

Yacht Devices

User Manual

Tank Adapter

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

Firmware version
1.08

2024

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Web: <http://www.yachtd.com>



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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, current 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. Refer to Section VI.19 for details.

The Device can be used with European (10 to 180 Ohm range) American (240 to 330 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, as well with current-output sensors, for example, industry standard 4..20 mA sensors.

The Adapter can be installed as a standalone measuring device, connected only to the sensor, or in parallel with an existing analog gauge (various types of 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 (2500 Volt RMS) galvanic isolation between NMEA 2000 and sensor inputs.

Starting with Version 1.05, the Adaptor can switch the load channels of NMEA 2000 digital switching equipment on or off. Up to 4 different conditions can be used.

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

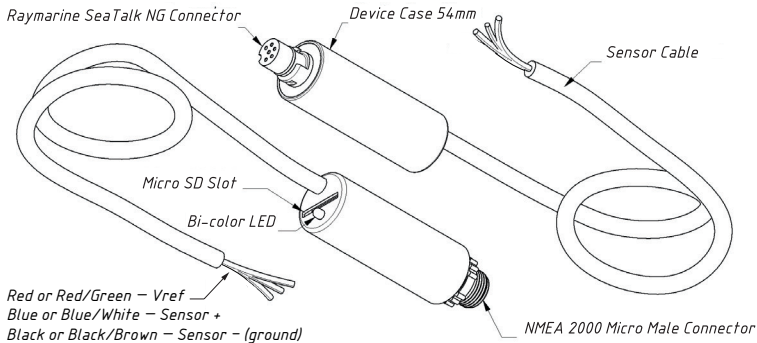


Figure 1. Drawing of YDTA-01R and YDTA-01N models of the Adapter

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 interface and sensor inputs	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



Yacht Devices Ltd declares that this product is compliant with the essential requirements of EMC directive 2004/108/EC.



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 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.

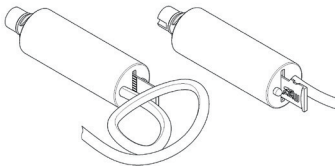


Figure 2. Device with MicroSD card (pin side visible at left, label side at right)

III. Device Installation and Connection



All connections should be made when the NMEA 2000 and/or analog gauge power is completely 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. When the Device configuration is finalized, do not forget to remove the card and seal the card slot with a sticker!

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 or Red/Green	Vref (reference voltage input)
Blue or Blue/White	Sensor + (current drive output / voltage input)
Black or Black/Brown	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.

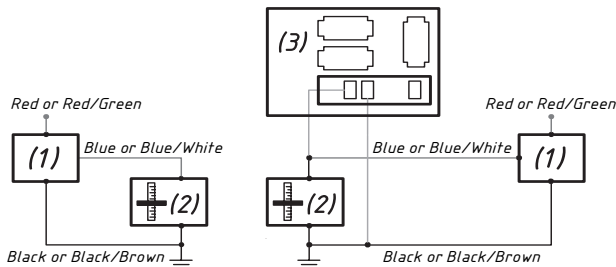
1.1 Standalone resistive sensor connection

If you have a resistive type sensor and 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 Device's «Sensor +» wire to sensor «Signal» or «+» wire and Device's «Sensor -» wire to sensor «Ground» or «-» wire. Device's «Vref» wire should be left unconnected and its terminal should be insulated. Set CONNECTION setting to RESISTIVE . You also need to measure sensor's resistances on full and empty tank and set those values into OHMS_EMPTY and OHMS_FULL settings (refer to Section VI).

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 «Sensor +» wire should be connected to MDI pin 11 (or the sensor's Green wire) and «Sensor -» wire to the MDI pin 12 (or sensor Green/Black wire). Device's «Vref» wire should be left not connected and its terminal should be insulated. Set CONNECTION setting to MDI (refer to Section VI).



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

Figure 3. 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 several different types: with one measuring coil, with two measuring coils, with full-bridge (modern «Smart» gauges like KUS/WEMA with 5-pin header connector) or motorized «Smart» gauge with internal reference voltage source.

You may have a «combined» gauge equipped with several buttons (see Figure 4, right), 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

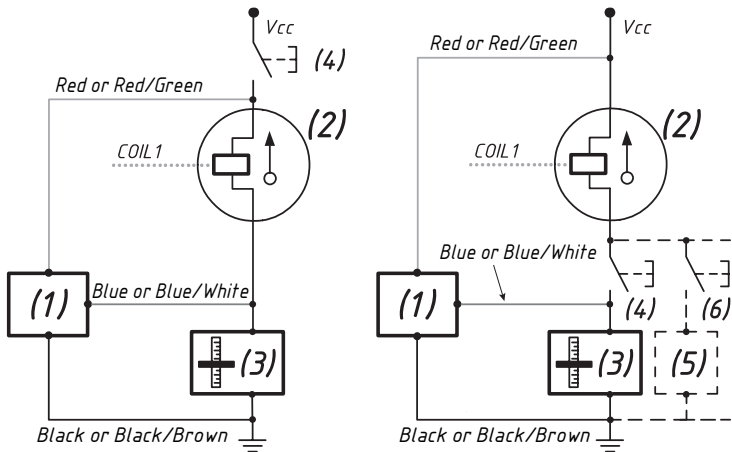
This is the oldest gauge type, pretty much an ammeter with rather high coil impedance. This gauge usually has only 3 terminals, (not counting the separate illumination terminal): «+» or «I» for power, «S» or «Sensor» for sensor connection and «-» or «GND» for ground. To confirm if you get 1-coiled gauge, disconnect all wires from the gauge and measure resistances:

- 1) between «+» and «Sensor» in both probes polarities, you should get the same resistance value, in order of hundreds of Ohms, let's call it R_COIL1;
- 2) between «-» and «Sensor» in both probes polarities, you should get very high resistance, close to infinity;
- 3) between «+» and «-» in both probes polarities, you should get very high resistance, close to infinity.

If all 3 conditions above match, you got the 1-coiled gauge.

Connect Device's «Vref» wire to the gauge's power terminal (up to 16 Volts), the «Sensor +» wire to the gauge's «Signal» input, and the «Sensor -» wire to the gauge and fuel sensor's common ground terminal. If you have the «combined» gauge with selector switch (Figure 4, right), connect the Device's «Sensor +» wire to the fluid level sensor output (or «+») before the switch. Set the CONNECTION setting to 1COIL and set the measured gauge coil resistance value (R_COIL1) into setting OHMS_COIL_1 . You also need to measure sensor's resistances on full and empty tank and set those values into OHMS_EMPTY and OHMS_FULL settings (refer to Section VI).

To make an accurate measurement, you will need to warm up your gauge: turn it on and let it operate for approximately 15 minutes. When you are ready, promptly disconnect the gauge and measure coil resistance. To increase accuracy, make several measurements and take the average value.



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

Figure 4. Connection in parallel with an existing 1-coil analog gauge

1.3.2 Connection to a 2-coil gauge

One-coiled gauges have a drawback, their reading depends on (scales linearly) with applied voltage. In most setups gauges power positive terminal is directly connected to DC bus with not stabilized voltage, and to circumvent the input voltage instability the 2-coil gauges were developed, they have coils wound in opposite directions, thus readings depend much less on the power input voltage fluctuations. This gauge usually also has only 3 terminals, (not counting the separate illumination terminals): «+» or «I» for power, «S» or «Sensor» for sensor connection and «-» or «GND» for ground (Figure 5).

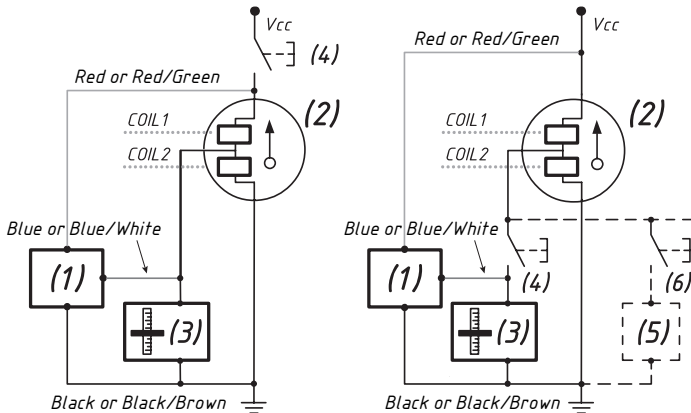
To confirm if you get 2-coiled gauge, disconnect all wires from the gauge and measure resistances:

- 1) between «+» and «Sensor» in both probes polarities, you should get the same resistance value, in order of hundreds of Ohms, let's call it R_COIL1 ;
- 2) between «-» and «Sensor» in both probes polarities, you should get the same resistance value, in order of hundreds of Ohms, let's call it R_COIL2 ;
- 3) between «+» and «-» in both probes polarities, you should get value equal to $R_COIL1 + R_COIL2$.

If all 3 conditions above match, you got the 2-coiled gauge.

Connect the Device's «Vref» wire to the gauge's power terminal (up to 16 Volts), the «Sensor +» wire to the gauge's «Signal» input (or to the fluid level sensor's «Signal» wire after the measurement activation button or selector switch see Figure 5), and the «Sensor -» wire to the gauge's «Ground» terminal.

Set the CONNECTION setting to 2COIL for connection scheme shown on the right part of Figure 5 or to 2COIL_VCC for connection scheme shown on the left part of Figure 5. Then set the measured gauge coils resistances values (R_COIL1 and R_COIL2) into settings OHMS_COIL_1 and OHMS_COIL_2 . You also need to measure sensor's resistances on full and empty tank and set those values into OHMS_EMPTY and OHMS_FULL settings (refer to Section VI).



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

Figure 5. Connection in parallel with an existing 2-coil analog gauge

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 both coils resistances. To increase accuracy, make several measurements and take the average value.

1.3.3 Connection to a «Smart» high-impedance gauge with internal reference voltage

Most popular nowadays are «Smart» gauges with internal microprocessor measurement and control circuitry. One of such gauges family is a motorized gauge with internal reference voltage source connected to a resistor in series.

Note that when gauge is not powered, its «Sensor» input has very high impedance in respect to both «-» and «+» and impedance between «+» and «-» is also very high until voltage level is kept below the gauge's power-up threshold voltage.

To confirm if you get «Smart» gauge with high-impedance input, disconnect all wires from the gauge and measure resistances:

- 1) between «+» and «Sensor» in both probes polarities;
- 2) between «-» and «Sensor» in both probes polarities;
- 3) between «+» and «-» in both probes polarities.

In all 3 cases you should get very high value, close to infinity.

If all 3 conditions above match, you got high-impedance gauge.

Now you need to determine the internal reference voltage. Connect only power to the gauge (to «+» and «-» respectively, leave gauge «sensor» not connected to anything). Measure the voltage between gauge's «Sensor» and «-» terminals. Let's call this voltage V_{INT_REF} . Voltage should be stable. If you observe that voltage fluctuates with regular intervals, that means your gauge drives sensor with pulses of current to save on energy and our Adapter is not compatible.

If you got a stable voltage, proceed and connect a precision (1% or better) resistor, which has a resistance R_{LOAD} close to fluid level sensor's 50% resistance, to the gauge instead of the sensor, between gauge's «Sensor» and «-» terminals power up the gauge and measure voltage between the gauge's «Sensor» terminal in respect to gauge's «-» terminal. Let's call this voltage V_{LOAD} . Now we can calculate the gauge's internal in-series resistance R_{INT} using a formula:

$$R_{INT} = ((V_{INT_REF} * R_{LOAD}) / V_{LOAD}) - R_{LOAD}$$

If all tests above match, connect the Device's «Vref» wire to the gauge's power terminal (up to 16 Volts),

«Sensor +» wire to the gauge's «Signal» input, and «Sensor -» wire to the gauge's «-» terminal (Figure 5, left). Set CONNECTION=1COIL, set OHMS_COIL_1 with calculated R_INT value, set 1COIL_REF with measured V_INT_REF value. You also need to measure sensor's resistances on full and empty tank and set those values into OHMS_EMPTY and OHMS_FULL settings (refer to Section VI).

1.3.4 Connection to a «Smart» gauge with an extra internal resistive load

Those modern gauges are manufactured by KUS/WEMA and they have a distinct 5-pin header connector. Gauge internal structure is similar to 2-coil gauges, but there is an extra internal resistor R_RES connected between «+» and «-» terminal.

To confirm if you get gauge with such extra resistor, disconnect all wires from the gauge and measure resistances — you should get the same values in both forward and reverse probes polarity:

- 1) between «-» and «Sensor» terminals, let's call this value R1
- 2) between «+» and «Sensor» terminals, R2
- 3) between «-» and «+», R3
- 4) connect «-» and «+» together and measure resistance between them and «Sensor», R4

All of those resistance values should not change when probes polarity is inverted, if you got different resistance value when probes polarity is inverted, this gauge is not compatible and you can only use it in VOLTAGE mode, with fluid values available only when gauge is powered.

If all tests above match, calculate gauge's internal resistances (R_COIL1, R_COIL2, R_RES) using a spreadsheet available on our site: <https://www.yachtd.com/downloads/>

Connect the Device's «Vref» wire to the gauge's power «+» terminal (up to 16 Volts), «Sensor +» wire to the gauge's «Sensor» input, and «Sensor -» wire to the gauge's «-» terminal (Figure 5, left). Set CONNECTION=2COIL_VCC, set OHMS_COIL_1 with calculated R_COIL1 value, OHMS_COIL_2 with calculated R_COIL2 value, OHMS_RES with calculated R_RES value. You also need to measure sensor's resistances on full and empty tank and set those values into OHMS_EMPTY and OHMS_FULL settings (refer to Section VI).

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 Device's «Sensor +» wire to the «Voltage» output of the sensor and Device's «Sensor –» wire to «Ground» or «–» of the sensor. Most sensors with voltage output have an internal reference voltage source. To determine that, check if the voltage level on the sensor's «Voltage» output does not depend on the sensor's power input voltage. If so, the Device's «Vref» wire should be left unconnected and insulated. If sensor's output voltage depends on (linearly scales with) sensor's power supply voltage, connect Device's «Vref» wire to Sensor's power input wire.

Set the CONNECTION setting to VOLTAGE. You also need to measure sensor's output voltages on full and empty tank and set those values into VOLTS_EMPTY and VOLTS_FULL settings. If Device's «Vref» wire is connected, you also need to measure voltage on «Vref» wire and set its value into REFERENCE setting (refer to Section VI). To get most accurate results, keep REFERENCE voltage on the «Vref» wire stable during VOLTS_EMPTY and VOLTS_FULL measurements, for example, fully charge the battery or connect to shore power.

1.5 Connection to a current-output sensor

Most common standard on current-output sensor is a «current loop» sensor with 4..20 mA output current. You can easily convert it to a voltage-output sensor by loading the sensor's current output with a 250 Ohm precision resistor (1% or better), making the 1..5 Volt range voltage sensor.

Connect Device's «Sensor +» wire to sensor's current source (positive) and Device's «Sensor –» wire to sensor's current sink (negative or ground) as close to resistor as possible. Current sensors have an internal reference voltage, so Device's «Vref» wire should be left not connected and insulated. Then configure the Device as per Section 1.4.

1.6 Connection to a gauge acting as a pure current source (experimental)

You may got a setup with current source driving the sensor with a constant current, that goes into high impedance state when current source is switched OFF (similar to gauge described in Section 1.3.3 but

with R_INT close to zero).

In that case Connect Device's «Sensor +» wire to the «Current sink» input of the sensor and Device's «Sensor –» wire to current source and sensor's common «Ground».

Set CONNECTION setting to HYBRID. When current source is ON, Device will automatically switch to VOLTAGE mode and when current source is OFF, the Device will switch back to RESISTIVE mode. Thus you will need to set both VOLTS_EMPTY and VOLTS_FULL settings (measure voltages across the sensor when the current source is ON, refer to Section III.1.4 and IV) and sensor's resistances (measure sensor resistances on full and empty tank and set those values into OHMS_EMPTY and OHMS_FULL, refer to Section III.1.1 and IV).

1.7 Parasitic sensor wire resistance compensation

If you connect the Device directly to a fluid level sensor, but the wire that 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.14).

2. Connection to NMEA 2000

The Device can be 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 power-up

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 it has successfully connected to the NMEA 2000 network.

2. Signals during normal operation

When data logging function is not enabled (factory settings, refer to Section VIII), Device emits a series of two consecutive LED flashes. If logging is enabled, Device emits a series of three consecutive LED flashes. This sequence is emitted each time PGN 127505 «Fluid Level» or PGN 130314 «Actual Pressure» is sent to the NMEA 2000 network. Default interval is 2.5 seconds but you can change it.

- **Flash #1:** indicates Device's analog front-end circuitry status. GREEN if analog circuitry operates normally and Device have calculated valid fluid level or pressure values that are in range, otherwise RED. RED may indicate hardware failure, for example: bad fluid level sensor, wire damage or bad contact, but usually it means that the Device is incorrectly connected or Device's parameters (CONNECTION setting, sensor resistances/voltages range, gauges coils resistances) are set up incorrectly. Refer to the Section III and double-check that the Device analog inputs are correctly wired, then get the current Device configuration (YDTASAVE.TXT file, refer to Section V) and confirm that all the required settings are set with valid values.
- **Flash #2:** indicates Device's NMEA 2000 communication status. GREEN if data was successfully transmitted or received to NMEA 2000. RED means bad connection to NMEA 2000. Refer to Appendix A
- **Flash #3:** indicates the MicroSD card logging status. GREEN indicates that the last log file write operation was successful, RED indicates a log file write error (there is no free space left on the

MicroSD card, the file with the last available filename is full or there is card file system error). Check the card file system, delete old logs if necessary.

3. Three flashes, one time after inserting the MicroSD card into the Device

After the MicroSD card is inserted, the Device LED emits 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. Make sure card is formatted with FAT32 (FAT12, FAT16, MS DOS) file system, check the card file system for errors, try another card; make sure the file with correct name (YDTA.TXT) is present and is in the right place (card root folder).

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

4. Signals during firmware update

LED signals during firmware update procedure 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 «YD commands» entered into the Device's NMEA 2000 «Installation Description, Field 2» using PC software like CAN Log Viewer developed by our company, ActiSense NMEA Reader or Maretron N2KANalyzer and the corresponding NMEA 2000-to-PC gateway. This method is very simple and may be supported in some advanced NMEA 2000 display devices, like Maretron DSM series instrument displays.

Table 2. 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, refer to Section VI.19)	Yes	Yes
(6)	Transmission interval for PGN 127505 and 130314	No	Yes
(7)	Select preset for standard sensors (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)	Device operation mode/connection method	Yes	Yes
(11)	Analog gauge's parameters	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
(16)	Set measured fluid value damping time constant	Yes	Yes
(17)	Set digital switching equipment control rules	Yes	Yes

Note 1: Selects standard resistance range values for most commonly used resistive type sensors (European: 10 Ohms empty, 180 full; USA: 240 Ohms empty, 33 full; Japan: 0 Ohms empty, 310 full), i.e. sets (8) and (9) in one go.

NMEA 2000 device (2) and system (3) 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. Factory default configuration is given in Appendix D. The file contents must conform to these rules:

- ASCII plain text format should be used;
- line endings should be of Windows (CR LF) or Unix (LF) and not of Macintosh (CR) format;
- the same setting should not be used more than once in a file (if so, only the setting/value that comes last in a file will be applied);
- 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 YDTA.TXT configuration file placed into the card's root folder into the Device and in a few seconds you will observe three LED signals indicating that the configuration file has been processed or not (refer to Section IV.3). On success, a new file YDTASAVE.TXT file with the current configuration of the Device will be created in the root folder of the card.

After you have observed three GREEN LED signals, remove the card and check the new YDTASAVE.TXT file and make sure that all your settings were applied correctly. You can also load an empty YDTA.TXT file (of zero length or with only comments) 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 (edit and rename file to YDTA.TXT, then load into the Device).

A vertical line in the list of parameters below means that the setting may have one of these values. Square brackets are used to group the parameters.

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 of pressure sensor number)

Factory setting: 0

Sets output PGN 127505 data field «Fluid Instance», also known as «tank number» or output PGN 130314 data field «Pressure Instance», also known as «pressure sensor number». If multiple Devices are used in the same network, set different and unique combination of «Fluid Instance» and «Fluid Type» / «Pressure Instance» and «Pressure Type» values on each Device. For example, if there are three fresh water tanks and one black water tank installed on the vessel, 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 (fluid type or pressure source type)

Factory setting: DIESEL

Sets output PGN 127505 data field «Fluid Type» or output PGN 130314 data field «Pressure Source». 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 NMEA 2000 display devices, in that case fall back to type DIESEL.

For the pressure sensor mode, refer to Section VI.19.

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

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, 2COIL_VCC for KUS/WEMA gauge, MDI — in parallel with Volvo Penta MDI box, VOLTAGE — connection to a voltage-output or current-output sensor, HYBRID — for gauge/panel with current source driving the 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 measured when the tank is empty. It is highly recommended to measure the actual sensor resistance on empty tank to account for variations between sensors specimens and for mechanical offset introduced when the sensor is installed. If values from the sensor's specifications are entered, fuel level data should be considered provisional. Typical 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 measured when the tank is full. It is highly recommended to measure the actual sensor resistance on full tank to account for variations between sensors specimens and for mechanical offset introduced when the sensor is installed. If values from the sensor's specifications are entered, fuel level data should be considered provisional. Typical 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 measured when the tank is empty. It is highly recommended to measure the actual sensor output voltage on empty tank to account for variations between sensors specimens and for mechanical offset introduced when the sensor is installed. If values from the sensor's specifications are entered, fuel level data should be considered provisional.

8. VOLTS_FULL= x

x — number from 0.00 to 16.00

Factory setting: 5.0

Voltage-output type sensor output voltage when tank is full. It is highly recommended to measure the actual sensor output voltage on empty tank to account for variations between sensors specimens and for mechanical offset introduced when the sensor is installed. If values from the sensor's specifications are entered, fuel level data should be considered provisional.

9. REFERENCE= x

x — number from 0.00 to 16.00

Factory setting: 5.0

Used to compensate for sensor's power voltage fluctuations on those sensors that have voltage level output linearly dependent on power voltage. Use with VOLTAGE mode only. If the Device's «Vref» wire is not connected to a sensor's power source, this setting is ignored.

Otherwise, the fluid level is calculated by the formula:

$$\text{Level (\%)} = (\text{«Sensor+» voltage} - \text{VOLTS_EMPTY}) / (\text{VOLTS_FULL} - \text{VOLTS_EMPTY}) * (\text{REFERENCE} / \text{«Vref» voltage}) * 100\%$$

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

Use in 1COIL, 2COIL or 2COIL_VCC mode and set measured COIL 1 resistance value. Refer to Section III.1.3.

11. OHMS_COIL_2= x

x — number from 0.00 to 10000.00

Factory setting: 200.0

Use in 2COIL or 2COIL_VCC mode and set measured COIL 2 resistance value. Refer to Section III.1.3.

12. OHMS_RES= x

x — number from 0.00 to 10000.00

Factory setting: 0.0

Use in 2COIL_VCC mode with KUS/WEMA gauge, set calculated gauge R_RES resistance value in Ohms (refer to Section III.1.3.4). Set to 0 if you have a standard 1-coil gauge.

13. 1COIL_REF= x |OFF

x — number from 0.00 to 16.00

Factory setting: OFF

Use in 1COIL mode with high-impedance gauge with internal reference voltage source, set calculated gauge internal voltage reference value V_INT_REF in Volts (refer to Section III.1.3.3). Set to OFF if you have a standard 1-coil gauge.

14. 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.

15. CAPACITY=*x*|UNKNOWN

x — integer from 0 to 99 999

Factory setting: UNKNOWN

Tank capacity (volume) in liters. Set to 0 or UNKNOWN to force the Device to send output PGN 127505 data field «Tank Capacity» with «Not Available» value.

16. CALIBRATION=*p4,p8,...,p95*|OFF

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

Factory setting: OFF



Do not perform calibration until you have set up and verified correctness of Device's 0 and 100% readings!

First confirm that Device's readings smoothly approach 0 when the tank is emptied and 100% when the tank is filled up, with no over- and under-shoot!

Note that CALIBRATION settings should be OFF for this test.

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.

17. LOG=OFF|ON

Factory setting: OFF

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

18. INTERVAL=x

x — integer from 1 to 60, log interval in minutes

Factory setting: 10

Set the log interval. Refer to Section VIII.

19. PRESSURE_SENSOR_PA=OFF|x

x — integer from -30000 to 30000 excluding 0, conversion of 1% reading to pressure value in Pascals.

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.

20. DAMPING= x

x – integer from 1 to 1200, fluid level damping time constant, in seconds

Factory setting: 3

Fluid level values, measured by the fluid level sender, can be unstable in rough sea conditions. You can increase the damping time constant if you find that the fluid level data reported by the Device is too sensitive to the boat attitude.

21. SW x_a =[$c\ t\ b\ ch$] | NEVER

x – integer from 1 to 4, rule number;

a – action, ON|OFF;

c – condition;

t – time, integer from 0 to 65534, time interval in seconds;

b – bank, integer from 0 to 252;

ch – channel, integer from 1 to 28;

Factory setting: NEVER.

This setting enables, disables and configures up to 4 rules to control NMEA 2000 digital equipment.

You can configure up to 4 rules to turn NMEA 2000 digital switching equipment channels ON and OFF, depending on the measured value.

The Condition can be either a comparison to a set value, in the form of $<P$ (less than or equal) or $>P$ (more than), where P is the fluid level in percent; or $ER|OK$, where ER is the sensor failure condition, OK is normal sensor operation condition.

The time parameter defines the interval for which a condition should be true in order to trigger the rule.

Bank and channel parameters define the target NMEA 2000 digital switching equipment bank number and channel.

Examples:

SW1_ON=<20 15 1 28

Adds ON rule #1 to switch the NMEA 2000 digital switching equipment bank 1, channel 28 ON when the tank level drops below 20% for 15 seconds.

SW1_OFF=>20 3 1 28

Adds OFF rule #1 to switch the NMEA 2000 digital switching equipment bank 1, channel 28 OFF when the tank level is more than 20% for 3 seconds.

SW4_ON=ER 3 1 27

Adds ON rule #4 to switch the NMEA 2000 digital switching equipment bank 1, channel 27 ON when the sensor failure condition is registered for 3 seconds.

SW4_OFF=OK 3 1 27

Adds OFF rule #4 to switch the NMEA 2000 digital switching equipment bank 1, channel 27 OFF when the sensor failure condition is not registered for 3 seconds.

SW3_ON=NEVER

SW3_OFF=NEVER

Disables both ON and OFF rules #3.

VII. Device Configuration with an Installation Description Field

NMEA 2000 «Installation Description» data fields 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 NMEA 2000 display devices may also allow editing of installation description data fields. Please refer to your software or chart plotter documentation for details.

Address Claim		Product Information	
Address	187 HEX: BB	Database version	2.100
Unique number	760281	Product code	5586
Manufacturer code	717	Model version	Tank Adapter / YACHTD.COM
Device instance	0	Model ID	YDTA-01
System instance	0	Software version	1.01 27/08/2018
Class / function	75 / 150	Serial	00760281
Industry	4: Marine	Certification	Not applicable
Self-configurable	Yes	LEN (mA)	2 [100 mA]
Configuration Information		Heartbeat	
Installation description 1		☒ CAN1	☐ CAN2 ☒ Equipment
Installation description 2	YD:DEV 1	Updated	14:52:41.358
Manufacturer information	Yacht Devices Ltd., www.yachtd.com		

Figure 6. Configuring the Device with CAN Log Viewer

To configure the Device, enter a special string starting with «YD:» to the «Installation description 2» data field 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 return. If a command is entered without the last parameter, the Device replies with the current value of the parameter.

Figure 6 on the previous page shows the process of configuring the Device with our 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 6, click the «Update» button to apply changes, observe the value in the «Device Instance» field changed to 1, and «Installation description 2» field changed to «YD:DEV 1 DONE», indicating that the command was accepted and executed correctly.

Table 3 lists all supported commands, note that parameters in square brackets [] can be omitted to obtain the current setting's value.

Table 3. list of supported «YD commands».

Command string format	Example	Description
YD:RESET	YD:RESET	Resets Device's settings to the default values.
YD:DEV <number>	YD:DEV 1	Sets NMEA 2000 «Device Instance» value (0–255). (Note 1)
YD:SYS <number>	YD:SYS 3	Sets NMEA 2000 «System Instance» value (0–15). (Note 1)

Table 3 continued

YD:TYPE <number>	YD:TYPE 4	Sets «Fluid Type» or «Pressure Source». Refer to Sections VI.3 and VI.19 (Note 1).
YD:TANK <number>	YD:TANK 15	Sets «Fluid Instance» or «Pressure Instance» (0–15). Refer to Sections VI.2 and VI.19. (Note 1)
YD:PGN <pgn> <interval>	YD:PGN 127505 60000 YD:PGN 127505 50 YD:PGN 130314 1000	Sets transmission interval for outgoing PGN 127505 «Fluid Level» or 130314 «Actual Pressure» in milliseconds. Values from 50 to 60 000 (1 minute) are allowed. (Note 2)
YD:SENSOR <type>	YD:SENSOR EUR YD:SENSOR USA YD:SENSOR JAP	Sets both resistance values for empty and full tank for the standard fluid level sensors, EUR: 10–180, USA: 240–33, JAP: 0–310 Ohms. (Note 1)
YD:OHMS_EMPTY <number>	YD:OHMS_EMPTY 11.42	Sets the sensor resistance value for an empty tank (or zero pressure) in Ohms. Range: from 0.00 to 400.00. (Note 1)
YD:OHMS_FULL <number>	YD:OHMS_FULL 160.6	The same as above, but for a full tank (or maximal pressure)
YD:CAPACITY <number>	YD:CAPACITY 378	Sets the tank capacity in liters (0–99999). Setting of 0 sets «Tank Capacity» data field of PGN 127505 to «Not Available». (Note 1)
YD:REFERENCE <number>	YD:REFERENCE 5.0	Sets reference voltage in Volts (0–16). Refer to Section VI.9. (Note 1).

Table 3 continued

YD:VOLTS_EMPTY <number>	YD:VOLTS_EMPTY 0.0	Sets voltage for an empty tank (or zero pressure) in Volts (0–16). Refer to Sections VI.7 and VI.19. (Note 1)
YD:VOLTS_FULL <number>	YD:VOLTS_FULL 5.0	Same as above, but for full tank (or maximal pressure).
YD:CONNECTION <type>	YD:CONNECTION RESISTIVE YD:CONNECTION MDI YD:CONNECTION 1COIL YD:CONNECTION 2COIL YD:CONNECTION 2COIL_VCC YD:CONNECTION VOLTAGE YD:CONNECTION HYBRID	Sets operation mode that depends on the connection method. Refer to Sections VI.4 and III.1. (Note 1)
YD:COIL_1 <number>	YD:COIL_1 330.65	Sets gauge parameter, COIL resistance in Ohms (0.00–10000.00). Refer to Sections VI.10 and III.1.3. (Note 1)
YD:COIL_2 <number>	YD:COIL_2 240.5	Sets gauge parameter, COIL2 resistance in Ohms (0.00–10000.00). Refer to Sections VI.11 and III.1.3. (Note 1)
YD:OHMS_RES <number>	YD:OHMS_RES 125.6	Sets gauge parameter, extra resistance R_RES in Ohms (0.00–10000.00). Refer to Sections VI.12 and III.1.3.4. (Note 1).
YD:1COIL_REF <number>	YD:1COIL_REF 5.08 YD:1COIL_REF OFF	Sets gauge parameter, internal reference voltage source voltage V_INT_REF in Volts (0.00–16.00). Refer to Sections VI.13 and III.1.3.3. (Note 1).

Table 3 continued

YD:WIRES <number>	YD:WIRES 0.48	Sets sensor wires parasitic resistance in Ohms (0.00–100.00). Refer to Section VI.14. (Note 1)
YD:PRESSURE <number>	YD:PRESSURE 10000	Converts the Tank Adapter to a Pressure Sensor. Refer to Section VI.19. Range: –30000 to 30000, 0 – OFF. (Note 1)
YD:DAMPING <number>	YD:DAMPING 0 YD:DAMPING 15	Sets damping interval in seconds (1–1200). Refer to Section VI.20.(Note 1)
YD:SWx <ON OFF> <condition> <time> <bank> <channel> YD:SWx <ON OFF> NEVER YD:SWx	YD:SW1 ON <20 15 1 28 YD:SW1 OFF >20 3 1 28 YD:SW4 ON ER 3 1 27 YD:SW4 OFF OK 3 1 27 YD:SW3 ON NEVER YD:SW3 OFF NEVER YD:SW2	Sets digital switching rules. Refer to Section VI.21. Here x – is a rule number (1–4). Without arguments – shows current ON and OFF rules for the specified rule number.

*Note 1: If the parameter is omitted, the Device will return the current parameter value.
For example, if you enter YD:TANK, the reply will be YD:TANK 0, where 0 is the current Device's NMEA 2000 «Fluid Instance» value (tank number).*

Note 2: If the interval parameter is omitted, the Device will return the current interval.

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.

To enable log recording, put the following settings into YDTA.TXT file:

```
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 kByte 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 into the Devices' non-volatile memory 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. For RESISITVE mode only. Voltage is applied to Device's «Vref» wire. Check connection scheme, confirm it matches Device's CONNECTION setting, disconnect the wire if you use CONNECTION=RESISITVE. Refer to Section VI.4.
 - ID — Invalid data. Device's analog front-end is in bad state, and/or calculated measurement result is invalid. Possible due to sensor failure, bad wiring or invalid Device analog input connection method or configuration not matching the analog circuitry parameters (incorrect CONNECTION mode set, invalid gauge or sensor parameters were set).
4. *#01* — NMEA 2000 «Fluid Instance» (tank number), or «Pressure Instance» in Pressure Sensor mode (sensor number). 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 (refer to Section VI.19), 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 from the archive.

Prepare a MicroSD card with FAT or FAT32 file system, and copy TUPDATE.BIN file to the root folder.

Power down the Device, insert card and power up the Device with card inserted.

From 5–10 seconds after powering on, the Device's LED will emit 5 GREEN flashes, indicating 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 on Figure 7). Usually, access to this list is in the «Diagnostics», «External Interfaces» or «External devices» menu entry of the chart plotter.

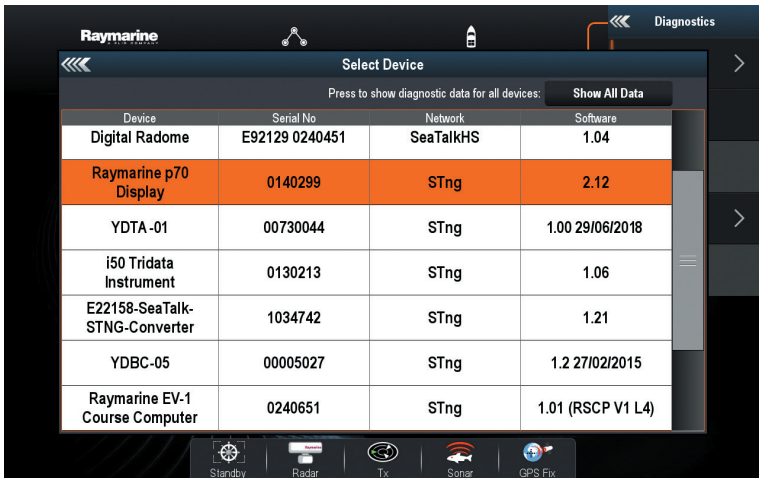


Figure 7. Raymarine c125 MFD «Device List» showing YDTA-01 unit.

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.
Device second LED flash is RED.	1. 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. 2. 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.
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 NMEA 2000 display device supports reception of the «Fluid Level» 127505 PGN. Update the firmware of your display 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 third LED flash is RED (third flash will be emitted only when data logging is enabled)	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.

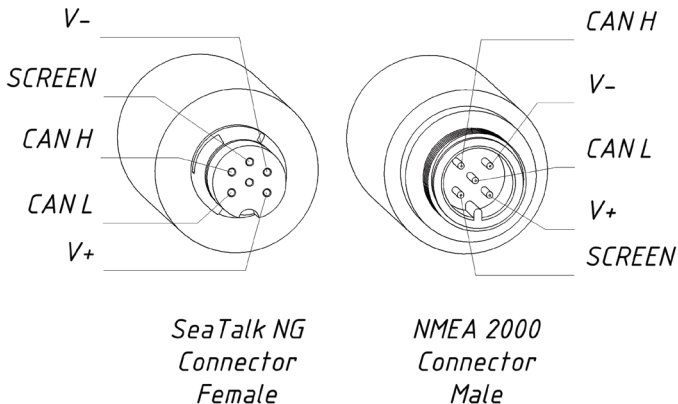


Figure 1. NMEA 2000 connectors of the YDTA-01R (left), and connectors of the YDTA-01N (right)

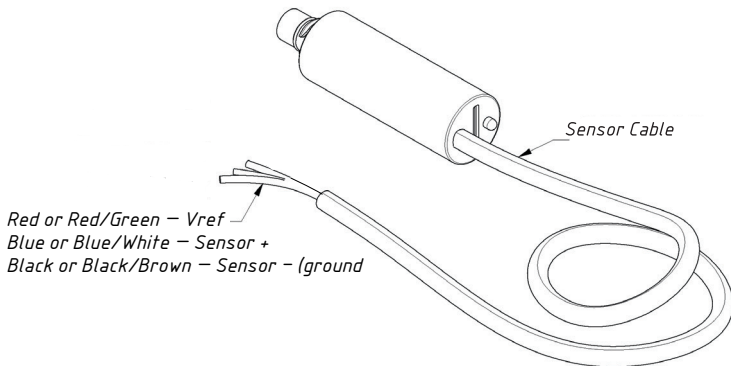


Figure 2. Device wire colors

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)
Binary Status Report, PGN 127501 (0x1F20D)	Yes	No
Switch Bank Control PGN 127502 (0x1F20E)	No	Yes

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: 1.08 09/04/2024

# NMEA 2000 SETTINGS
TANK=0
FLUID=DIESEL
DAMPING=3

# 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
OHMS_RES=0.0
1COIL_REF=OFF
```

```
# TANK SIZE AND SHAPE
CAPACITY=UNKNOWN
CALIBRATION=OFF

# DIGITAL SWITCHING RULES
SW1_ON=NEVER
SW1_OFF=NEVER
SW2_ON=NEVER
SW2_OFF=NEVER
SW3_ON=NEVER
SW3_OFF=NEVER
SW4_ON=NEVER
SW4_OFF=NEVER

# SENSOR DATA RECORDING
LOG=OFF
INTERVAL=10

# SWITCH THE ADAPTER TO PRESSURE SENSOR
PRESSURE_SENSOR_PA=OFF

# End of file
```

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

