

# **Yacht Devices**

## **User Manual**

**Yacht Devices Engine Gateway YDEG-04**

also covers models  
YDEG-04N, YDEG-04R

Firmware version

1.52

**2026**

## Package Contents

Device	1 pc.
This Manual	1 pc.
Jumper Plug for Deutsch 6-pin connector	1 pc.
Stickers for MicroSD slot sealing	6 pc.

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## Introduction

The Device acts as a gateway from various engine CAN networks to an NMEA 2000 marine digital network. The list of compatible models is quite extensive and covers most Volvo Penta models (EVC – all versions, MDI, EDC III, EDC IV, EFI with MEFI4B or later, and EGC), Yanmar (4JH-CR and 4LV series), Mercury and MerCruiser (with Smartcraft 2.0), BRP Rotax, some Cummins, Caterpillar, Steyr, Man, Suzuki, and other J1939-compatible engines. It allows you to view engine data such as RPM, temperature, operating hours, and other information on the screen of your chart plotter or any other display device connected to the NMEA 2000 network. Data conversion for generators is also supported, for example ONAN generator with NIM Cummins module, Kohler or Northern Lights with Dynagen autostart controller.

The Gateway was originally developed specifically for Volvo Penta engines with an EVC system, but it can also be used with engines from other manufacturers (an adaptor cable may be required). On most vessels equipped with Volvo Penta or J1939 engines, the Device should work plug-and-play, without any configuration. Please read the Section IV of the manual before connecting.

The Device can be supplied with either Raymarine SeaTalk NG connector (YDEG-04R version), or with DeviceNet Micro Male connector (YDEG-04N version). To connect to other types of NMEA 2000 networks, an adapter cable is required (not included with the Device and must be purchased separately).

The Device, in its factory configuration, does not transmit data to engine networks and features high-voltage galvanic isolation between the NMEA 2000 network and the engine network. When installed in accordance with the manual, the Device should have no impact on the operation of the engine network. Device's main CPU is powered from the NMEA 2000 network, but Device's J1939 interface should be also powered from a separate power source on the engine side, both 12 and 24 Volt systems are supported.

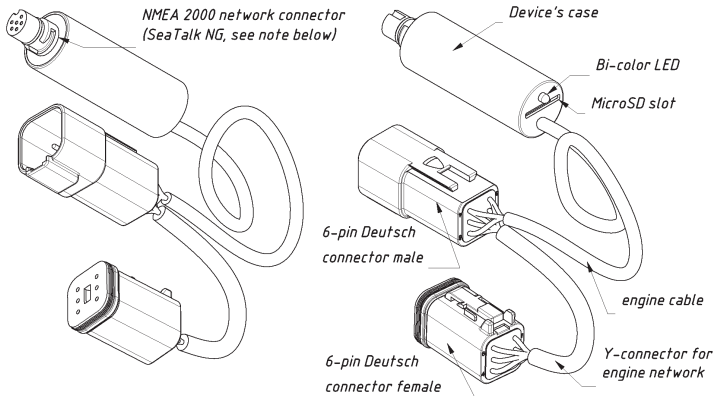
The Device is equipped with a MicroSD card slot that can be used to load configuration settings (via a text file) and firmware updates. The card may also be used to record engine network data for Device configuration and diagnostics.

Thank you for choosing our products, and we wish you happy voyages!

## Warranty and Technical Support

1. The Device warranty is valid for two years from the purchase date. If a Device was purchased in a retail store, the sale receipt may be requested when applying a warranty claim.
2. The Device warranty is terminated in case of violating the instructions of this Manual, case integrity breach, repair or modification of the Device without manufacturer's written permission.
3. If a warranty request is accepted, the defective Device must be sent to the manufacturer.
4. The warranty liabilities include repair and replacement of the goods and do not include the cost of equipment installation and configuration, as well as shipping the defective Device to the manufacturer.
5. Responsibility of the manufacturer in case of any damage as a consequence of the Device operation or installation is limited to the Device cost.
6. The manufacturer is not responsible for any errors and inaccuracies in guides and instructions of other companies.
7. The Device requires no maintenance. The Device's case is non-dismountable.
8. If the event of a failure, please refer to Appendix A before contacting the technical support.
9. The manufacturer accepts applications under the warranty and provides technical support only via e-mail or from authorized dealers.
10. Contact details of the manufacturer and a list of the authorized dealers are published on the website: <http://www.yachtd.com/>.


## I. Product Specification




*Figure 1. Drawing of YDEG-04R model of Gateway*

Our devices are supplied with different NMEA 2000 connectors. Models with the suffix -R are equipped with connectors compatible with the Raymarine SeaTalk NG standard (as shown in the image above). Models with the suffix -N come with standard NMEA 2000 Micro Male connectors (see Appendix E).

<b>Device parameter</b>	<b>Value</b>	<b>Unit</b>
Operating voltage (from an NMEA 2000 network)	10..30	V
Reverse polarity protection	Yes	—
Average current consumption	38	mA
Load equivalency number	1	LEN
Operating temperature range	-20..55	°C
Galvanic isolation between NMEA 2000 and engine network	2500	V <sub>RMS</sub>
Supply voltage from engine network	10..30	V
Average current consumption (engine network)	13	mA
Engine cable length (to Deutsch male connector)	500	mm
Device's case length (without connector)	54	mm
Weight without MicroSD card	75	g

 Yacht Devices Ltd declares that this product is compliant with the essential requirements of EMC directive 2014/30/EU.

 Dispose of this product in compliance with the WEEE Directive or local regulations. Do not dispose of it with household or industrial waste.

## II. MicroSD Slot and Card's Compatibility

The Device features a MicroSD card slot for configuration (see Section V) and firmware updates (see Section VIII).

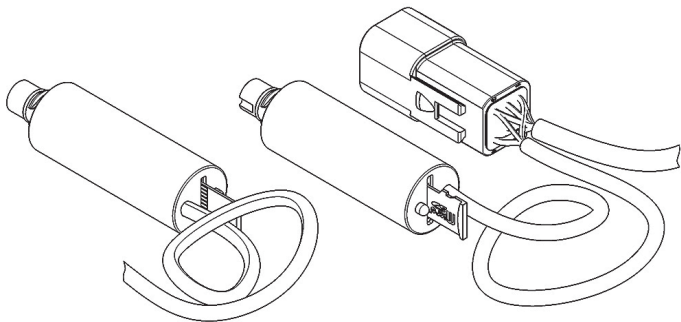


*The Device slot has a spring-loaded «push-push» mechanism and ensures proper card fixation. Improper inserting or releasing (withdrawing your finger too quickly or not waiting for the click) can result in the card being propelled out of the Device up to 5 meters. To avoid possible eye injury, loss of or damage to the card, and other hazards, insert and remove the card with caution.*

Since the slot is typically not used during normal operation, do not forget to remove the card and seal it with the provided sticker or a piece of tape to prevent moisture and dust ingress.

The Device supports MicroSD memory cards of all sizes and classes. The MicroSD card must be formatted on a personal computer before use in the Device. The Device supports the following file systems: FAT (FAT12, FAT16, MS-DOS) and FAT32. It does not support exFAT, NTFS, or any other file systems.

Be careful when inserting the MicroSD card into the Device. The card is inserted with the label side facing the LED and with the contact pads side toward the engine cable.



*Figure 2. Device with MicroSD card (pin side visible at left, label side at right)*

### III. Installation and Connection to NMEA 2000 Network

Device requires no maintenance. When selecting an installation location, choose a dry area. Avoid placing the Device where it could be submerged, exposed to rain, or subjected to water spray. Keep in mind that you may need to view the LED indicators or insert a card for configuration or diagnostics.

The connection method depends on the type of NMEA 2000 connector. While the YDEG-04N can be connected directly to an NMEA 2000 backbone or with a drop cable (up to 6 meters long), the YDEG-04R can only be connected directly to a SeaTalk NG backbone (white connector) without a spur cable. If you require a longer connection for a SeaTalk NG network, you can use the YDEG-04N with an NMEA 2000 drop cable and a SeaTalk NG-to-NMEA 2000 adapter cable (A06075 or A06078).

Before connecting the Device, turn off the bus power supply. Refer to the following guidelines on NMEA 2000 networks cabling and layout requirements:

- SeaTalk NG Reference Manual (81300-1) for Raymarine networks
- Technical Reference for Garmin NMEA 2000 Products (190-00891-00) for Garmin networks

After connecting the Device, close the lock on the connection to ensure its water resistance and reliability.

The Device has a bi-colour red/green LED. After turning the power in the NMEA 2000 network on, the Device's LED will give a series of 2 flashes 5 seconds apart. If this does not happen, see Appendix A.



*If your boat has no NMEA 2000 network installed, you should deploy at least a basic NMEA 2000 network first. You cannot simply connect the Gateway to a NMEA 2000 port of your chart plotter. Many manufacturers offer a «Starter Kit» which contains all that is necessary to establish a basic network and connect two devices:*

- *for Raymarine SeaTalk NG, see Raymarine part number T70134;*
- *for NMEA 2000, see Garmin part number 010-11442-00.*

## IV. Connection to Engine Network



*Read and become fully familiar with the contents of this section. Never connect the Device to the connector that «just looks right» until you are sure about its wiring. If you have any doubts, ask a specialist.*

Modern engine networks may seem very complicated and may have many similar connectors with different wiring and different purposes. Some engines, which only differ by one character in the model's name, may have a vastly different electronics and different wiring. Be sure that you are using the appropriate manual. Usually, a manual lists the colors of wires, and you may check a connector by the color of the incoming wires.

Never disconnect or connect any connectors when either NMEA 2000 or engine side is powered ON. The entire installation process must be performed with no power coming into the engine network and with the engines disconnected at the circuit breaker.

The Device uses two data lines called «CAN HIGH» and «CAN LOW», and two power supply lines: VCC (positive) and GND (negative, ground), see Appendix E. We strongly recommend checking the engine connector wiring in the engine's manual, and verifying your engine connector wiring with a simple multimeter to be sure that you find the right connector:

- turn OFF the circuit breaker and check resistance between the CAN HIGH and CAN LOW pins, it must be 60..120 Ohm;
- turn ON the circuit breaker (for some models, ignition also should be on) and check voltage on the VCC and GND pins (be careful not to short-circuit anything) of the connector, it must be 12..24 V.



*Do not connect the Device to any connectors labeled «Panel», «Diagnostics», «Datalink», «Aux» or «Senders». If you have any doubts, ask a technician.*

The Table 1 below shows the connection method, the required adapter cable, and the minimum configuration for receiving data from various types of engines.

*Table 1. Connection method to various engines*

Engine type	Connection point	Adapter cable	Configuration
			Comment
Volvo Penta gasoline engines with MEFI4B produced in 2004–2005	10-pin Marine Data Link connector	EFI 10-pin adaptor cable	PROTOCOLS=J1939,MEFI4B
			See Note 1.
Volvo Penta gasoline engines with MEFI4B/EGC system produced in 2005–2010	8-pin diagnostic VODIA connector	EVC/VODIA 8-pin adaptor cable	PROTOCOLS=J1939,MEFI4B
			-
Volvo Penta gasoline engines with MEFI4B/EGC produced in 2010 and newer	6-pin diagnostic VODIA connector	-	PROTOCOLS=J1939,MEFI4B
			YDEG engine connector rewiring is needed
Volvo Penta diesel engines D1/D2 equipped with MDI box	- Multilink port on the MDI box - In series with the EVC tachometer	-	PROTOCOLS=J1939,MDI
			If EVC tachometer is broken/missing, connect supplied jumper plug instead of the tachometer
Volvo Penta diesel D3 engines with EVC-A/B/C MC (Mechanical Control) produced in 2004–2009	C5:ENGINE port on the EVC HIU	EVC-A MC 12-pin C5:ENGINE adaptor cable	PROTOCOLS=J1939,VOLCANO
			Engine data only
	C4:MULTISENSOR (yellow) port on the EVC HIU	EVC-A multisensor adaptor cable	PROTOCOLS=J1939,VOLCANO WATER_DEPTH_OFFSET=0 WATER_SPEED_CORRECTION=0 WATER_TEMP_OFFSET=0
			Multisensor data only

Table 1 continued

Volvo Penta diesel D4 and D6 engines with EVC-A EC produced in 2004–2005	12-pin X5:MULTILINK connector on the HCU	EVC-A EC 12-pin X5:MULTILINK adaptor cable	PROTOCOLS=J1939
			-
Volvo Penta diesel D4, D6, D9 and D12 engines with EVC-B/EVC-C	X5:MULTILINK port on the HCU	-	PROTOCOLS=J1939
			See Note 2, 3.
Volvo Penta diesel engines with EVC-D, EVC-E, EVC2.0 and newer	Any free port on the Multilink hub	-	PROTOCOLS=J1939
			-
Yanmar 4JH-CR (Common Rail) and 4LV series	to 6-pin Diagnostic connector «C-C»	Yanmar 4JH adapter cable	PROTOCOLS=J1939
	in series with B25/C35/YD25 display, to «A-A» 12-pin engine cable connector	Yanmar B25/C35 adapter cable	All versions of 3JH3, 4JH3, 4JH4, 4JH5 are NOT compatible.
Caterpillar diesel engines equipped with J1939 bus (C7, C9, C12, C18, C32 and others)	9-pin Deutsch diagnostic connector	Caterpillar Round 9-pin adapter cable	J1939 presence depends on the model, production year and serial number. J1939 bus usually is wired on pins F and G of 9-pin SAE diagnostic connector
	In series with Marine Power Display (MPD)	Caterpillar Display 12-pin cable	
Cummins diesel engines equipped with J1939 bus (QSL9, QSM11, QSX15, QSK 19/45/60 and others)	9-pin Deutsch diagnostic connector	Cummins Round 9-pin adaptor cable	PROTOCOLS=J1939
	Smartcraft 2.0 Junction box (if installed)	SmartCraft 10-pin adaptor cable	J1939 presence depends on the model, production year and serial number.
			PROTOCOLS=SMARTCRAFT
			-

Table 1 continued

Cummins ONAN gensets (equipped with NIM module)		DIY adapter cable	PROTOCOLS=J1939, SMARTCRAFT, GENSET ISO_REQUEST=65253 GENSET N2K CLASS=ON
			See Note 4.
Mercury/ MerCruiser engines equipped with Smartcraft 2.0 ( <b>with CAN-P bus</b> ) system	Smartcraft 10-pin connector on the engine harness or to Smartcraft Junction box	SmartCraft 10-pin adapter cable	PROTOCOLS=SMARTCRAFT
			See Note 5.
BRP Rotax gasoline engines	6-pin diagnostic DLC connector	BRP CAN (Bombardier Rotax) cable	PROTOCOLS=BRP_ROTAX ENGINE_CAN_SPEED=500
			Reboot the Device after configuration change. Also see Notes 6, 7.
Suzuki SPC 2.0, 2022 and newer	In series with the tachometer	Suzuki 8-pin adaptor	PROTOCOLS=SUZUKI
			-
Hyundai Seasall S270	Service tool connector on EOI module	DIY adapter cable	PROTOCOLS=HYUNDAI ENGINE_CAN_SPEED=500
			-
MAN engines equipped with MMDS-CLC or MMDS-LC-CAN display	CAN1 connector on the display	DIY adapter cable	PROTOCOLS=J1939
			Some MAN setups also need PROTOCOLS=J1939,MAN See Section V.3 for details.

**Note 1.** All ten wires must be connected to the Marine Data Link Connector on the engine side. If only five wires are present, it indicates that your engine is equipped with an older MEFI version (MEFI-3 or MEFI-4), which is not compatible with the Device.

**Note 2.** In some cases, CAN1 and CAN2 buses in the Multilink port can be swapped. If you have first LED blink red when the ignition is ON, check this: <https://www.yachtd.com/faq/#swapped>

**Note 3.** On EVC-B and EVC-C systems, fuel consumption is only available if the «trip computer» option is installed (so that you can see fuel rate on your EVC display). Refer to our FAQ for more details: <https://www.yachtd.com/faq/#fuelrate>.

**Note 4.** Refer to this article for more details: [https://www.yachtd.com/news/genset\\_support.html](https://www.yachtd.com/news/genset_support.html).

**Note 5.** If you have limited data set received (usually on older engines with an analog gauges), try to apply the following line in the configuration file:

```
PROTOCOLS=SMARTCRAFT,HANDSHAKE
```

**Note 6.** On older BRP engines (produced near 2005), 250 kbps baud rate was used. If you have first blink red, try the following configuration:

```
ENGINE_CAN_SPEED=250.
```

Do not forget to reboot the device to activate a new baud rate!



The jumper plug supplied with the Device is not a terminator of a CAN bus. It connects two CAN buses on the 6-pin connector (see Appendix E).

**Note 7.** If you have limited dataset (RPM only, usually on older engines, produced near 2005), try the following configuration:

```
PROTOCOLS=BRP,REQUESTS
```

The Device is compatible with any engine supporting the standard J1939 protocol over the CAN bus. Since there is no standard J1939 connector used by all manufacturers, custom adapter cables must be fabricated according to the Gateway pinout (see Appendix E) and the engine's documentation for any engines not listed in the Table 1 above. Do not connect the Gateway to connectors that merely look similar without first confirming the connector's function and pinout. Before connecting the device to the engine, we highly recommend testing the interface using the procedure described here:

<https://www.yachtd.com/faq/#j1939engcheck>.

## V. Device Configuration and Settings

Before editing the configuration file, make sure the device's LED indicator flashes green–green every 5 seconds when the engine ignition is ON and NMEA 2000 is powered ON and functions properly. This confirms that both physical connections are functioning correctly. There is no point in editing the configuration file if there are physical connection issues — that is, if one or both LED flashes are red (for more information on LED indication, see Section VII). The only exception is if you need to change the baud rate, for example for BRP or HYUNDAI engines.

The Device is preconfigured, and for single J1939 and MDI engines, reconfiguration is usually not required.

To obtain the current configuration, create an empty file named **YDEG.TXT** — not *YDEG.TXT.txt* or *YDEG(03).TXT*. Some operating systems hide extensions for known file types; if so, enable the display of file extensions in the system settings or use an alternative file manager.

Copy the file to a memory card formatted in FAT32 (not exFAT or NTFS). Windows OS may have difficulty formatting cards larger than 32 GB into FAT32 using standard tools. In that case, use a smaller card or a third-party formatting utility.

Insert the card into the device. You should see a green–red–red LED indication once — this means the configuration file was found, but no changes were applied (as the file is empty). After this, a **YDEGSAVE.TXT** file containing all current settings will be created on the card. You may use this file as a template (in this case, rename it to **YDEG.TXT**). Carefully read the comments in the configuration file. Note that you do not need to load the entire configuration file each time you make a change — only the parameters listed in the file will be updated; all others will remain unchanged.

In general, the configuration file must meet the following requirements:

- ASCII plain text format should be used;
- line endings should be in Windows (CR LF) or Unix (LF) and not of Macintosh (CR) format;
- a given setting must not appear more than once in the configuration file. In the event of duplicate entries, the system will use the last value encountered;

- parameters and their values must be entered in UPPER CASE;
- each parameter must be on a separate line;
- commentary lines must start with the # symbol.

A sample of the configuration file is given in Appendix D.

The configuration file settings are described below.

### *1. PROTOCOLS=J1939,MDI*

This option allows to enable or disable a certain protocol support. The full list of supported protocols is: J1939, MEFL4B, SMARTCRAFT, BRP\_ROTAX, EDC2, MDI, VOLCANO, VW, SUZUKI, HYUNDAI, GENSET, MAN. You can also enable a certain option (described in the Section IV): REQUESTS, HANDSHAKE, OPT1

### *2. ENGINE\_CAN\_SPEED=50|125|250|500*

This setting changes the baudrate of the Gateway's engine interface. Most engine network (like J1939 or Smartcraft) uses 250 kbps which is default value. Some engines (like BRP Rotax and Hyundai) use 500 kbps. 50 and 125 kbps options are experimental and currently don't have practical application. Note that you need to reboot the Device to apply new baudrate, due to hardware limitations.

### *3. ENGINE\_x=y*

*x* – NMEA 2000 Engine Instance (engine number) [0..7]

*y* – engine address on the J1939 network [0..253,OFF]

Factory configuration (from *x=0* to 7): 0, 1, OFF, OFF, OFF, OFF, OFF, OFF

In the NMEA 2000 Standard, engines are assigned data instance numbers from port to starboard, starting with 0. Therefore, the port engine (or a single engine) should use instance 0, and the starboard engine in a twin-engine configuration should use instance 1.

Engines on a J1939 network also have source addresses, with the port engine typically assigned address 0, and subsequent engines assigned 1, and so on. However, this convention is not always followed. In such cases, you can determine the addresses using YDEG-04 log recording feature (see Section VIII).

For example, on a catamaran with two engines that are not connected to a single shared network, both engines will have address 0 on their separate J1939 networks. In this case, the following settings should be used:

Device connected  
to the port engine

```
ENGINE_0=0  
ENGINE_1=OFF
```

Device connected  
to the starboard engine

```
ENGINE_0=OFF  
ENGINE_1=0
```

The value OFF guarantees that no data associated with the given identifier will be transferred to the NMEA 2000 network.

Engines in the BRP CAN and SmartCraft networks do not have J1939 addresses, but this setting is used to identify the port and starboard engines. For details, see Sections IV.5 and IV.6.

Different types of engine data may come from more than one different J1939 source addresses. Device allows you to explicitly select source addresses for voltage, fuel level and transmission (see V.15, V.18 and V.29).

For all other data types, ENGINE\_x is used to select source address, with one notable exception: if you set PROTOCOLS=MAN, you can select two addresses, ENGINE\_4..ENGINE\_7 will be used to select «secondary» J1939 data source address: ENGINE\_0 and ENGINE\_4 will be mapped to NMEA 2000 engine instance 0, ENGINE\_1 and ENGINE\_5 will be mapped to NMEA 2000 engine instance 1 and so on.

#### 4. HOURS\_OFFSET=x

x – number of seconds, -9999999..9999999

Factory setting: 0

The number of seconds to be added to the engine hours. Some users have replaced ECU or EDC modules, which report engine hours only since the time the module was installed. This setting allows the NMEA 2000 engine hours gauge to display the corrected hours value.

#### 5. RUDDER=x|OFF

x – NMEA 2000 Rudder Instance, 0..252

Enables rudder angle conversion (with specified data instance) to NMEA 2000 (for Smartcraft and Volvo EVC only).

6. *FUEL\_RATE\_FAKE=ON|OFF*

Enables transmission of the «fake» fuel rate data calculated using RPM readings. For more details, refer to this article: [https://www.yachtd.com/news/instant\\_fuel\\_consumption.html](https://www.yachtd.com/news/instant_fuel_consumption.html).

7. *FUEL\_RATE\_MUL=x*

*x* – number from 0.001 to 65.500. Default value is 0.7 (recommended for VOLCANO protocol).

Multiplicative coefficient used to scale VOLCANO fuel rate and «fake» fuel rate. Use 0.7 for VOLCANO, adjust if necessary.

8. *GENSET\_N2K\_CLASS=ON|OFF*

Changes the NMEA 2000 Device Class/Function.

OFF – 50/160 «Propulsion/Engine Controller», ON – 35/180 «Electrical Generation/Engine Gateway». Factory default OFF. Set to ON if your MFD requires «Electrical Generation» Class for generators data.

9. *TRIM\_ZERO=x*

*x* – calibration value of 0% tilt/trim position, 0..65534  
Default setting 25600

This parameter contains tilt/trim value reading at 0% position. Automatically set during calibration. Manual adjustments are usually not required.

10. *TRIM\_STEP=x*

*x* – 30000..30000 (except 0)  
Default setting 128

This parameter contains calibration value of 1% step of tilt/trim. Automatically set during calibration. Manual adjustments are usually not required.

### *11. CALIBRATE\_TRIM=x*

This setting is not saved to the configuration or the YDEGSAVE.TXT file. It specifies the current tilt/trim angle of the port engine (ENGINE\_0) and is used to update the V.9–V.10 settings with actual data.

Most MFDs do not support negative trim angles, so it is recommended to calibrate the tilt/trim to a range of 0 to 100%. First, trim the port engine to the lowest position and load the configuration file with the following line:

```
CALIBRATE_TRIM=0
```

If the Gateway has tilt/trim data, the TRIM\_ZERO value (V.9) will be updated, and you will see three green confirmation flashes. Then, trim the engine to the highest position, and load the file with the following line:

```
CALIBRATE_TRIM=100
```

The Gateway will calculate the trim step corresponding to 1% and will update the TRIM\_STEP value (V.10). Check the V.9 and V.10 values in the YDEGSAVE.TXT file and adjust them if necessary.

### *12. EXHAUST\_TEMP=OFF|ON*

Enables Exhaust gas temperature transmission from the engine network (if available) via PGN 130316 «Temperature, Extended Range» with Temperature Source (temperature type) 14 = Exhaust Gas Temperature. Temperature Instance will be the same as Engine Instance set in ENGINE\_x.

### *13. INTAKE\_MANIFOLD\_TEMP=OFF|1..252*

NMEA 2000 has no data type for transmitting intake manifold temperature (supported in Volvo Penta, J1939, SmartCraft and BRP Rotax engines). Moreover, many chart plotters have gauges for a limited set of data types.

This setting is added as a workaround for these limitations. OFF blocks the sending of temperature messages, and values 1..252 allow to send intake manifold temperature via PGN 130316 «Temperature, Extended Range». Temperature Instance will be the same as Engine Instance set in ENGINE\_x. You can use one of the following Temperature Source (temperature type):

- 01 = Outside Temperature
- 02 = Inside Temperature
- 03 = Engine Room Temperature
- 04 = Main Cabin Temperature
- 05 = Live Well Temperature
- 06 = Bait Well Temperature
- 07 = Refrigeration Temperature
- 08 = Heating System Temperature
- 09 = Dew Point Temperature
- 10 = Wind Chill Temperature, Apparent
- 11 = Wind Chill Temperature, Theoretical
- 12 = Heat Index Temperature
- 13 = Freezer Temperature
- 14 = Exhaust Gas Temperature
- 15 through 128 Reserved
- 129 through 252 Generic Temperature Sources other than those defined

This allows you to map intake manifold temperature to one of the temperature gauges supported by your NMEA 2000 displays.

*14. NMEA\_BATTERY=[KEYSWITCH | CHARGING | POWER\_INPUT | OFF]*

*Factory setting: KEYSWITCH*

Equipment on the NMEA 2000 network can display battery voltage, and the network may already include sensors that report this information. In such cases, you can set this parameter to OFF to prevent the Gateway from transmitting duplicate battery voltage data.

The engine may provide values such as the ignition (keyswitch) battery voltage, the charging-circuit voltage, and the voltage of an auxiliary battery connected to the engine. This setting lets you to specify which of these voltages should be sent to NMEA 2000 via PGN 127508 «Battery Status».

### 15. BATTERY\_x=y

*x* – NMEA 2000 Battery Instance (battery number) [0..7]

*y* – J1939 address of the engine providing the battery potential data [0..253,OFF].

Factory settings (from *x*=0 to 7): 0, 1, OFF, OFF, OFF, OFF, OFF, OFF

This setting specifies which NMEA 2000 Battery Instance (battery number) should be used for battery data received from the given J1939 address.

### 16. NMEA\_ALTERNATOR=[KEYSWITCH | CHARGING | POWER\_INPUT | OFF]

Factory setting: *KEYSWITCH*

This setting specifies which J1939 data type should be transmitted to NMEA 2000 as «Alternator potential». Note that J1939 battery data source addresses should be already selected in BATTERY\_x. In most cases, battery data source addresses are the same as engine data source address.

### 17. FUEL=[DIESEL | GASOLINE | OFF]

Factory setting: *DIESEL*

This setting allows you to select the type of fuel in the tanks. We recommend using the default DIESEL setting, even if you have a gasoline engine, since most modern MFDs still do not support gasoline fuel tanks. Set to OFF to completely block the transmission of fuel level data.

### 18. FUEL\_x=[y,z|OFF]

*x* – NMEA 2000 Fluid Instance (tank number) [0..9]

*y* – J1939 address of the engine providing the fuel level data [0..254]

*z* – tank relative to the engine [PORT, STARBOARD]

Factory setting (from *x*=0 to 7): {0,PORT}, {0,STARBOARD}, OFF, OFF, OFF, OFF, OFF, OFF, OFF

In J1939 standard, each engine may have two fuel tanks (port and starboard relative to the engine). The engine in J1939 also has its bus address. These two values are specified at the right part of this setting. The left part contains NMEA 2000 fuel tank identifier. In practice, however, most engines have only one fuel

tank (port). For twin engines with a common CAN bus, equipped with only two tanks (one for each engine), use the following settings:

FUEL=DIESEL

FUEL\_0=0, PORT

FUEL\_1=1, PORT

FUEL\_2=OFF

#### 19. TANK\_CAPACITY\_x=y|DEFAULT

*x* – fuel tank number

*y* – volume in liters

Fuel level data is transmitted in the engine network as a percentage. Use this setting to specify the fuel tank volume. If this value is set, you can get the fuel level in liters/gallons on your MFD, not only in percent. With the DEFAULT value, tank volume is sent as «not available».

#### 20. TANK\_CALIBRATION\_x=p4,p8,...,p95|OFF

*x* – fuel tank number

p4,p8,...,p95 – 12 calibration points (decimal values, 0..100)

*Factory setting: OFF for all tanks*

Resistive fuel level sensors cannot take into account the fuel tank shape, and the readings usually have substantial error. This setting defines 12 calibration points for readings at 4, 8, 12, 20, 30, 40, 50, 60, 70, 80, 90 and 95% level (assuming that 0% and 100% readings do not require calibration). For each point, you should specify the correct reading value. For example, if your fuel gauge shows 50% when the tank actually is only 19% full, then you should set 19 as the value for the 50% calibration point (7th value in the calibration string).

To simplify obtaining the calibration string, we prepared an Excel file available on our web site: <https://www.yachtd.com/downloads/calibration.xls>.

You only need to specify your gauge's readings and the measured remaining fuel volume to get the calculated calibration string.

### 21. *FRESH\_WATER=OFF|0..15*

This setting allows to convert fresh water level from Volvo EVC engines to NMEA 2000. The specified number indicates the data instance of the NMEA 2000 fresh water tank to which the fresh water tank level from the first engine will be mapped. Default value is OFF.

### 22. *MDI\_AUX\_MASK=x*

*x* – 24-bit mask, hexadecimal number 000000...FFFFFF

Factory setting: 000000

An external sensor can be connected to Volvo Penta MDI engines. This parameter defines what alert should be sent to NMEA 2000 when this auxiliary sensor is activated. For example, if an auxiliary sensor is installed and reports «water in the fuel», set the mask as 000100 (hexadecimal number, bit 9 is set) in accordance with the table in Appendix B.

### 23. *MDI\_SYS\_FAULT\_MASK=x*

*x* – 24-bit mask, hexadecimal number 000000...FFFFFF

Factory setting: 000000

This setting allows to map «System fault» status from Volvo Penta MDI unit to a certain NMEA 2000 engine discrete status in accordance with the table in Appendix B.

### 24. *ALERT\_x=[y,w,z|OFF]*

*x* – number from 0 to 9, internal index of the Device

*y* – 24-bit mask, hexadecimal number 000000...FFFFFF

*w* – decimal SPN number, see your engine manual

*z* – decimal FMI number, from 0 to 31, see your engine manual

You can map a certain J1939 DTC code (SPN and FMI) to desired NMEA 2000 engine warning, in addition to those listed in Section V, Table 3. SPN and FMI codes you should find in the technical documentation of your engine, and mask values are listed in the Appendix B, Table 1.

For example:

ALERT\_0=000020,158,1

When this setting is applied, you will get «Low System Voltage» warning (corresponding to mask 000020) if the DTC code with SPN=158 (Keyswitch Battery Potential) and FMI=1 (Data Valid but Below Normal Operational Range – Most Severe Level) is received from the engine.

*25. ALERT\_WARN1\_MASK=x*

*x – 24-bit mask, hexadecimal mask, hexadecimal number 000000...FFFFFF*

*Factory setting: 000000*

Activates NMEA 2000 engine discrete status «Warning Level 1» if at least one bit of the current engine status matches the specified mask. For more details, refer to the Section VI.5.

*26. ALERT\_WARN2\_MASK=x*

*x – 24-bit mask, hexadecimal number 000000...FFFFFF*

*Factory setting: 000000*

Activates NMEA 2000 engine discrete status «Warning Level 2») if at least one bit of the current engine status matches the specified mask. For more details, refer to the Section VI.5.

*27. ALERT\_POWER\_REDUCTION\_MASK=x*

*x – 24-bit mask, hexadecimal number 000000...FFFFFF*

*Factory setting: 000000*

Activates NMEA 2000 engine status «Power Reduction» if at least one bit of the current engine status matches the specified mask. For more details, refer to the Section VI.5.

*28. NMEA\_ALERT\_MASK=x*

*x – 24-bit mask, hexadecimal number 000000...FFFFFF*

*Factory setting: FFFFFFF*

Only bits set in this mask can be set by the Device in the NMEA 2000 engine discrete status. For more details, refer to the Section VI.6. See V.35 also.

### *29. TRANSMISSION\_x=y*

*x* – NMEA 2000 Transmission Instance [0..7]

*y* – transmission address on the J1939 network [0..253,OFF]

*Factory configuration (from x= 0 to 7): 0,1,OFF,OFF,OFF,OFF,OFF,OFF*

This setting specifies the mapping between the J1939 transmission address and its NMEA 2000 identifier, set as OFF to disable data transmission for a given NMEA 2000 identifier. See V.35 also.

For SmartCraft network, engine number (0..3) should be used instead of transmission address.

### *30. WATER\_DEPTH\_OFFSET=x*

*x* – OFF (default value) or a number from -1000 to 1000

Used for Volcano protocol only. Positive value (in centimeters) specifies the distance from the transducer to the water line, and negative value represents the distance from the transducer to the keel. This value is sent as the transducer offset (in separate data field) via PGN 128267 «Water Depth».

The OFF value turns off PGN 128267 «Water Depth» transmission.

### *31. WATER\_SPEED\_CORRECTION=x*

*x* – OFF (default value) or a number from -1000 to 1000

Used for Volcano protocol only. This value indicates speed correction factor in percent (10 is +10%). The speed is sent in the NMEA 2000 PGN 128259 «Speed, Water Referenced».

Note that you should set non-OFF value (e.g. zero, no correction) in order to enable Volcano transducer STW data conversion.

### 32. WATER\_TEMP\_OFFSET=*x*

*x* – OFF (default value) or a number from -1000 to 1000

Used for Volcano protocol only. Value is given in 0.1 Celsius, -10 means that reading will be decreased by 1 degree Celsius. Temperature is sent as a «sea temperature» via PGN 130316 «Temperature, Extended Range».

Note that you should set non-OFF value (e.g. zero, no correction) in order to enable Volcano transducer sea temperature data conversion.

### 33. PASS\_PGN\_TO\_NMEA=*x*

*x* – empty or list of NMEA 2000 or J1939 PGNs separated by comma

Factory setting: empty

Enables forwarding of a specified messages from an engine network to a NMEA 2000 network (see also V.36–37). Up to 20 PGNs can be specified.

For example, if you have NMEA 2000 transducer in your engine network, add the line below into configuration file YDEG.TXT to forward water depth (NMEA 2000 PGN 128267), speed through water (PGN 128259), and water temperature (PGN 130310):

```
PASS_PGN_TO_NMEA=128267,128259,130310
```

### 34. PASS\_ADDR\_TO\_NMEA =OFF|YDEG|AS\_IS|*n*

*n* – number from 0 to 253

Factory setting: OFF

Different devices in engine and NMEA 2000 networks may have matching addresses, so, the forwarding of such messages can cause conflicts. To avoid this, YDEG can use its own NMEA 2000 source address or a specified address as the source address in the forwarded messages. This is managed by the PASS\_ADDR setting.

OFF value turns off the message forwarding, with AS\_IS messages being forwarded as is (with original sender address). If the YDEG value is chosen, the address of Gateway will be used, or you can set a fixed address in a range of 0..253.

The YDEG value is a recommended option in the case of forwarding NMEA 2000 messages. The AS\_IS option should be used to forward J1939 messages. For example, to forward active diagnostic trouble codes from one or multiple engines use the following settings:

```
PASS_PGN_TO_NMEA=65226  
PASS_ADDR_TO_NMEA=AS_IS
```

### 35. TRANMISSION\_ALERT\_MASK=*x*

*x* – 5-bit mask, hexadecimal number 00..1F

Factory setting: 1F

Only bits set in this mask can be set by the Device in the NMEA 2000 transmission discrete status. For more details, refer to the Section VI.6.

### 36. PASS\_PGN\_TO\_ENGINE=*x*

*x* – empty or list of NMEA 2000 or J1939 PGNs separated by comma

Factory setting: empty

Allows forwarding of specified PGNs from an NMEA 2000 network to an engine network. Up to 20 PGNs can be specified in the list.

Some boats have trip/fuel computers installed in the engine network that require NMEA 2000 speed data. To forward speed through water (PGN 128259) and speed over ground with course (PGN 129026), use the following settings:

```
PASS_PGN_TO_ENGINE=128259,129026
```

### 37. PASS\_ADDR\_TO\_ENGINE=OFF|AS\_IS|*n*

*n* – number from 0 to 253

### *Factory setting: 210*

The network address is used to send messages to the engine's network. Addresses below 180 can be occupied by various devices. The OFF value turns off the forwarding of messages, with AS\_IS value, CAN frames will be forwarded «as is», i.e. with an original source address preserved.

It is recommended to keep the factory setting if you have no reasons to change it.

### *38. TRANS\_ALERT\_x=[y,w,z|OFF]*

*x* – digit from 0 to 9, internal index of the Device

*y* – 5-bit mask, hexadecimal number 00..1F

*w* – decimal SPN number, see the manual of your specific engine

*z* – decimal FMI number, from 0 to 31, see the manual of your engine

This setting allows to enable a certain NMEA 2000 transmission status (in accordance with the specified mask value) if a diagnostic message (PGN 65226) containing the specified SPN and FMI codes is received from the engine's transmission. For example:

`TRANS_ALERT_0=08,124,18`

When this setting is applied, you will get «Low Oil Level» transmission warning (corresponding to mask 000008) if the DTC code with SPN=124 (Transmission Oil Level) and FMI=18 (Data Valid But Below Normal Operating Range — Moderately Severe Level) is received from the engine.

### *39. GROUP OF SETTINGS: SUBSTITUTE\_XXXX=OFF|y*

*XXXX* – BOOST, FUEL\_PRESSURE, OIL\_PRESSURE, OIL\_TEMP, CLNT\_PRESSURE, CLNT\_TEMP, TRANS\_PRESSURE, TRANS\_TEMP

*y* – sensor data instance, decimal number from 0 to 252

*Factory setting: all settings are OFF*

This group of settings allows engine data to be replaced with data from NMEA 2000 sensors connected to the NMEA 2000 network or to the engine network. Temperature data (engine oil, coolant, and transmission oil) is replaced with data from temperature sensors (PGNs 130312 or 130316). Pressure data (boost, fuel, engine oil, coolant, or transmission oil pressure) is replaced with data from pressure sensors (PGN 130314).

The sensor **data instance** (not to be confused with NMEA 2000 terms such as *device instance* or *system instance*, or with *data types* like *Air Temperature* or *Sea Temperature*) must match the data instance specified in the setting. Data from that sensor will be used for the port engine (ENGINE\_0 or TRANSMISSION\_0; see V.1 and V.15). For the next engine or transmission (ENGINE\_1 or TRANSMISSION\_1), data from the sensor with the next data instance number will be used. For example, you have two engines and need to add Boost Pressure data from two NMEA 2000 pressure sensors installed on the charge air manifolds, which send pressure via PGN 130314 «Actual Pressure». But you also have a weather station that already sends Atmospheric Pressure via PGN 130314 with Pressure Instance=0. So we need to use next available Pressure Instances: set up boost pressure sensors with Pressure Instances 1 for port and 2 for starboard sensor. Then pair both of them with the Device using setting

```
SUBSTITUTE_BOOST=1
```

Both sensors' pressure data will be received by Device and sent back but as «Engine Boost Pressure», via PGN 127488 «Engine Parameters, Rapid Update».

Data from sensor with Pressure Instance 1 will be used for port engine, data with next Pressure Instance 2 will be used for Starboard engine.

For temperature data types, we can offer Exhaust Gas Sensor YDGS-01. This unit can measure temperatures up to 800 Celsius.

For pressure data types, we recommend Tank Adapter YDTA-01. Initially designed as a fuel level sensor, it can be easily converted to a pressure sensor. It is compatible with resistive and voltage sensors, and can be connected to the sensor solely or in parallel with analog and digital gauges. For more details, refer to this article: [https://www.yachtd.com/news/substitute\\_pressure\\_sensor.html](https://www.yachtd.com/news/substitute_pressure_sensor.html).





## VI. Mapping of Engine and Transmission Statuses (Warnings)





The NMEA 2000 standard defines 24 engine warnings and 5 transmission warnings (listed in Appendix B). Not all NMEA 2000 instrumental displays and chart plotters provide full support the engine and transmission statuses.

### 1. Volvo Penta D1 and D2 engines

Volvo Penta D1 and D2 engines are equipped with MDI (Mechanical Diesel Interface) unit and have a few sensors connected to the MDI which reports on a small number of problems (engine overheating, low oil pressure, and low ignition battery voltage) using proprietary message. To enable processing of these messages, add MDI to PROTOCOLS list (see V.1), remove MDI to disable (recommended for all non-MDI engines). The Table 2 below shows the supported warnings.

Table 2. Mapping of engine status for D1 and D2 engines to NMEA 2000

Symbol	Description	Status in NMEA 2000 [bit]
	<b>Pre-heating.</b>	Preheat Indicator [11].
	<b>Starting.</b> Turning on the starter	Not displayed, no corresponding status.
	<b>Stopping.</b> Engine stopping	Engine Shutting Down [24].
	<b>Fuel level.</b> Fuel level less than 20% (if the sensor is installed).	Not displayed, no corresponding status.

Symbol	Description	Status in NMEA 2000 [bit]
	<b>System fault.</b> Malfunction in engine cables (open circuit, short circuit).	Can be mapped by user (*).
<b>AUX</b>	<b>Auxiliary alarm.</b> Triggering of auxiliary sensor (if connected; depends on the implementation).	Can be mapped by user (*).
	<b>Coolant temperature.</b> Coolant high temperature.	Over Temperature [2].
	<b>Oil pressure.</b> Low oil pressure.	Low Oil Pressure [3].
	<b>Charging.</b> Low voltage of ignition battery.	Low System Voltage [6].

\* The conditions «System fault» and «Auxiliary alarm» can be mapped by the user to bits of engine status in NMEA 2000 using the settings: MDI\_AUX\_MASK and MDI\_SYS\_FAULT\_MASK (see V.8 and V.9)

## 2. Other Volvo Penta and J1939 engines

Modern engines can have more than 10 different sensors and provide hundreds of diagnostic codes (in J1939 PGN 65226 «Active Diagnostic Trouble Codes» aka «Diagnostic Message 1» or DM1). Generally used diagnostic codes are described in the J1939 standard. Table 3 below lists the Device's default warnings mapping.

With the ALERT\_x and TRANS\_ALERT\_x settings, you can independently map up to 10 extra diagnostic codes for engine and 10 extra codes for transmission (not already listed in Table 3 below) to NMEA 2000 status bits (see V.24 and V.35).

Table 3. Mapping of J1939 engine and transmission status to NMEA 2000

<b>Description</b>	<b>SPN</b>	<b>FMI</b>	<b>Engine discrete status in NMEA 2000 [bit]</b>
Low fuel pressure	94	1, 18	Low Fuel Pressure [5]
Water in fuel	97	0	Water in Fuel [9]
Low engine oil level	98	1	Low Oil Level [4]
Low engine oil pressure	100	1, 18	Low Oil Pressure [3]
High boost pressure	102, 106	0, 16	High Boost Pressure [12]
High coolant temperature	110	0, 16	Over Temperature [2]
Low coolant level	111	1	Low Coolant Level [7]
Low battery voltage	158	1	Low System Voltage [6]
Engine over speed	190	0, 16	Rev Limit Exceeded [13]
High oil temperature (transmission)	177	0, 16	Transmission Over Temperature [2]
Low oil pressure (transmission)	127	1, 18	Transmission Low Oil Pressure [3]
Low oil level (transmission)	124	1	Transmission Low Oil Level [4]

### 3. Bombardier BRP Engines

The Engine Gateway supports native fault codes of BRP engines in addition to fault and diagnostics codes transmitted with J1939 DM1 messages (see Table 3 above).

Table 4. Supported BRP CAN fault codes

<b>Fault Code</b>	<b>Fault Description</b>	<b>NMEA 2000 Status</b>
P0217	High engine coolant temperature	Over Temperature [2]
P0524	Low oil pressure condition	Low Oil Pressure [3]
P1520	Low oil level	Low Oil Level [4]
P0562	Battery voltage too low	Low System Voltage [6]
P0127	Intercooler system fault	Water Flow [8]
P0544	Exhaust gas temperature sensor functional problem	EGR System [14]
P0545	Exhaust gas temperature sensor shorted to ground	EGR System [14]
P0546	Exhaust gas temperature sensor open circuit or shorted to battery	EGR System [14]
P0122	TAS (Throttle Accelerator Sensor) 1 fault (short circuit to GND)	Throttle Position Sensor [15]
P0123	TAS (Throttle Accelerator Sensor) 1 fault (short circuit to battery)	Throttle Position Sensor [15]
P1102	TPS adaption failure	Throttle Position Sensor [15]
P1104	TPS adaption cancelled	Throttle Position Sensor [15]
P0600	CAN communication problem	Engine Comm Error [21]
P1680	Communication problem detected by MPEM	Engine Comm Error [21]
P1681	Communication problem – instrument cluster message missing	Engine Comm Error [21]
P1682	Communication problem – EMS message missing	Engine Comm Error [21]

Not all BRP CAN fault codes can be mapped to a NMEA 2000 engine status, as NMEA has only 24 engine status flags (see Appendix B). But you can define mapping of additional fault codes with the ALERT\_x setting (see V.24).

For example, to map P1030 to «Maintenance Needed», you should place the following line in the configuration file:

```
ALERT_0=080000,4144,0
```

Where 080000 is the hex mask of «Maintenance Needed» (see Appendix B), 4144 is a decimal equivalent of hexadecimal 1030 (BRP fault codes are hexadecimal), the last number — 0 — can be any value from 0 to 31 (not used).

#### *4. SmartCraft warnings*

A list of supported warnings is given in our FAQ at <https://www.yachtd.com/faq/#smartcraft>.

#### *5. Combined warnings*

Engine status bits in NMEA 2000 like «Warning Level 1», «Warning Level 2», and «Power Reduction» are combined warnings. Non-critical issues like low battery voltage or water in the fuel filter can initiate second-level general warnings, and engine over-heating or low oil pressure are first-level warnings. Displays or indicating devices can show these statuses in yellow or red window, respectively.

Using the ALERT\_WARN1\_MASK, ALERT\_WARN2\_MASK and ALERT\_POWER\_REDUCTION\_MASK (see V.25–V.27), you can configure how these statuses are turned on.

For example, to have the «Warning Level 2» status turned on when water is in the fuel filter (bit 9) or when there is low system voltage (bit 6), you should assign the following mask (assigned in hexadecimal values):  
ALERT\_WARN2\_MASK=000120

#### *6. Global blocking of warnings*

The NMEA\_ALERT\_MASK setting allows to block unwanted engine warnings. Device will send only those engine warnings, which have the corresponding mask bits set to 1 (see V.28). For example, to allow all warnings, set its value to FFFFFFFF (assigned as a hexadecimal number), to prevent all warnings from coming through, set it to 000000.

The TRANMISSION\_ALERT\_MASK (see V.30) is used in the same way to block transmission warnings.

## VII. LED Signals

### *1. Two LED flashes every 5 seconds.*

The first flash indicates the engine network condition. Green if within the last period (5 seconds) data has been accepted from the engine network, red if not. The first red blink can indicate wrong engine connection, no power supply from the engine or incorrect baud rate setting.

The second flash indicates the NMEA 2000 network condition. Green if in the last period the data has been received or successfully sent (confirmation of data reception from other devices), red if not. The second red blink may indicate physical issues with NMEA 2000 (wrong topology, missing terminators, failed drop cables or T-connectors), or no active devices in the network.

The Device accepts a limited set of NMEA 2000 messages (see Table 2, Appendix C), the remaining messages are filtered at the hardware level. In this regard, some NMEA 2000 networks can indicate a red light the most time when the engine network is turned off (ignition off) and the NMEA 2000 is functioning normally. In this case, to check the NMEA 2000 connection, turn at least one device in this network (e.g. the chart plotter) off and on again. The status of the NMEA 2000 for some time should be displayed with green flashes.

### *2. Three LED flashes, once after MicroSD card is inserted into the Device*

Three green flashes: the YDEG.TXT file has been read and changes have been applied to the current Device settings. The YDEGSAVE.TXT file on the card has been saved with the updated configuration.

Green, red, red: the YDEG.TXT file has been read from the card, but the current configuration of the Device has not been changed (either the configuration file does not differ from the current settings or there are no settings in the file). The YDEGSAVE.TXT file on the card has been saved with the current configuration.

Three red flashes: the YDEG.TXT was not found on the MicroSD card or the file system is not supported.

### *3. Five green flashes when NMEA 2000 network is turned on*

The Device has the MicroSD inserted with a firmware update, the firmware is updated (see Section VIII).

## VIII. Firmware Updates and Settings Reset

Download the archive using this link: <https://www.yachtd.com/downloads/GUPDATE.zip>. Unzip it, check README.TXT file, and unless otherwise specified, copy the GUPDATE.BIN file to microSD card formatted in FAT32 (not exFAT!). Power down the Device (from NMEA 2000 side), insert card and power up the Device (from NMEA 2000 side). After 5–15 seconds, you should get 5 green LED flashes indicating that firmware update is successful.

If the Device already uses the same firmware version, file is corrupted or can't be opened, the Device switches to the normal mode without any additional indication.

You can find the Device's serial number and firmware version in the header of YDEGSAVE.TXT file. Also, this information is displayed in the NMEA 2000 Device List (SeaTalk NG, SimNet, Furuno CAN) or in the common list of external devices on the chart plotter (see third line at Figure 3 on the next page). Usually, this list is located in the «Diagnostics», «External Interfaces» or «External devices» menu of the chart plotter.

To reset the Device to default settings, just upload default configuration file (refer to the Appendix D). Or, if you have any NMEA 2000-to-PC gateway, you can apply the following command in the *Installation Description 2* field of the Device's properties:

```
YD:RESET
```

Raymarine

Diagnosics

Select Device

Press to show diagnostic data for all devices: **Show All Data**

Device	Serial No	Network	Software
Digital Radome	E92129 0240451	SeaTalkHS	1.04
Raymarine p70 Display	0140299	STng	2.12
YDEG-04	00030042	STng	1.0 09/08/2016
i50 Tridata Instrument	0130213	STng	1.06
E22158-SeaTalk-STNG-Converter	1034742	STng	1.21
YDBC-05	00005027	STng	1.2 27/02/2015
Raymarine EV-1 Course Computer	0240651	STng	1.01 (RSCP V1 L4)

Standby Radar Tx Sonar GPS Fix

*Figure 3. Raymarine c125 MFD devices list with Gateway (YDEG-04)*

## IX. Diagnostic data recording

The Device can record data from the engine bus for diagnostics and configuring. To create a log file, prepare a microSD card formatted in FAT32 (not exFAT). Create YDEG.TXT file with a single line:

```
ENGINE_LOG=ON
```

Make sure that file is named as YDEG.TXT, not YDEG.TXT.txt or YDEG(03).TXT. Copy this file to microSD card.

Turn the engine ignition ON, run engine if necessary. Make sure first LED flash is GREEN, if the first flash is RED, indicating no engine communications, data log will not be recorded. On success, device will record all engine side CAN bus data traffic into YDEGxxx.CAN files, where xxx is an incrementing file number. New CAN file will be created if currently recorded file size exceeds the limit or a new log recording session will be started (e.g. after engine side power cycle).

To stop log recording, turn the engine ignition OFF. Check that YDEG changed the first LED signal to RED. Wait about 5 sec to be sure that file is closed, and eject the card. Check the CAN files sizes. If you eject the card too early or NMEA 2000 was powered off before the first LED flash becomes RED, you will get file with zero size, indicating log recording failure. In that case, check the card file system for errors and try again.

The recorded YDEGxxx.CAN files can be viewed or converted in CAN Log Viewer software [http://www.yachtd.com/products/can\\_view.html](http://www.yachtd.com/products/can_view.html). Also, you can replay this file using Voyage Recorder YDVR-04 to simulate engine bus on your test bench. And of course, you can send the recorded files to technical support to check if the Gateway configuration fits the engine data.

The file format is open and described in the CAN Log Viewer documentation. To analyze data, protocol knowledge is required. BRP CAN and Smartcraft are proprietary protocols, Volvo Penta EVC protocol is a proprietary extension of J1939 protocol. J1939 protocol documentation can be obtained from SAE (<http://www.sae.org>).

## Appendix A. Troubleshooting

Situation	Possible cause and solution
No LED indication after the NMEA 2000 network is powered on	<p><b>1. No power supply on the bus.</b> Check if the bus power is supplied (NMEA 2000 network requires a separate power connection and cannot be powered by a plotter or another device connected to the network). Check the fuse of NMEA 2000 power supply.</p> <p><b>2. Loose connection in the power supply circuit.</b> Treat the Device connector with a spray for cleaning electrical contacts. Plug the Device into another, proven connector.</p>
The Device LED flashes every five seconds, but the Device is not displayed in the list of external devices on the plotter, data do not appear, the second LED blink is always RED	<p><b>1. Loose connection in the data circuit.</b> Treat the Device connector with a spray for cleaning electrical contacts. Plug the Device into another, proven connector.</p> <p><b>2. There are problems in the NMEA 2000 network.</b> The network segment is not connected to the plotter, backbone topology is non-linear or there are missing terminators in the network. Plug another device into the selected connector and make sure it appears in the list of devices on the plotter. Note: please see VIII and VII.1 also.</p>
Ignition is on, but no engine data received and the first LED blink is RED	<p><b>1. Improper engine connection.</b> Make sure the Device is correctly connected to the engine and correct adapter cable is used, e.g. BRP engine needs an extra adaptor cable or Device's Y-harness rewiring.</p> <p><b>2. Issues on the engine side.</b> Check all engine side wiring integrity, measure power voltage and CAN bus termination resistance, See FAQ <a href="https://www.yachtd.com/faq/#j1939engcheck">https://www.yachtd.com/faq/#j1939engcheck</a>.</p> <p>Tip: if no power comes from the engine, check the power wire and its fuse.</p> <p><b>3. Invalid engine side CAN bus baud rate.</b> Volvo Penta EVC and J1939 networks use 250 kbps speed (default Device setting), but BRP and Hyundai CAN networks use 500 kbps. See V.2. Do not forget to reboot the Device to apply new CAN baud rate!</p>

Situation	Possible cause and correction
<p>The Device can't be reconfigured.</p> <p>When microSD card is inserted, Device responds with 3 RED flashes, YDEGSAVE.TXT file is not created on a card.</p>	<p><b>1. Card is not formatted correctly.</b> Reformat the card in FAT32 (see II).</p> <p><b>2. Card has a filesystem error.</b> Check the card for errors using system utilities, or reformat the card.</p> <p><b>3. YDEG.TXT file is missing or wrong file name.</b> Make sure that YDEG.TXT file is placed into the card root folder, and the file name is YDEG.TXT, not YDEG.TXT.txt or YDEG(03).TXT. Some OS can hide file extensions for known file types. In this case, use the alternative file explorer, or disable «hide file extension» option in your system.</p>

## Appendix B. Bits for Engine and Transmission Status

Table 1. Bits for NMEA 2000 Engine Discrete Status (DD206,DD223)

Bit number	Mask (hex)	Meaning
1	000001	Check Engine
2	000002	Over Temperature
3	000004	Low Oil Pressure
4	000008	Low Oil Level
5	000010	Low Fuel Pressure
6	000020	Low System Voltage
7	000040	Low Coolant Level
8	000080	Water Flow
9	000100	Water in Fuel
10	000200	Charge Indicator
11	000400	Preheat Indicator
12	000800	High Boost Pressure
13	001000	Rev Limit Exceeded
14	002000	EGR System
15	004000	Throttle Position Sensor
16	008000	Engine Emergency Stop Mode
17	010000	Warning Level 1
18	020000	Warning Level 2
19	040000	Power Reduction
20	080000	Maintenance Needed
21	100000	Engine Comm Error
22	200000	Sub or Secondary Throttle
23	400000	Neutral Start Protect
24	800000	Engine Shutting Down

*Table 2. Bits for NMEA 2000 Transmission Discrete Status (DD221)*

<b>Bit number</b>	<b>Mask (hex)</b>	<b>Meaning</b>
1	01	Check Transmission
2	02	Over Temperature
3	04	Low Oil Pressure
4	08	Low Oil Level
5	10	Sail Drive

## Appendix C. NMEA 2000 and J1939 Messages Supported by the Device

Table 1. Supported J1939 messages

<b>PGN</b>	<b>SPN</b>	<b>Description</b>
60160	—	Transport Protocol — Data Transfer
60416	—	Transport Protocol — Connection Management
61443	92	Electronic Engine Controller 2 / Engine Percent Load At Current Speed
61444	190	Electronic Engine Controller 1 / Engine Speed
61444	513	Electronic Engine Controller 1 / Actual Engine - Percent Torque
61445	523	Electronic Transmission Controller 2 / Current Gear
65021	2451	Generator Phase C AC RMS Current
65021	2481	Generator Phase C Line-to-Neutral AC RMS Voltage
65024	2450	Generator Phase B AC RMS Current
65024	2480	Generator Phase B Line-to-Neutral AC RMS Voltage
65027	2449	Generator Phase A AC RMS Current
65027	2479	Generator Phase A Line-to-Neutral AC RMS Voltage
65028	2456	Generator Total AC Reactive Power
65029	2452	Generator Total AC Power
65030	2436	Generator Average Basic AC Quantities / AC RMS Frequency
65030	2440	Generator Average Basic AC Quantities / Line-Line AC RMS Voltage
65030	2444	Generator Average Basic AC Quantities / Line-Neutral AC RMS Voltage
65226	—	Active Diagnostic Trouble Codes
65253	247	Engine Hours, Revolutions / Engine Total Hours of Operation

Table 1. continued

65257	182	Fuel Consumption (Liquid)/ Engine Trip Fuel
65262	110	Engine Temperature 1 / Engine Coolant Temperature
65262	175	Engine Temperature 1 / Engine Oil Temperature 1
65263	94	Engine Fluid Level/Pressure 1 / Engine Fuel Delivery Pressure
65263	100	Engine Fluid Level/Pressure 1 / Engine Oil Pressure
65262	109	Engine Fluid Level/Pressure 1 / Engine Coolant Pressure
65266	183	Fuel Economy (Liquid) / Engine Fuel Rate
65270	102	Inlet/Exhaust Conditions 1 / Engine Intake Manifold #1 Pressure
65270	173	Inlet / Exhaust Conditions 1 / Exhaust Gas Temperature
65271	158	Vehicle Electrical Power 1 / Keyswitch Battery Potential
65271	167	Vehicle Electrical Power 1 / Charging System Potential (Voltage)
65271	115	Vehicle Electrical Power 1 / Alternator Current
65271	168	Vehicle Electrical Power 1 / Battery Potential / Power Input 1
65271	114	Vehicle Electrical Power 1 / Net Battery Current
65272	127	Transmission Fluids / Transmission Oil Pressure
65272	177	Transmission Fluids / Transmission Oil Temperature
65276	38	Dash Display / Fuel Level 2
65276	96	Dash Display / Fuel Level 1
65279	97	Water in Fuel Indicator
65280	—	Cummins proprietary (Genset Status)
65373	—	Volvo Penta proprietary (engine tilt/trim)
65417	—	Volvo Penta proprietary (MDI warnings)

Table 2. Supported NMEA 2000 messages

<b>PGN</b>	<b>Tx</b>	<b>Rx</b>	<b>Description</b>
59392	Yes	Yes	ISO Acknowledgment
59904	—	Yes	ISO Request
60160	—	Yes	ISO Transport Protocol (DT)
60416	—	Yes	ISO Transport Protocol (CM)
60928	Yes	Yes	ISO Address Claim
65240	—	Yes	ISO Commanded Address
126208	Yes	Yes	NMEA Group Function
126464	Yes	—	PGNs Group List
126993	Yes	—	Heartbeat
126996	Yes	—	Product Information
126998	Yes	—	Configuration Information
127245	Yes	—	Rudder
127488	Yes	—	Engine Parameters, Rapid Update
127489	Yes	—	Engine Parameters, Dynamic
127493	Yes	—	Transmission Parameters, Dynamic
127497	Yes	—	Trip Fuel Consumption, Engine

Table 2. continued

127504	Yes	—	AC Output Status-DEPRECATED
127505	Yes	—	Fluid Level
127508	Yes	—	Battery Status
127514	Yes	—	AGS Status
127744	Yes	—	AC Power / Current Phase A
127745	Yes	—	AC Power / Current Phase B
127746	Yes	—	AC Power / Current Phase C
127747	Yes	—	AC Voltage / Frequency-Phase A
127748	Yes	—	AC Voltage / Frequency Phase B
127749	Yes	—	AC Voltage / Frequency Phase C
128259	Yes	—	Speed, Water Referenced (see V.23)
128267	Yes	—	Water Depth (see V.22)
130312	—	Yes	Temperature
130314	—	Yes	Actual Pressure
130316	Yes	Yes	Temperature, Extended Range

*Note: NMEA 2000 Device Instance, System Instance, Installation Description Field 1 and Installation Description Field 2 can be changed using PGN 126208 (a professional software and hardware may be required). Yacht Devices Engine Gateway YDEG-04 is certified by the National Marine Electronics Association.*

## Appendix D. Example of a Configuration File YDEG.TXT

Below is a file with default configuration values:

```
# Current configuration of the Yacht Devices Engine Gateway
# Serial number: 00046078, firmware: 1.51 06/12/2025

# Supported protocols: J1939,MEFI4B,SMARTCRAFT,BRP_ROTAX,EDC2,MDI,VOLCANO,
# SUZUKI,GENSET,MAN,HYUNDAI. Options: REQUESTS,HANDSHAKE,OPT1.
PROTOCOLS=J1939,MDI

# The default speed is 250 kbps (J1939, SmartCraft), but this may vary depending
# on the protocol and its version. Most BRP engines use 500 kbps.
ENGINE_CAN_SPEED=250

# Mapping of the engine network instances (CAN addresses for J1939, MDI, EDC2,
# Volcano and MEFI4B; engine numbers for SmartCraft and BRP) to NMEA instances.
ENGINE_0=0
ENGINE_1=1
ENGINE_2=OFF
ENGINE_3=OFF
ENGINE_4=OFF
ENGINE_5=OFF
ENGINE_6=OFF
ENGINE_7=OFF

# The number of seconds to add to the motor hours is useful when the EDC/ECU has
# been replaced, negative values are allowed
HOURS_OFFSET=0
```

```
# Convert an engine angle to a NMEA 2000 rudder angle (for SmartCraft only)
RUDDER=OFF

# Send fake fuel rate data depending on RPM. See the description and calibration
# settings at: https://www.yachtd.com/news/instant\_fuel\_consumption.html
FUEL_RATE_FAKE=OFF
# This setting is used in fake fuel rate calculations and in the Volcano protocol
FUEL_RATE_MUL=0.700

# Change the NMEA 2000 device class/function from 'Engine Gateway' to 'Genset
# Gateway', this is useful when GENSET protocol is used
GENSET_N2K_CLASS=OFF

# These trim settings are reset when SMARTCRAFT or MEFI4B protocols are
# switching. Use the CALIBRATE_TRIM setting (see the Manual) to calibrate the
# trim on the water.
TRIM_ZERO=25600
TRIM_STEP=128

# ON/OFF. Transmission of exhaust gas temperature from the engine network.
EXHAUST_TEMP=OFF

# For new Raymarine MFDs, the exhaust temperature messages must originate from
# the same CAN address as the rest of the data. If we are using data from the
# engine network, this is not a problem. However, sensors in the exhaust system
# are often installed by users themselves (e.g. our Exhaust Gas Sensor) and
# located in the NMEA network. This setting specifies the NMEA instance (not
# the CAN address!) of the temperature sensors for the first two engines (only
# two engines/gensets are supported):
EXHAUST_FORWARD=OFF,OFF
```

```
# OFF/1..252. Maps the intake manifold temperature to the NMEA 2000
# temperature types (types 1..14 are defined, other values are reserved).
INTAKE_MANIFOLD_TEMP=OFF

# What J1939 data (KEYSWITCH/CHARGING/POWER_INPUT/OFF) is sent to the NMEA 2000
# network as battery data. The value depends on the engine model.
NMEA_BATTERY=KEYSWITCH

# Mapping of engine battery data to NMEA 2000 batteries
BATTERY_0=0
BATTERY_1=1
BATTERY_2=OFF
BATTERY_3=OFF
BATTERY_4=OFF
BATTERY_5=OFF
BATTERY_6=OFF
BATTERY_7=OFF

# What J1939 data (KEYSWITCH/CHARGING/POWER_INPUT/OFF) is sent to the NMEA 2000
# network as alternator voltage
NMEA_ALTERNATOR=KEYSWITCH

# Send engine fuel level data as DIESEL or GASOLINE (which may not be supported
# by MFD), or OFF to completely block the sending of fuel level data
FUEL=DIESEL

# Map fuel tanks (two can be connected to each engine in J1939 and SmartCraft)
# to NMEA 2000 tanks (0..9). For J1939, the number on the right is the engine
# address. For SmartCraft, it is the engine number (0..3). For BRP Rotax, only
# the PORT tanks are supported.
FUEL_0=0,PORT
```

FUEL\_1=0, STARBOARD

FUEL\_2=OFF

FUEL\_3=OFF

FUEL\_4=OFF

FUEL\_5=OFF

FUEL\_6=OFF

FUEL\_7=OFF

FUEL\_8=OFF

FUEL\_9=OFF

# Tank capacity in litres

TANK\_CAPACITY\_0=DEFAULT

TANK\_CAPACITY\_1=DEFAULT

TANK\_CAPACITY\_2=DEFAULT

TANK\_CAPACITY\_3=DEFAULT

TANK\_CAPACITY\_4=DEFAULT

TANK\_CAPACITY\_5=DEFAULT

TANK\_CAPACITY\_6=DEFAULT

TANK\_CAPACITY\_7=DEFAULT

TANK\_CAPACITY\_8=DEFAULT

TANK\_CAPACITY\_9=DEFAULT

TANK\_CAPACITY\_9=DEFAULT

# p4, p8, ..., p95 | OFF. This setting defines 12 calibration points at 4%, 8%,  
# 12%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% and 95% (assuming that 0% and  
# 100% do not require calibration). For each point, specify the correct reading  
# value. For example, if your fuel gauge shows 50% when the tank is actually  
# only 19% full, you should set 19 as the value for the 50% calibration point  
# (the 7th value in the calibration string).

TANK\_CALIBRATION\_0=OFF

TANK\_CALIBRATION\_1=OFF

TANK\_CALIBRATION\_2=OFF  
TANK\_CALIBRATION\_3=OFF  
TANK\_CALIBRATION\_4=OFF  
TANK\_CALIBRATION\_5=OFF  
TANK\_CALIBRATION\_6=OFF  
TANK\_CALIBRATION\_7=OFF  
TANK\_CALIBRATION\_8=OFF  
TANK\_CALIBRATION\_9=OFF

# OFF/0..15. Mapping the Volvo Penta EVC water tank to an NMEA fresh water tank  
# on the 1st engine. For subsequent engines, the tank number will be incremented.  
FRESH\_WATER=OFF

# Mapping of Volvo Penta MDI auxiliary sensor warning to NMEA 2000 warnings.  
# For example, if an auxiliary sensor signals the presence of water in the fuel,  
# set the value to 000100.  
MDI\_AUX\_MASK=000000  
# Mapping of Volvo Penta MDI «System Fault» to NMEA 2000 warnings.  
MDI\_SYS\_FAULT\_MASK=000000

# These settings allow up to 10 custom J1939 and BRP Rotax alerts to be mapped  
# to NMEA 2000 engine warnings.

ALERT\_0=OFF  
ALERT\_1=OFF  
ALERT\_2=OFF  
ALERT\_3=OFF  
ALERT\_4=OFF  
ALERT\_5=OFF  
ALERT\_6=OFF  
ALERT\_7=OFF  
ALERT\_8=OFF

ALERT\_9=OFF

# Turn on 'Warning Level 1', 'Warning Level 2' or 'Power Reduction' if at least  
# one bit of the current engine status matches the specified mask.

ALERT\_WARN1\_MASK=000000

ALERT\_WARN2\_MASK=000000

ALERT\_POWER\_REDUCTION\_MASK=000000

# Only bits set in this hexadecimal mask can be set by the Gateway in the  
# engine status in NMEA 2000.

NMEA\_ALERT\_MASK=FFFFFF

# Map engine network transmission instances to NMEA 2000 instances

TRANSMISSION\_0=0

TRANSMISSION\_1=1

TRANSMISSION\_2=OFF

TRANSMISSION\_3=OFF

TRANSMISSION\_4=OFF

TRANSMISSION\_5=OFF

TRANSMISSION\_6=OFF

TRANSMISSION\_7=OFF

# These settings allow up to 10 custom J1939 and BRP Rotax alerts to be mapped  
# to NMEA 2000 transmission warnings.

TRANS\_ALERT\_0=OFF

TRANS\_ALERT\_1=OFF

TRANS\_ALERT\_2=OFF

TRANS\_ALERT\_3=OFF

TRANS\_ALERT\_4=OFF

TRANS\_ALERT\_5=OFF

TRANS\_ALERT\_6=OFF

TRANS\_ALERT\_7=OFF  
TRANS\_ALERT\_8=OFF  
TRANS\_ALERT\_9=OFF

# Only the bits set in this hexadecimal mask can be set by the Gateway in the  
# transmission status in NMEA 2000.

TRANMISSION\_ALERT\_MASK=1F

# Settings for the Volcano protocol, see the User Manual

WATER\_DEPTH\_OFFSET=OFF  
WATER\_SPEED\_CORRECTION=OFF  
WATER\_TEMP\_OFFSET=OFF

# Forward messages with specified PGNs from an engine network to a NMEA network.

PASS\_PGN\_TO\_NMEA=OFF

# OFF/YDEG/AS\_IS/0..252. These messages may be forwarded with no changes  
# (AS\_IS), from the Gateway's address, or from a specified CAN address.

PASS\_ADDR\_TO\_NMEA=AS\_IS

# Forward specified messages from an NMEA 2000 network to an engine network.

# Some boats have trip/fuel computers installed in the engine network that  
# require NMEA 2000 speed data.

PASS\_PGN\_TO\_ENGINE=OFF

# OFF/AS\_IS/0..253. These messages can be forwarded with no changes (AS\_IS) or  
# from the specified CAN address.

PASS\_ADDR\_TO\_ENGINE=210

# List of PGNs separated by commas. This can be used with engines and  
# generators which report engine hours (PGN 65253), software version (PGN  
# 65242), or serial numbers (PGN 65260) on request.

ISO\_REQUEST=OFF

```
# This group of settings allows replacing of engine data with data from NMEA
# 2000 sensors connected to NMEA 2000 network or engine network. Specified
# setting is for the ENGINE_0 or TRANSMISSION_0, data instance +1 will be used
# for ENGINE_1, etc.
SUBSTITUTE_BOOST=OFF
SUBSTITUTE_FUEL_PRESSURE=OFF
SUBSTITUTE_OIL_PRESSURE=OFF
SUBSTITUTE_OIL_TEMP=OFF
SUBSTITUTE_CLNT_PRESSURE=OFF
SUBSTITUTE_CLNT_TEMP=OFF
SUBSTITUTE_TRANS_PRESSURE=OFF
SUBSTITUTE_TRANS_TEMP=OFF

# End of file
```

## Appendix E. Device Connectors

V+, V- - Battery 12V; CAN H, CAN L - NMEA 2000 data;  
SCREEN - Not connected in the Device.

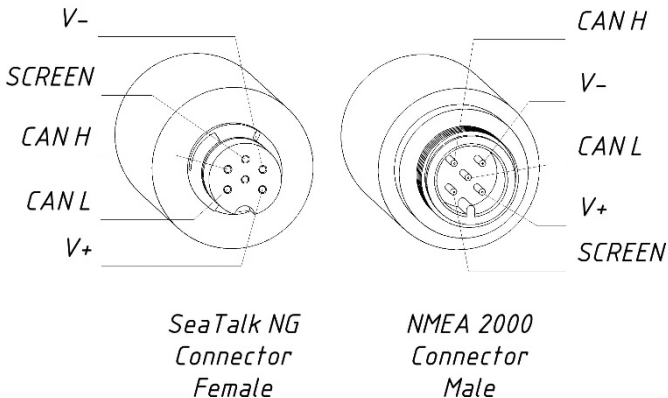
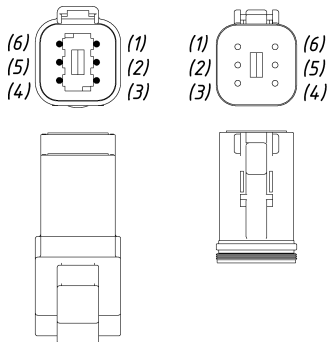


Figure 1. NMEA 2000 connectors of the YDEG-04R (left) and YDEG-04N (right) models

## 6-pin Deutsch connector



- (1) - CAN1 LOW, Green or Blue
- (2) - CAN2 LOW, Brown
- (3) - CAN1 HIGH, Yellow
- (4) - GND (negative supply, ground), Black
- (5) - CAN2 HIGH, White
- (6) - VCC (positive supply, 10..30V), Red

*Pins (2) and (5) are not connected to the Device.*

*Figure 2. Engine connectors, DT04-6P (male, left) and DT06-6S (female, right)*

In the jumper plug supplied with the Device, contacts (1) and (2) as well as contacts (3) and (5) are interconnected. In this way, CAN1 and CAN2 are united into a single network (applicable for Volvo Multilink bus only). Contacts (2) CAN2 LOW and (5) CAN2 HIGH are not connected to the Device.