Yacht Devices
User Manual

Tank Adapter

also covers models
YDTA-01R, YDTA-01N

Firmware version
1.04

2019

Yacht Devices Tank Adapter YDTA-01 is certified by the National Marine Electronics Association.

NMEA 2000® is a registered trademark of the National Marine Electronics Association. SeaTalk NG is a registered trademark of Raymarine UK Limited. Garmin® is a registered trademark of Garmin Ltd.

Contents

Package Contents

Device	1 pc.
This Manual	1 pc.
Blade "FASTON" receptacles	4 pcs.
Stickers for MicroSD slot sealing	6 pcs.
MicroSD card	not supplied
NMEA 2000 drop cable	not supplied

Note: Device can be connected to the network backbone directly, without an NMEA 2000 drop cable.

Introduction

The NMEA 2000 Tank Adapter YDTA-01 (hereinafter Adapter or Device) allows you to connect an existing resistive or voltage-output type fluid level sensors installed on a tank and display the fluid level on NMEA 2000 devices, including chart plotters and instrumental displays.

The Adapter can be configured to report one of the 15 fluid types defined in the NMEA 2000 standard, including Diesel Fuel, Gasoline Fuel, Oil, Fresh Water, Waste Water, Black Water (Sewage), or Live Well.

Since version 1.04, the Adapter can be switched to the «pressure sensor» mode, and report one of the 15 pressure data types (Atmospheric Pressure, Water Pressure, Oil Pressure, etc.) instead of fluid level. Please see VI.17 for details.

The Device can be used with European (10 to 180 Ohm range) American (240 to 33 Ohm range) or Japanese (0 to 310 Ohm range) standard fluid level sensors as well as with any nonstandard sensors with maximum resistance less than 400 Ohm. Device can also be used with fluid level sensors which output analog voltage signal in the range from 0 to 16 Volts.

The Adapter can be installed as a standalone measuring device, in parallel with an existing analog gauge (2-coils and 1-coils gauges are supported), or in parallel with a Volvo Penta engine's MDI (Mechanical Diesel Interface) box.

Fluid tank level sensor readings can be calibrated with 12 calibration points to get accurate readings on tanks of any shape. Parasitic resistance of the sensor wires can be compensated in the Device's settings.

The Device is equipped with a Micro SD card slot intended for configuration, firmware updates, diagnostics and data logging. No special software is required to update or configure the Adapter. You only need a device (laptop or smartphone) with a MicroSD card reader and a simple text editor.

The Device is powered from the NMEA 2000 network and provides high voltage galvanic isolation between NMEA 2000 and sensor inputs.

We thank you for purchasing our Devices and wish you happy voyages!

Warranty and Technical Support

1. The Device warranty is valid for two years from the date of purchase. If a Device was purchased in a retail store, the sale receipt may be requested when applying for a warranty claim.

2. The Device warranty is terminated in case of violation of the instructions in this Manual, case integrity breach, or repair or modification of the Device without the 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 of the defective Device to the manufacturer.

5. Responsibility of the manufacturer in case of any damage as a consequence of the Device's 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. In the event of a failure, please refer to Appendix A before contacting technical support.

9. The manufacturer accepts applications under warranty and provides technical support only via e-mail or from authorized dealers.

10. The contact details of the manufacturer and a list of the authorized dealers are published on our website: http://www.yachtd.com/
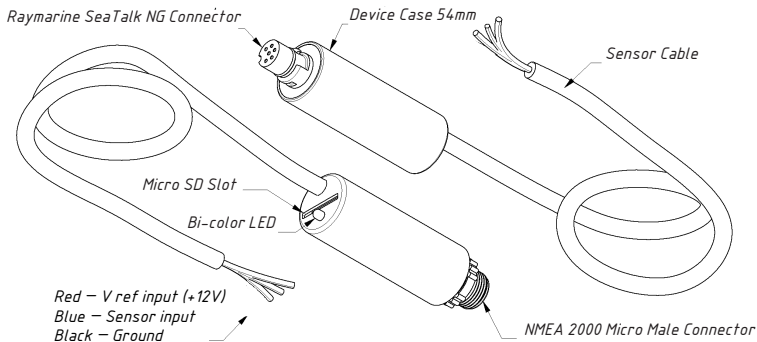
I. Product Specification

Figure 1. Drawing of YDTA-01R and YDTA-01N models of the Adapter

Our Devices are supplied with different types of NMEA 2000 connectors. Models containing R in the suffix of model name are equipped with NMEA 2000 connectors and are compatible with Raymarine SeaTalk NG. Models containing N in the suffix are equipped with NMEA 2000 Micro Male connectors.

Device parameter	Value	Unit
Supply voltage (from NMEA 2000 network)	7..16	V
Average current consumption (from NMEA 2000 network)	45	mA
Load Equivalency Number	2	LEN
Galvanic isolation between NMEA 2000 and sensor input	2500	V_{RMS}
Maximum voltage on sensor and gauge reference voltage inputs	16	V
Voltage output sensor supported range	0..16	V
Fluid level sensor resistance range	0..400	Ohm
Analog gauge coils resistance range	0..10 000	Ohm
Sensor resistance/voltage measurement accuracy	±1	%
Sensor cable length	800	mm
Device case length	54	mm
Weight (without MicroSD card)	50	g
Operating temperature range	-20..55	°C

II. MicroSD Slot and Card Compatibility

The Device has a slot for a MicroSD card that allows you to configure the Device (refer to Section VI), update the firmware (refer to Section IX) and log the tank level usage in a file (refer to Section VIII).

If the MicroSD card is not permanently installed for logging, we recommend sealing the card slot with a sticker that is supplied with the Device or with a piece of tape to prevent water from entering the Device through the slot.

> ⚠️ *The Device slot has a "push-push" mechanism that works on a spring and ensures proper card fixation. Improper loading or unloading (withdrawing your finger to 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.*

The Device supports MicroSD memory cards of all sizes and classes. The MicroSD card must be formatted on a personal computer before it can be used 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 toward the LED and with the pin side toward the sensor cable.
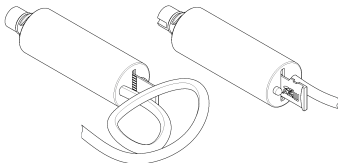

Figure 1. Device with MicroSD card (pin side visible at left, label side at right)

III. Installation and Connection of Device

⚠️ *All connections should be made when the power is cut off at the circuit breaker. This will protect against accidental short circuits during installation.*

Connect the Device to the tank level sensor before making the connection to the NMEA 2000 network. This will protect against accidental sparks which can be hazardous when working with the fuel tanks.

The Device requires no maintenance. When deciding where to install the Device, choose a dry mounting location. Avoid places where the Device can be flooded with water, this can damage it.

1. Tank level sensor connection

The device has three wires for connection to a tank level sensor.

Table 1. Device wire colors and functions

Wire color	Signal
Red	Vref, analog gauge reference voltage
Blue	Sensor +
Black	Sensor – (ground)

The wires should be connected by crimping in sleeves or by twisting rather than soldering. Soldered connections can quickly break down in the marine environment and require insulation from moist air with paint or lacquer.
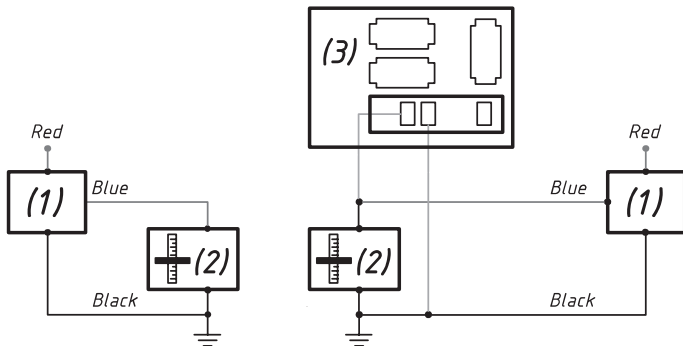
1.1 Standalone sensor connection

If you do not have a gauge connected to your tank level sensor (e. g. you have installed the sensor yourself), you should connect only two wires of the Adapter: the blue wire to the sensor «Signal» or «+» output

and Black wire to sensor «Ground» or «−». The red wire should be left unconnected and its terminal should be insulated. The CONNECTION setting should be set to RESISTIVE (refer to Section VI); this is the factory setting.

1.2 Sensor for Volvo engines with MDI unit

If the fuel tank level sensor is connected to the Volvo engine MDI (Mechanical Diesel Interface) unit, you can connect the Adapter in parallel with the MDI unit «Fuel level» input: the blue wire should be connected to MDI pin 11 (or the sensor's Green wire) and Black wire to the MDI pin 12 (or sensor Green/Black wire). Red wire should be left not connected and its terminal should be insulated. You should also configure the Adapter and set CONNECTION setting to MDI (refer to Section VI).

(1) — YDTA, (2) — Fuel Sensor, (3) — Volvo Penta MDI

Figure 1. Standalone sensor connection (left) and connection in parallel with Volvo MDI unit (right)
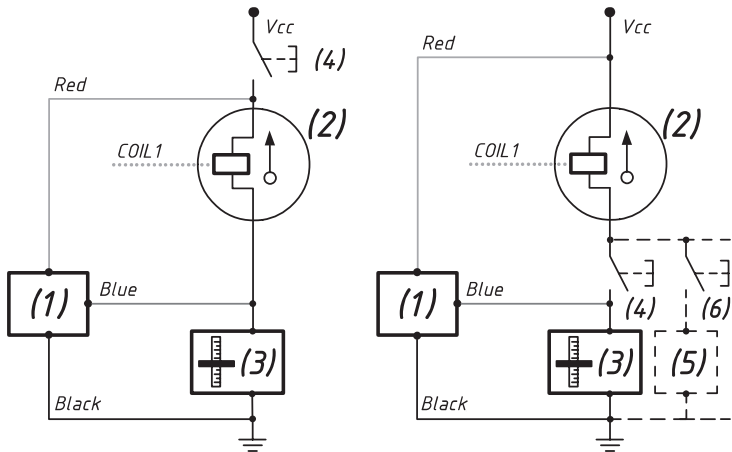
1.3 Connection in parallel with an existing analog gauge

An analog gauge connected to your tank level sensor can be of two types: with one measuring coil (the gauge has only two terminals) or with two measuring coils (the gauge has three terminals).

You may have a «combined» gauge equipped with several buttons (see Figure 2), one of which activates measurement of the tank level. The Adapter detects whether the button pressed or not, and this does not affect the measurement results.

1.3.1 Connection to a 1-coil gauge

If the gauge has one coil, the Red wire should be connected to the gauge's power terminal (up to 16 Volts), the Blue wire to the gauge «Signal» input, and the Black wire to the fuel sensor's ground terminal. If you have the «combined» gauge, connect the Blue wire to the fluid level sensor output (or «+») before the button. You should also configure the Adapter and set the CONNECTION setting to 1COIL (refer to Section VI.4).

(1) — YDTA, (2) — Gauge, (3) — Fuel Sensor, (4) — Optional Button,
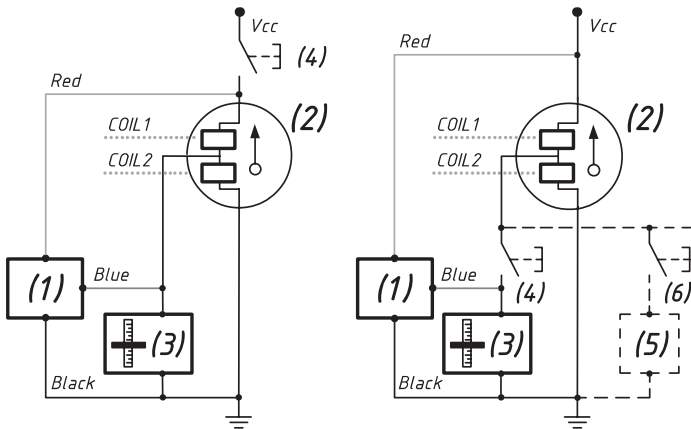*(5) and (6) — Parallel Sensors (optional)*

Figure 2. Connection in parallel with an existing 1-coil analog gauge

1.3.2 Connection to a 2-coil gauge

If the gauge has two coils, the Red wire should be connected to the gauge's power terminal (up to 16 Volts), the Blue wire to the gauge's «Signal» input (or to the fluid level sensor's «Signal» wire after

the measurement activation button, see Figure 3), and the Black wire to the gauge's «Ground» terminal.

You should also configure the Adapter and set the CONNECTION setting to 2COIL for connection scheme shown on the right part of Figure 3 (or if your gauge has no buttons) or to 2COIL_VCC for connection scheme shown on the left part of Figure 3 (see Section VI.4).

*(1) — YDTA, (2) — Gauge, (3) — Fuel Sensor, (4) — Optional Button,
(5) and (6) — Parallel Sensors (optional)*

Figure 3. Connection in parallel with an existing 2-coil analog gauge

When using an Adapter with an existing gauge you will need to measure its coil resistance values with an ohmmeter or multimeter and set the measured values to the configuration parameters OHMS_COIL_1 and OHMS_COIL_2 (refer to Sections VI.10 and VI.11).

To make an accurate measurement, you will need to warm up your gauge: turn it on and let it operate for approx. 15 minutes. When you are ready, promptly disconnect the gauge and measure the COIL 1 resistance — between the gauge reference voltage source (+12V) input and sensor «signal» input. For a two coil gauge, you should also measure the COIL 2 resistance — between the gauge «signal» input and gauge «ground» input. To increase accuracy, make several measurements and take the average value.

1.4 Connection to a voltage-output sensor

Check your voltage-output sensor specifications, it should support output of an analog voltage signal in the range from 0..16 Volts. Configure the sensor to activate this output mode if necessary.

Connect the blue wire to the «Voltage» output of the sensor and the black wire to «Ground» or «−» of the sensor.If you have a sensor with an additional reference voltage output, connect the red wire to it, this will increase the measurement accuracy. Otherwise, the red wire should be left unconnected and its terminal should be insulated. You should also configure the Adapter and set the CONNECTION setting to VOLTAGE and configure voltage settings (refer to Section VI).

1.5 Parasitic sensor wire resistance compensation

If you connect the Device directly to a fluid level sensor, but the wire which connects the fluid level sensor to a «Signal» input of an analog gauge is too long, it may add up an additional fixed value to the gauge coil resistance, which can cause a persistent measurement error.

If the total sensor wire length is greater than 5 meters, it is recommended to measure the resistance with an ohmmeter or multimeter and set the measured value in the configuration parameter OHMS_WIRES (refer to Section VI.12).

2. Connection to NMEA 2000

The Device is directly connected to the network backbone without a drop cable. Before connecting the Device, turn off the bus power supply. Refer to the manufacturer's documentation if you have any questions regarding the use of connectors:

- 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 NMEA 2000 connector lock to ensure its water resistance and reliability.

The Device is powered from the NMEA 2000 network and has an LED which flashes red or green. After the NMEA 2000 network power is turned on, the Device LED should produce one long and three short green flashes. If this does not happen, refer to Appendix A.

You can also check the NMEA 2000 connection and firmware version from a chart plotter. Please refer to Section IX for details.

IV. LED Signals

The Device is equipped with a two-color red/green LED that indicates the Device's state.

1. Signals during on sequence

The Device produces one long (half second) GREEN flash after powering on indicating that the Device is successfully initialized.

After initialization the Device produces three short (quarter of second) LED flashes indicating that is has successfully connected to the NMEA 2000 network.

2. Signals during normal operation

When logging of data on the MicroSD card is disabled (factory settings, see the Section VIII), the Device produces a short (quarter of second) GREEN flash every time the «Fluid Level» PGN is sent to the NMEA 2000 network. Default interval is 2.5 seconds.

Short RED flash indicates an issue with the fluid level sensor (fluid level sensor has an internal fault, its wires are damaged, it is connected incorrectly or the Device sensor connection and resistance settings are incorrect).

If logging on the MicroSD card is enabled and a MicroSD card is inserted, the Device will produce a series of two short LED flashes instead of one. The meaning of the first flash is the same as described above. The second LED flash indicates the MicroSD card log status: GREEN indicates that the last log file write operation was successful, RED indicates a log file writing error (there is no free space left on the MicroSD card, the file with the last available filename is full or there is an error in the file system).

3. Signals during the configuration using MicroSD card

After the MicroSD card is inserted, the Device produce three flashes:

- **GREEN, GREEN, GREEN:** the YDTA.TXT file has been read and changes have been applied to the current Device settings. The YDTASAVE.TXT file with an updated configuration has been saved on the card.

- **GREEN, RED, RED:** the YDTA.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 YDTASAVE.TXT file with the current configuration has been saved on the card.

- **RED, RED, RED**: the YDTA.TXT was not found on the MicroSD card or the file system is not supported.

You can safely remove the MicroSD card when the flash sequence is finished.

4. Signals during firmware update

LED signals during firmware updates are described in Section IX.

V. Device Configuration and Settings

⚠️ *Configuration of the Device should not be performed at sea.*

The Device can be configured by two different methods:

1. With the configuration file on a MicroSD card.
2. With a special set of commands which can be entered into the installation description field of the Device using PC software like CAN Log Viewer developed by our company, ActiSense NMEA Reader or Maretron N2KAnayzer. This method is very simple and may be supported in some chart plotter models.

Table 1. Applicability of the configuration methods

Number	Setting or action	Method	
		[1]	[2]
(1)	Reset device settings to a factory defaults	Yes	Yes
(2)	NMEA 2000 device instance	No	Yes
(3)	NMEA 2000 system instance	No	Yes
(4)	NMEA 2000 data instance (tank number or pressure instance)	Yes	Yes
(5)	NMEA 2000 fluid type (or pressure type, see VI.17)	Yes	Yes
(6)	Transmission interval for PGN 127505 and 130314	No	Yes
(7)	Resistive sensor type (European, USA, Japanese)	Note 1	Yes
(8)	Sensor resistance/voltage on full tank	Yes	Yes
(9)	Sensor resistance/voltage on empty tank	Yes	Yes
(10)	Sensor connection method	Yes	Yes
(11)	Sensor gauge coils resistance values	Yes	Yes
(12)	Sensor wires parasitic resistance value	Yes	Yes
(13)	Tank capacity	Yes	Yes
(14)	Tank shape calibration points	Yes	No
(15)	Logging to MicroSD card and log interval	Yes	No

Note 1: Sensor type can be programmed in this method by setting the sensor resistance to full (8) and empty (9) tank.

NMEA 2000 device (2) and system (4) instances should not be modified by the user, these fields are used by installers in complex NMEA 2000 networks.

VI. Device Configuration with a MicroSD Card

To configure the Device, a configuration text file YDTA.TXT should be created in the root folder of the MicroSD card. A sample of the configuration file is in Appendix D. The file contents must conform to these rules:

- 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.

Insert the card with the configuration file into the Device and in a few seconds you will see three LED signals (refer to Section IV.3) indicating that the configuration file has been processed. The YDTASAVE.TXT file with the current configuration of the Device will be created in the root folder of the memory card.

After the three LED signals, you can remove the card and check the new YDTASAVE.TXT file to be sure that the configuration file has been properly interpreted. You can also load an empty YDTA.TXT file (with zero length) into the Device to get the YDTASAVE.TXT file with the full configuration of the Device and then use it as a template to configure the Device.

A vertical line in the list of parameters below means that the setting may have one of these values.

1. CFGRESET

Resets device settings to the default values. If this setting is present in the configuration file, all other settings will be ignored.

2. TANK=x

x — integer from 0 to 15, NMEA 2000 data Instance (tank number)
Factory setting: 0

Tank number should be configured when multiple Devices are installed. For example, if there are three fresh water tanks and one black water tank installed on the vessel, you may configure the black water tank Adapter

with fluid type «SEWAGE» (see the next setting) and tank number 0, fresh water tank Adapters with fluid type «WATER» and tank numbers 0, 1, 2.

3. FLUID=DIESEL|WATER|WASTE|LIVEWELL|OIL|SEWAGE|GASOLINE|x

x – integer from 0 to 15, data type
Factory setting: DIESEL

Fluid type, values 0..6 has definition in NMEA 2000, types 7..15 are reserved: 0 - Diesel Fuel, 1 - Fresh Water, 2 - Waste Water, 3 - Live Well, 4 - Oil, 5 - Black Water (Sewage), 6 - Fuel (Gasoline). Note that the GASOLINE type is not supported by some chart plotters.

For the pressure sensor mode, see VI.17.

4. CONNECTION=RESISTIVE|1COIL|2COIL|2COIL_VCC|MDI|VOLTAGE

Factory setting: RESISTIVE

Tank level sensor connection method. RESISTIVE — standalone connection, 1COIL — in parallel with 1-coil gauge, 2COIL and 2COIL_VCC — in parallel with 2-coil gauge, MDI — in parallel with Volvo Penta MDI box, VOLTAGE — connection to a voltage-output sensor. Refer to Section III.1.

> Note: starting from firmware version 1.03, the CONNECTION setting replaces the old PARALLEL setting and the RESISTIVE value replaces the old NO value.

5. OHMS_EMPTY=x

x — number from 0.00 to 400.00
Factory setting: 240.0

Sensor resistance in Ohms when tank is empty. Values for the standard sensors: European 10, USA: 240, Japan: 0.

6. OHMS_FULL=x

x — number from 0.00 to 400.00
Factory setting: 33.0

Sensor resistance in Ohms when tank is full. Values for the standard sensors: European 180, USA: 33, Japan: 310.

   7. VOLTS_EMPTY=x

x — number from 0.00 to 16.00
Factory setting: 0.0

Voltage-output type sensor output voltage when tank is empty.

   8. VOLTS_FULL=5.0

x — number from 0.00 to 16.00
Factory setting: 5.0

Voltage-output type sensor output voltage when tank is full.

   9. REFERENCE=5.0

x — number from 0.00 to 16.00
Factory setting: 5.0

Voltage-output type sensor reference output voltage. If the red wire of the Device in not connected to a reference voltage source, this setting is ignored.

Otherwise, the fluid level is calculated by the formula:

```
Level (%) = («Sensor+» voltage - VOLTS_EMPTY) / (VOLTS_FULL - VOLTS_EMPTY) *
(REFERENCE / «Vref» voltage) * 100%
```

Calibration settings are applied to this calculated level value. Refer to Section VI.14.

10. *OHMS_COIL_1=x*

x — number from 0.00 to 10000.00
Factory setting: 200.0

Coil 1 resistance in Ohms for 2COIL connection or single coil resistance in Ohms for 1COIL connection. Refer to Section III.1.3.

11. *OHMS_COIL_2=x*

x — number from 0.00 to 10000.00
Factory setting: 200.0

Coil 2 resistance in Ohms for 2COIL connection. Refer to Section III.1.3.

12. *OHMS_WIRES=x*

x — number from 0.00 to 100.00
Factory setting: 0.0

Sensor wire's parasitic resistance in Ohms. Used for compensation of the sensor wire resistance. Refer to Section III.1.5.

13. *CAPACITY=x|UNKNOWN*

x — integer from 0 to 99 999
Factory setting: UNKNOWN

Tank capacity (volume) in liters. Setting of 0 is the same as UNKNOWN and will disable tank capacity transmission to the NMEA 2000 network.

14. *CALIBRATION=p4,p8,…,p95|OFF*

p4,p8,…,p95 — 12 calibration points (decimal values, 0..100)
Factory setting: OFF

Resistive fuel level sensors do not take the shape of the fuel tank into account, therefore, the readings usually have substantial error. The same issue is applicable to the voltage-output sensors which do not have an internal calibration mechanism or do have a non-linear output. This setting defines 12 calibration points for 4, 8, 12, 20, 30, 40, 50, 60, 70, 80, 90 and 95% readings (assuming that 0% and 100% readings do not require calibration). For each point you should specify the correct display 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. You only need to specify your gauge's readings and the measured remaining fuel volume to get the calculated calibration string.

15. *LOG=OFF|ON*

Factory setting: OFF

Disables/enables logging of tank level data to a file on the MicroSD card. Refer to chapter VIII.

16. *INTERVAL=x*

x — integer from 1 to 60, log interval in minutes
Factory setting: 10

Set the log interval. Refer to chapter VIII.

17. PRESSURE_SENSOR_PA=OFF|x

x – integer from -30000 to 30000 excluding 0, conversion of 1% to Pascal
Factory setting: OFF

This setting converts the Tank Adapter to a pressure sensor. With the value of 1000, it will convert 10% of the fluid level to 10000 Pascal or 10 kPa, and send the data in PGN 130314 «Actual Pressure». Fluid data will not be transmitted anymore, and the NMEA 2000 device class and function will be switched to 75 / 140 (pressure measurement device).

The tank number (VI.2) will be used as data instance, and fluid type value (VI.3) will be used as corresponding pressure type: 0 - Atmospheric Pressure, 1 - Water Pressure, 2 - Steam Pressure, 3 - Compressed Air Pressure, 4 - Hydraulic Pressure, 5 - Filter Pressure, 6 - Altimeter Setting, 7 - Oil Pressure, 8 - Fuel Pressure, 9..15 are reserved and have no definition in NMEA 2000.

Pressure sensors can be used with the engine gateways of Yacht Devices to substitute actual engine data or add data types not supported by the engine. To configure the Tank Adapter as a pressure sensor, we recommend initially configuring and calibrating it in usual way, and switching to the pressure sensor mode in the last step.

VII. Device Configuration with an Installation Description String

Installation description strings are stored in the Device's memory and are usually written by installers to specify the device location or to leave notes or contact information. They can be set with a PC software and a hardware gateway to the NMEA 2000 network. Some models of chart plotters also allow editing of installation description strings. Please refer to your software or chart plotter documentation for details.

Figure 1. Programming with CAN Log Viewer

To program the Device, enter a special string starting with «YD:» to the installation description field 2 in the Device properties. For example, «YD:DEV 1» (without quotes) will change the NMEA 2000 device instance of the Device to 1. If the command is accepted by the Device, it will add «DONE» to the entered text and «YD:DEV 1 DONE» will be displayed in this installation description field. Note that the Device always accepts correct strings regardless of the current settings.

In Figure 1 on the previous page, you can see the process of programming the Device with free CAN Log Viewer software (to open this window, select the item «NMEA 2000 Devices» in the «View» menu, refresh the list of devices, select the device and click «Properties» button). You can download this program (runs on Microsoft Windows, Mac OS X and Linux) at http://www.yachtd.com/downloads/. Yacht Devices NMEA 2000 Wi-Fi Gateway or Yacht Devices NMEA 2000 USB Gateway is required to connect the PC to the NMEA 2000 network.

CAN Log Viewer also allows you to modify the NMEA 2000 device instance by entering a value in the dedicated field (see «Address Claim» group on the screenshot).

After entering the command as shown in Figure 1 (click the «Update» button to apply changes), the value in the «Device Instance» field will be changed to 1, and «Installation Details 2» field will be changed to «YD:DEV 1 DONE».

In the Table 1, parameters in square brackets [] can be omitted to obtain the current setting's value.

Table 1. Installation description strings

Command string format	Example	Description
YD:RESET	YD:RESET	Reset device settings to the default values.
YD:DEV <number>	YD:DEV 1	Set NMEA 2000 device instance value (0 - 255).
YD:SYS <number>	YD:SYS 3	Set NMEA 2000 system instance value (0 - 15).

Table 1 continued

YD:TYPE [number]	YD:TYPE 4	Fluid type, one of the 7 types defined in NMEA 2000: 0 = DIESEL, 1 = WATER, 2 = WASTE, 3 = LIVEWELL, 4 = OIL, 5 = SEWAGE, 6 = GASOLINE.
YD:TANK <number>	YD:TANK 15	Set NMEA 2000 fluid instance value (0 - 15).
YD:PGN <pgn> [interval]	YD:PGN 127505 60000 YD:PGN 127505 50 YD:PGN 130314 1000	Set transmitting interval for PGN 127505 (Fluid Level) or 130314 (Actual Pressure) in milliseconds. Values from 50 to 60 000 (1 minute) are allowed.
YD:SENSOR [type]	YD:SENSOR EUR YD:SENSOR USA YD:SENSOR JAP	Set the default standard sensor resistance values for empty and full tank. EUR: 10 - 180, USA: 240 - 33, JAP: 0 - 310 Ohms.
YD:OHMS_EMPTY <number>	YD:OHMS_EMPTY 11.42	Set the sensor resistance value for an empty tank in Ohms. Range: from 0.00 to 400.00.
YD:OHMS_FULL <number>	YD:OHMS_FULL 160.6	The same as above, but for a full tank.
YD:CAPACITY [number]	YD:CAPACITY 378	Set the tank capacity in liters. Range: from 0 to 99 999. Setting of 0 sets «Tank Capacity» data field of PGN 127505 to «Not Available».
YD:REFERENCE <number>	YD:REFERENCE 5.0	Voltage-output fluid level sensor reference voltage. Range: from 0 to 16. See Section 1.4.
YD:VOLTS_EMPTY <number>	YD:VOLTS_EMPTY 0.0	Voltage-output fluid level sensor voltage for an empty tank. Range: from 0 to 16. See Section 1.4.

Table 1 continued

YD:VOLTS_FULL <number>	YD:VOLTS_FULL 5.0	Voltage-output fluid level sensor voltage for a full tank. Range: from 0 to 16. See Section 1.4.
YD:CONNECTION <type>	YD:CONNECTION RESISTIVE YD:CONNECTION MDI YD:CONNECTION 1COIL YD:CONNECTION 2COIL YD:CONNECTION 2COIL_VCC YD:CONNECTION VOLTAGE	Tank level sensor connection method. RESISTIVE: standalone connection, 1COIL: in parallel with 1-coil gauge, 2COIL and 2COIL_VCC (see Section III): in parallel with 2-coil gauge, MDI: in parallel with Volvo MDI box, VOLTAGE: for fluid level sensor with voltage output.
YD:COIL_1 <number>	YD:COIL_1 330.65	Coil 1 resistance in Ohms for 2COIL connection or single coil resistance in Ohms for 1COIL connection. Range: from 0.00 to 10000.00.
YD:COIL_2 <number>	YD:COIL_2 240.5	Coil 2 resistance in Ohms for 2COIL connection. Range: from 0.00 to 10000.00.
YD:WIRES [number]	YD:WIRES 0.48	Sensor wires parasitic resistance in Ohms Range: from 0.00 to 100.00.
YD:PRESSURE [number]	YD:PRESSURE 10000	Converts the Tank Adapter to pressure sensor (see VI.17). Range: -30000 to 30000, 0 – OFF.

VIII. Recording a Log File

The Device allows recording measured sensor data values to the MicroSD card at regular intervals. This log files can be used as an archive of voyage fluid levels historical data.

Create a file called YDTA.TXT with the following lines included:

```
LOG=ON
INTERVAL=5
```

where 5 is a time interval between the log records in minutes.

Insert the MicroSD card into the Device. The Device will produce three green LED flashes (refer to Section IV.3) indicating that the configuration file has been processed.

The YDTAxxxx.TXT file (where xxxx – is a file number from 0001 to 9999) will be created in the root folder of the MicroSD card. The Device will append a new data records to the file according to the configured interval until the maximum file size is reached, in this case the next file will be created. After powering on, the Device will seek for a file with the greatest file number and will continue to append data to it. When the file with the last available file name (YDTA9999.TXT) is completely filled up with data, the logging stops.

The log file size is four clusters; with a 32 KB cluster size (can be specified during the card formatting) it will contain 2674 records (over nine days with 5 minutes logging interval).

Note that the logging configuration settings are saved in the non-volatile memory of the Adapter and will be active even after the card is removed or when the NMEA 2000 network is powered off. Logging will restart automatically when a MicroSD card is inserted allowing you to change a card on-the-fly.

Log files are ASCII-encoded text files with fixed line length. Each record contains 7 data fields with fixed length divided by an ASCII «Space» character. Record example:

```
10.05.2016 05:43:23 OK #01 Level  37.7%, 754.1 L
```

where

1. 10.05.2016 — local date in DD.MM.YYYY format.

2. 05:43:23 — local time in hh:mm:ss format.

3. OK — status code. Can be one of the following:

    OK — no error

    NA — Device could not get NMEA 2000 address. This can happen if there are more than 252 NMEA devices in the NMEA 2000 network.

    IS — Invalid state. The Device is connected improperly. This status indicates that the gauge reference voltage is applied to the corresponding Device input, but the «CONNECTION» setting is set wrong. Refer to Section VI.4.

    ID — Invalid data. Fluid level sensor resistance measurement is greater than 400 Ohm. Usually indicates sensor or wiring fault or incompatible sensor type.

4. #01 — Tank number (NMEA 2000 Fluid Level Instance). Refer to Section VI.2.

5. Level 37.7%, — Measured tank level in percent (with calibration applied). Note the leading space(s) and separator coma.

6. 754.1 L — Measured tank level in liters.

    If the tank volume is not configured («CAPACITY» setting is set to «UNKNOWN») the value will be set to «----- L»

    If the measured level is > 1000, the fractional part will be ignored, e. g. «1023 L».

In the pressure sensor mode (see VI.17), the last parameter in the log file is replaced by the pressure value in Pascals.

IX. Firmware Updates

Download an actual version of the firmware file from our site: http://www.yachtd.com/downloads/

Extract the TUPDATE.BIN file which contains the firmware update of the Adapter from the archive.

Prepare a MicroSD card with FAT or FAT32 file system, and copy TUPDATE.BIN file to the root folder. Insert the card into the Device and turn on the NMEA 2000 network power.

From 5–10 seconds after powering on, the LED will produce 5 green LED flashes. This indicates that the firmware update is successfully completed.

If the Device is already using the given version of the firmware or if the Device cannot open the file or the file is corrupted, the bootloader immediately transfers control to the main program. This is done without visual cues.

The Device information including the firmware version is displayed in the list of NMEA 2000 devices (SeaTalk NG, SimNet, Furuno CAN) or in the common list of external devices on the chart plotter (check the third line in Figure 1 on the next page). Usually, access to this list is in the «Diagnostics», «External Interfaces» or «External devices» menu entry of the chart plotter.
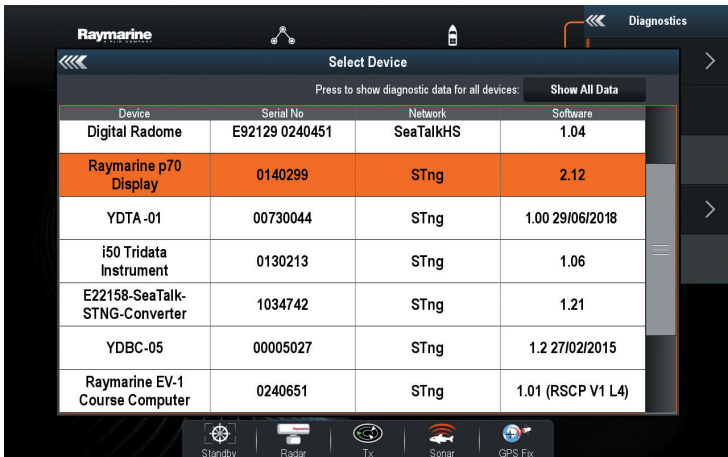
Figure 1. Raymarine c125 MFD devices list with Adapter (YDTA-01)

Appendix A. Troubleshooting

Situation	Possible cause and required actions
No LED indication after the NMEA 2000 network is powered on	**1. No power supply on the bus.** Check if the bus power is supplied (NMEA 2000 network requires a separate power connection and cannot be powered by a chart plotter or another device connected to the network).
	2. Loose connection in the power supply circuit. Treat the Device connector with a spray for cleaning electrical contacts. Plug the Device into another NMEA 2000 connector.
The Device produces long (1 second) red LED flashes continuously.	**1. Device cannot get NMEA 2000 device address.** There are more than 252 NMEA devices already in the NMEA 2000 network. Consider using our NMEA 2000 Bridge YDNB-07 to divide your network into separate segments.
The Device produces short green LED flashes corresponding to the configured PGN transmit interval, but is not displayed in the list of external devices on the chart plotter, data do not appear	**1. There is a NMEA 2000 network connection issue.** Loose connection in the data circuit. Treat the Device connector with a spray for cleaning electrical contacts. Plug the Device into another NMEA 2000 connector.
	2. Connectivity issue in the NMEA 2000 network. The network segment is not connected to the chart plotter 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 chart plotter.
The Device is displayed in the list of devices on the chart plotter, but fluid level data does not appear on the screen, Device first LED flash is RED	**1. Fluid level sensor connection issue.** Check if the fluid level sensor is connected according to the instructions given in Section III.1. Check the fluid level sensor and its wires for shorts and failed connectivity.
	2. Incorrect Device settings (wrong connection method, sensor resistance range or coil resistances are set in the device configuration). Reconfigure the Device (refer to Section VI).

Situation	Possible cause and required actions
The Device is displayed in the list of devices on the chart plotter, but fluid level data does not appear on the screen, Device first LED flash is GREEN	**1. Incompatible equipment.** Make sure that your hardware supports reception of the «Fluid Level» 127505 PGN. Update the firmware of your equipment if necessary.
	2. Fluid level meter or gauge is not enabled in the chart plotter settings. Check the «data pages customization» section of the chart plotter manual and enable the gauge.
	3. Chart plotter does not support selected fluid type (e.g. GASOLINE). Try to set another fluid type (e. g. DIESEL; refer to Section VI.3).
Device is configured to log fuel data to the MicroSD card, but second LED flash is RED	**1. MicroSD card issue.** Check if the card has a supported file system (refer to Section II). Check the card file system for errors. Replace the card if the issue persists.
	2. There is no space left on the card.
	3. The file with the last available filename YDTA9999.TXT is full. Backup and delete log files.
Incorrect fluid level readings	**1. Fluid level sensor connection issue.** Check if the fluid level sensor is connected according to the instructions given in Section III.1. Check the fluid level sensor and its wires for shorts and failed connectivity.
	2. Incorrect Device settings (wrong connection method, sensor resistance range or coil resistances are set in the device configuration). Reconfigure the Device (refer to Section VI).
	3. Sensor wires are too long. Compensation of the parasitic sensor wire resistance is recommended (refer to Section VI.12).
	4. Fluid level sensor needs calibration. Perform calibration as described in Section VI.14.

Appendix B. Device Connectors

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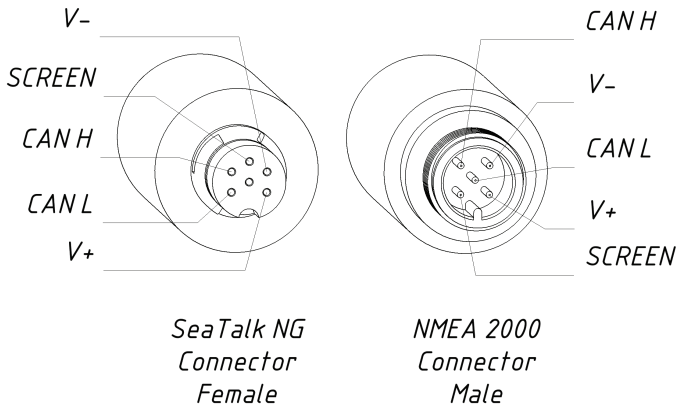SCREEN – Not connected in the Device.

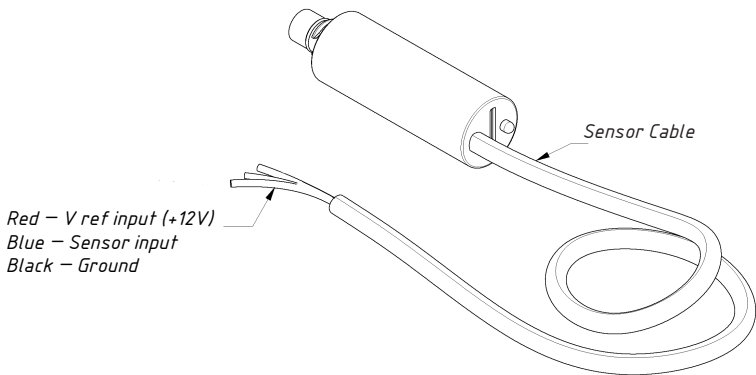*Figure 1. NMEA 2000 connectors of the YDTA-01R (left), and connectors of the YDTA-01N (right) models*

Red — V ref input (+12V)
Blue — Sensor input
Black — Ground

Figure 2. Device wire colors

Appendix C. NMEA 2000 Messages Supported by Device

Message	Receive	Transmit
ISO Acknowledgment, PGN 59392 (0xE800)	Yes	Yes
ISO Request, PGN 59904 (0xEA00)	Yes	No
ISO Transport Protocol (DT), PGN 60160 (0xEB00)	Yes	No
ISO Transport Protocol (CM), PGN 60416 (0xEC00)	Yes	No
ISO Address Claim, PGN 60928 (0xEE00)	Yes	Yes
ISO Commanded Address, PGN 65240 (0xFED8)	Yes	No
NMEA Group Function, PGN 126208 (0x1ED00)	Yes	Yes
PGN List Group Function, PGN 126464 (0x1EE00)	No	Yes
System Time, PGN 126992 (0x1F010)	Yes	No
Heartbeat, PGN 126993 (0x1F011)	No	Yes
Product Information, PGN 126996 (0x1F014)	No	Yes
Configuration Information, PGN 126998 (0x1F016)	No	Yes
Fluid Level, PGN 127505 (0x1F211)	No	Yes (1)
GNSS Position Data, PGN 129029 (0x1F805)	Yes	No
Local Time Offset, PGN 129033 (0x1F809)	Yes	No
Actual Pressure, PGN 130314 (0x1FD0A)	No	Yes (1)

Note 1 : Sent every 2.5 seconds by default, interval can be changed in the Adapter's settings (refer to Section VII).

Note 2: NMEA 2000 Device Instance, System Instance, Installation Description Field 1 and Installation Description Field 2 can be changed with PGN 126208 (professional NMEA 2000 installer software and hardware may be required).

Appendix D. Example of Configuration File

Contents listed below corresponds to the factory settings.

```
# Current configuration of Yacht Devices Tank Adapter
#Firmware version: 1.04 23/05/2019

# NMEA 2000 SETTINGS
TANK=0
FLUID=DIESEL

# CONNECTION AND SENSOR TYPE
CONNECTION=RESISTIVE

# RESISTIVE SENSOR SETTINGS (EUROPE: 10..180, USA: 240..33, JAPAN: 0..310)
OHMS_EMPTY=240.0
OHMS_FULL=33.0

# VOLTAGE SENSOR SETTINGS
VOLTS_EMPTY=0.0
VOLTS_FULL=5.0
REFERENCE=5.0

# ANALOG GAUGE SETTINGS
OHMS_COIL_1=200.0
OHMS_COIL_2=200.0
OHMS_WIRES=0.0

# TANK SIZE AND SHAPE
CAPACITY=UNKNOWN
```

```
CALIBRATION=OFF

# SENSOR DATA RECORDING
LOG=OFF
INTERVAL=10

# SWITCH THE ADAPTER TO PRESSURE SENSOR
PRESSURE_SENSOR_PA=OFF

# End of file
```