Installation

B E
1(1)

EVC^{EC}-C
Electronic Vessel Control

D4, D6, D9, D12, D16

The EVC^{EC}-C system

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

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

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

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

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

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

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

Functionality

Engine speed and gear shift

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

Multiple helm stations

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

Engine synchronization

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

Instrumentation

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

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

EVC system tachometer

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

Powertrim

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

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

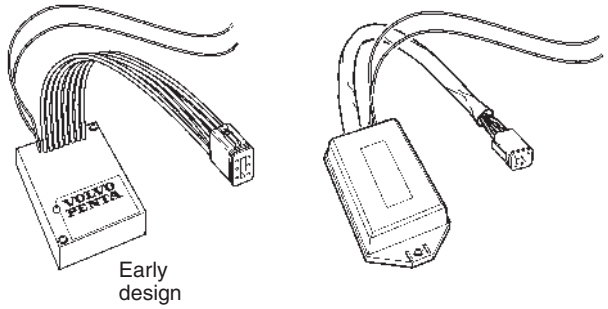
Powertrim Assistant (PTA)

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

EVC system display

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

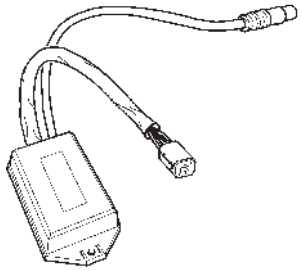
NMEA 0183 interface



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.

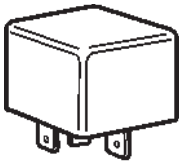
NMEA 2000 interface



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.

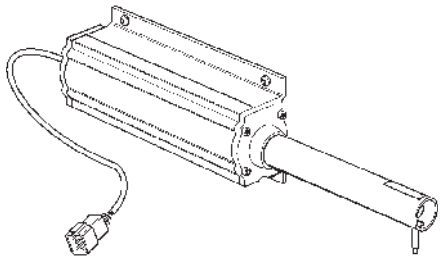
Relay for external accessories



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

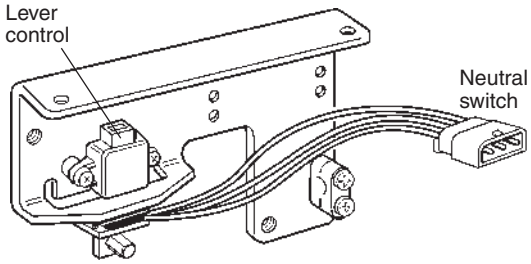
Relay	12 V, 20A	D4, D6, D9
Relay	24 V, 20A	D6, D9, D12, D16

Actuator D4/D6, stern drive DPH/DPR



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

Adapter for mechanical controls



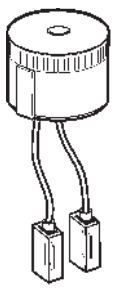
Use of an adapter for mechanical controls will enable you to use any mechanical control in combination with the EVC system. The adapter will convert the mechanical push-pull movement into an electric signal.

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

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

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

Buzzer (option)



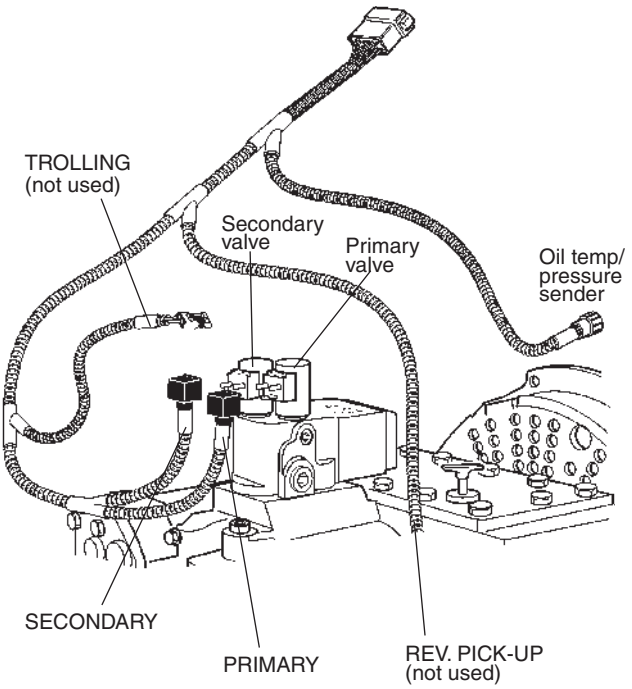
The buzzer is to be mounted in a consealed place, prefeably under the dashboard. When installing a buzzer there is a need for an "instruments, panels and auxiliary cable".

Cables and cable harnesses

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

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

D16
Reverse gear
MG 5145A, MG 5170DCE

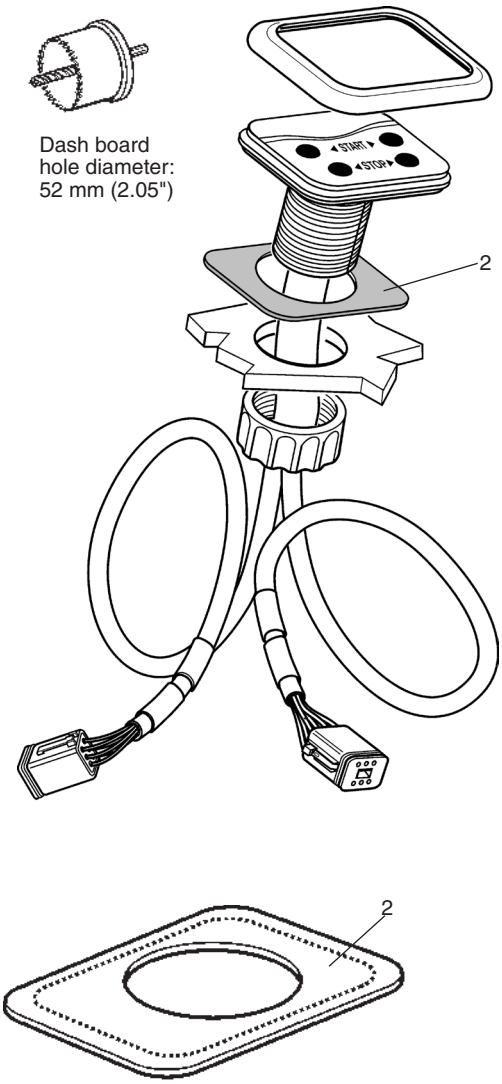


The figure shows reverse gear with cables connected for left-hand rotation in forward gear.

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

Frame-mounted panel

Twin engine panel is shown.



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

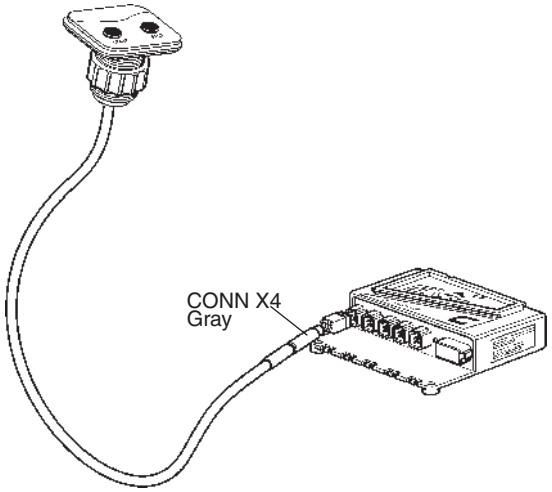
Separate the inner part of the gasket (2) from the outher part. Remove the protective paper and fit the gasket (2) on the underside of the panel.

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

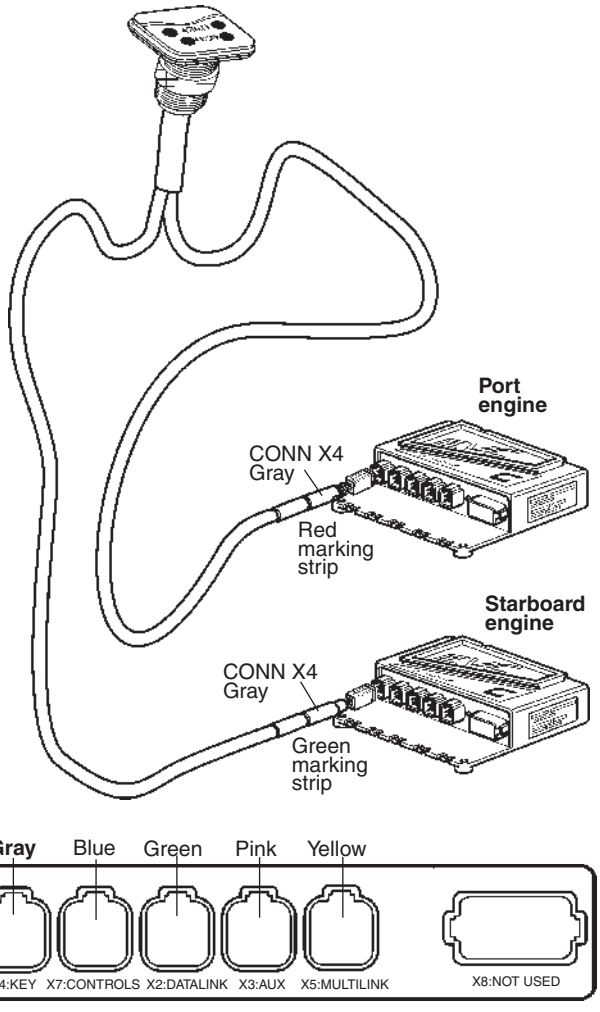
NOTE! It is important that the self adhesive gasket is fitted properly on the under side of the panel.

Connection to the HCU

Single engine panel



Twin engine panel



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

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

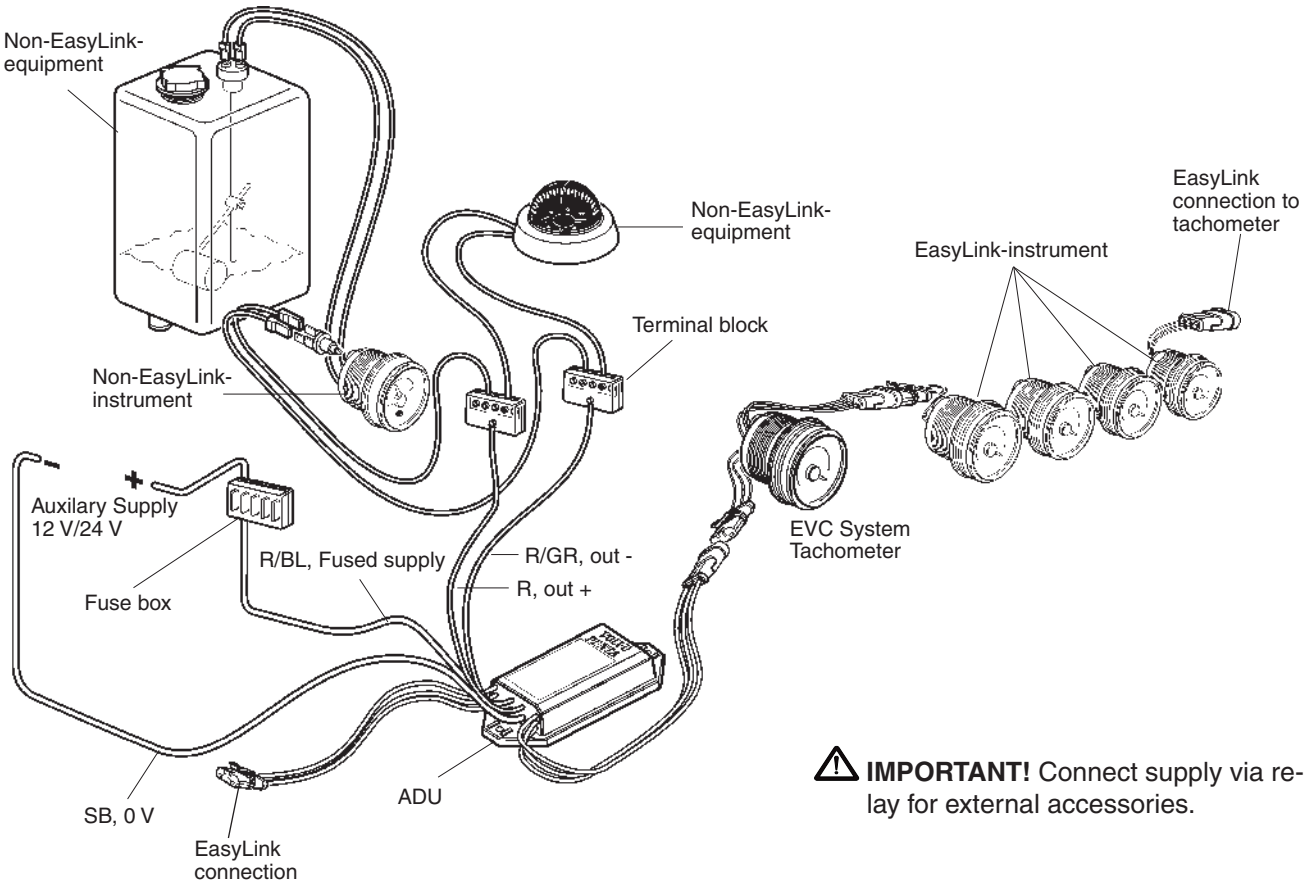
Auxiliary dimmer unit (ADU)

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.

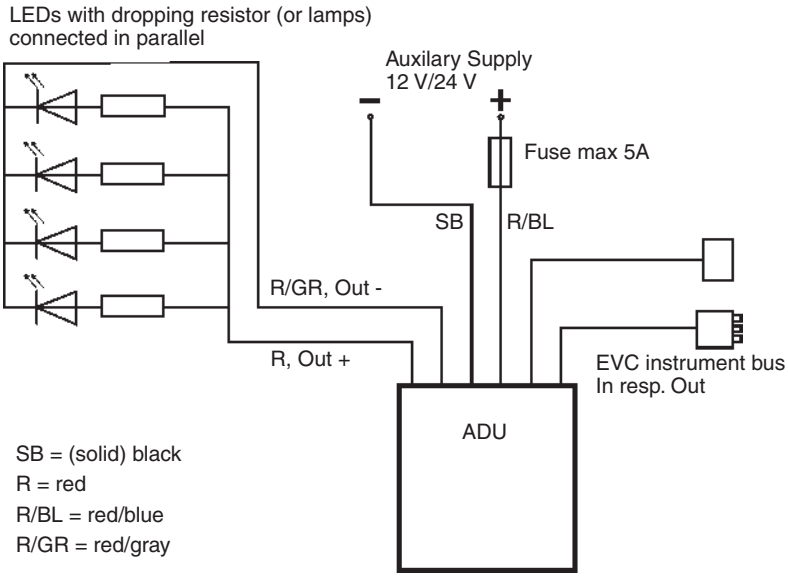
The ADU can be fitted anywhere along the chain of other EasyLink instruments. See the figure below.

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



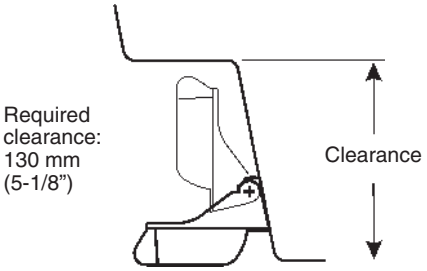
⚠ **IMPORTANT!** Connect supply via relay for external accessories.

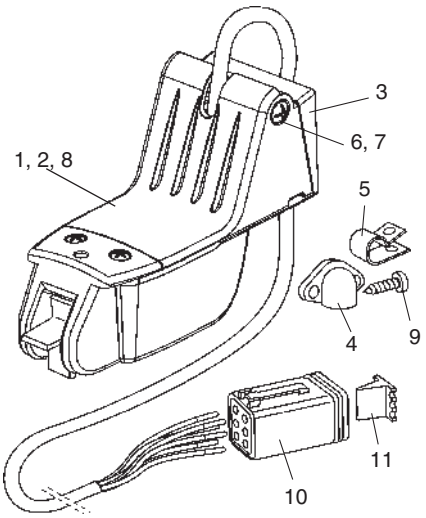


Multisensor

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

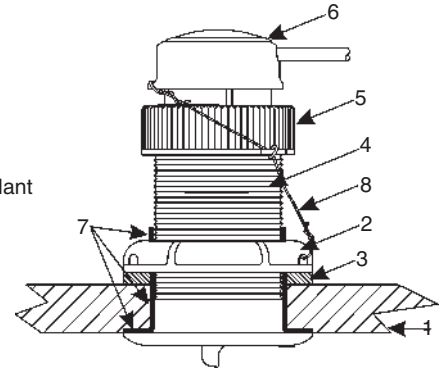
Transom mounted sensor





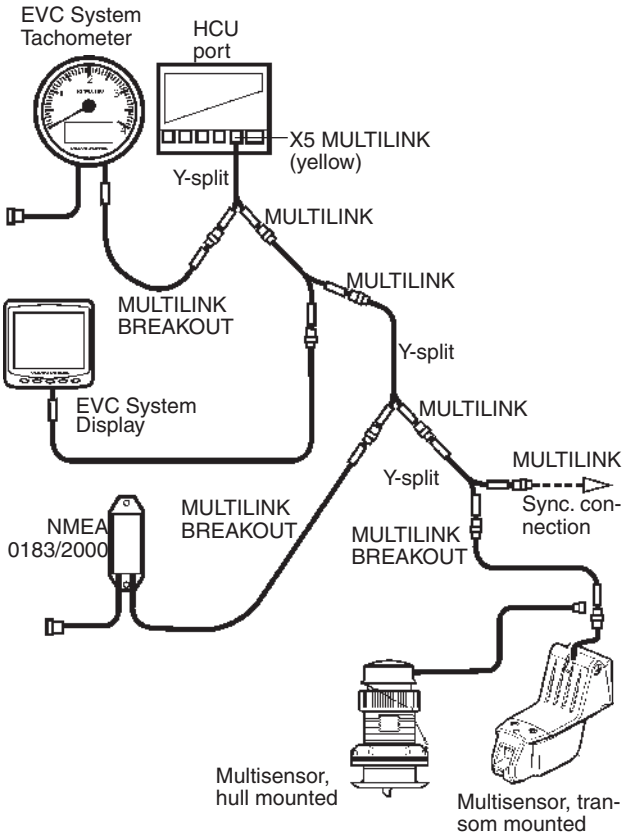
1 Sensor
2 Bracket
3 Shim (9°)
4 Cable cover
5 Clamp
6 Nut
7 Screw
8 Screw, selftapping
9 Screw, selftapping
10 6-pin connector
11 Connector wedge

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 display.

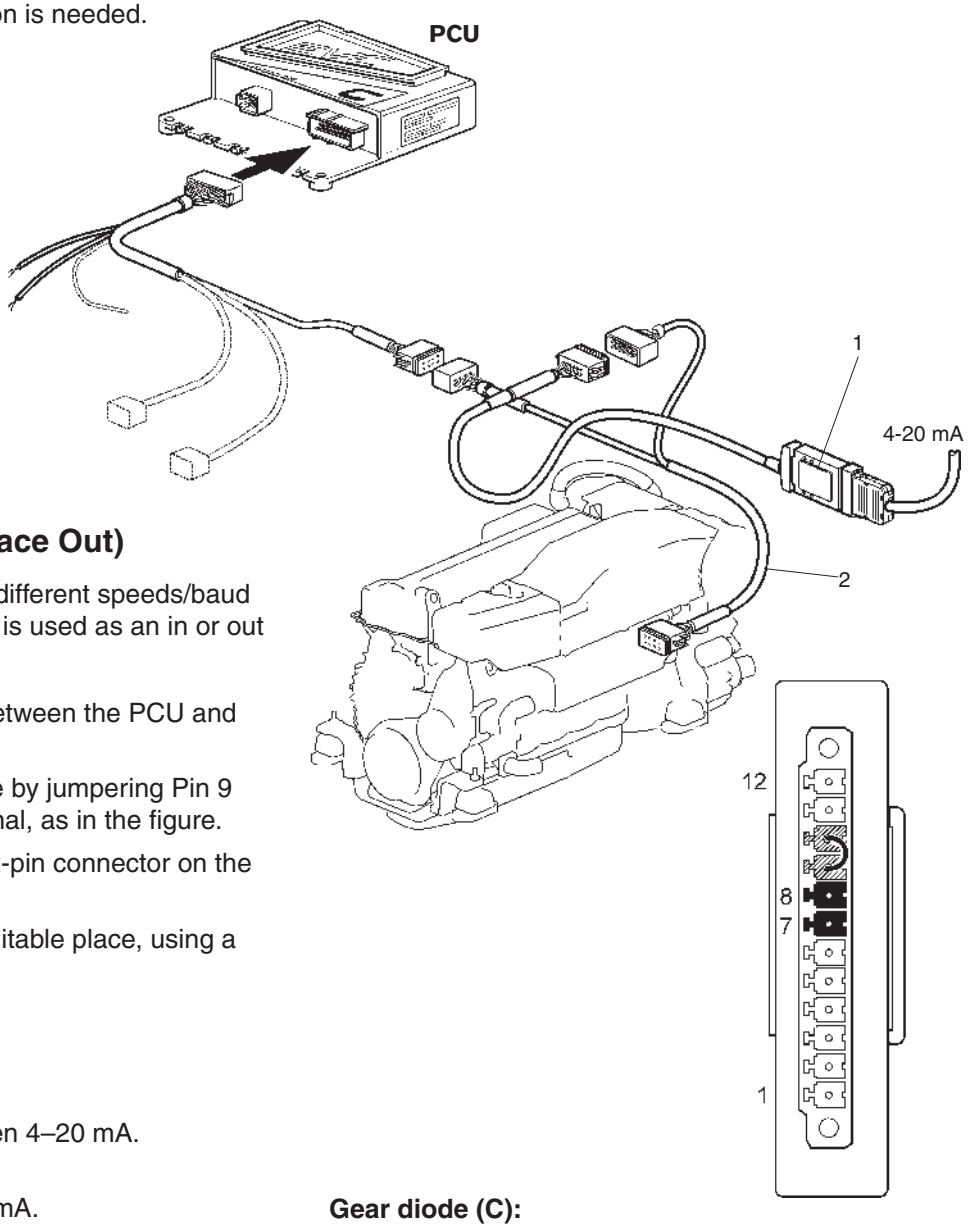
Calibration of boat speed

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

Output interface, 4–20 mA

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

- Slip function



Installation order (Interface Out)

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

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

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

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

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

Throttle diode (A):

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

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

Switched off -
Other cases.

Slip diode (B):

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

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

Switched off -
Other cases.

NOTE! Also applies to the Out interface.

Gear diode (C):

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

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

Switched off -
Other cases.

Power diode (D):

Constant light -
The unit has power supply.

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

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

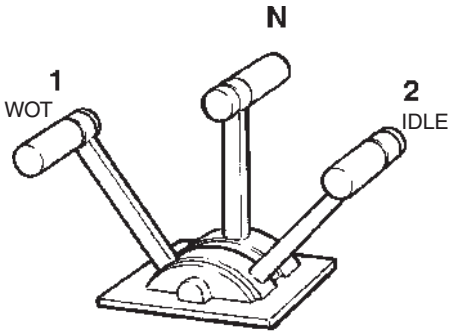
Switched off -
Other cases.

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

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

Preparations:

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



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

   NOTE! 2.0 indicates a twin lever control.

2. Move the throttle lever to the position for full throttle forwards WOT (1).

   Release the lever and confirm the position by pushing NEUTRAL BUTTON.
   1.1 is shown on the tachometer display.

3. Move the throttle lever to the idling position IDLE (2).

   Release the lever and confirm the position by pushing NEUTRAL BUTTON.
   1.2 is shown on the tachometer display.

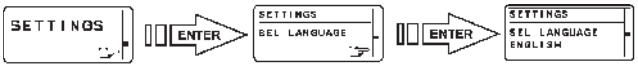
4. Push NEUTRAL BUTTON to exit lever calibration. The green LED(s) by the neutral button will show steady light and the system returns to MAIN MENU.

Select language and units

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

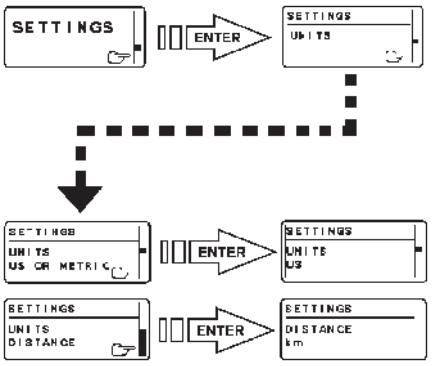
1. Activate helm station by pushing the ACTIVE STATION BUTTON on the EVC panel.
2. Select and enter SETTINGS from MAIN MENU.

Language



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

Units



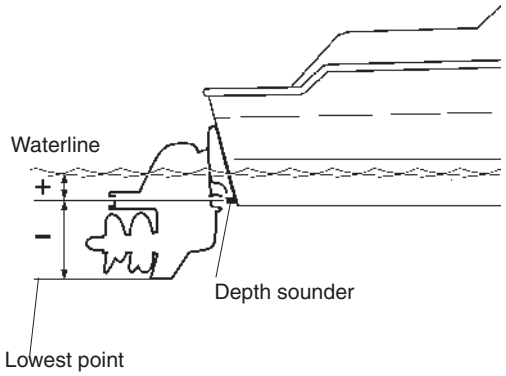
5. Select and enter UNITS.
   Select UNITS US OR METRIC.
6. Select and confirm the appropriate unit (US or metric).
7. Select and enter UNITS DISTANCE.
8. Select and confirm the appropriate unit for distance (km, NM, MILES).
9. Push BACK BUTTON twice to return to MAIN MENU.

Depth alarm (Option)

All depth alarm functions are accessed through this menu.

Requirements

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



DEPTH ALARM, ON/OFF

Depth alarm can be switched ON/OFF.

SET DEPTH

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

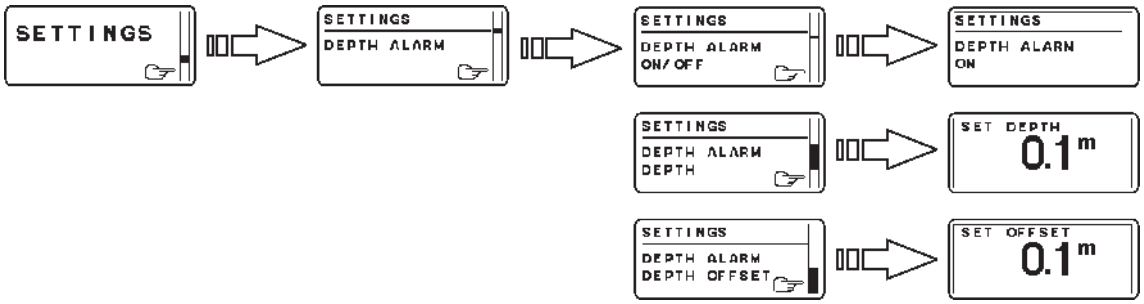
Once adjustment value is reached, the data is stored by pushing NAVIGATION WHEEL.

DEPTH OFFSET

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

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

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



Depth alarm pop-up

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

Acknowledge depth alarm by pushing NAVIGATION WHEEL.

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

Depth alarm signal loss

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

Coolant pressure

R

Explanation: Coolant pressure too low.

Reaction: Engine power is reduced.

Action:

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

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

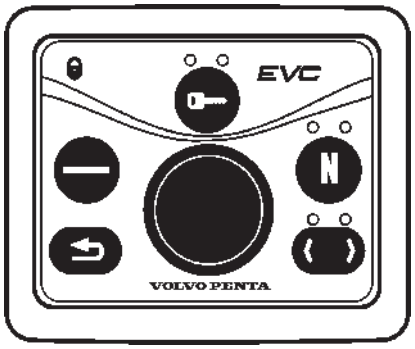
R

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.



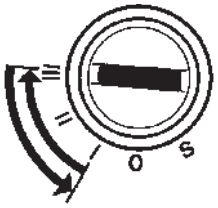
Activate the control panel and lock the system

Press the activation button for at least one second. When the button is released, the indication lights up to confirm that the control position is activated.

NOTE! If the indicator flashes, the control position has not been activated because the control lever(s) are not in the neutral position or the system has been locked from another control panel.

If the boat has more than one control panel/helm station, the system can be locked, so that the engine can only be controlled from the activated station. Press the activation button for a second further to lock the system. The padlock sign 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.

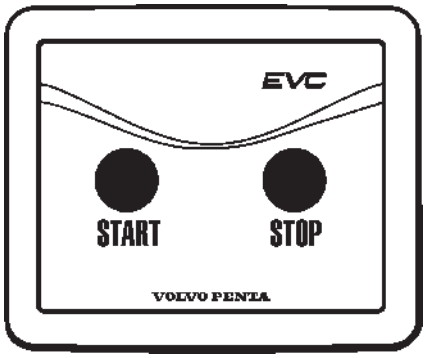


Start the engine

Start by using the ignition switch

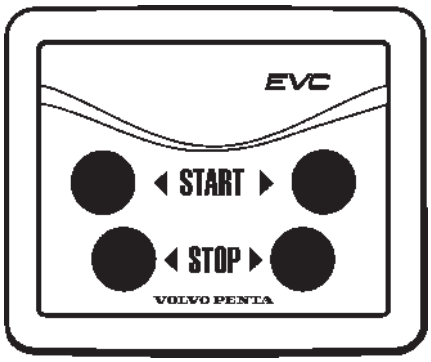
Turn the key to position **III**. Release the key and let it return to position **I** as soon as the engine has started. Stop cranking if the engine does not start within 20 seconds.

NOTE! If further start attempts are needed, the key must be turned back to position **0** first.



Starting by using the start button

Press the starter button. Release the button as soon as the engine has started. Please note that if you start from an alternative control station, the starter key at the main control station must be in position **I**. Stop cranking if the engine does not start within 20 seconds.



Overheating protection

If the starter motor is engaged for its maximum activation time, the starter motor circuit is cut automatically to protect the starter motor from overheating. Leave the starter motor to cool for at least five minutes (if possible) before making a new start attempt.