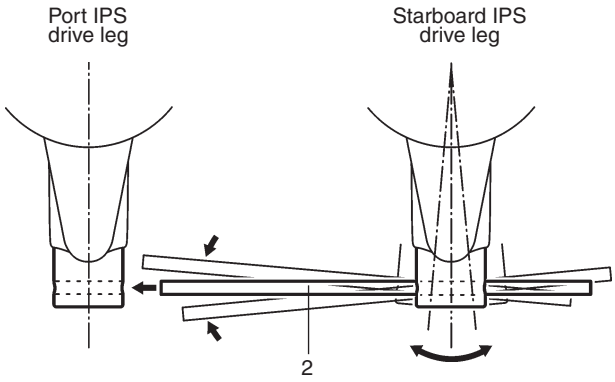
When calibrating, push the plastic cylinders (1) into the exhaust outlets on the drive legs.

NOTE! The cylinders must be pushed all the way to the bottom of the outlet holes.

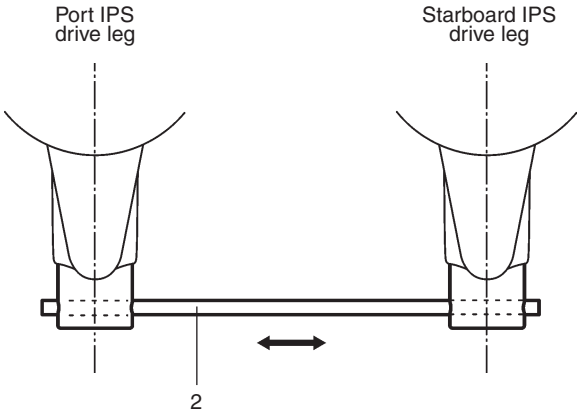


Place the aluminum bar (2) in the port cylinder and use it as an “aligning tool” as shown in the illustration.

Carefully position the drive with the bar until the bar aligns with the hole in the starboard cylinder (1).



Then move the bar to the starboard cylinder and repeat the steps above until the bar aligns with the port cylinder hole.



When the bar (2) can easily be moved through the cylinder holes without any resistance the drive legs are in parallel and parallel to the boat keel.

NOTE! The cylinders must be in place, that is against the bottom of the exhaust outlet holes.

Steering mode setting

The setting of the steering mode, that is the IPS-units steering angles, is depending on the properties of the boat hull. The steering angles influence the turn radius of the boat.

Steering angles should be set so that the boat is running/turning in a safe, reliable and comfortable way.

Settings are made by using the VODIA diagnostic scan tool and the switch box, special tool part no. **3809562** and **3887101**.

Steering mode setting is performed after "Drive leg factory setting" and "Drive leg parallel calibration".

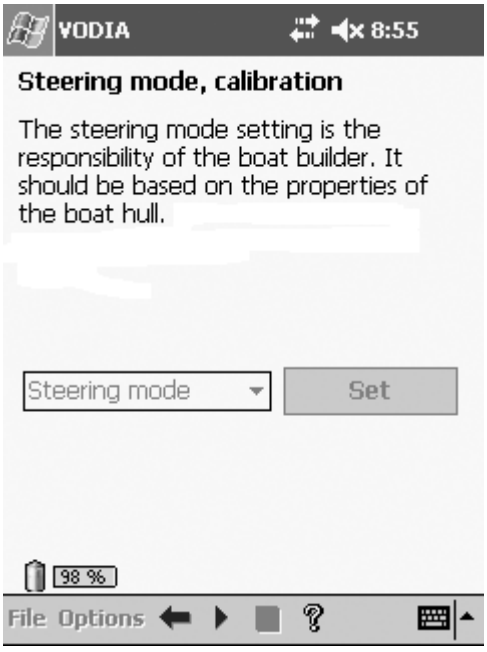
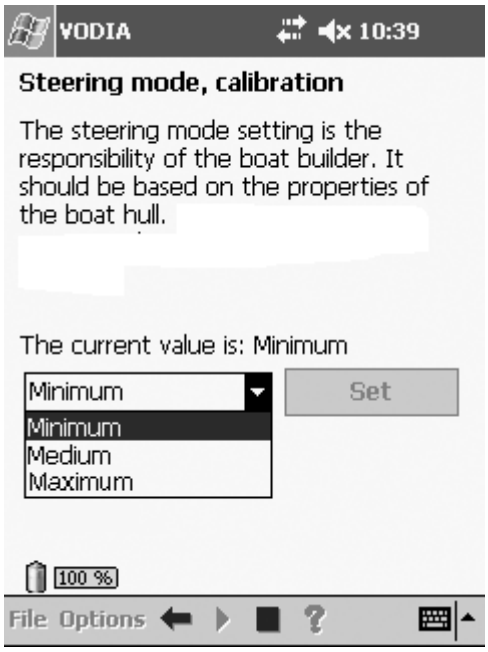


Figure shows the VODIA start menu under "Steering mode calibration".



There are three values when setting the steering angles: MINIMUM, MEDIUM and MAXIMUM.

The MINIMUM value is the default value.

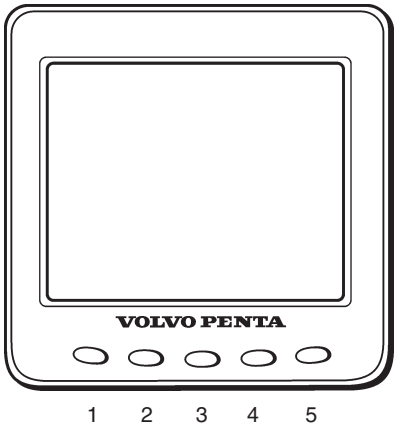
The MAXIMUM (SPORT) value corresponds with the lowest turn radius. And the MINIMUM value will consequently result in the highest turn radius.

Report calibration to VODIA website

⚠ **IMPORTANT!** After finished calibration procedure connect to VODIA website and report Volvo Penta IPS calibration.
If this calibration has been reported a new calibration is not needed after future updates.

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).

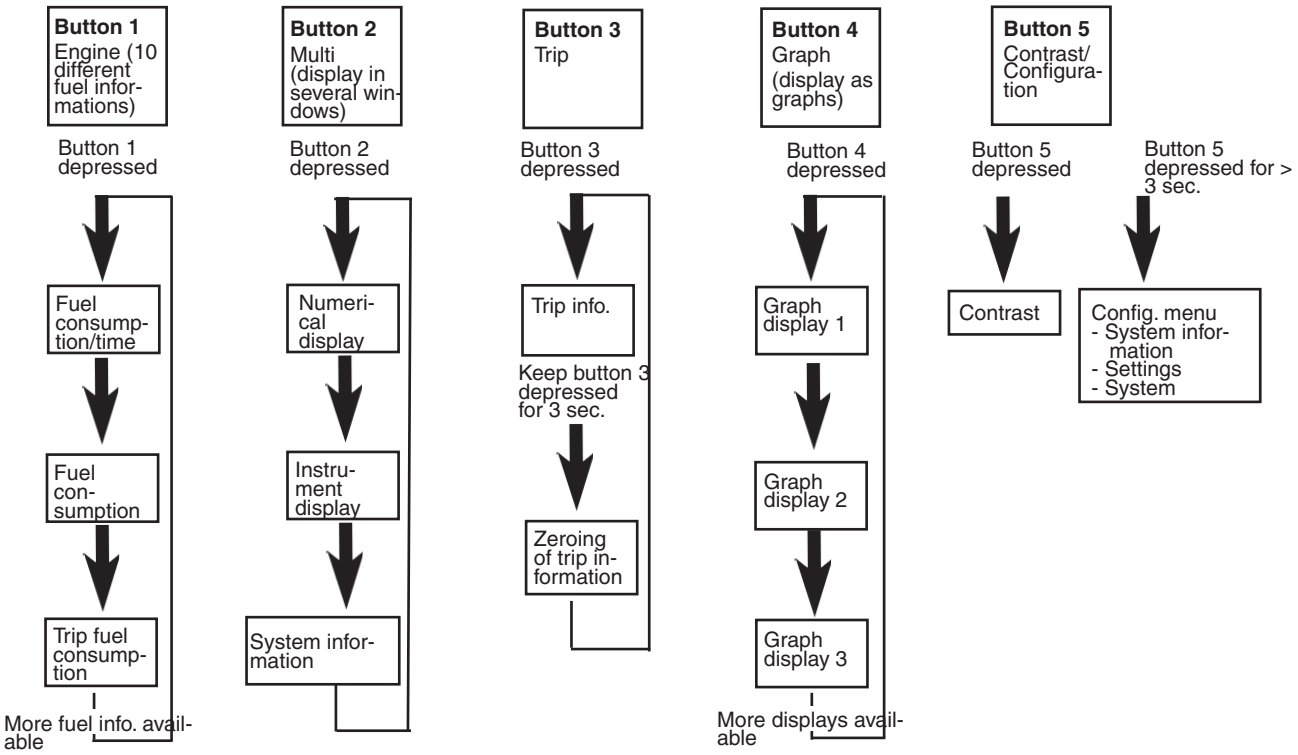
Before the display is used, it may be necessary to modify the way that the display shows operating information, to comply with user requirements. You can see the settings that can be changed in the section about the configuration menu.

⚠ **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

Read the **Safety Precautions** chapter before starting work.



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

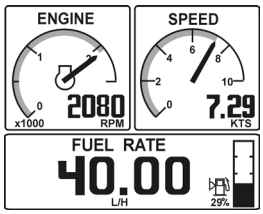


Figure for single engine installation

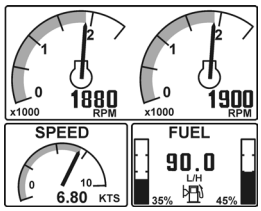
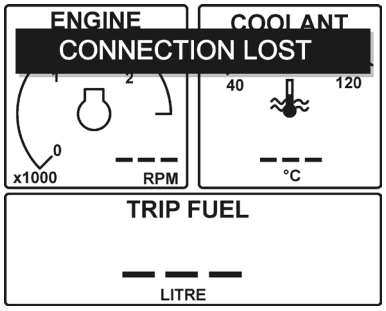


Figure for twin engine installation

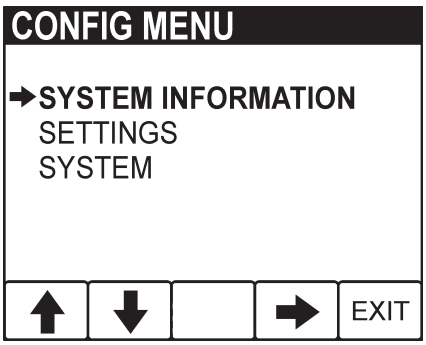
Display after starting screen

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)

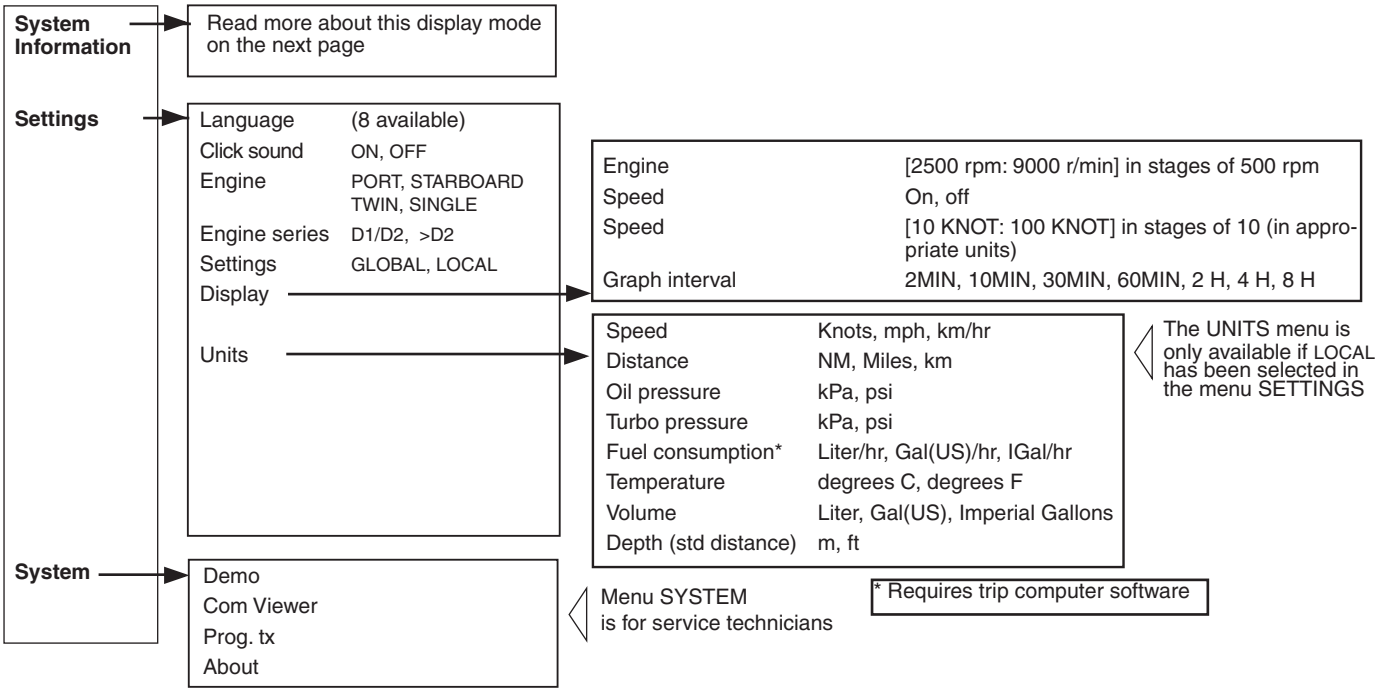
The configuration menu is used to:

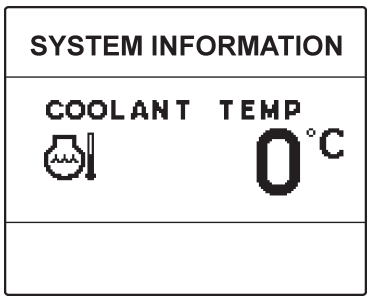
- access the display mode SYSTEM INFORMATION
- do various settings for the display
- reach information and functions for servicing the display

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.

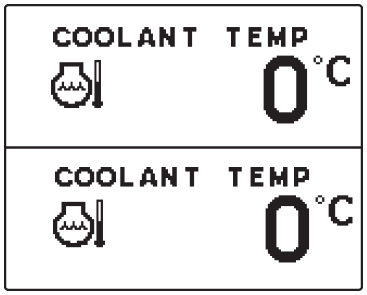
Configuration menu structure





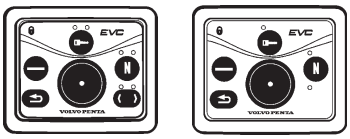
SYSTEM INFORMATION display mode for single engine installations

Port side

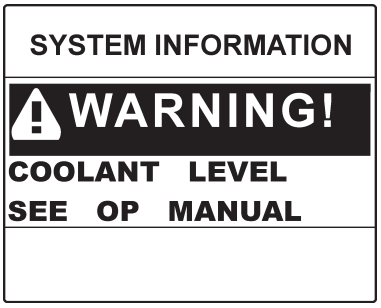


Starboard side

SYSTEM INFORMATION display mode for twin engine installations



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.

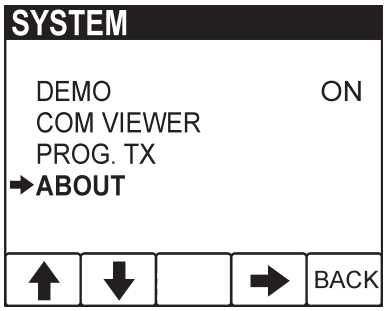
In display mode SYSTEM INFORMATION there are several functions:

- 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 this owner'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, drive-unit 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 occured.

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 occured.

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 occured.

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.

Erasing fault codes

Any fault codes in the diagnostic function are automatically erased every time the system is powered down:

Stop the engine and check that the ignition key(s) is(are) in position 0.

Check that instruments go out.

Fault codes are now erased.

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 codes are set.

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.

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

Explanation

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

1.	2.	3.	4.
Description	R		
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

R

Explanation: Fault in engine speed sensor.
Reaction: Engine power is reduced.

Action:

- Please contact a Volvo Penta workshop.

Water in fuel

O

Explanation: Water in water trap in fuel filters.
Reaction: None

Action:

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

Seawater pressure

R

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.

Air temperature

R

Explanation: Charge air temperature too high.
Reaction: Engine power is reduced.

Action:

- Please contact a Volvo Penta workshop.

Coolant level

R

Explanation: Coolant level too low.
Reaction: Engine power is reduced.

Action:

- Check coolant level. Please refer to "Maintenance: Freshwater 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.

Coolant pressure

R

Explanation: Coolant pressure too low.

Reaction: Engine power is reduced.

Action:

- Check the coolant level. Please refer to "Maintenance: Freshwater 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.

Coolant temperature

R

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.

Fuel pressure

R

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.

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.

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.

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.

Engine oil temperature

R

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.

Engine oil filter

R

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.

Crankcase pressure

R

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.

Exhaust temperature

R

Explanation: Exhaust temperature too high.

Reaction: Engine power is reduced.

Action:

- Please contact a Volvo Penta workshop.

Transmission oil pressure

R

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.

Battery voltage

O

Explanation: Battery voltage too low.
Reaction:

Action:

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

Auxiliary stop

R

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.

Primary battery

R

Explanation: Poor battery or charging.
Reaction:

Action:

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

Secondary battery

R

Explanation: Poor battery or charging.
Reaction:

Action:

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

30 V supply fuse

R

Explanation: Fuse is broken.
Reaction:

Action:

- Please contact a Volvo Penta workshop.

EMS supply fuse

R

Explanation: Fuse is broken.
Reaction:

Action:

- Please contact a Volvo Penta workshop.

Extra supply fuse

R

Explanation: Fuse is broken.
Reaction:

Action:

- Please contact a Volvo Penta workshop.

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.

Lever calibration

O

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

O/R

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

R

Explanation: Miscellaneous fault.
Reaction:

Action:

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

Check joystick

O/R

Explanation: Fault in joystick.
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.

Check steering wheel

O

Explanation: Fault in steering wheel unit.
Reaction: Engine power is reduced.

Action:

- Restart both engines.
- Please contact a Volvo Penta workshop if the fault remains.

Limited engine rpm

R

Explanation: Fault in steering system.
Reaction: Engine power is reduced on both sides.

Action:

- Restart both engines.
- Please contact a Volvo Penta workshop if the fault remains.

Limited steering

R

Explanation: Fault in steering system.
Reaction: Engine power is reduced on both sides. Limited steering.

Action:

- Restart both engines.
- Please contact a Volvo Penta workshop if the fault remains.

No steering wheel response

 R 

Explanation: Fault in steering wheel unit.
Reaction: Engine power is reduced on both sides. No steering.

Action:

- Restart both engines.
- Please contact a Volvo Penta workshop if the fault remains.

No gear/throttle and steering

 R 

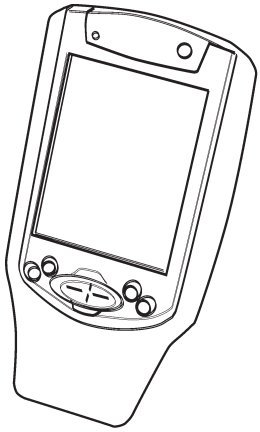
Explanation: Fault in steering system.
Reaction: No steering. No propulsion.

Action:

- Restart both engines.
- 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 prameters 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! For docking station press ALARM ACKNOWLEDGE 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

Neutral beep

Vodia text: "NeutralBIP". This parameter makes it possible to activate or deactivate the fuction 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).

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 system tachometer(s)/ display(s)
- Checking of fault codes

Running in

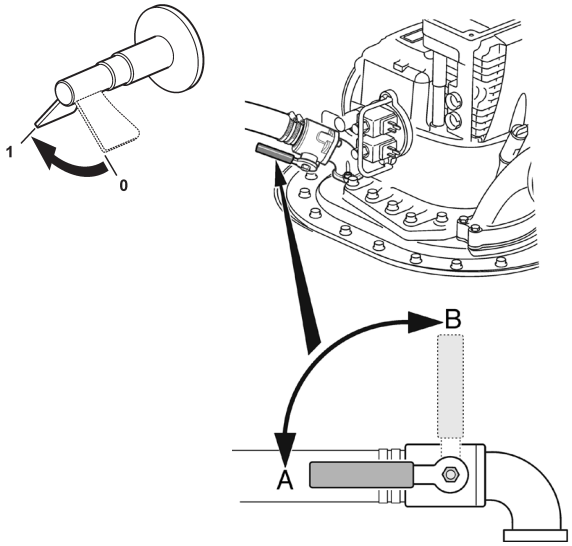
The engine must be running in for its first 10 operating hours:

Do not operate the engine at full load except for short peroids.

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.
- 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.

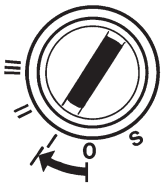
- Start the engine room fan, if installed, and let it run for at least four minutes.
- Open the sea water cock(s) (two for D6, one for D4) on the drive-unit, position **A** open and position **B** closed.
- Check that the amount of fuel aboard is enough for your planned voyage.

Starting method

Put the gear in neutral

Put the reverse gear in neutral by moving the control lever(s) to neutral at all helm stations.

There is beep signal when the levers are in neutral position.



Turn the ignition on

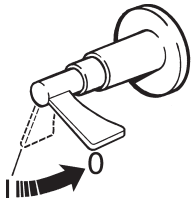
Turn the starter key to position **I** to switch the ignition on.

Examples:

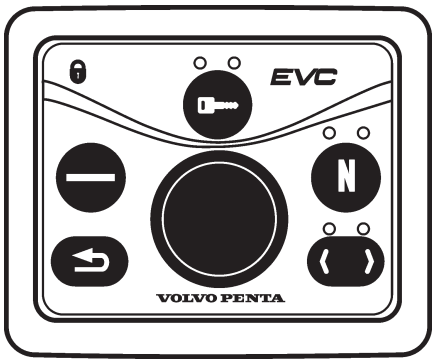
Check the tachometer display

If a fault is registered it will be viewed in the tachometer display.

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.



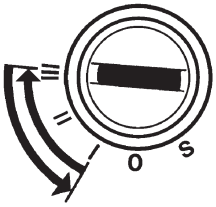
Activate the control panel and lock the system

Press the active station 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, the system can be locked, so that the engine can only be controlled from the activated control board. Press the activation button for a second further to lock the system. The padlock sign lits up in confirmation.

Unlock the system by pressing the activation button for one second. This can only be done from an activated control panel.

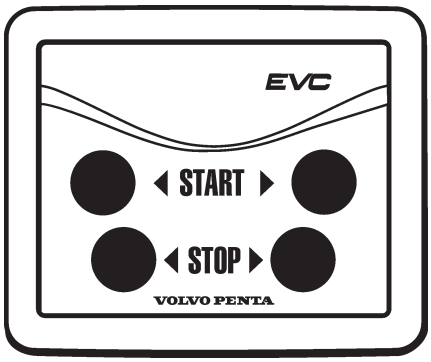


Start the engine

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.

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**.

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.

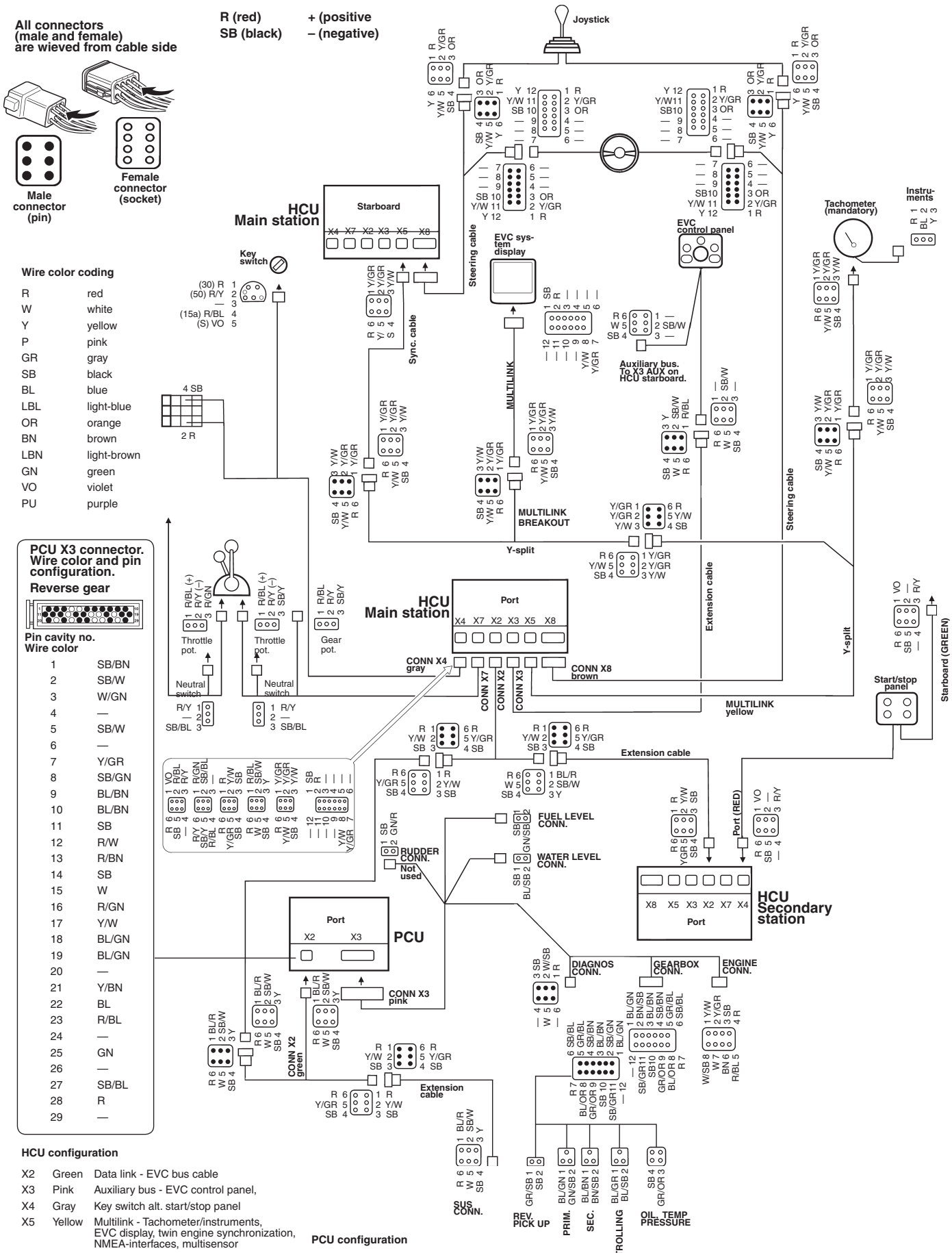
Read the instruments and warm up the engine

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 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.

Wiring color and pin-out schematics



HCU configuration

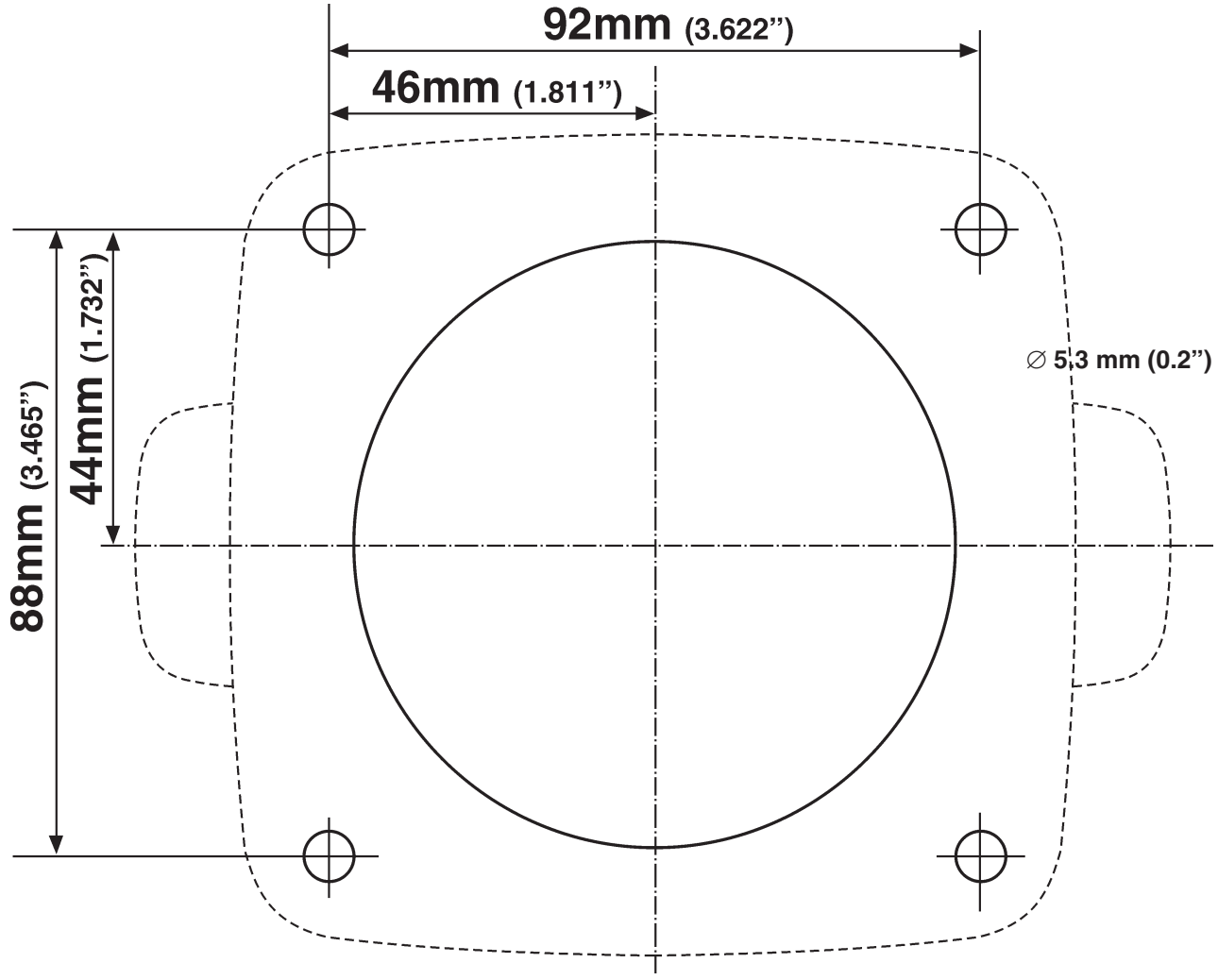
X2	Green	Data link - EVC bus cable
X3	Pink	Auxiliary bus - EVC control panel,
X4	Gray	Key switch alt. start/stop panel
X5	Yellow	Multilink - Tachometer/instruments, EVC display, twin engine synchronization, NMEA-interfaces, multisensor
X7	Blue	Controls
X8	Brown	Steering cable connection

PCU configuration

X2	Green	Data link - EVC bus cable
X3	Pink	Engine and transmission

Templates for controls and panels

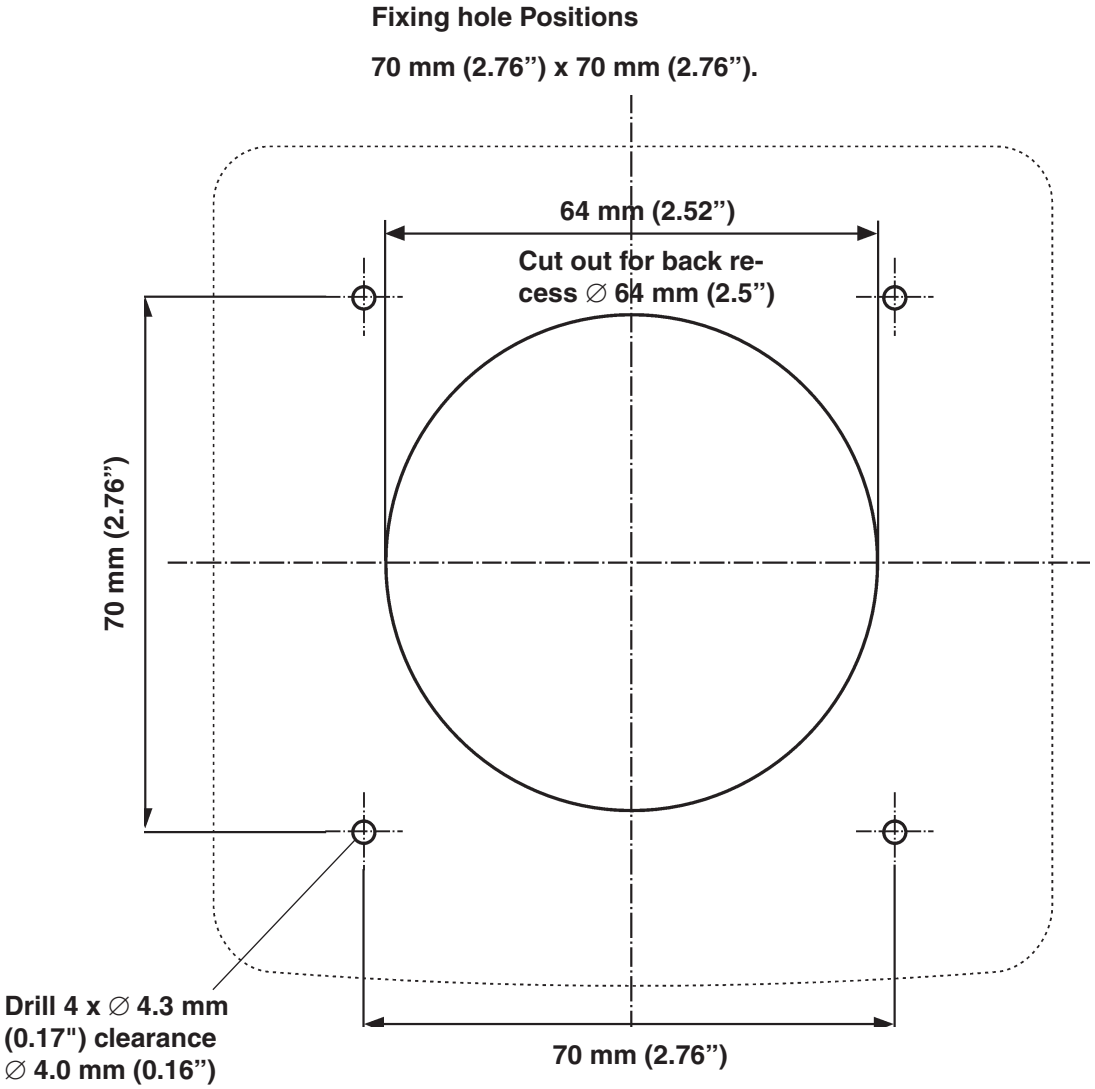
Control, single and twin installations SCALE 1:1



⚠ **IMPORTANT!** If this template has been photocopied, check the dimensions before using it because photocopies can distort images slightly.

EVC system display SCALE 1:1

Overall size 110 mm (4.33”) x 110 mm (4.33”).



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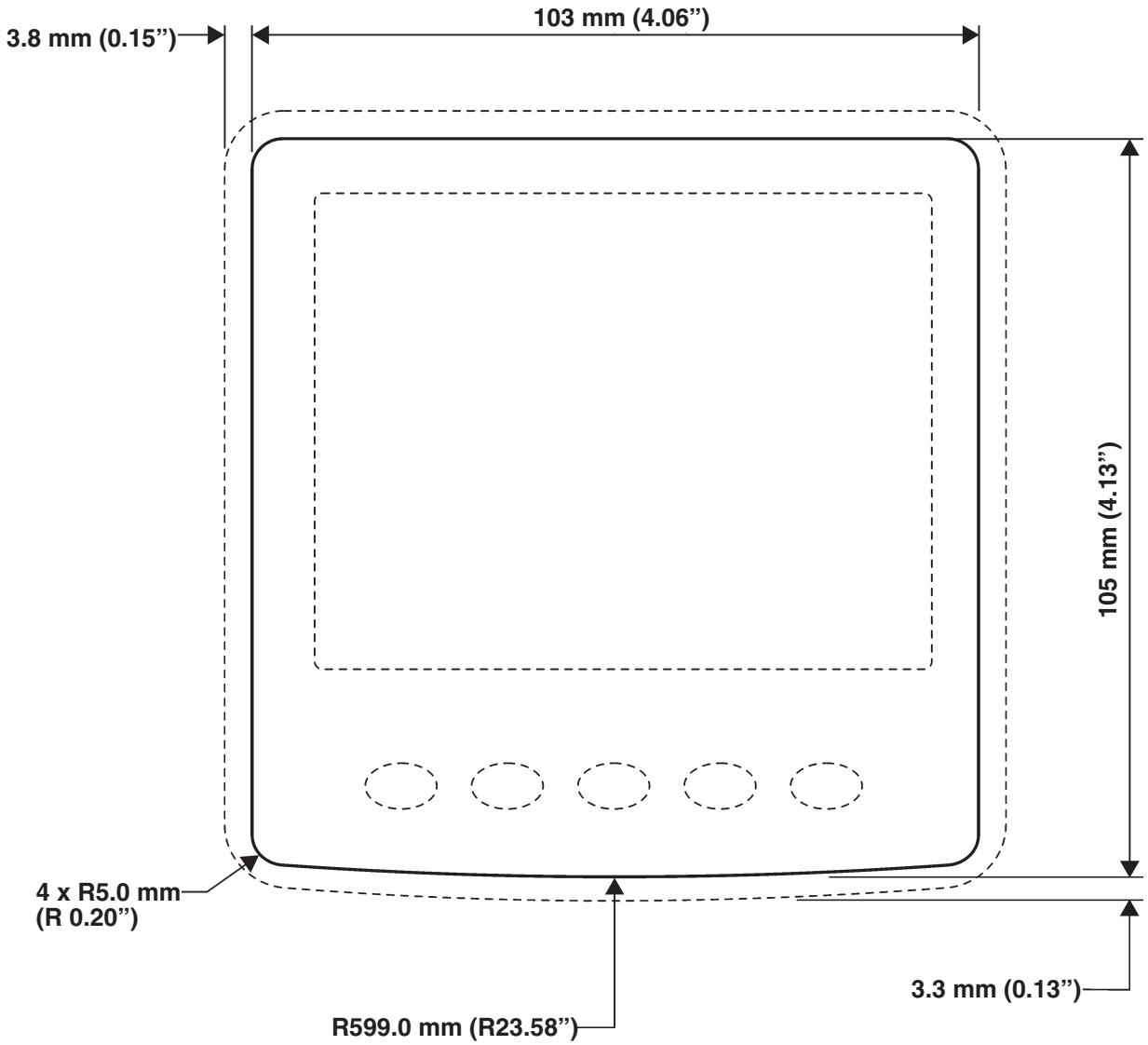
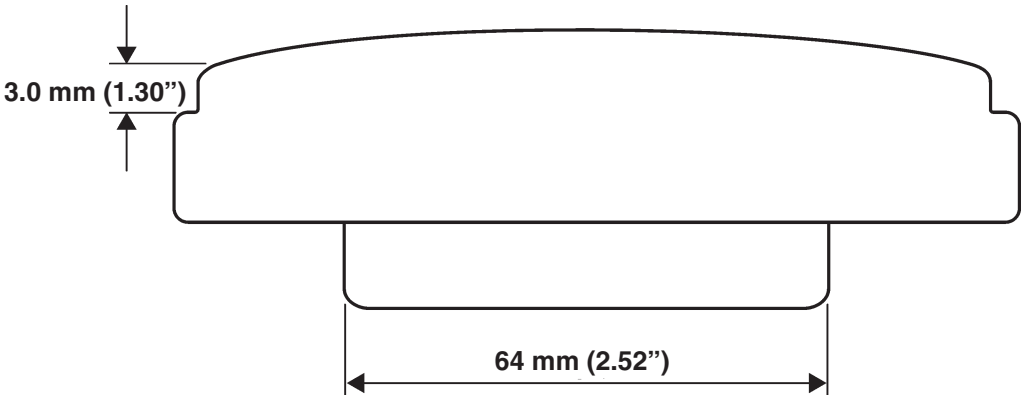
EVC system display, flush-mounted SCALE 1:1





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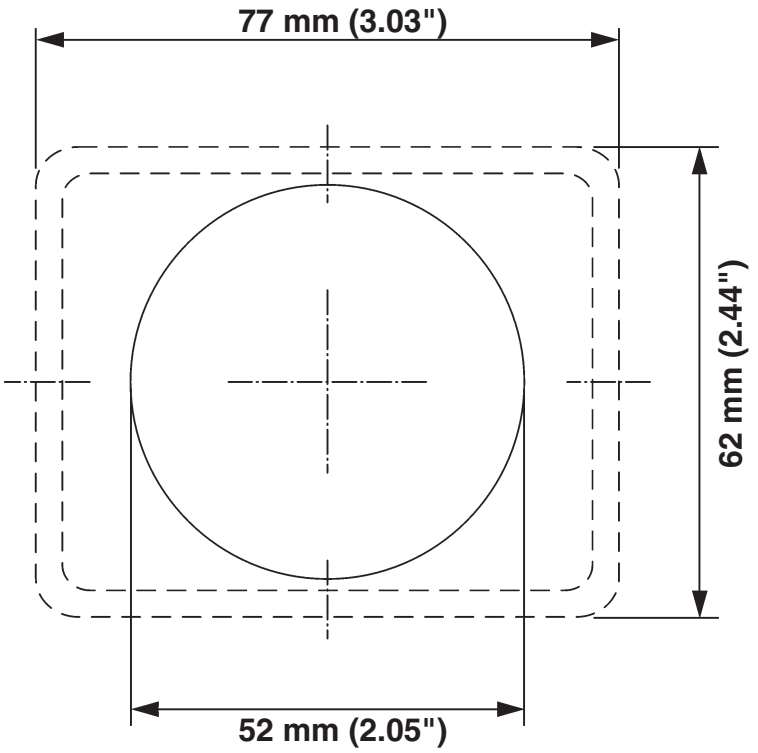
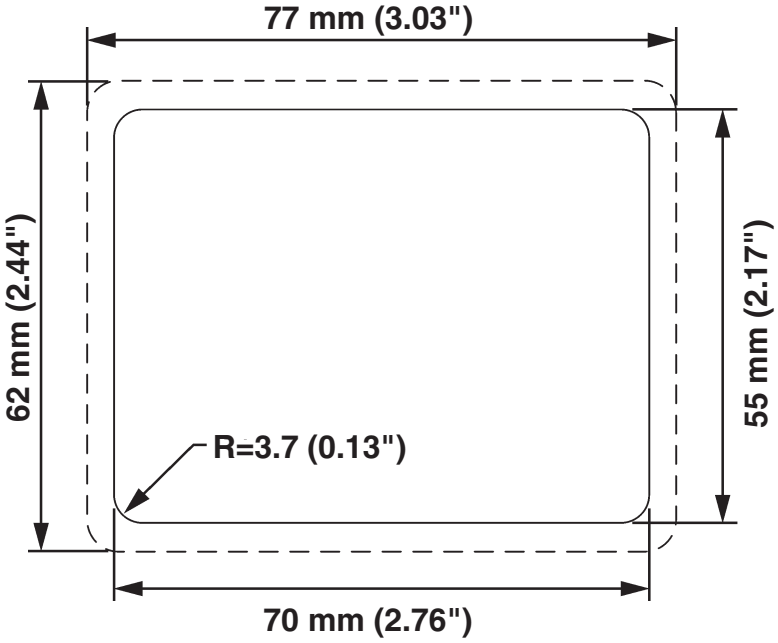
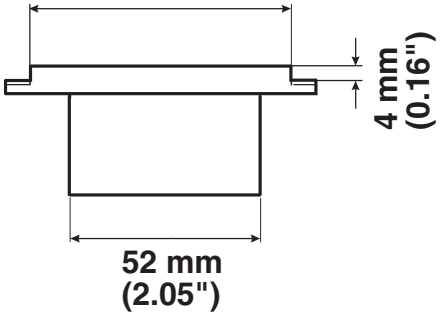
Panel, frame-mounted SCALE 1:1



Panel, flush-mounted





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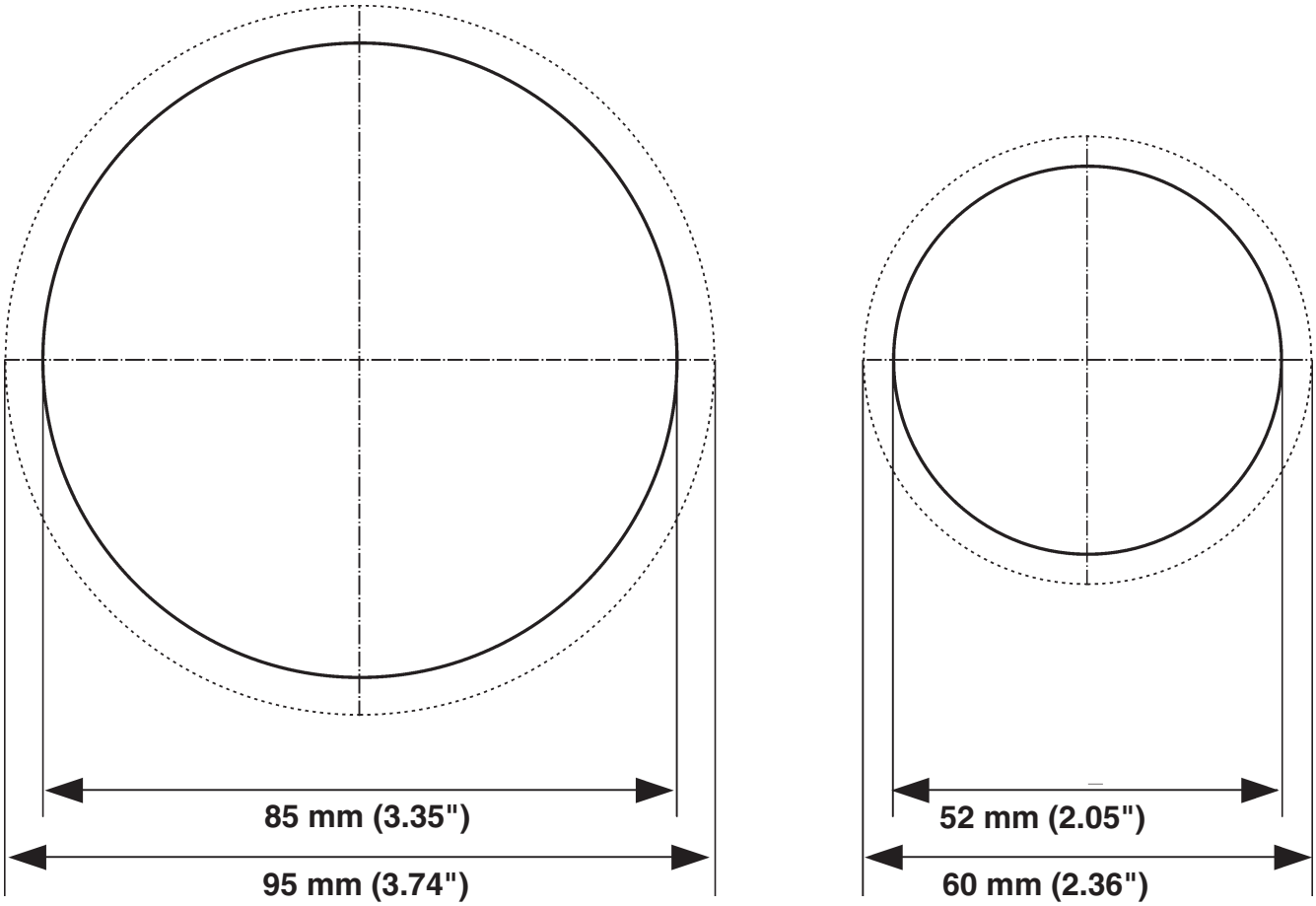
Instruments, frame-mounted SCALE 1:1



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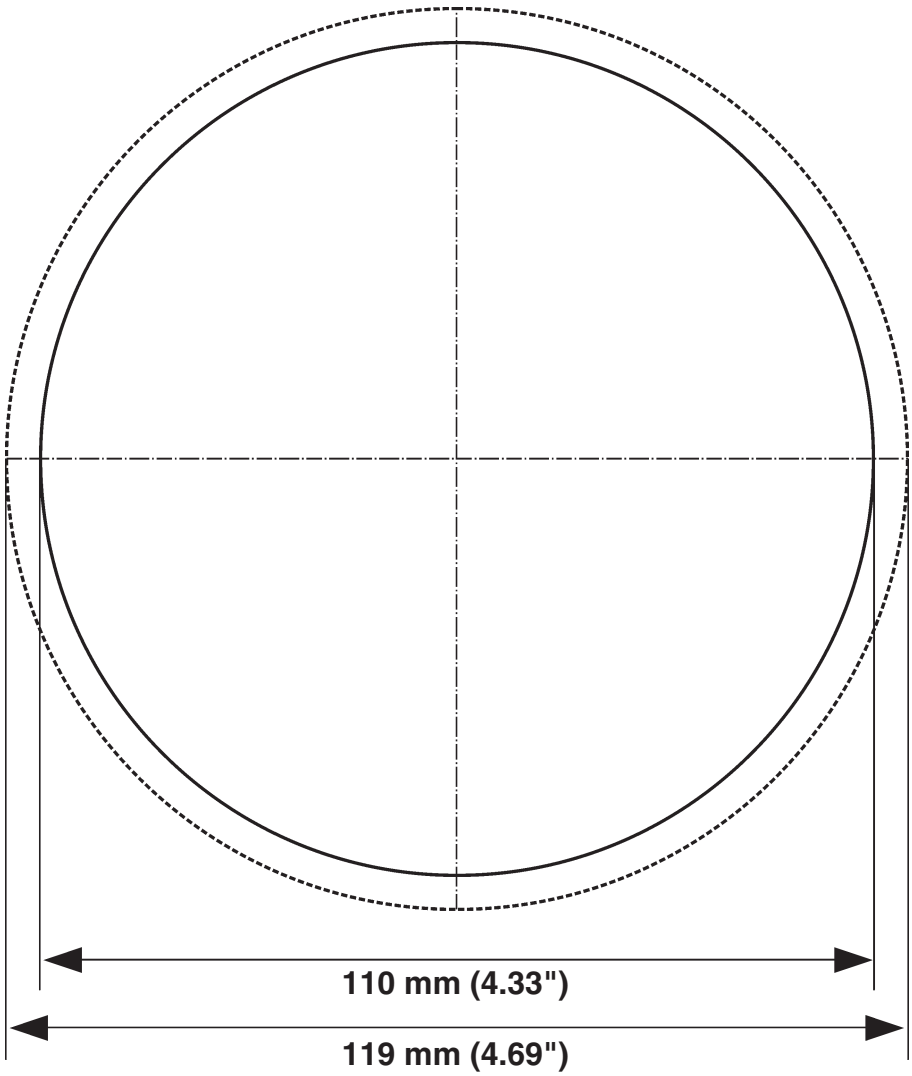
Instruments, frame-mounted SCALE 1:1



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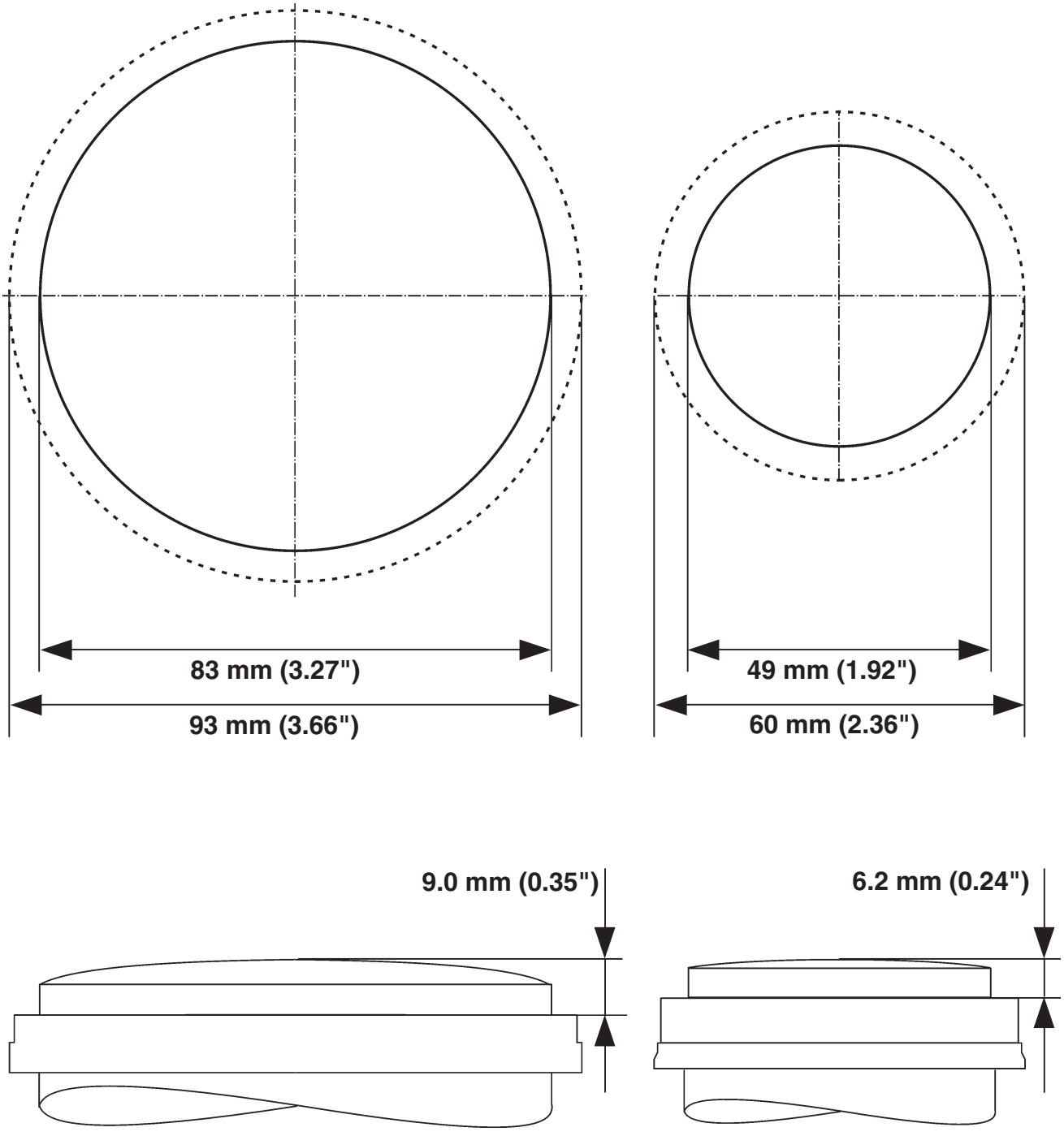
Instruments, flush-mounted SCALE 1:1



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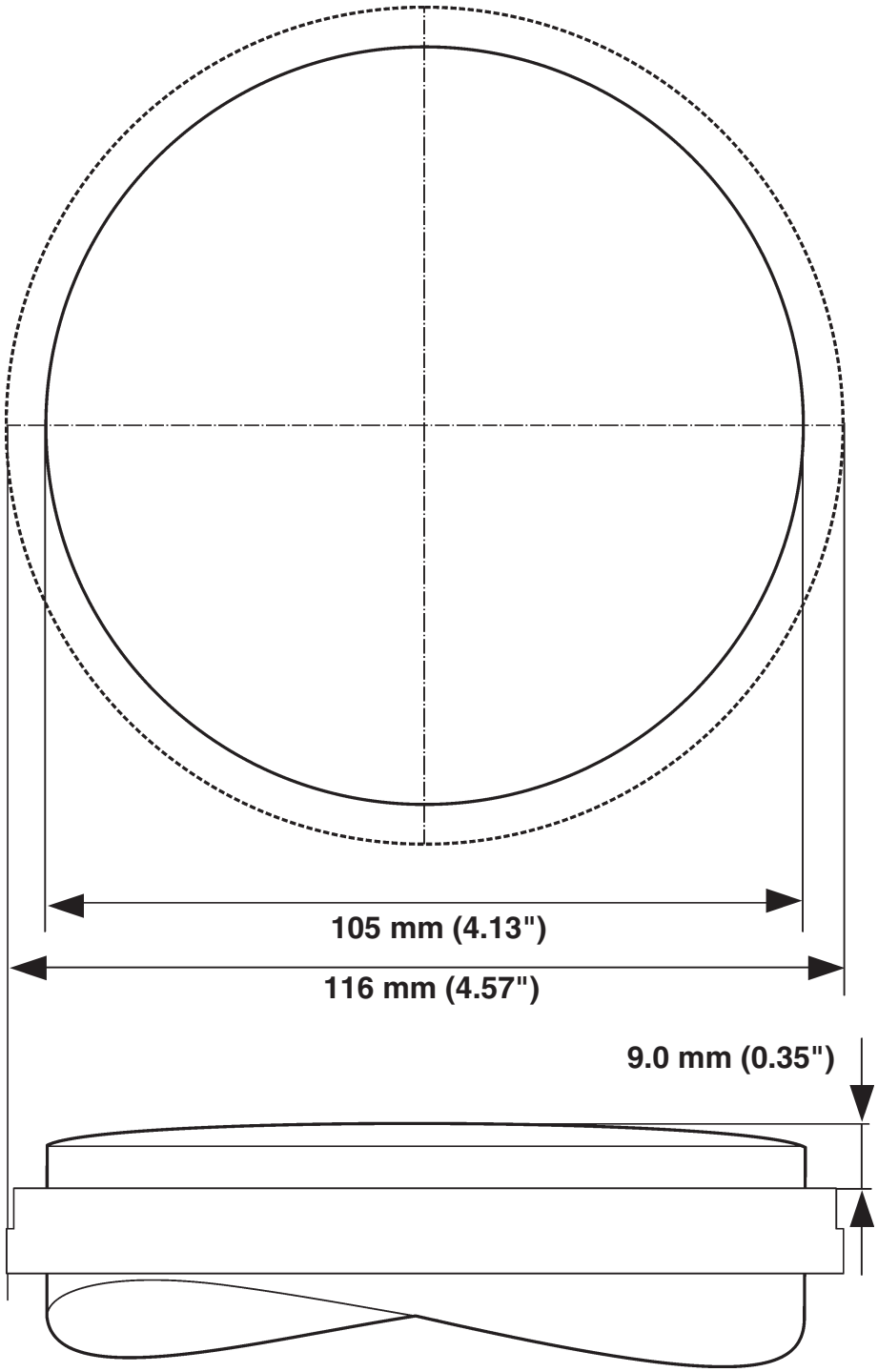
Instruments, flush-mounted SCALE 1:1



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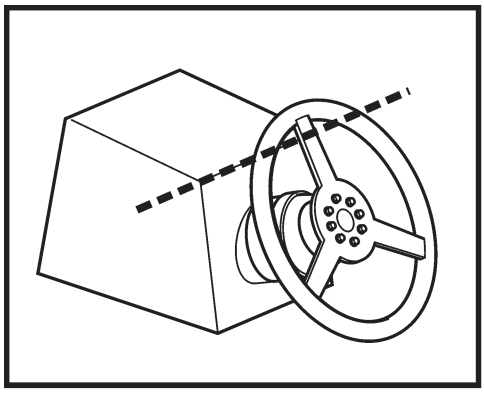
Steering wheel adjuster, vertical mounting SCALE 1:1



Vertical

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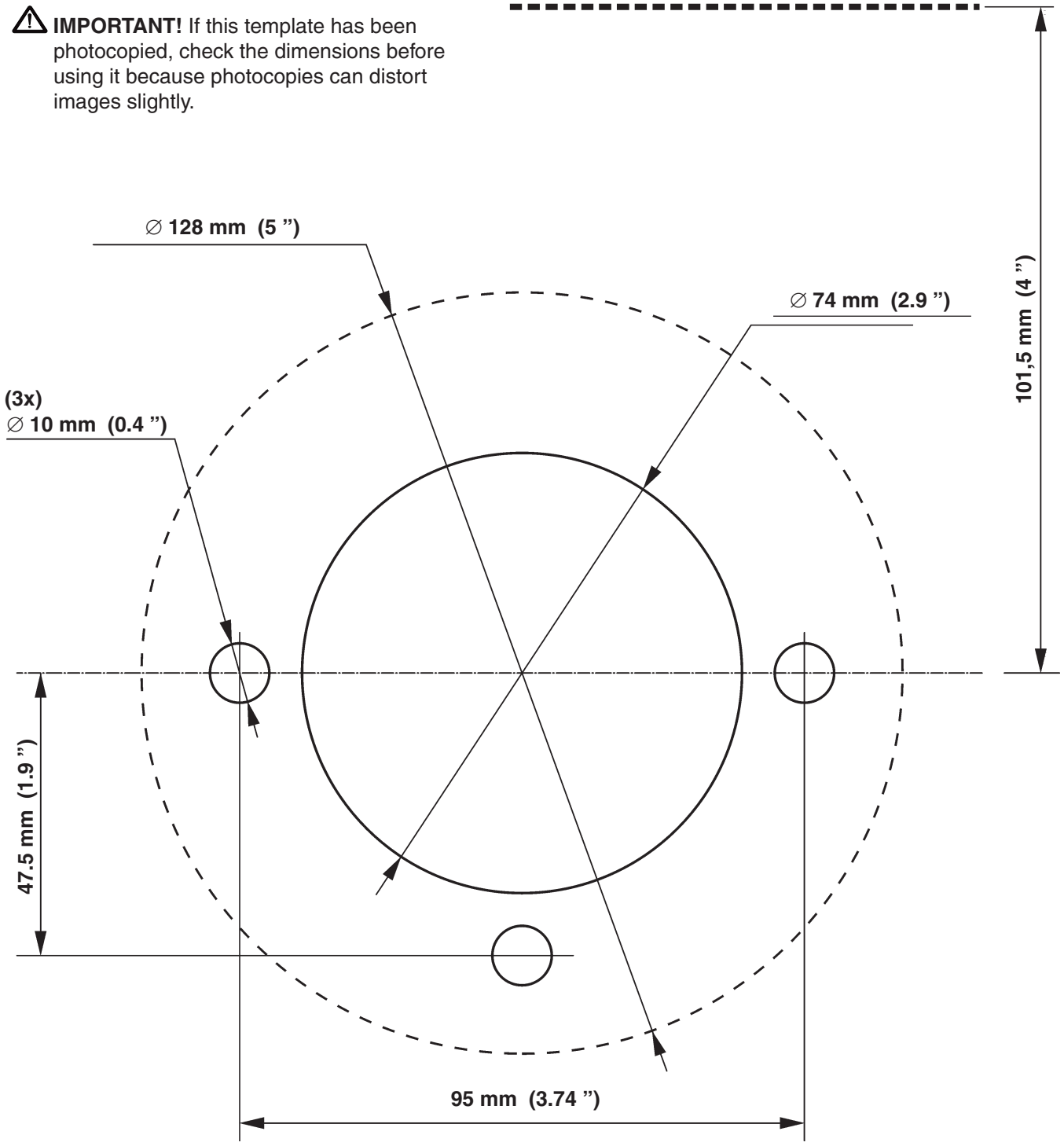
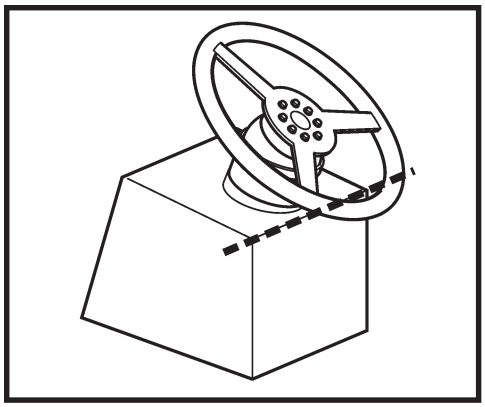


Steering wheel adjuster, horizontal mounting SCALE 1:1



Horizontal

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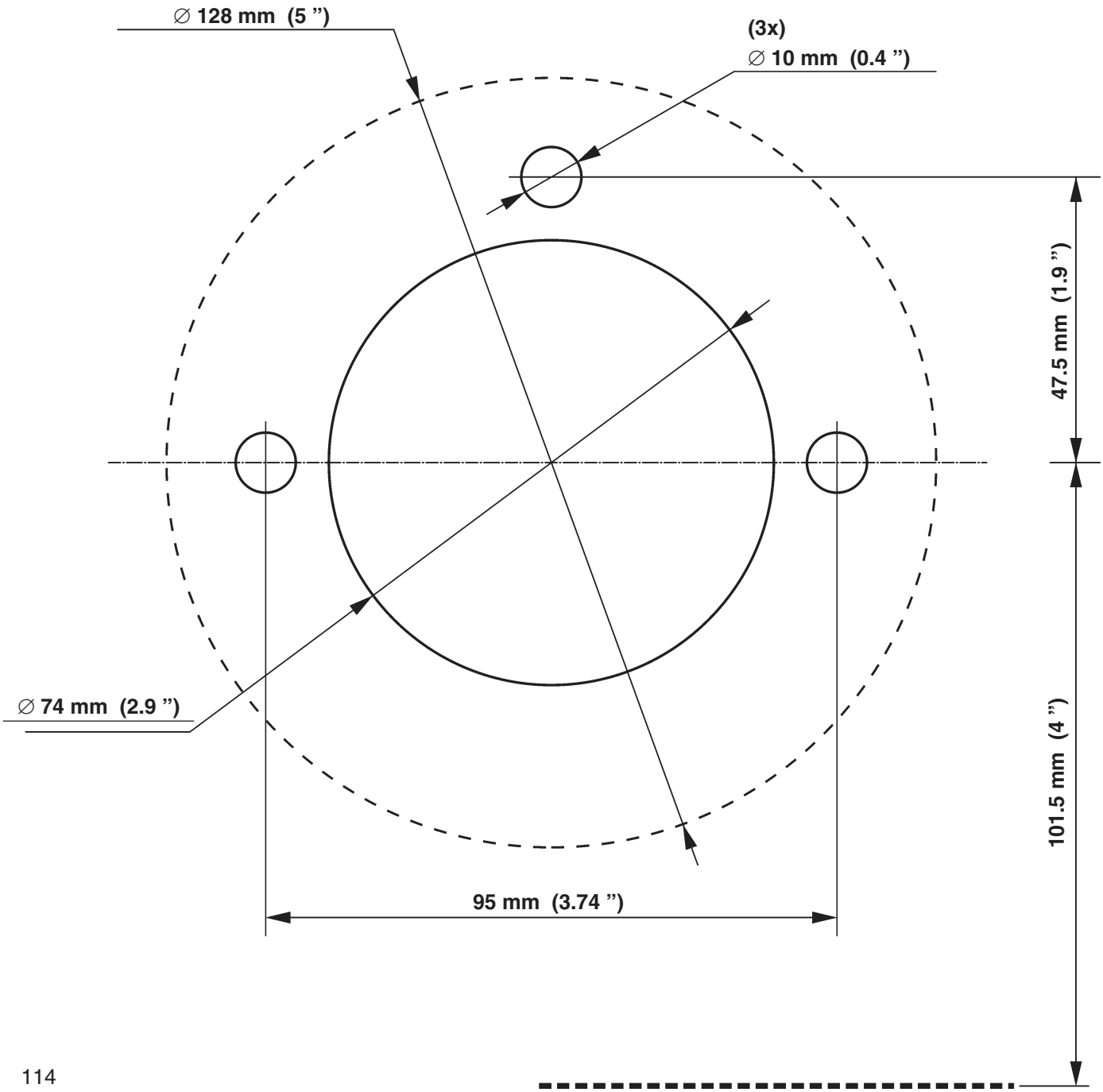
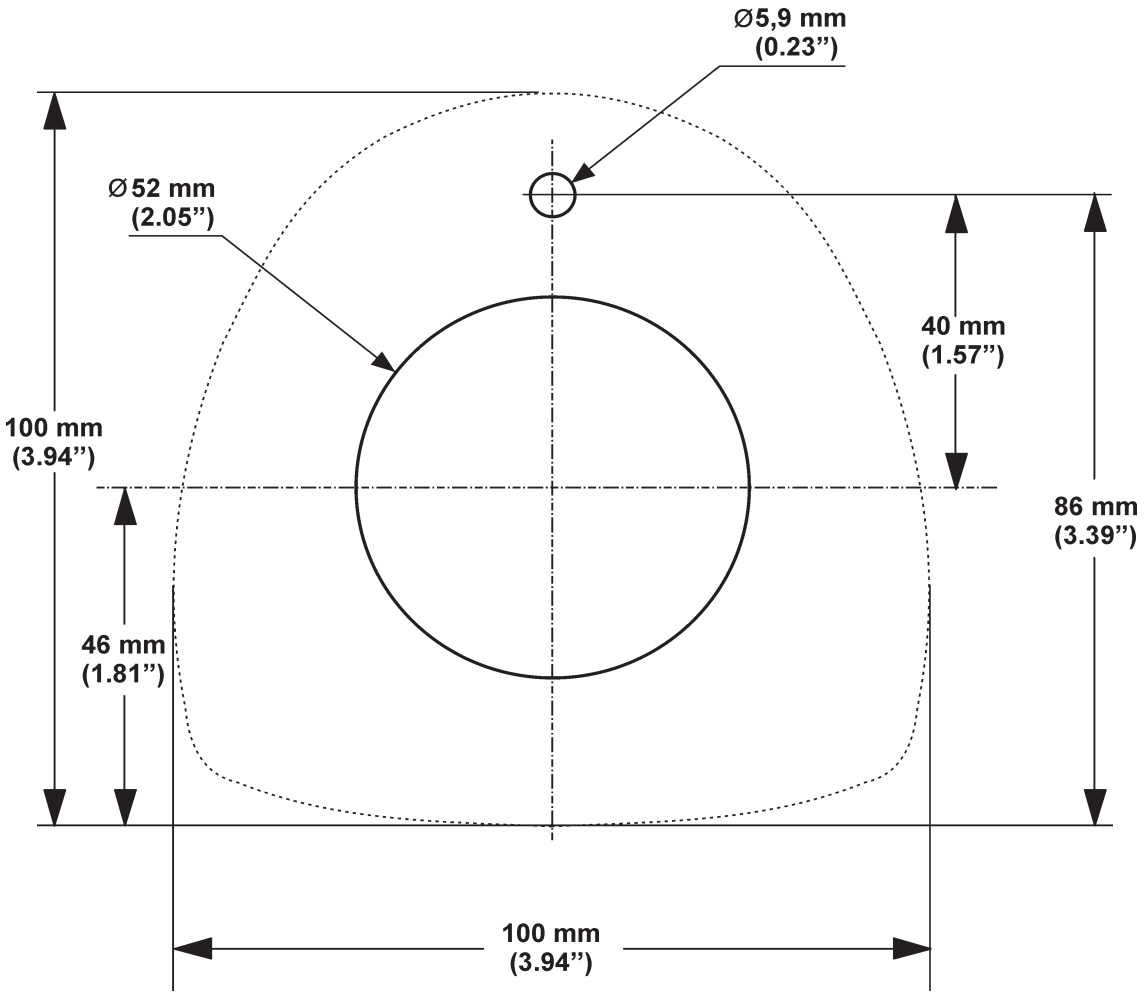


Joystick

SCALE 1:1



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Notes

Notes

References to Service Bulletins

Group	No.	Date	Concerns

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Do you have any complaints or other comments about this manual? Please make a copy of this page, write your comments down and post it to us. The address is at the bottom of the page. We would prefer you to write in English or Swedish.

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